Canadian Railway and Marine World.

October, 1912.

The Construction of a Steel Centre Sill Wooden Box Car at the C.P.R. Angus Shops.

By Frederick H. Moody, B. A. Sc.

Very few of the many people engaged in railway business have any inside information of the steps involved in the production of rolling stock in large quantities, most of the information generally at hand being that which deals with the repair of cars, and the general carpenter work incidental thereto. The production of cars by the hundreds is an entirely different proposition, involving different methods of preparation and assembly to those entering into the repair of cars or their production in small quantities. Everything is handled on such a large scale as to make the two conditions almost entirely foreign to each other. For that reason, and feeling that there is a desire for information of the methods used by the larger builders in the construction of cars, the article here presented was undertaken. As typical in many particulars of the practice of the large builders, and at the same time a process unique in itself, the methods employed at the Canadian Pacific Ry. Angus shops, Montreal, have been selected for the matter of description. The methods involved have been advanced to a very high degree of efficiency, and it is doubtful if there are any companies which can produce as high a grade of car more expeditiously than is possible in these shops. On four tracks, it is regular practice to turn out 40 cars a day of the type under discussion here, viz.: the steel centre sill wooden box car, large numbers of which have been added to the company's rolling stock during the last two years.

Fig. 1.—C.P.R. Steel Centre Sill Wooden Box Car.

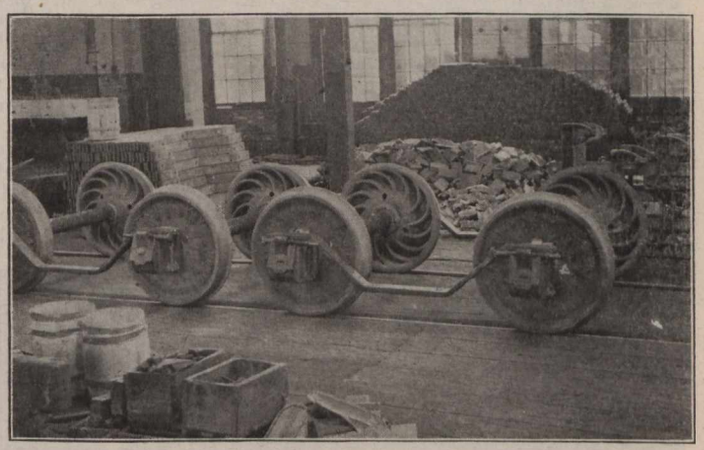


Fig. 2.—First Step in Car Truck Assembling.

This car is constructed entirely of wood throughout, except for a steel centre sill, around which the car is constructed. This is a type of construction that has become fairly common on the bigger roads recently. The kind used by the C.P.R. is slightly different from those commonly to be found, the individuality of the designers entering into the construction to a certain degree. The car here considered is shown in fig. 1, the C.P.R. having several thousands now in operation.

THE TRUCK. Nearly all the parts entering into the construction of the car are made right in the works, very little of the material being purchased outside. In other words, the plant is practically complete in itself. The trucks are no exception, other than the bolsters, both truck and body.

The arrangement of the shops for the expeditious handling of the material in its passage through them in the course of manufacture and assembly is particularly worthy of note. The wheel foundry is located in a building to the rear of the truck shop, and from that building the wheels are taken to the rear end of the truck shop for machining. The casting of the cast iron wheels is such a familiar process that no particular description will be given of the process, the steps of the manufacture being taken up at the point where the cast wheels are delivered to the truck shop. At the rear of this shop there are several wheel boring mills, where the hubs are bored out to a standard gauge, and the process and movements on the parts of the operatives have been developed to such a degree that the cost of machining the wheels is reduced to a remarkably small figure. The axles are also turned down to the required dimensions in the same place, which is equipped with special axle turning lathes, and the same points regarding the cost of production may be here emphasized as well. It may be pointed out, however, that while the cost of production is remarkably low, the quality of the output has in no way been reduced, as the processes have been refined to such a degree, and the operatives are so familiarized with the steps involved, from the regularity of their employment on this class of work alone, that the quality is maintained with decreased operating expenses.

In the same part of the shop, there are a couple of wheel presses for the mounting of the wheels on the axles in the usual manner familiar to all. From that point, the wheels are run on to a through track running the length of the shop, each mounted wheel being run down this track as assembled. The length of the track provides ample storage capacity for any fluctuations in the rapidity with which the wheels are drawn off, and also when the wheels are mounted more slowly than usual.

Near the front of the shop, the awaiting axles of the mounted wheels have the axle boxes slipped over the ends, a whole batch being so mounted at one time by an operator going up one side and down the other, the boxes being piled up on each side of the track in a convenient manner. These boxes are first of all assembled with the dirt collar, etc., on the inner end, and are all ready for assembling at this stage.

Pairs of these wheels are next rolled along the track in the same direction to the position shown in fig. 2. To the left, on the other side of the assembling track, there is kept a pile of arch bars. On the other side of the track in fig. 2, there will also be noticed a pile of bearing brasses conveniently located to the assembling point. Into the axle boxes previously mounted on the axle ends, a journal brass is slipped into position, one in each. When two wheels are thus equipped, an arch bar is placed across between as in the illustration, in the correct position for finally bolting together, thereby assembling the wheels in the correct relation to each other. On top of each of the axle boxes, there are also placed two bolts of the required length, for convenience in the final fitting up. These bolts are obtained by the assemblers from bins conveniently located alongside the assembling track.

Two truck skeleton frames thus loosely thrown together are then run further on down the track to the point shown in fig. 3, where they are further added to by the

addition of the spring plank with the columns attached thereto. These spring planks may be noticed to the rear in fig. 3, where a small pile is kept for the operators, being constantly replenished from the rear of the shop, where the columns are rivetted to the spring plank, by a gang whose duty it is to see that the assemblers are provided at all times with all the necessary material to proceed with the work without delay. The spring plank, on being lowered into place by the jib crane to the rear, is fitted with the spring equipment between the columns at each end. This consists first of all of a couple of pieces of hard wood placed on the spring plank, on top of which is the four coil spring with guiding cap over top, carrying two rollers.

Passing the truck thus far assembled a little further along, places it in the position to the left in fig. 4, where the truck bolster is lowered into position on the truck between the guides. These truck bolsters are also kept in piles alongside of the track, as shown to the rear in this illustration, within range of the same jib crane used in the last operation of placing in position the spring plank on the truck. In the same position, the upper arch bar is placed in position from the store pile to the rear. With all these parts assembled, the column bolts are slipped into position in the column bolt holes, and the truck is then ready to be moved along to the position to the right in fig. 4, where the bolts on both sides of the truck are tightened up over spring washers by the operator. It will be noticed that along both sides of the track, there is a depressed channel, on the edge of which the operator can conveniently sit while tightening up the bolts. This channel is long enough for two trucks when there is a large gang operating at one time. At the same time as the truck bolts on both sides are being tightened up, the brake rigging members that belong to the truck are being put in position on the truck, so that on leaving this point, the truck in itself is entirely completed. Passing a little further along the shop, the body bolster is located over the truck bolster from the awaiting pile of these members near the door of the building. There is a swinging jib crane at this point for this purpose.

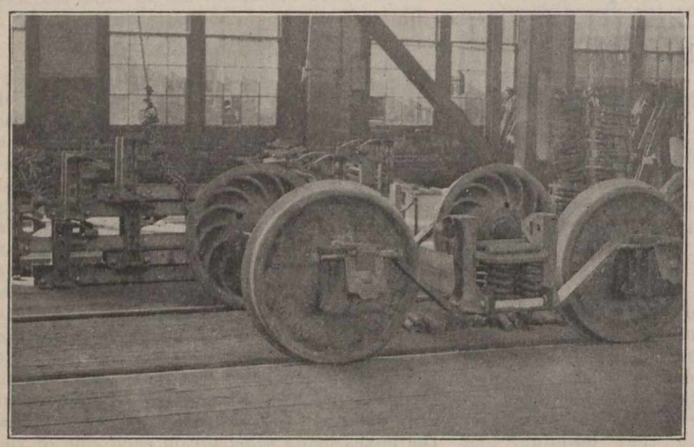


Fig. 3.—Second Step in Car Truck Assembling.

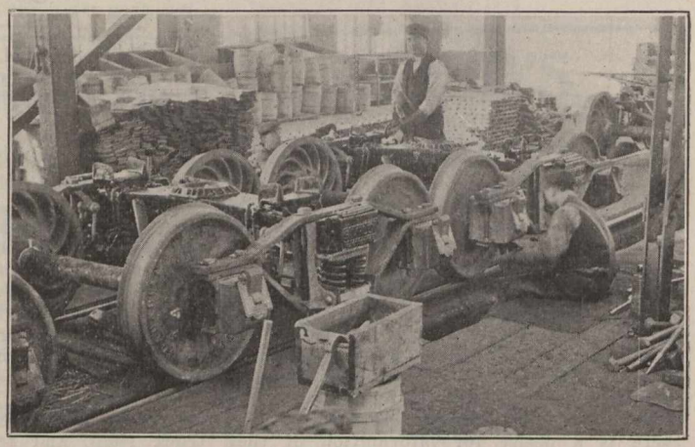


Fig. 4.—Final Step in Car Truck Assembling.

STEEL CENTRE SILL. The buildings which comprise the Angus shops are located along both sides of a central midway, which runs through the works. The truck shop is on the west side of the midway, with the freight car shop alongside. The blacksmith shop is across the midway from the truck shop, and located in the opposite direction from the car shop. It is at the rear of this blacksmith shop, in a small lean-to, that the steel centre sills are fabricated from the structural shapes that enter into their make-up. The constructional work on these is of the usual form, with the custom-ary flangers, punchers, rivetters, etc. The sills as there produced are shown in fig. 5 to the right, in the row lying on the ground.

The sills shown in fig. 5 are on a tract of ground across the midway from the car shop. To the right of the midway crane column in this illustration, there is kept a store of steel centre sills from the shop at the rear of the blacksmith shop, from which the few shown on the ground are drawn by means of a steam yard crane operating on the industrial track to be seen in the lower right hand corner of fig. 5. Here the sills are equipped with the necessary draft rigging. The draft springs are temporarily bolted together between their end plates, and dropped into position in the coupler yoke. The coupler is then rivetted in, and the cover plate rivetted down over all as shown to the left in the illustration. Both ends are similarly equipped at the one setting, when the centre sill is ready for assembly into the car.

UNDERFRAMING. All the wooden parts entering into the assembly of the car are machined in the shop across the midway from the car shop, beyond the point of assembly of the sills shown in fig. 5. Alongside of this place is the point of assembly of the steel centre sill to the two trucks. There are two tracks for this operation, the process being carried on concurrently on both tracks. The trucks from the truck shop are run out on to turntables in a track running the length of the midway, run along this track, and by two other turntables can be run across to either of the tracks for the assembly of the sill to the trucks.

Between the two assembly tracks, as indicated in fig. 6, there is a pile of wooden side sills completely machined ready for assembling. On to two trucks located the proper distance apart, two of these side sills are dropped, the body bolster fitting into the notches in the lower face of the side sill, correctly aligning the car trucks, and squaring the body bolsters with regard to each other. When the trucks and body bolsters are thus squared up with regard to each other, the steel centre sill is placed in position on the two trucks, and the rivet holes aligned. Both ends are then rivetted to the body bolsters, making a perfect and permanent alignment of the underframing.

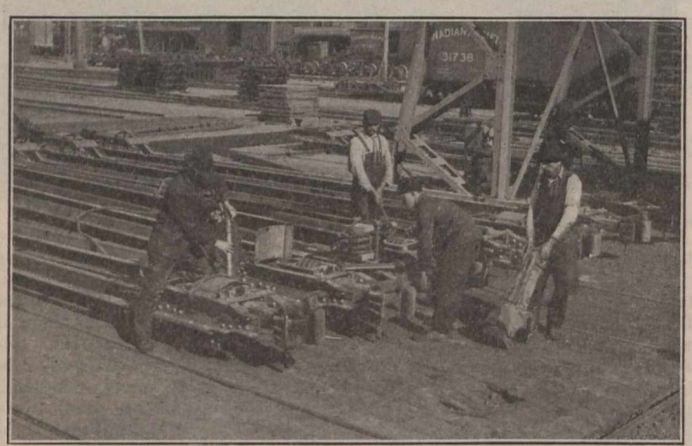


Fig. 5.—Fitting Draft Gear into Centre Sill.

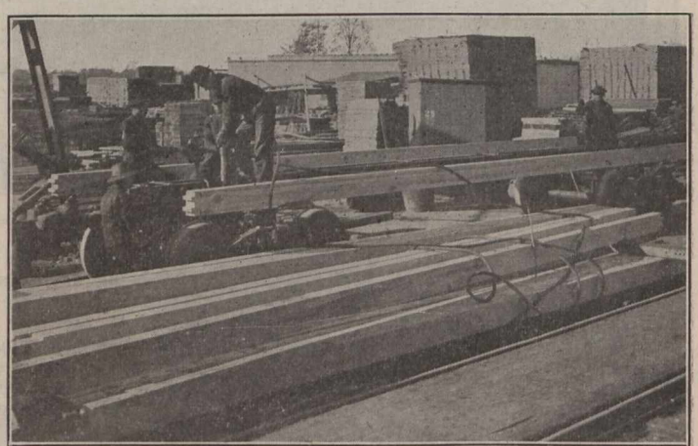


Fig. 6.—Rivetting Centre Sill to Body Bolster.

The trucks thus located with regard to each other, and with the two wooden side sills resting loosely on the body bolsters, the whole is pushed across the midway into the position shown in fig. 7, in the car shop, where the balance of the underframing is put into position. Along this same track in the building, there is a long row of cars in different stages of advancement, so, in order to have them all pass through the shop uniformly, they are all connected together by chains or other connecting links at the couplers, so that between the different steps, the row moves forward one car length, leaving space for the entry of this skeleton car composed of trucks and centre sill.

THE BOTTOMING is the first operation in the series through which the car passes in working down the shop. There are seven men working on this operation, working together when required, and independently on the smaller parts. Everything runs as by clock work, every man knowing exactly what is expected of him. Very little fitting of any of the wooden members is required, as the machining in the wood-working department takes care of all fitting parts except in such places as it is more convenient or quicker to do the fitting right on the job.

The first step is the fitting of the side sills, which are resting loosely on the body steel centre sill are also placed. These are for the nailing of the decking.

The truss rods, bent in the shop in the manner described in Canadian Railway and Marine World, of Dec., 1911, are then slipped into position through the holes in the end sills, and after locating on the truss rod posts and under the queen posts, have the turnbuckles attached, and the end washers and nut screwed on, the outer truss rods being then tightened up, the inner ones not being tightened up at this stage, as the end timber has as yet to be added at a latter period in the car construction.

At this point in the proceedings, one of the workmen leaves the general work to assemble the air cylinder to its supporting frame preparatory to fitting to the needle beams as described. Another of the workmen, while the frame is being tightened up at all points, goes over the top surface of the frame thus far assembled, with a paint brush on the end of a stick, covering all the upper surfaces with a coating of red paint, thereby protecting the contact surfaces between the frame and the decking. It might again be emphasized that all the fittings and parts for the car are kept conveniently located to the assembling point at all the stages of erection. At this point, the fittings are kept in the row of bins in the rear in fig. 7, while the members are located in piles alongside of the assembling point.

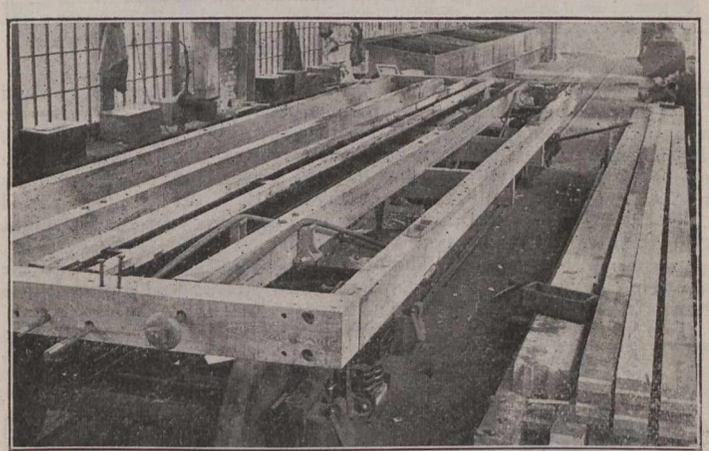


Fig. 7.—Assembling Car Underframing.

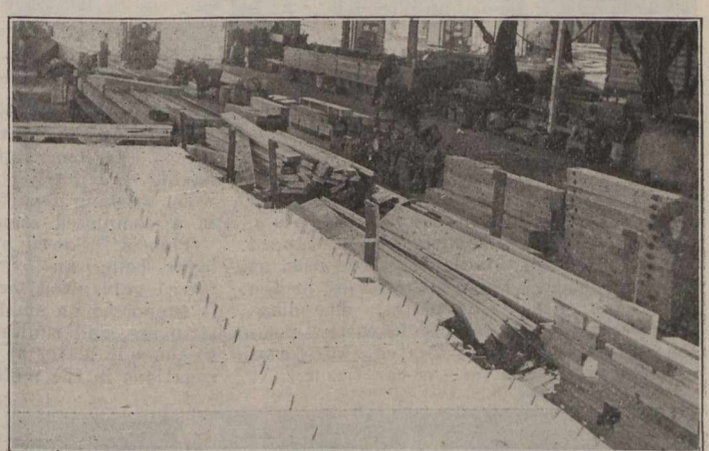


Fig. 8.—Decking Car Top.

bolsters from the locating work they were called upon to perform in the yard. While recessed at the points where they rest on the body bolsters, cavities must be chopped in the bottom of the recesses for the sills to rest evenly over the rivets of the bolster. The side sills are then bolted to the bolsters through the base caps of the superstructure bracing, shown in fig. 7. At the same time, the four truss rod saddles are located on the bolster and bolted in place, and the same operation performed with the queen posts on the needle beams, the latter being then bolted to the side sills. The air cylinder on its supporting framework is then swung up into position under the needle beams, and bolted thereto.

The ends of the side sills, which have previously been tenoned in one direction only, have part of this tenon cut off to fit into the mortise of the end sills, which are loosely put in place. At the same time, the end bumper plate which goes between the end sill and the end of the steel centre sill, is slipped into position. The truck king pins are also dropped into place.

The framing is now ready to receive the wooden intermediate sills which are kept at hand in the pile to the right in the illustration. These are dropped in place and bolted close up against the outer truss rod posts. Similarly the lapping or strips laid on the Between each pair of assembling tracks, there is a third track communicating directly with the wood-working shop across the midway, on which the stock is constantly replenished. Likewise the fittings, such as turnbuckles, end plates, etc., have limited stores in the bins mentioned, with greater stores outside the wall opposite the point where that particular part enters into the construction. The inside stores are replenished from time to time through doors located along this wall. Convenience is a strong point in the layout of this car building plant, and means a great deal towards the rapidity with which it is possible to turn out the cars.

DECKING. For the decking, the bottomed car is moved a car length further along the shop, a new gang taking up the work at this point, all the cars moving at the same time, each gang changing cars. Another car enters from the outside gang for the bottoming gang to commence operations upon.

The decking operation is shown in fig. 8. On it, seven men are engaged. As soon as the car is placed, the decking gang throw up on to the car from the pile to the right in fig. 8, sufficient decking to cover the car spacing it roughly along the length of the car. From a mark on the side sills at the centre of the car, the first deck plank is located squarely across the car and nailed. Working in both directions from this central plank, the balance is laid, the workmen nailing down every third or fourth plank in the edge at the matched strip. The planking is made to fit over any protruding bolt heads in the sills, by chopping out a recess in the lower face. The rest of the base castings for the superstructure framing are also located, and special length decking fitted around. The decking at the centre is slightly longer than that in the body of the car, from the fact that the door spaces are located there.

The decking having been nailed along the intermediate sills on every third or fourth plank, and this operation completed for some distance on each side of the centre, a workman follows along the different sills, driving in nails a short distance as in fig. 8, until they have been placed in each plank the length of the car. This workman then goes over the same nails with a light sledge, driving them home with a single blow. Thus every movement is made to count, and the planking is laid with the least possible amount of labor in the most expeditious manner.

SUPERSTRUCTURE. The most spectacular part of the car construction operation is the erection of the superstructure framing. While the last nails of the decking are being driven home, the train of cars is moved along another car length, and, at the same time, the workmen commence throwing on to the deck of the car the machined car belting rails, the work on which has been completed just previously, by an operator who attaches the upper bevel edges to the rail for the dislodgement of the grain for which the cars are constructed. The triangular shaped strip is nailed to the belting and sawn to the required lengths, and set aside ready to throw on the car as it is moved along the line. While the nailing of the decking is being completed, a workman from the superstructure gang goes over the deck surface and drills the diagonal and vertical holes through the decking for the small superstructure tie rods, completing the task before the car is ready to be moved along. The belting placed on the deck is located in pairs. The material for the superstructure diagonals is also placed on the deck in a convenient manner.

On the edges of the deck, the roof side plates are placed, and across the car on the deck between the side plates, the carlines are fitted with bolts at the ends across between the side plates lightly tightened up, and when tie bolts from the carlines through the side plates are located, all the bolts are tightened down carefully, making sure that the roof structure thus formed

is square. The ridge rail is also placed in position with the intermediate stringers.

While the latter members are being added to the roof frame, the corner and door posts are driven into the base castings, the roof frame having first of all been slipped to one side in order that the base castings might be exposed. Through the roof side plates, the tie rods are slipped by the workmen, leaving the roof structure and its fittings in the shape shown in fig. 9. It will be noticed in this illustration that there is an elevated platform near the level of the car roof, from which some of the assembling operations such as the driving of the posts are carried out.

The next step is to lift the roof structure at both ends by means of air hoists over both those points, resting the elevated structure on the tops of the awaiting posts, which have just previously been capped with end castings, similar to those used at the lower end. These fit recesses in the lower edge of the side plates. The diagonal bracing is also located in correct position as the roof is being located, thus forming a loose skeleton of the car frame. At the same time, the horizontal tie rods that are to pass along the belt railing are slipped into place, and loosely tightened.

The different diagonals and posts being located and the roof lowered into position, the next step is to fit the belt railing into place on all four sides of the car. There are two rows along the four sides, tightly fitting into place, making of themselves a very solid structure of the car framing. The frame is finally completed to the appearance shown in fig. 10, by the tightening up of all the various tie bolts in the framing. The rapidity with which this assembling of the roof frame and the putting together of the wall frame are carried out is nothing short of wonderful, and the observer is strongly reminded of the structures rapidly built up in the Arabian Nights.

SHEATHING AND ROOFING. The car now passes along one more stage in its path, when the sheathing of the sides is attended to. This is a simple task, as the matched lumber is prepared to length and only requires to be nailed on. This is followed by the addition of end ladders, previously assembled on the side benches by a workman detailed for this specific purpose, followed by the end trussing and the mounting of the door and its fittings, the door having previously been made up in the wood working department and brought over in a completed state.

This is followed by the roofing, the first layer being an overlapping one of reinforced galvanized metal. This metal layer is supported on small strips resting on the stringers, and running from the ridge pole to the side plates as shown in fig. 11. Corrugations in the metal fit over these strips. Over top of this, the matched lumber for the roof is laid.

FINAL TOUCHES. Passing the car down one more step, most of the final touches to it are made. These include the additional parts shown in the car in fig. 12, such as the centre runway on the car roof, brake standard and its attachments, and the grab irons on the roof. On the lower level, there is a further gang adding the end deadwood, and tightening the centre truss rods on to it, piping the car for the air, putting on the steps, and the other minor details that go to make the completed car. The outside trimmings of the car near the roof are also added. This completes the car construction, and it is now ready for the finishing touches in the paint shop.

THE PAINT SHOP is at the extreme end of the erecting shop, through large corrugated fire doors. Here there is room for several cars in a row, where they are painted one after the other by means of the air brush. Needless to say, the air of this shop is a bright red from the atomized paint floating about in the atmosphere. But the job is performed very rapidly, and the resulting work is said to be superior to hand brush painting, as the paint is made to penetrate into the pores of the wood and into all the crevices that could not be reached by the brush. Each car receives three coatings, with a several hour period intervening between each coat that it might penetrate and dry.

The car thus painted is taken out into the yard, where the lettering and numbering is attended to with stencils in the usual manner. Without any special waiting after the car is thus numbered and painted, it is hauled away to make room for more, so rapid is the rate of production, even though the yard space at the disposal of the builders is quite large.

The capacity of each track per day is 10 cars under normal conditions, so a good idea of the rate at which the work progresses may be gathered. The steps in the work are so mechanical, and the methods involved so well planned, that the workmen are not pushed beyond normal working. To watch the gradual evolution of the car is, to say the least, a most interesting sight, and it is very instructive.

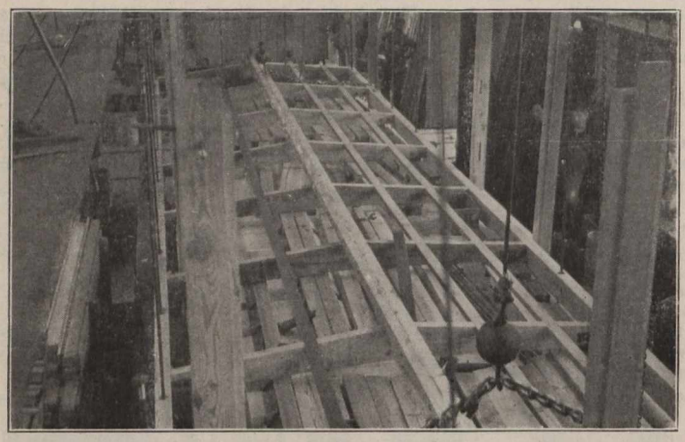


Fig. 9.—Raising Assembled Roof Frame.

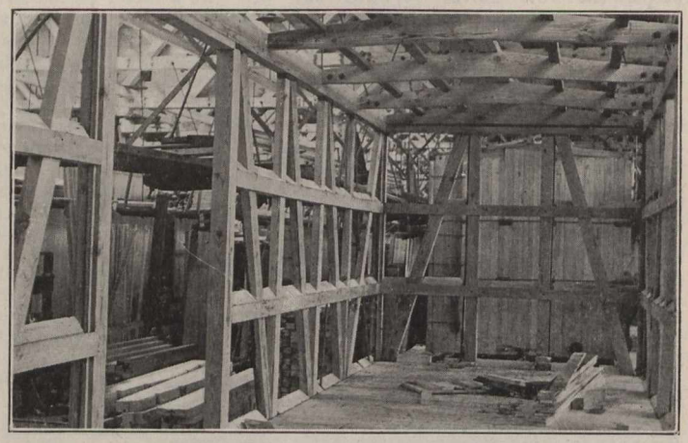


Fig. 10.—Assembled Superstructure Framing.

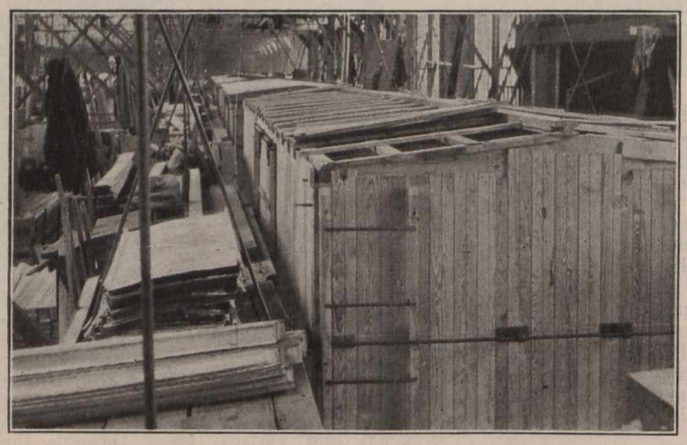


Fig. 11.—Fitting on Galvanized Roofing.

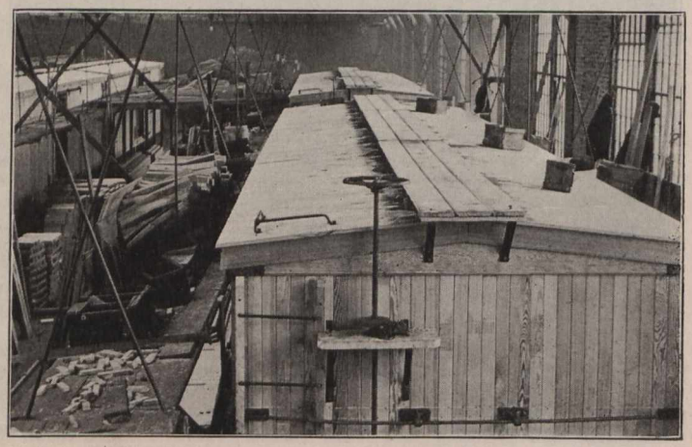


Fig. 12.—Roof of Completed Car.

Profiles of Railways From the Atlantic Coast to the St. Lawrence and the Great Lakes.

Accompanying this article are five profiles of railways extending from the Atlantic coast to the St. Lawrence river and in one case to the great lakes. The small scale on which these profiles are drawn compels the omission of minor variations in grade, but the main characteristics of the lines are shown. Where rates of grades are marked on the profiles the rates are the maximum in the location marked, and not the average for the entire rise; in many cases, of course, this maximum exists for only a short distance. These profiles are of special interest in showing the comparative features of the several profiles as shown.

The Intercolonial Ry., fig. 1, extends from Halifax approximately along the coast line to Quebec and Montreal. The newer line of the National Transcontinental Ry., fig. 2, forms in part a cross country or chord line to the coast-line loop of the Intercolonial Ry. between Moncton and Quebec, and by thus crossing the ranges and the high land of the interior it reaches much higher elevations than the older line. The Intercolonial Ry. practically touches sea level at different points, including Levis, opposite Quebec, and has maximum grades of 1.1 to 1.3%.

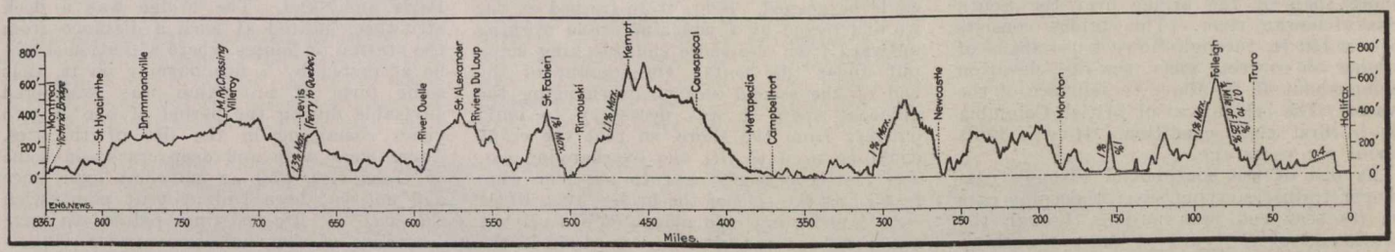


Fig. 1.—Intercolonial Ry.; Halifax to Quebec and Montreal.

Fig. 3 shows the profile of the Grand Trunk Ry. from Portland to Montreal, and fig. 4 shows that of the approximately parallel route of the combined Boston and Maine and Central Vermont railways from Boston to Montreal. The former route, 298 miles, has practically a continuous ascent from the coast to the summit elevation of 1,350 ft., and then a continuous descent to the St. Lawrence. The latter route, 334 miles, has comparatively easy stretches at each end, while its middle or mountain section comprises two main summits, one a little over and the other a little under the 1,000 ft. elevation, or considerably below the summit elevation of the G.T.R. line. Central Vermont Ry. above Lake Champlain As a matter of interest we give the following list of elevations on the line of the

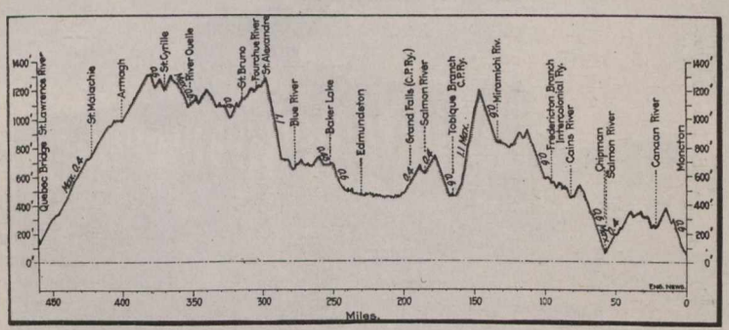


Fig. 2.—National Transcontinental Ry.; Moncton to Quebec.

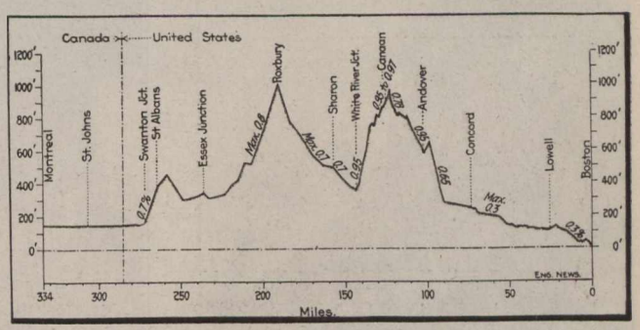


Fig. 4.—Boston & Maine Rd. and Central Vermont Ry.; Boston to Montreal.

profiles of two or more lines between the same points.

In making such comparisons, however, it must be understood that the profiles do not afford a basis for criticism as to the relative excellence of the work done by the locating engineers, since different lines may pass through country of entirely different topographic characteristics. Even when located approximately in the same district, no direct criticism can be used on the profiles. One may be an old line built when low cost of construction was of much more importance than low grade operating conditions, while another may have been built at later date, when traffic was of such importance as to warrant high construction cost to obtain low grades.

In the following notes reference is made only to certain of the main characteristics, leaving the reader to study for himself the

The National Transcontinental Ry. keeps high above sea level, and its maximum grades are 1.1%, with long grades of 0.4% against eastbound and 0.6% against westbound traffic. Near Quebec it maintains an elevation of approximately 150 ft. for crossing the St. Lawrence at the Quebec bridge. The maximum elevation is 1,200 ft. A considerable part of the line is in wild and unsettled country, and water tanks or water stations are located at intervals of about 15 miles. This line makes a saving, of 32.85 miles, or 4%, in distance, its length being 460.50 miles, as compared with 487.6 miles between the same points on the Intercolonial. This new road is under construction, but not yet in operation. It was located by the National Transcontinental Ry. Commission's engineers, and will form the eastern connection of the Grand Trunk Pacific Ry., by which company it is to be operated.

and above sea level respectively:

	Lake Champlain, ft.	Sea level, ft.
White River Jct.	267.4	361.4
Sharon	406.0	500.0
Randolph	597.5	691.5
Roxbury	915.0	1,009.0
Montpelier	428.2	522.2
Essex Jct.	249.0	343.0
St. Albans	289.0	383.0
Swanton Jct.	60.0	154.0
Stanbridge	56.0	150.0

One of the profiles given above, between Buffalo, N.Y., and Chicago, Ill., fig. 5, shows the Michigan Central Railroad which runs through a portion of Ontario and Michigan. The sharp depression on this line, consequent on the utilization of the Detroit river tunnel, is overcome by the use of electric locomotives constructed so as to have sufficient power to haul standard trains over the consequent heavy grades.—Engineering News.

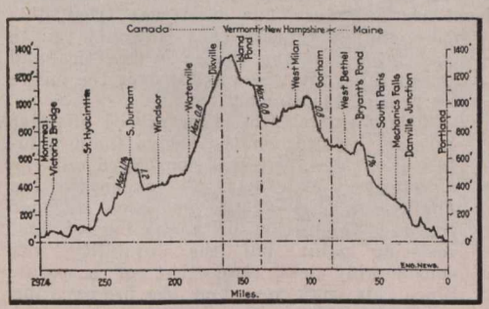


Fig. 3.—Grand Trunk Ry.; Portland to Montreal.

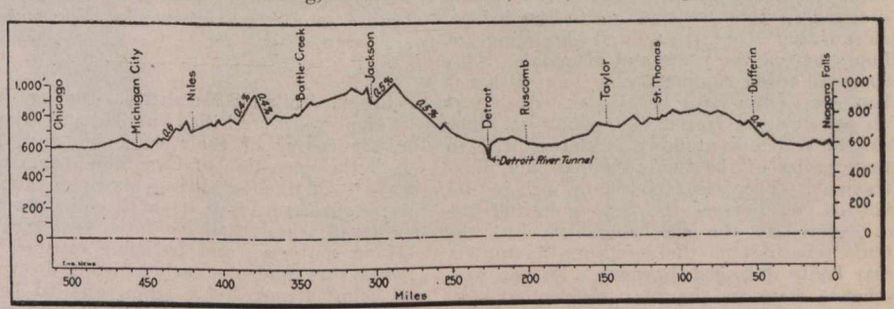


Fig. 5.—Michigan Central Rd.; Niagara Falls to Chicago.

Removing and Repairing a Wrecked Timber Truss Span on the C. N. R.

The clearing of a wrecked timber truss span and erection of a temporary structure, restoring traffic, was accomplished a short time ago in three days on the Canadian Northern Ry. at Saskatoon, Sask., where a derailed car demolished the north shore span of the bridge over the South Saskatchewan river. This bridge consists of six 150 ft. through Howe truss spans of timber on concrete piers, the rail elevation being about 45 ft. above the surface of the water. The bridge was of British Columbia fir in first class condition. It was built about six years ago.

As one of the southbound through passenger trains, carrying several sleeping cars on its rear end, was pulling through the south end of the yard at the approach to the bridge on March 4, the rear truck of the last sleeper left the rails at a switch about 500 ft. north of the bridge. The truck slewed and led off on the switch to the west or right hand side until the wheels that should have been on the left hand rail were over a foot outside the right hand rail and beyond the guard timber. There was a 30 ft. approach trestle, but the wheels were hanging over the ends of the ties when this was reached, so the guard rails could have no effect. The sleeper was dragged in this position on to the bridge, sideswiping the truss and breaking or knocking out the posts and diagonals. This span collapsed completely, falling with the last car to the river bed below, which was almost dry and frozen to the bottom. The sleeper which went down is shown at B in the smaller of the two accompanying illustrations. The damage to the bridge did not extend beyond the first pier and the car preceding the one which wrecked the truss remained on the structure, having its rear badly damaged, however. Fifteen passengers were in the rear sleeper, and 12 were injured, but none fatally. A fire started in the wreckage, but was quickly put out by the city forces.

The wreckage of the truss and the car was cleared away with the aid of a Lidgerwood ballast unloader, which dragged it sideways off the bridge site. A track which runs west along the river bank at right angles to the bridge was utilized for this purpose, the Lidgerwood car being set at the point marked A on the photograph of the reconstruction.

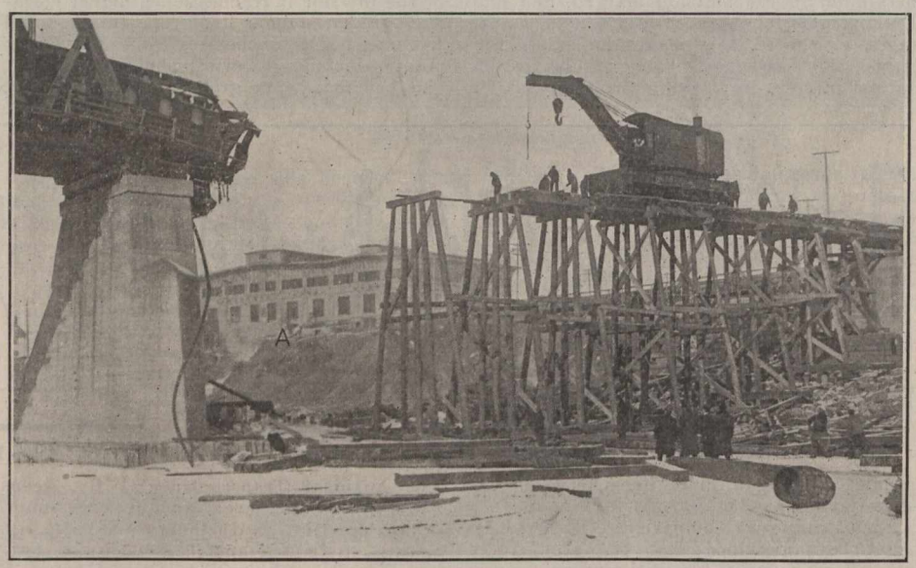
The cable was then run down to the wreckage, dragging the tangled mass of rods and timber and the wrecked sleeper out of the way.

Reconstruction was started by first erecting a temporary trestle over which traffic could be opened. Bents were framed on the ice and raised by a wrecking crane working outward from the shore end, blocking being put under the bents. On account of the end of the second sleeper overhanging the adjacent span, it was necessary to build entirely from the shore, so that the crane could be used to lift the overhanging car. The last two bents next to the pier were framed at the side of the bridge, then lifted clear and swung into place. When all but one panel of the trestle was decked, the crane lifted the end of the hanging car and pushed it forward on the undamaged part of the bridge.

With traffic thus restored, work was continued on the erection of the permanent Howe truss span, utilizing the trestle for falsework. Additional posts were placed vertically on the end of each sill to carry the weight of the new span.

The nature of this accident was such that it was believed to be unpreventable by the guard rails, and it is also believed that a steel structure would have suffered similarly.

Wreckage of the Timber Truss.



Method of Clearing and Re-erecting the Span.

Steam Railway Fatalities.—During July, 24 employes were killed and 34 were injured, in the course of their work in connection with the operation of Canadian steam railways. Of the fatalities, six were due to being run over, four each to collisions and to derailments, three to falls, two each to falling material, and to being crushed between cars, and one each to being drowned, to being struck by a train, and to being shot. Of the non-fatal accidents, nine were due to being struck by trains, cars and light engines, eight to being run over, seven to collisions, six to derailments, three to falling material, two to scalding, and one each to being burnt, and being caught between rail and crossing plank.

The report that Mackenzie, Mann & Co. had offered the Government $90,000 for Snake island, situated about three miles from Roche's point in Lake Simcoe, was denied by Sir Donald Mann, Sept. 4.

A Temporary Cement Wash Protection for Bridge Timbers.

A temporary fire protection for old timbers on a steel bridge where the length of useful service had nearly been reached and the wood badly checked was recently provided on the Boston & Maine Rd. by a wash made up of Portland cement, plaster of Paris and sand. The bridge was a deck structure, located at such a distance from the station or houses where attention might be attracted by a fire burning on it, that some form of protection was considered advisable during the period of one or two years remaining in the life of the ties. There were wide and deep cracks in some of these ties, and as sufficient experience had not yet been had at that point with the use of fire-resisting paints to give assurance of their effective service, experiments were made in filling the cracks with various compositions, and also covering the entire top surface of the ties and guard rail .

The first experiment was with cement and water alone, but this plaster cracked and came out of the cavities in the ties, so as to afford very little protection. A mixture of lime, cement and sand was then used on another portion of the bridge and was found to give better protection. Finally a mixture of cement, plaster of Paris and very fine sand was tried, this being mixed so thin that it would run in and fill all of the cracks in the ties and guard rails. It was washed over the entire surface of the timber.

This form of protection proved effective in stopping fires on the bridge for a number of months, but was considered only as a temporary expedient. The expense of the application was about the same as that for the application of a coating of fire-resisting paint, but the durability was considerably less than that of a paint. Since this work was done the fire-resisting paints have been investigated further and found to be sufficiently serviceable as a protection. They are believed to be preferable, where the protection is desired to last for any considerable period.

The experiments and observations in connection with the cement wash coatings outlined in the foregoing have been carried out under the direction of B. F. Pickering, Supervisor of Bridges and Buildings, Boston and Maine Railroad, at Salem, Mass.

Making Cattle Guards at the Grand Trunk Railway London Car Shops.

Under the direction of Geo. Powe, Foreman Woodworking Department, G.T.R. car shops, London, Ont., a series of jigs for the rapid machining and assembling of the component members of a G.T.R. standard cattle guard, has been developed, and will be illustrated and described herewith. A standard cattle guard of the narrowest size is shown in fig. 1. These guards are made in three sizes. The two commoner sizes are those which fit in between the two rails and the mating ones for each side of a single track line. The third is the one used between the inner pair of tracks on a double track line. Large numbers of all sizes are made up at London, as that is the central point of a large mileage of both single and double track.

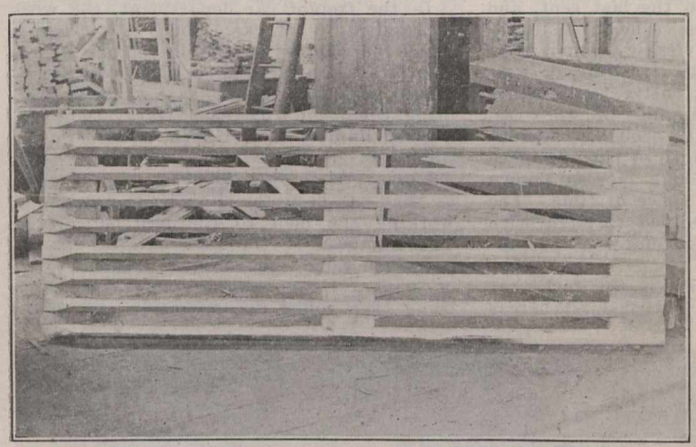


Fig. 1.—Standard Narrow Size G.T.R. Cattle Guard.

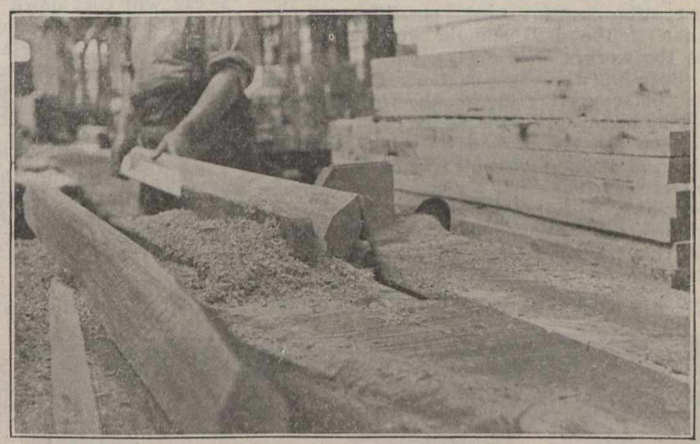


Fig. 2.—Edging Top of Cattle Guard Bars.

The first operation, illustrated in fig. 2, is that of edging the bars. The stock is placed in piles alongside of a rip saw, as shown in the right background in this illustration. On the rip saw table, to the left of the saw, there is secured a guide block, into which the base of the bar fits, tilting the bar over into the path of the saw an amount sufficient to give the required bevel. The bar is kept over to the saw by the outer edge of the bar being guided on the guide block. The operator on the far end pushes the bar half-way through its cut, when it is seized by an assistant at the near end and drawn through the balance of the cut. The guide is so set as to cause the saw to cut through half the width of the bar. The half-cut bar is returned along the surface of the table, on the left side, where it is again seized by the first operator and passed through as in the first cut, completing that portion of the machining. It may be noted in passing that, on the far side of the saw, there is a vertical board clamped to the table at an angle to the saw, for the purpose of diverting off the table the wedge-shaped pieces that are scrapped by the saw. Otherwise, the saw might pick up these pieces and hurl them back at the operator, with injurious results.

After the passage of a batch through this last operation, the saw is fitted up for the second or end bevelling operation. The machine as set up for this is shown in fig. 3. On the surface of the table, there is a small piece of board, tongued on the lower side to fit the groove of the table, along which it is guided. A counterweight, slung over the end of the table on a pulley attached thereto for the purpose, is attached to the rear end of the guide board to balance the weight of these moving parts and relieve the operator of much of the arduous part of the work. At the proper angle on the top of the guide board, there is nailed a locating strip, against which the bevel of the bar is held while the cut is being taken. The operator takes the cut to the depth of the top bevelling, reverses the bar and repeats on the opposite end. No assistant is required in this part of the work. To the right of the saw, it will be noticed that there is a saw guard to prevent the saw lifting the severed part and throwing it back towards the operator.

The bar has next to be drilled to receive the three binding bolts. A horizontal drilling machine, rigged as in fig. 4, is employed for this operation. Secured to the drilling machine table, and at right angles to the drill spindle in the horizontal plane, there is an extension to support the bar while drilling and at the same time to locate the holes. This extension has a rear edge which guides the board and against which the operator keeps the bar pressed while machining. Hinged to this rear edge are three hinged stops (the one to the right not shown), against which the bars are held to locate the holes. In the illustration, the bar is held along against the first stop while the operator is pulling the drill through from the rear. When this hole is drilled, the first hinged stop is swung up out of the way and the bar shoved along to the next or central stop, and the second hole drilled. This stop is then swung up out of the way and the bar located against the third and last hole. The holes in the bar are thus located exactly equidistant to each other, insuring against the holes not lining up properly in the final assembling. This drilling is quickly performed by a dextrous operator.

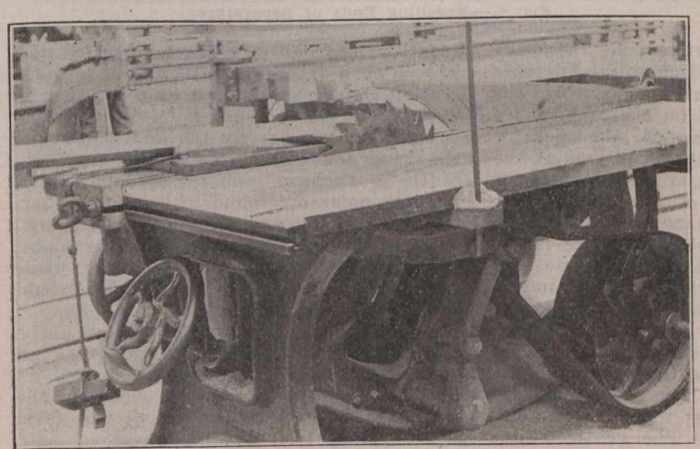


Fig. 3.—Bevelling Ends of Cattle Guard Bars.

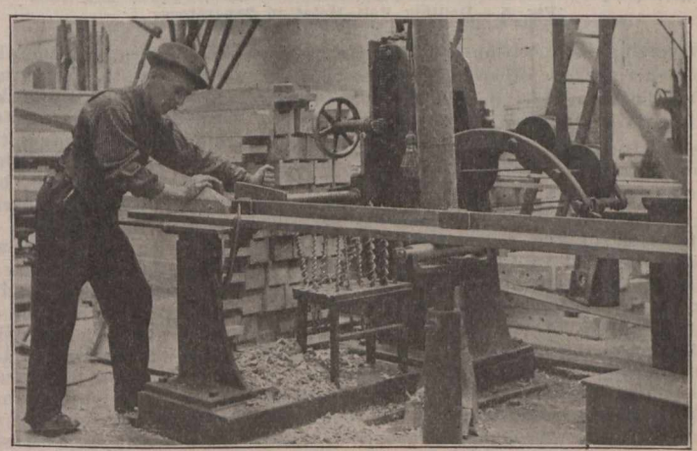


Fig. 4.—Drilling Bolt Holes in Cattle Guard Bars.

Next in order comes the drilling of the separating blocks, through which the clamping bolts pass. This operation is performed in the same drilling machine as the drilling of the bars, the separators having been cut off to length previously. These pieces, being small, permit of rapid handling, and in consequence a quicker method of using the machine than that employed in the previous instance is desirable. Carrying the work towards the drill, instead of the drill towards the work, seemed the best method

of accomplishing this, and the method of so doing is shown in the accompanying illustration, fig. 5. Clamped to the top of the drill table, there is a section of board covering the whole table top, and extending over the sides. The front of the board is lined up against the front edge of the table. On this board, there is a sliding wooden table, guided on the under part by a tongue fitting the groove of the latter, this tongue and groove being in line with the drill spindle. The separators are located on this movable platen up against the forward edge, located endwise against the pin shown. The drill spindle is located permanently in position, and the holes drilled by the operator forcing the upper carrying table towards the drill. Rapid operation is thus made possible, more so than if the drill spindle were moved up to the work.

Bevelling the edges is the next operation on the separating blocks, the rip saw being set up as in fig. 6 for this purpose. Parallel to the saw on the saw table, there is clamped a long board carrying a tongued upper surface, on which a carriage over top, with a grooved lower surface, is guided. In a recess on the upper surface of the carriage, the separator is located, and the carriage with contained separator run past the saw, trimming off the corner.

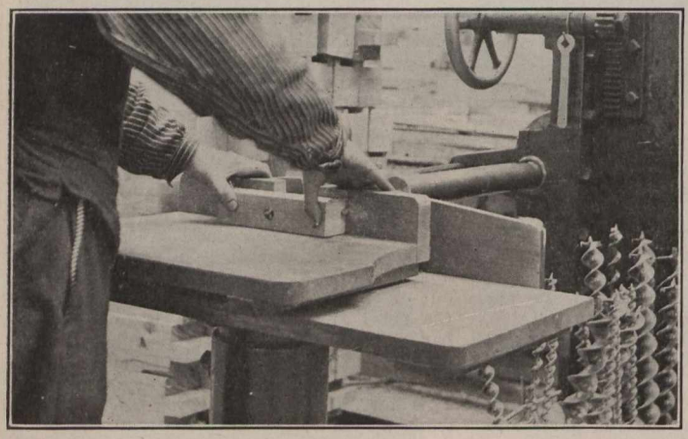


Fig. 5.—Drilling Bolt Holes in Separators.

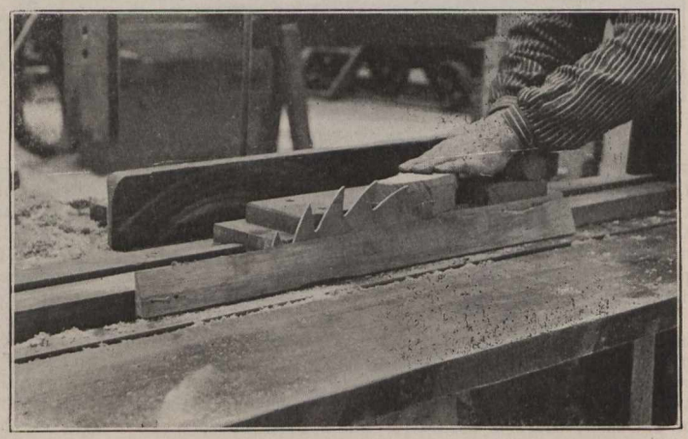


Fig. 6.—Bevelling Ends of Separators.

Reversing the position of the separator on the carriage, the other end is trimmed down. On the near side, it will be noticed that there is a bevel strip, secured to the guide board to the rear, for deflecting the severed pieces from the saw and preventing injuries to the operator.

The wooden parts entering into the construction of the cattle guard being thus far completed in the machining, the parts are all taken to the assembling stand, as in fig. 7. Bolts from the screw department are piled conveniently under the assembling stand, and the separating blocks, in recesses in the upper surface. Against the edge to the right, which has a retaining shoulder, the first bar is located and three clamping bolts passed through. Then, alternately slipping separators and bars on to the projecting bolts, the guard is gradually built up. It will be noticed that there is a guiding surface under the points where the three bolts come, facilitating the rapid assembly of the component parts.

The cattle guards, assembled as in fig. 1, are removed and placed in piles outside the door in the background for shipment as required. Large numbers of these guards are in constant demand as already mentioned, so that nearly all the time there is some one or other of the operations outlined being performed in the shop.

Piece Work System at the Grand Trunk Railway Port Huron Shops.

Under the supervision of J. L. Hodgson, Master Car Builder, G.T.R. shops, Port Huron, Mich., a system of handling piece work has been developed that has proved a very valuable asset. In these shops, everybody but the office staff works on piece work, prices having been set for even the smallest operations, such for example as the painting of a couple of inches of stripping along the side of a passenger car, and similar small tasks. The management in this way knows exactly what the repair of a car will cost down to the last cent, and can therefore determine almost instantly whether it would be advisable to undertake the repairs at that particular time, or wait until they are more extensive, and require a more complete stripping of the car. Knowing the cost and the probable earnings of the workmen, the length of time required to put the repairs through is also known to within a very short space of time. The work can thus be scheduled through with a certainty of its being completed as promised.

A most important item is the fact that the workmen are more satisfied. Whereas low wages are generally the rule where day work exists, from the general indifference shown by the workmen concerning the amount of time wasted on the task, under a piecework system the more the operator does, the bulkier is the pay envelope at the end of the week. This is probably one of the greatest incentives of a piecework system, if it is properly managed like the one under consideration, where the price is set permanently, and the workman has no fear hanging over his head that at some time if too great an amount is earned in a given interval, the price will be cut so as to reduce his earnings. Under such a scheme, the incentive to increase the output of the plant is removed, and the scheme is but slightly better than a day work system that is properly supervised. The greatest loss in such a case lies in the limited output from a given factory. The greater the output from a given factory, other things being equal, the less the standing charge per unit of production, and at the same time, the time when it will become necessary to extend the plant to handle increased business, will be pushed further into the future, involving the use of the capital that might otherwise be tied up, to other purposes. At these shops, no trouble has been experienced with the system, as no cutting exists. The men are given a fair price, and when they start in on a job, they know there is a certain amount of money in it for them, and in consequence, it is to their advantage to complete the task in the shortest possible time compatible with good workmanship. The popularity of the scheme is evidenced by the fact that some little difficulty has been experienced in obtaining foremen in certain of the departments, from the fact that the more dextrous workmen can make as much or more than the foreman in charge of the work. The incentive naturally is to remain where there is the most money.

In the freight car department, the work is handled by tracks. That is to say, a bunch of cripples is run in on one of the shop tracks, and none of the cars are removed until the whole lot are again in operating condition. To each track, there are a given number of workmen, about two per car, apart from the trucks, which are handled separately. These men operate in pairs, as that has been found to be the means of working the men to the best advantage. The numbers of the cars entered for repairs are each written on a separate piece of paper, these several pieces of paper being then rolled up separately and mixed together in a hat. The leader in each pair of men then draws one of these slips, representing the car on which that couple are to work. This method of distributing the work was made necessary by the fact that while the prices set for each of the different parts of the work have been set as fairly as is possible, some are found to be slightly better than others, and the more wily workmen would soon determine the best jobs, and on each occasion select that one, while probably the more plodding workman would have the poorer one shoved off on him.

As each track of cars is ready to be placed, an incoming inspector goes over each of the cars separately, noting all the repairs required on a special form provided for the purpose. For freight car bodies, this form is 13 x 14½ ins., divided into four main columns of items. At the top of the form, the schedule number, incoming inspector's name, road, class, number, and date commenced, and finally the date completed, are entered by this incoming inspector. In the four main columns of items, there are printed 178 parts, covering every kind of repair possible on the car. Opposite each item, there are three items giving number of pieces, rate and amount. In these columns, at the points required by the nature of the repairs that the inspector observes, the several amounts are filled in, duplicate forms being made out. The original goes

to the office, where it is retained by a chief piecework timekeeper under the supervision of the chief clerk, while the duplicate is handed to the leading workman, so that he may know what repairs are expected of him. At the end of the last item column, there is a space for the entry of the number of workmen on the car, check number, hours and amount. With this repair sheet before them, the workmen know exactly how much money there is in that car for them, and proceed accordingly.

Each pair of workmen operate independently of the others on the balance of the cars in the early part of the work. From the nature of things, some cars will require more extensive repairs than others, and will not be completed as soon as the ones requiring the light repairs. Therefore, the pairs from the light repair jobs, as they complete their tasks, are combined with others on the heavier repair tasks until that job is also finished. In that way, all the workmen are kept employed up to the completion of the final car, by a careful juggling around on the part of the foreman. The total cost of the car is pooled, and the different workmen paid in proportion to the number of hours each one has worked. Needless to say, there are no loafers under such a system, as the balance of the workmen see to it that each one does his proper share and works at the proper rate.

whole car run out into the yard. The final inspection was formerly made in the shop, before the body was lowered on the trucks, but as the car strains are different when in service conditions, it was found that bolts, etc., that had been indifferently tightened up in the shop, were loose in the yard. The workman now makes a point of having everything tight, so as to avoid having to make an extra, unpaid-for trip to the yard to finish a careless job.

Crooked work on the part of the men in turning in false statements of the work, is almost impossible, and requires the co-operation of at least five to make it possible—incoming inspector, two workmen, piece work inspector and the outgoing inspector—an almost impossible combination. The job as finally correct, is signed by the outgoing inspector, and the sheet returned to the office, where it can be compared with the original, and any changes detected.

The work in the passenger car department is handled somewhat differently from that in the freight car department from the very nature of the work. The work here cannot be pooled in the same way, as there are several classes of skilled labor at work at the same time on the car, whereas in the freight car, most of the labor is of a rough type.

The assistant foreman allocates the work to the various workmen, giving out slips

remarkable, and all are of the opinion that conditions are much improved to what they were formerly under the old day work system.

The amount of clerical work involved would at first sight appear to be rather heavy, especially when it is mentioned that for the passenger car painting alone, there are over 3,000 different prices, covering even the smallest detail of repair. The clerks become so thoroughly familiarized with the prices of the different operations that only one is required in each department, and he makes up all the entries and the memos to be given the men each day.

Matching Head Tool Setting Gauge at the Grand Trunk Railway London Shops.

In the saw setting department of the G.T.R. shops at London, Ont., there is a handy little gauge for the setting of the cutters of a planer or lumber matching machine. As shown in the accompanying illustration, it is set up for aligning the cutting tools required in the tonguing and grooving of the edges of matched lumber.

The device consists of a base casting, carrying an upright with a bearing through which projects on each side an arbor of the diameter of the matching machine

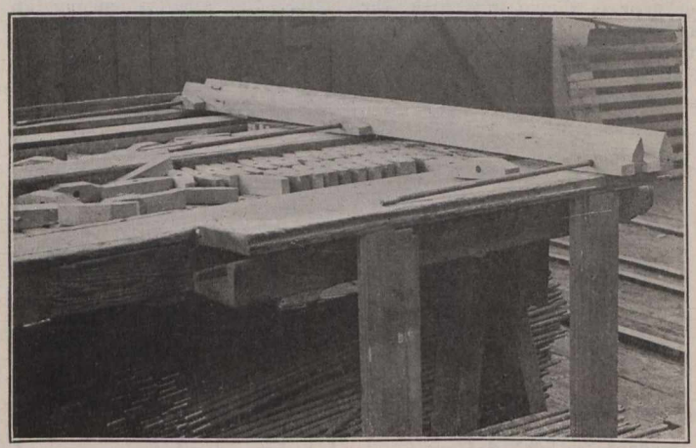
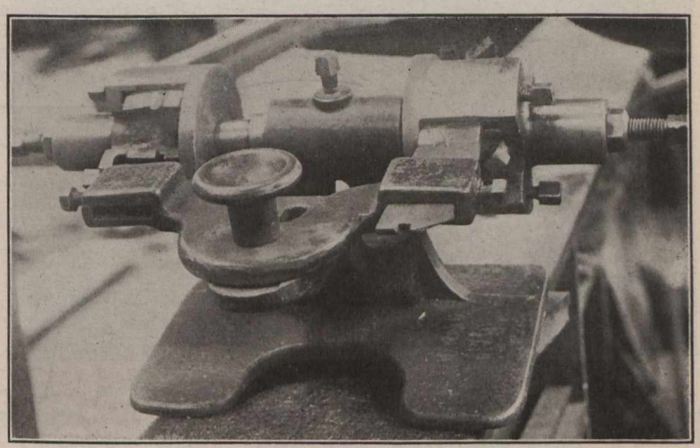


Fig. 7.—Assembling Parts of Cattle Guard.



Gauge for Setting Cutters in Matching Machine Head.

The order for the work from the incoming inspector can at the best only cover such repairs as are apparent before the car is stripped. On stripping, other defects frequently become apparent, and to have them added to the pay list, the workman makes out a separate list of these on a plain piece of paper, and has this signed by either the incoming inspector or the foreman, who must then make an inspection to see if these defects really exist. Unless such an extra slip is made out and signed by the proper authority, the workmen are not paid for this work. This course is taken so that there can be no danger of bunco work.

The workmen each night put in slips of the amount of work performed that day. The piecework inspector, with these slips, checks over the work to ascertain if that amount really has been completed, and on verification, proceeds to make out pay memos to the men, stating the amount earned the previous day. These are delivered to the men before 10 a.m. next day, so that each day, the men are kept advised of the previous day's work. This has been found to be a good incentive to keep them keen on improving past records.

The work as it progresses is checked by the outgoing inspector for quality, and to determine if all the repairs have been performed. The outgoing inspector makes the final inspection after the body of the car has been lowered on the trucks, and the

called "shins," on which the nature of the work is noted. The workman proceeds to perform the work outlined, and on the completion, has the assistant foreman inspect the job and initial the shin, which is then deposited in the piece work timekeeper's box, the assistant foreman then giving the workman another shin for further work. The assistant foreman is in reality an inspector, and distributor of work.

The shins, as they are collected by the piece work time clerk, have the information contained entered on a schedule sheet, one of which is made out for each car, stating the nature of the operation and the price, dimensions, etc., in the same manner as the original sheet used in the freight car department. Before this entry, the clerk measures up the work to ascertain if the amount noted has actually been completed. The entries from the various shins finally completing the car repairs, the schedule is signed by the foreman and passed on to the office. In this case, there is a similar chain through which the orders pass, as in the freight department, requiring a general conspiracy on the part of the various parties responsible in order to have any manipulation of the accounts. The individual amounts are so small as to make the incentive for crooked work of no account.

Briefly, the above outlines the system of piece work as applied to these car shops. The smooth operation throughout is most

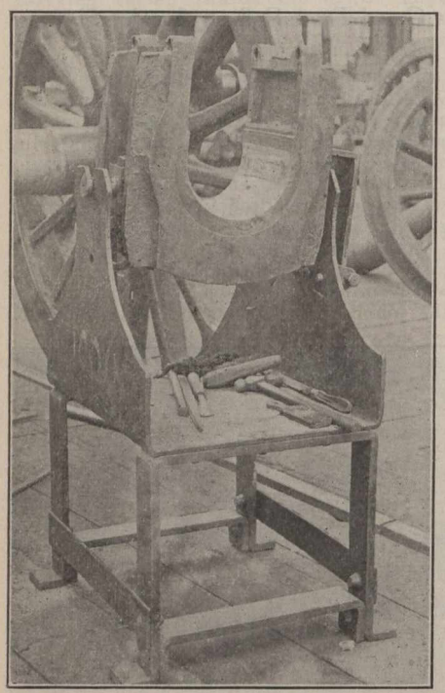
spindle which carries the cutter head. On a projecting ledge to the front, there is a movable cross arm, the ends of which are located opposite the location of the cutter on the arbor. These ends are open to receive the gauging pieces used for setting the cutting tools.

A gauging piece made of wood is cut as closely as possible to the shape desired, the tongued part in one end and the grooved part in the other as in the piece in the right opening. The cutters for the matched lumber are three in number, at three equidistant points on the circumference, making nine cutters in all. These individual cutters are ground to shape previously to being brought to the setting machine. The gauging piece for the tongued side of the lumber is set in the right-hand opening, the correct distance in towards the centre to give the right diameter to the cutter. The sets of three blades for the tip of the matching and the two sides are then set to this wooden gauge, which has been clamped in position in the opening. The three sets are each in turn set to the same gauge by revolving around the arbor to each successive position. Each combined cutter will then cut to the same diameter. The reverse end of the gauge is entered in the other opening, and the other cutters set in a similar manner. The corresponding cutters are then both ready for application to the machine.

Railway Mechanical Methods and Devices.

Driving Wheel Brass Stand at the Grand Trunk Railway Stratford Shops.

In the G.T.R. shops at Stratford, Ont., there is in use a very convenient stand on which to place the driving wheel brasses while scraping them to a fit on the driving axle. The brass as it comes from the boring mill requires to be fitted to the axle in some cases, and may require lifting off the axle several times between these work-



Scraping Stand for Driving Wheel Brasses.

ings before a final good fit is attained. Lifting the brass off the axle each time, and placing in a convenient position for fitting, consumes time, and it is in the decreasing of the time consumed, and the ease of operation, that this stand excels.

In the vertical guiding sides of the brass as it rests on the axle, two lifting hooks are placed. These consist of a block of steel with a projecting trunnion bearing on one face, while on each of two opposite sides, there are pointed studs, which can be screwed out against the sides of the guiding ways of the brass, the trunnion bearing outward, forming a solid trunnion bearing on each side of the brass, all as shown in the accompanying illustration.

The fitting stand consists of a piece of plate bent upward at each end, and supported on a framework of wrought iron bars. The uppermost ends of the upturned edges of the plate, are cut out to the size of the lifting hook trunnions. The corners of the upturned ends of the plate are cut away to facilitate the workman's movements while scraping.

The brass on the axle is lifted by a swinging jib crane overhead, by means of the trunnions, and placed in a similar position on the stand, the legs downward. That is the normal position, from the fact that the greater weight being there holds them down. To hold the brass up the other way in the position shown in the illustration, there is an attachment to the other side of the supporting stand, consisting of a plate hinged half way down the side, which can be swung up, a bent end fitting into the guiding way on the side to the right as indicated. The brass is thus in a convenient position for scraping, and the stand itself makes a handy table for the mechanic's tools.

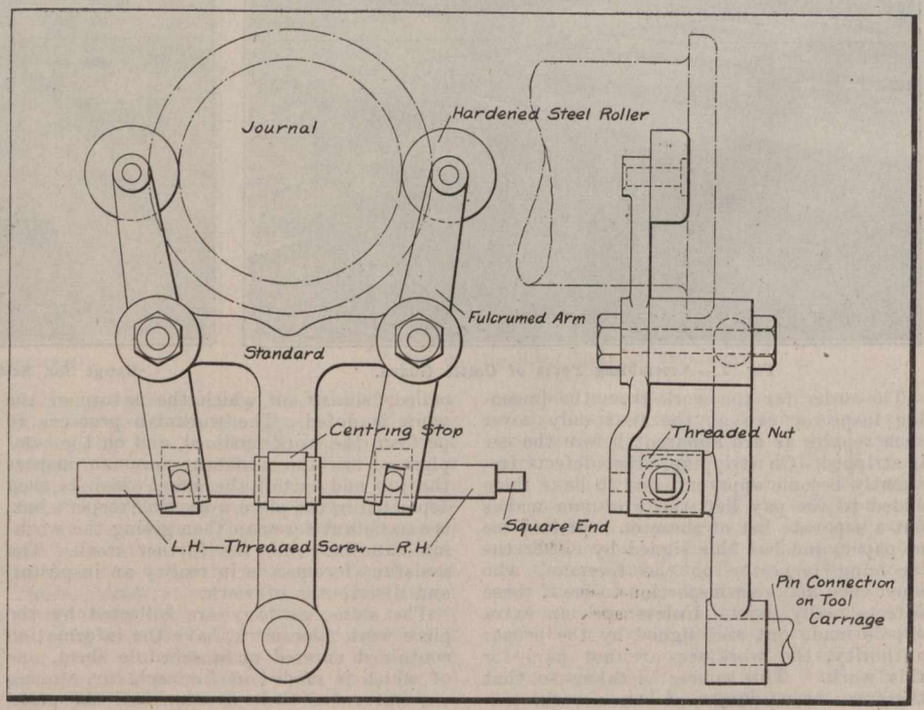
Double Axle Roller at the Central Vermont Railway Shops.

The practice of rolling the journals of car axles, on the completion of the machining in the lathe, is almost universally adopted for giving them a fine and smooth finish that will not be hard on the journal brasses nor entangle the waste in the journal box. In some few instances recently, special axle grinders have been employed for the purpose, and the results obtained have been most satisfactory. The tendency in all shops would seem to lead to the use of grinding wherever possible on bearing surfaces, yet at the same time, the older method of rolling seems to be so firmly entrenched as to be here to stay for some considerable time at least.

A marked improvement on the finishing tools of the single roller type is shown in the accompanying illustration. This is a double roller, so constructed as to equalize the springing tendency on one side as it exists in tools with a single roller. On a pin projecting from the side of the tool carriage, there is a vertical double arm standard, carrying at the outer end of each arm a fulcrumed arm. At the upper ends of the fulcrumed arms, there are hardened steel rollers, as in the usual construction. The lower ends of the fulcrumed arms are bifurcated to receive pins projecting from threaded nuts mounted on a right and left hand threaded screw, supported near the centre by a centering stop on the face of the vertical part of the standard. One end of this screw is squared for a socket wrench.

Normally, while the axle bearing is being turned in the lathe, the roller jaws are kept wide open by turning the threaded screw so as to have the threaded blocks close together near the centering stop. When they are required for service, the screw action is reversed, bringing the rollers up against the journal sufficiently tight to give the required rolling action to smooth down the rough surface. The two rollers bear equally on both sides, as it is self adjusting on the pin support from the lathe tool carriage. The rollers are also so mounted as to have the pressure on both sides come diametrically opposite to each other.

The big advantage in such an arrangement lies in the fact that the heavy rolling pressure is equalized on both sides. With the single-roller type, the resulting thrust on the journal is all in one direction across the bed of the lathe, the reaction on the centres, if the rolling is required to reduce a very rough surface, is quite high, with a consequent injurious effect on the lathe. With two rollers placed opposite each other, the reaction is removed from the lathe centres. The double rollers also tend to produce a better job than the single, for, with the latter, the axle is sprung an amount varying according to the distance the tool is from the lathe centre. Consequently, the journal portion tends to be tapered smaller at the end. The double rollers have no tendency to spring from the equalized action, so that if the original turning is parallel, the resulting rolled journal will be equally true.



Double Axle Roller Designed to Equalize the Springing Tendency.

This tool is used in the Central Vermont Ry. car shops at St. Albans, Vt.

McDonald and Son, Toronto, who own a miniature railway at Scarboro beach park, Toronto, have requested the city council's permission to lay a miniature single track railway on Toronto island, from Hanlan's point to Centre island, for the carrying of passengers and light freight. The estimated cost is $25,000.

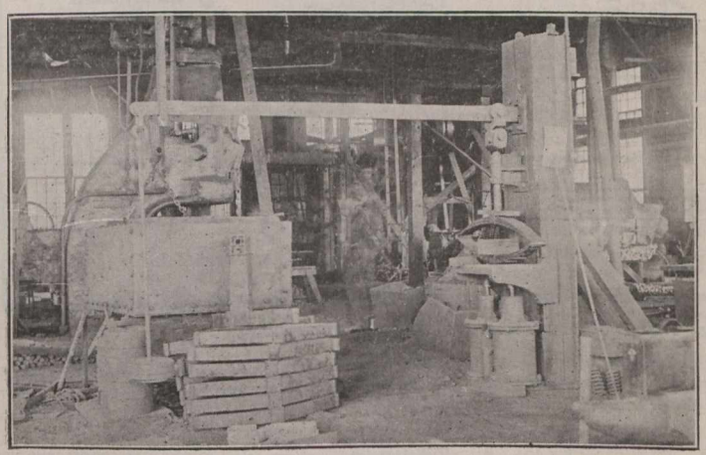
Spring Testing Machine at Grand Trunk Railway Port Huron Shops.

The accompanying illustration shows a spring testing machine as installed in the G.T.R. shops at Port Huron, Mich. Other machines of a similar construction are in use at other shops on the G.T.R., essentially the same as this one.

The whole device is carried on a heavy oak post, bedded in the ground in concrete, and is located in the blacksmith shop. Attached to the front of the post there is a lever projecting to the left front, pinned in the front of the post. A short distance out on this lever there is a short link connecting to a plunger guided in a casting on the front face of the post as indicated. At the base of the post are located a pair of air cylinders, the plungers of which operate upward on the under side of a table, which is free to rise, guided in ways on the face of the post. The lever at the top of the post projects several feet to the left, the outer end being supported by a loop from the roof beams. On the extreme outer end, a weight rod is suspended, for the carrying of weights in a manner similar to that on the usual weigh scales.

The spring to be tested is placed on the top of the rising table, and after placing introduced as in a well made scale. Fric- certain weights on the weight rod, the air is introduced into the cylinder, compressing the spring to a certain degree, and after the latter takes its final position, the weight lever rises. For each spring there are two capacities that it is required to know. The first is the light load opening of the spring, and the second, the full load opening of the spring. Between the springs on the table, it will be noticed that there is a wooden block, a gauge for the light load spring opening. The weights to correspond to the light weight are placed on the weight rod, and if the gauge block is still free between the springs when the cylinder lifts the weights, the spring has the required light load capacity. A similar course is followed with the full load capacity, a thinner block, the one on the table to the left of the spring in the illustration, is placed in the spring, and the corresponding weights loaded on the arm and the spring tested in this position.

The machine as at first made did not prove at all sensitive, as all the connections were pins. These produced a good deal of friction, which, when multiplied through the series of levers, became quite serious. In the arrangement as it stands now, this trouble has been eliminated, for at each of the pin connections knife edges have been tion is reduced to a negligible quantity, and the machine also made more sensitive, from the fact that the distance between points of support have become more positive from the use of knife edges.



Spring Machine for Accurately Testing Capacities.

Railway Bridge With Solid Plate Floor.

A standard broad gauge 100 ft. span deck girder bridge on the Bengal-Nagpur Railway, India, has two rivetted trusses 10½ ft. deep over all and 10 ft. apart on centres. They are connected just below the top chords by shallow floorbeams 10½ ft. apart carrying two lines of web-connected stringers 5½ ft. apart under the centres of the rails.

The top flanges of the rails and floorbeams are flush and are covered by a full-width continuous flat floor plate 5-16 in. thick rivetted on the longitudinal edges to the bottom flange angles of the top chords. In the axis of the bridge the floor plate is supported by a full-length line of 6 x 3 x ⅜ in. tee bars which at each panel between floorbeams has two 45 deg. bends at each end making kneebraces with vertical legs rivetted to the floorbeam webs. The tee rails in the track are spiked to wooden crossties resting on a 6 x 8 in. wooden longitudinal sleeper laid directly on the flat plates under the centre of each rail. The solid floor plate serves as a top lateral system, the bottom chords are X braced by horizontal angles between the sway bracing frames at floorbeam panel points.

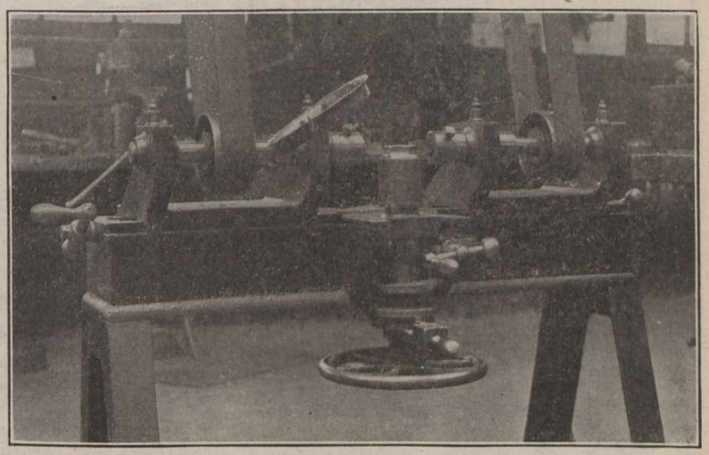
Milling Brass Nut Hexagons at Grand Trunk Railway Stratford Shops.

In the brass department of the G.T.R. Stratford, Ont., shops, there is a machine in use of a homemade design, originally designed at the Point St. Charles shops, Montreal, for milling the hexagon flats on brass nuts, performing the job two sides at a time in a very rapid manner.

As the accompanying illustration shows, the machine resembles a double ended lathe, the spindles being carried on heads that are moveable along the ways of the machine by means of the handles and adjusting screws on each end as indicated. In the chucks on the end of the spindles, are flat ended milling cutters, secured in the chuck with set screws. The flat ended milling cutters are made in the same manner as flat drills from bar stock, with the end flattened down, but not with the taper point. These cutters can be brought within any distance of each other to give the desired thickness across the flats of the nut.

The nut is screwed on the end of a corresponding screw mounted on the upper end of a stand on the cross slide corresponding to the tool post cross slide on the tool carriage of a lathe. This screw end is vertically adjustable through a screw passing up through the centre of the post, actuated by the handwheel at the bottom. Just above the handwheel there is an indexing device for turning the nut through the third of a circle at each move, and it is also possible with the same attachment to cut four and eight sides by indexing. With the hexagon, it is the practice to cut two sides with the index handle to the left, then in the centre, and finally on the right. The next nut has these steps reversed.

In the cutting, the cross slide carrying the nut is carried across through the cutters by the operator manipulating the handle in front, there being no cross feed. For the protection of the operator from the rapidly flying brass chips, the machine is provided in front with a gauge glass front, through which the operation can be observed without any danger to the eyes. This is shown swung out of the way in the off position.



Machine for Milling the Hexagons on Brass Nuts.

Superheater Switchers.—When the Lake Shore and Michigan Southern Ry. equipped a switching locomotive with a superheater in 1911, the experiment was expected by outside critics to prove a failure. Successful operation since that time has proved from test and observations on the part of the crews, that the saving in fuel and water amounts to 40%, which is greater than on road service. This reduces the time necessary to coal and water. The cylinder condensation is eliminated, removing the possibility, as in ordinary switchers, of water being thrown out of the stack, with injurious results to the clothing of bystanders. In addition, there is an almost entire absence of black smoke. Fires that formerly had to be cleaned every 12 hours, now need cleaning only half as often. Flue leakage has been materially reduced, and it is to be inferred that there will be a proportionately increased life to the boiler with decreased repairs.

Comparative Distances, Moncton to Quebec.—The distance on the National Transcontinental Ry. from Moncton, N.B., to the north end of the Quebec bridge is 460.45 miles, and the distance from Moncton to St. Jean Chrysostome, Que., south of Levis, where the N.T.R. crosses the Intercolonial Ry., is 454.75 miles. The distance from Moncton to this crossing over the Intercolonial Ry. is 487.6, or 32.85 more than by the N.T.R.

The Canadian Northern Prairie Lands Co., during July, sold 320 acres at an average of $15.25 an acre.

The Design and Construction of Locomotive Boilers.

Following is a continuation of the report of the American Railway Master Mechanics Association's standing committee's report on this subject, presented at the annual meeting in Atlantic City, N.J., recently, the first portion of the report having been published in Canadian Railway and Marine World for August:

ARCH TUBES.—Of the replies received, 15 members use 3 in. tubes, one member uses 2 in. tubes and one member uses 2¼ in. tubes. Five members do not use arch

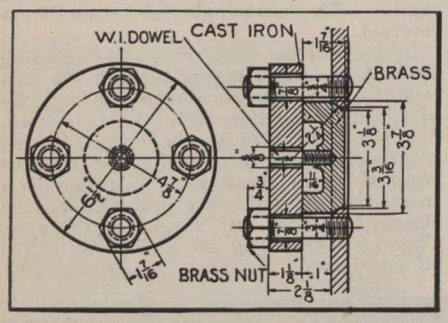


Fig. 16.—Arch Tube Hole Plate.

tubes at all. One member supports brick arches with studs fastened into the side sheet.

Thickness of tubes used: .15 in., .165 in., .18 in., .203 in., .25 in. Eight members use thickness of .18 in. Eleven members use seamless steel, one member uses charcoal iron, thickness of tube not given.

PLUGS OR PLATES FOR COVERING Arch Tube Holes in Throat Sheet and Back Head.—Twelve members use brass plugs, one member uses extra large size brass plugs for covering the holes; these plugs are drilled for 2¼ in. plug so as to avoid remov-

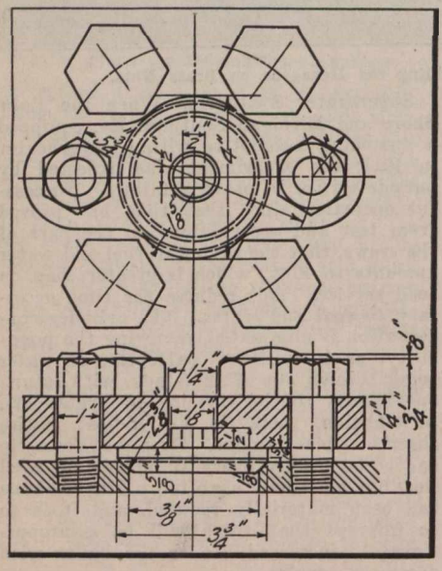


Fig. 17.—Arch Tube Hole Plate.

ing the large brass plugs when washing the tubes. Three members use plates with ball joints, as shown on figs. 16 and 17, claiming greater ease in removing and applying in close quarters.

THE SETTING OF ARCH TUBES varies. The replies received were indefinite as to just what practice they are following out. Six members did not state whether they use copper ferrules or not. Six members advise that they use copper ferrules. Three members set the arch tubes without ferrules. Three members set the tubes with a roller expander and a sectional expander to be used in the ordinary manner to set out the tube, as shown at A, fig. 18. Tubes are then beaded over with a bootleg tool, except by one member who bells out the tube on the water side to prevent the tube from pulling out of the sheet. This member does not use any ferrules. The other two members do use copper ferrules. Fig. 18 at B shows arch tube setting as used by one member.

For the information of the members you will find complete set of instructions for setting arch tubes, which is being used by several large roads with success. This covers tubes expanded and beaded on the outside as follows:

PREPARING HOLES IN FIREBOX Sheets.—Original holes in firebox sheet must be 3 3-32 in. in diameter. Worn holes must be reamed when more than 1-16 in. out of round. Sharp edges must be removed by slightly rounding with file or reamer.

in. thick seamless drawn steel. The tubes should be cut to proper length and bent to template conforming with drawings. The length can only be determined by actual measurement of the firebox and allowance

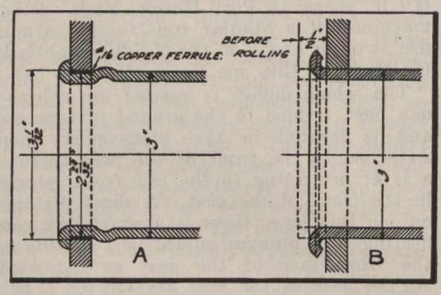


Fig. 18.—Two Methods of Setting Arch Tubes.

must be made for projection of ½ in. into water space at each end of firebox. Tubes must then be securely fastened with the roller expander. See A, fig. 19.

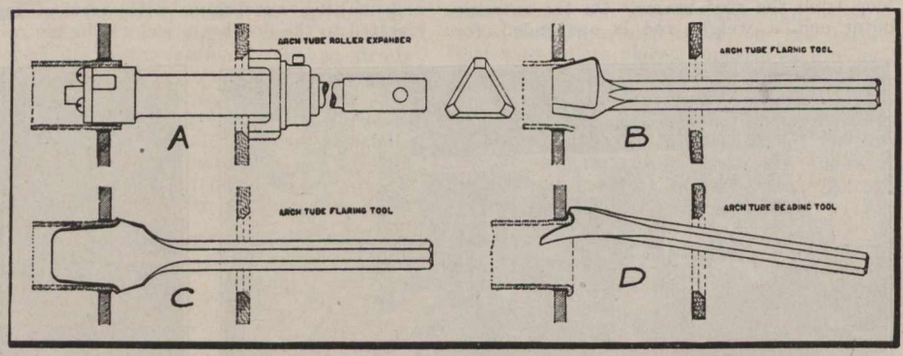


Fig. 19.—Different Tools for Beading Tube Ends.

APPLYING COPPER FERRULES.—Copper ferrules must be used at both ends of arch tubes. Ferrules should be 3 ins. outside diameter, .095 in. thick and ⅝ in. long, expanded by carefully hammering on a round mandrel to snugly fit the hole. Ferrules should be set with 1-16 in. projection on each side of sheet and secured in place with a roller expander.

PREPARING AND APPLYING TUBES.—Tubes must be 3 in. outside diameter, .18

FLARING TUBE ENDS.—After tubes have been set they must be flared at both ends with the flaring tools shown at B, fig. 19. After the tube ends have been thoroughly flared the tube ends are then ready for beading.

BEADING TUBE ENDS.—Additional flaring with tool shown at C, fig. 19, is necessary to start the bead. The bead must then be formed with special beading tool, fig. 19. Notice that it is not desired to

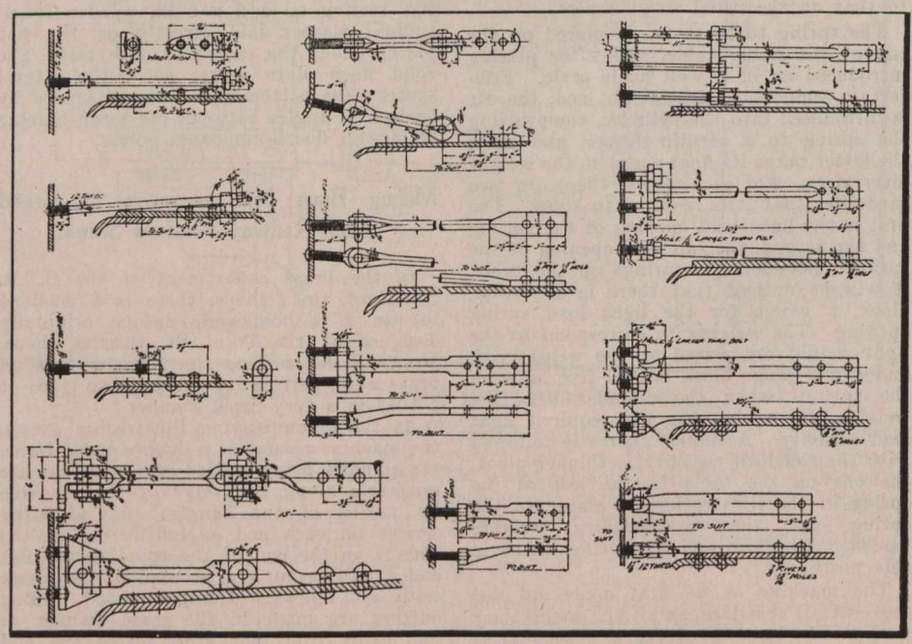


Fig. 20.—Twelve Styles of Throat Sheet Belly Brace.

form a full bead. The bottom of bead should stand 1-16 in. clear of the sheet.

MAINTENANCE OF ARCH TUBES.—Tubes should be thoroughly examined and cleaned at each washout of the boiler. At the least indication of scale formation in the tubes the pneumatic tube cleaner must be used. The tube cleaner is secured to a length of ½ in. air hose, to which is attached another ½ in. hose for supplying water while cleaning. Care must be taken so as not to break the cleaning cutters by

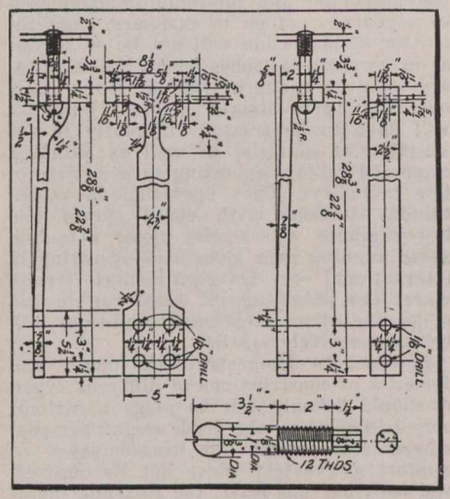


Fig. 21.—Two Methods of Throat Sheet Belly Brace.

allowing cleaner to be pushed through opposite end of tube. Stop must be provided on hose set at proper length for this purpose. Tube cleaner must be lubricated with signal oil fed through a lubricator in air supply pipe, 30 drops a minute. After cleaning, tubes must be inspected by holding a light at opposite end of tube to make sure that tubes are thoroughly cleaned and free from scale.

Leaky tubes must be stopped from leaking by rolling with expander, A, fig. 19. Before rolling tube ends must be thoroughly cleaned from scale.

Your committee has been unable to get any information in regard to which type of flue setting gives the best service, therefore are unable to make a recommendation as to which type we would recommend as standard practice.

RADIUS OF FLANGE IN BACK TUBE Sheet.—Replies received in regard to the radius in the back tube sheet where it connects to the crown sheets. Recommendations were made from ½ in. up to 2 ins. Some members had trouble with cracked sheets and leaky seams with large radius; others had trouble with the small radius. One member advises that he is now experimenting with a 4 in. radius and it seems to give good satisfaction, but it has not been in use a sufficient length of time to give a complete report. Two members increased the radius from ⅞ in. to 2 ins. and had considerable trouble with flue sheet working up and the flanges cracking. Two-inch radius has been discarded and they are now using ⅞ in., which improves the condition but does not eliminate the difficulty entirely.

DISTANCE FROM INSIDE OF FLANGE of Back Flue Sheet to Edge of Flue Holes.—Your committee recommends that the distance from the inside of the back flue sheet to the edge of the nearest flue hole be ample to prevent the flue sheet cracking through the flange. This distance will vary, depending on the radius of the flange of the tube sheet. In tube sheets with ⅞ in. radius, this distance should be at least 2 ins. at the top, ⅞ in. on the side. In sheets with 2 in. radius, the distance should be at least 2½ ins. at the top.

THROAT SHEET BRACE.—Your committee had the members submit designs of throat-sheet belly brace used and fig. 20 shows 12 styles of braces, the design of brace for this location to be such as to avoid any mud pockets and so as to allow for proper circulation of water.

METHOD OF SUPPORTING GRATE Side Frames.—Your committee recommends the grate side frames to be supported from studs in the mud ring or brackets fastened to the under side of the mud ring, the latter forming a pocket for the grate side frame to fit into.

SLOPING BACK HEADS are used by practically all of the members who replied to the circular. The slope varies from 8 to 20 degrees, making an average slope of 12 degrees. Sloping of back heads gives additional room in the cab, reduces the weight of the boiler and gives a maximum length of firebox, and still remains within a reasonable limit for hand firing.

STAYBOLTS.—Uniform spacing of all staybolts in all parts of the firebox is recommended by your committee. The majority of the members reported the use of button head crown stays for the six to nine centre rows of the crown sheet the entire length; two members use hammered heads for the first four or five rows from the flue sheet. The different forms of button heads are shown by fig. 22, on which you

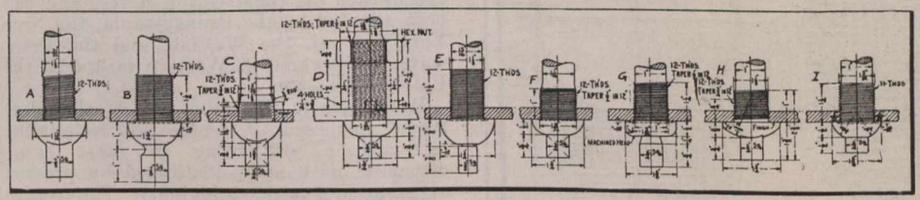


Fig. 22.—Different Styles of Buttonhead Staybolts.

will note that there are nine different designs shown. The member that uses style D advises that they are having some difficulty keeping the button heads tight.

Your committee favors the use of button heads on as many rows as the design of firebox will permit, but recommends for the consideration of members the practice of using hammered heads on the first four or five rows back from the flue sheet.

SLING STAYS.—Figs. 23 and 24 show the various types of sling stays in use by the different members and no difficulty with any of these types has been reported. Three members use a special flexible staybolt on all new equipment, as shown by fig. 25, and the use of this type of sling stay is also favored by, but not used by, another member. Sling stays are used to the extent of two, three and four rows back

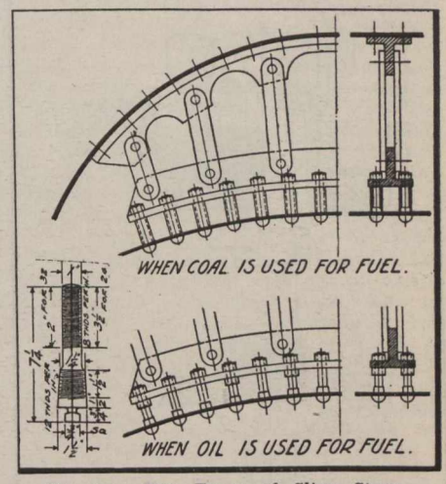


Fig. 24.—Two Types of Sling Stays.

from the tube sheet on boiler with combustion chamber.

FLEXIBLE STAYBOLTS.—Of the members who have replied, all except one member use flexible staybolts. Most of the members apply these in the breakage zone. Five members are making full installation of flexible staybolts on boilers with wide fireboxes. One member reports: "In Feb., 1907, locomotive received new firebox with full installation of flexible staybolts, with the exception of 4 bolts under the auxiliary dome and 4 under the steam turret; also 8 which go on top of same at back head. Feb., 1908, the locomotive received general repairs and firebox was in good condition. All caps were removed from flexible staybolts and they were found to be o.k. April, 1909, it was found necessary to patch the top of the back tube sheet on account of sheet cracking from the hole around the flange; this was done in the engine house. Oct., 1909, locomotive was given general repairs, and by this time the top of back tube sheet had given out in two more places, but as the sheet was in good condition otherwise it was patched. Three of the mudring corners also had to have small patches applied. After rattling scale from firebox sheets with large hammer, it was found that 40 of the flexible sleeves had cracked outside of the sheet, and on being taken out they were found to be crystallized, but no broken bolts were found. In 1911 the locomotive was again in the shop for general repairs and had all

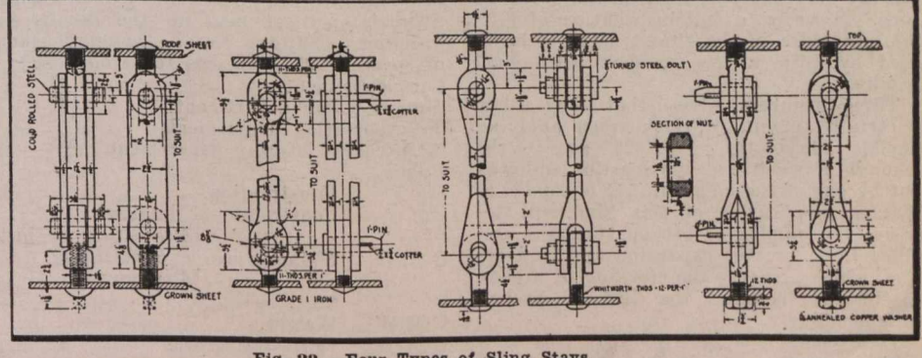


Fig. 23.—Four Types of Sling Stays.

caps removed from flexible staybolts and bolts found to be o.k. A patch was applied on top flange of flue sheet, half side sheet seam in firebox in good condition. When locomotive is shopped again it will be necessary to renew back flue sheet on account of same being patched. This locomotive

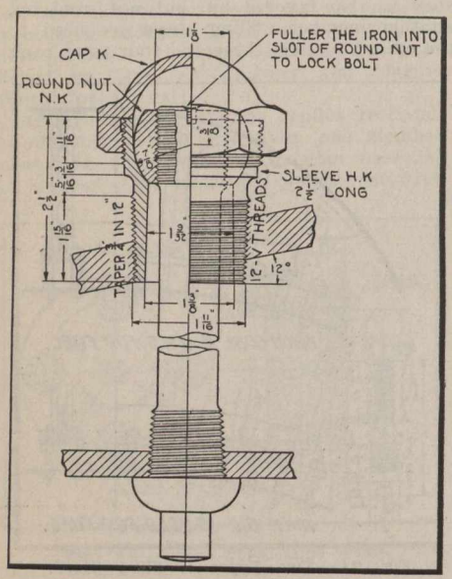


Fig. 25.—Flexible Staybolt Sling Stay.

made 319,567 miles to Nov., 1911, and lost no time due to broken staybolts."

One member advises that they have equipped some fireboxes with full installation of flexible staybolts, but can see no advantage in doing this. In their opinion the flexible staybolts are only advantageous

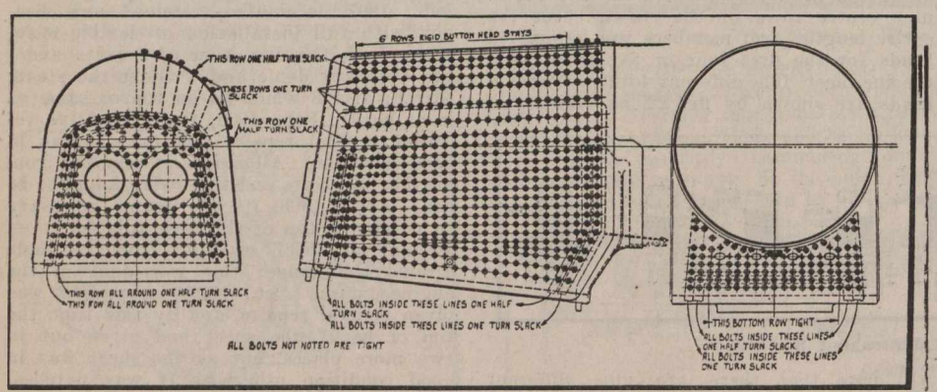


Fig. 26.—Slack Allowances and Location of Staybolts.

when applied in the breakage zone, and they have discontinued making full installation and are only applying them in the breakage zone. However, a full installation of flexible staybolts in the throat sheet is being used by quite a few members with good results.

Three members advise that they allow a certain amount of slack when applying flexible staybolts. Fig. 26 shows the amount of slack and the location followed out by one of the members. It is the belief that an application of this kind will decrease the number of broken staybolts and allow for a greater expansion and contraction, which prevents the cracking of firebox sheets and increases the life of firebox correspondingly.

Your committee believes that this is a subject worthy of further consideration and would suggest that some more of the members carry on a further investigation and make a report at some future date to this Association.

(To be continued.)

Suggestions and Deductions From Steel Passenger Cars.

By A. Copony, Chief Draughtsman, Car Department, G. T. R., Montreal.

It has always been the aim of railways to redesign and improve on existing passenger equipment, thus being in a position to take care of the ever increasing demands for safety, speed, and comfort of the travelling public whose wishes are becoming imperative in those sections of the country where competition amongst rival lines puts zest into the fight for supremacy in the passenger transportation business.

Several eastern and middle western roads have tried to keep up competition by means of increased speeds of trains run under a provisional guarantee, granting a refund of part of the fare in case trains are not run on time, whereas western and transcontinental lines, not able to perceptibly reduce their time of travel, on account of single tracks, are keeping up their bid for passenger traffic by means of safer cars, greater luxuries, and increased comforts, all of which items amount to astounding sums of expenses as well as profits to the railroads in question.

Since the advent of steel passenger cars the question of speed, comfort and safety has become more accentuated and the construction of these cars has become a matter of great importance, not only of the car department but of the motive power, the transportation and the maintenance of way departments, and the public in general as well, besides which there is a rational limit set to the expenses incurred for equipment, by the definite returns expected from this investment.

In order to show the interest evinced in certain performances of the cars by the different departments of railroads the following diagram will be of value in the more explicit treatment of details. The departments are indicated by following abbreviations set next to the details in question. [Editor's Note:—Owing to want of space the diagram has to be omitted.]

Car department		C
Motive power department		M
Transportation department		T
Maintenance of way department		W
Public		P
C	Construction.	
C	Constructional details.	
C	Maintenance	Protection against oxydization.
		Repairs.
C	Cost.	
C-M-W	Weight.	
C-M-W	Draft resistance.	
C-T-P	Insulation.	
C-T-P	Inside finish.	
C-T-P-M	Heating.	
C-T-P	Lighting.	
C-T-P	Ventilation.	
C-T-P	Sanitation.	

In the construction of steel passenger cars all the aforementioned points have to be carefully considered, besides which a host of other details have to be taken into consideration which depend on existing conditions under which a road is operating. For instance: It will be easier to build steel passenger cars operating in climates where the maximum and minimum temperatures of a year do not go to extremes, since the matter of insulation will not be so serious as in northern latitudes where the extremes are within a range of 120° or more. Cars operating in a climate of great humidity will have to be treated differently in the selection of material as well as painting, compared to cars operating in a climate of low humidity. Cars operating in mountainous sections with small curves and heavy grades will receive closer attention as to running gear than cars operating in international or transcontinental service where the percentage of total run to run under the above mentioned conditions will be comparatively small.

In order to demonstrate the merits and demerits of constructions of different types, it should be only fair to judge a car not only in regard to the dead weight per passenger seated, but the consideration of comfort and safety must not be omitted, and last, but not least, the cost and maintenance as well as draft resistance per car is of vital importance, if not to the passenger, decidedly so to the railway.

Not taking steel underframe cars with wooden superstructure into consideration and omitting the type of inside finish, we can split existing constructions into two different types, as follows: The double deck or monitor type and the single deck or turtle back car type.

THE DOUBLE DECK CAR TYPE.

This type follows in its main outlines the wooden car construction closely and has been adopted by the Pennsylvania, the New York Central, the Wabash, and the Delaware, Lackawanna & Western railroads, the Pullman Co., etc.

It consists in the main of a steel underframe composed of centre and side sills, intermediate sill being in most cases dispensed with and substituted by pressed or structural steel bridging. The centre sills are either of the fishbelly type built up of structural steel, or else consisting of heavy channels or I beams, as used by the Pennsylvania, the side sills are Z bar channel or I beams, or simple combinations of the aforementioned sections, the whole being well braced and connected with substantial steel-bolster castings, pressed or cast steel end sills and built up platforms, or designed to fit into the commonwealth type of end-framing casting, which is a combination of platform and bolster cast in one piece.

The superstructure consists of post of pressed steel or structural shapes, connected direct to the side sills, as well as indirect by means of the side sheets to the side sills. In some designs side plates are used for the top connection of the posts, but the Pennsylvania and the Pullman standard type of sleeping cars shows posts which connect in a clean sweep with the upper deck sills, thus eliminating lower deck carlins and side plates. In the first mentioned case either single, pressed steel, lower and upper deck carlins are used, but a number of constructions shows a combination of lower and upper deck carlins with deck posts, the whole being either pressed or of built up construction and applied while erecting the

framing of the car. The Pullman standard design and Pennsylvania standard of upper deck is built up on the floor as a unit and consist of pressed deck sill, upper deck carlins, posts, roofsheets, deck plates of pressed or rolled stock, the whole being applied to the posts after the lower framing is up. Side sheets, roof sheets, letter board plates, etc., are made of spliced sheets, or in one piece where convenient, the older constructions showing splices at posts with invisible joints and countersunk rivets, which have been found rather expensive in construction and weak as far as countersunk rivets in thin plates are concerned.

The permissible combined stresses for this framing, considering weight, load, and end shocks, the latter varying from 300,000 to 500,000 lbs., are usually taken within the range of 15,000 to 18,000 lbs. per square inch, but the weight of the car depends to a great extent on the selection of carrying members of the car, some designers preferring to build an underframe of which the carrying members are contained in the underframe only, as side sills and centre sills, thus keeping the centre of gravity of the carrying section within a small distance from the point where combined buffing shocks resulting from drawbar and buffing device are received.

Other designers take the construction of side plates, side sheets, belt rails and deckplates as carrying members of the cars into consideration and brace the sheets where necessary to prevent buckling. This construction has the advantage of permitting the use of a comparatively light underframe, but the centre of gravity of the whole section is thereby raised and larger bending moments resulting from buffing shocks are encountered, caused by the larger distance of centre of gravity from the centre of buffing shocks.

Roofsheets have, to my knowledge, not been considered for carrying members of this type of car, most probably on account of the comparative thinness of sheets and the minimum resistance to shear attained in the small sized rivets used for roof sheet connections, further on account of the complicated form of roof in general, although no buckling of sheets could be feared, since they are curved to fit the outline of the roof and stiff enough in most cases to resist compression stresses at the centre of the car.

The end framing of the cars is in most cases built up of heavy rolled sections, which are invariably stronger than the present day reinforced end framing of wooden cars, in order to prevent telescoping, some of the designers even using heavy platform posts back of the diaphragm as well, thus securing a double barrier against telescoping. There is no definite data as yet which would give a safe practical resistance to prevent telescoping, with the exception of the assumption of sections by the U. S. Postoffice Department, these being of a section modulus of 65 at a height of 18 ins. above the floor level.

Omitting the advantages of steel cars over wooden cars entirely there are many points which point in favor to the double deck car. The main consideration of most of the railways that has led to the adoption of the double deck steel passenger cars was their general outline, which follows the old type wooden car, so that the general appearance of a train when made up of wooden and steel cars will not be spoiled. The travelling public, used to this deck construction, looks with favor upon the inadequate but visible ventilating device maintained through the decksash opening, and overlooks the more efficient but less noticable ventilators applied to cars.

In sleeping cars the insufficient light entering the car through the deck sash is the only light besides artificial light that supplies the wants of an upper berth traveller for his early morning gymnastics called "dressing."

Not very much will be said in this place of disadvantages of the double deck type of steel passenger cars, since a comparison with the single deck type of car is inevitable.

THE SINGLE DECK TYPE.

The single deck car underframe is built up in a similar way to the underframe of double deck cars, but it is a very rare case, indeed, that calls for a fishbelly type of centre sills, a medium sized rolled shape being found to answer the purposes of construction in every way.

The superstructure up to the side plate above the posts, is the same as used with the double deck cars. A carlin connects the two side plates in a single sweep, and is in most cases made of pressed steel. The roof sheets are applied direct to the carlin, but it is quite a common practice to use tar paper at the spliced joints in order to get a water-tight connection between roof sheets. The application of tar paper for joints ought to be abandoned where roof sheets are carrying members of the car, since it is impossible to get and maintain an absolutely stiff joint in such places with this practice. The roof sheets are usually made heavier than in the double deck car type since a certain amount of deterioration is taken into consideration, so that after a series of years of oxidization the sheets are still strong enough to stand the strains they are subjected to. The carrying members of the car are as follows: The centre sills, side sills, side sheets, belt rails (if used in this construction) side plates and roof sheets.

The centre of gravity of the carrying section of the car is naturally higher than in a double deck type, and the buffing shock lever is naturally larger, but it is in almost every case possible to have a carrying cross section weighing less per lineal foot than in a double deck type of car, since the tension and compression members are spaced a larger distance apart.

I do not know of a case where a steel platform casting has been used in this construction, since it has always been the aim of the designers to reduce the weight of this type of car as much as possible.

Fibre stresses and buffing shocks are kept within the same limits as mentioned for double deck cars.

The advantages of this type of car over the double deck type of car are numerous. First of all the single roof construction, with slightly increased thickness of sheets and a deeper curvature of roof, permits the use of the roof sheets for carrying purposes, which also permits cutting down of the side plate since a heavy side plate would not increase the section modulus of the car materially. There is no need of a special bracing of the roof sheets, because the large curvature of the roof effectively prevents buckling of sheets. I would advocate in this type of car the omission of side plate and carlins entirely and have the posts pressed in such a manner that they would substitute the carlins, this means an extension of posts same as used on lower deck of Pullman standard sleeping car, opposite posts being joined at the apex of roof by means of a splice plate and covered with the roof sheets in the conventional way. It will be harder to press these posts, but incidentally the omission of side plates and carlins means a reduction in weight and labor, both of which facts mean a cheaper car, and, furthermore, an easy regulation of width of car over posts, which is found difficult to maintain in pressed carlins, as they are very liable to warp after pressing and while cooling, thus changing the width of car unless the carlins are repressed cold in a close fitting die, which process is expensive and therefore to be avoided.

The air volume contained in single deck cars, compared to the air volume of double deck cars of the same length, is larger, at the same time the outside cooling surface of the single deck car compared to that of the double deck car is smaller, the body construction (labor and material) is cheaper than the double deck type; this can also be said of the total cost of inside finish. There are not as many bends and joints to be made when applying insulating material, which is a very important item for the successful insulation of cars. The head room of the car is generally higher in the turtle back type.

As these cars cannot be ventilated by the use of a deck sash more efficient ventilators are applied, which are either working in conjunction with the lighting fixtures or applied separately, as is the practice of the Harriman lines.

The reduction of light caused by the elimination of the upper deck sash is a matter that might be taken as a drawback, but if one takes the amount of subdued light filtering through the old type art glass deck sash into consideration coupled with the amount of soot and dirt received through the same source, this advantage is turned to a decided disadvantage. In case the turtle back car should be used for a sleeping car design, the lack of light from the deck sash could be easily remedied by the application of skylights, consisting of a cast oblong concave glass let into the roof in the centre of the car, placed so that the convex side of the glass will project above the level of the roof, which will give the collecting soot and dust a chance to be blown off the smooth surface of the glass by the action of wind and rain.

A turtle back car would, on the other hand, provide decidedly more space for headroom in the lower as well as upper berth, since the roof starts up at the posts with an abrupt rise, giving about 8 to 10 ins. more total headroom at the centreline of berth than a double deck car, which would mean an increase in headroom of from 4 to 5 ins. per berth.

Despite the increased headroom and air volume per passenger, the turtle back car is easier to be heated, since there is no draft through deck sash, permitting heated air to escape when the ventilators

are closed and further the slightly decreased total roof surface should be a great factor in keeping the car warm on a smaller steam or fuel allowance than permitted for double deck cars.

CONSTRUCTIONAL DETAILS.

Constructional details are matters that should take the whole attention of the car department of the railway and that of the contractor. The simpler details are worked out the easier it will be to replace them when in service, and although I am a firm believer in pressed pieces for car construction, I will concede that it is easier to replace standard angles or shapes than to replace the former.

The use of windows of different height and size in one type of car, as well as the use of half elliptic deck sash of art glass above the window, are features that I think objectionable from the purchaser's standpoint, since it is necessary to shape the outside steel sheets as well as the inside finish in many cases to the shape of this half elliptic sash, which is an expensive job when executed in a repair shop without the aid of dies or presses. The different sizes of windows mean a larger number and more frequent change of dies in the contract shop, which operation takes time and money, on account of the greater number of templets and dies used and the work connected with these changes, the bill of which must be footed by the purchaser, without gaining any visible advantage excepting perhaps the rather doubtful pleasure of keeping a larger number of window panes or sash in stock to suit the different sizes of windows, since the saving in glass caused by different construction is a negligible quantity.

It is, however, erroneous to suppose that it is necessary to employ large hydraulic machinery, big squaring shears or multiple punches to do the repair work, as I have seen shops that built cars commercially successful without any of the heavier type of machinery used in freight car construction.

In regard to the means of permanent connection of several units in steel passenger car construction, we have at present only two methods that are to be mentioned here and these are rivetting and spot welding. The former, most commonly used, is a source of a great deal of trouble and expense in the erection of the cars, since it means a lot of preparatory work before a rivet can be driven. All material must be centre-punched, marked, punched to different rivet sizes, which causes in many cases rehandling of material on different machines, or resetting of single machines, assembling, reaming, and rivetting. Rivet holes never meet as perfectly as the drawings show them to meet, and the only means of getting the holes right is to punch them smaller and ream them to size afterwards when assembled. This is very expensive as to labor, and there is no assurance that the rivet will fill the hole after being driven. I have seen rivets driven in holes that were about ⅜ in. too large, so that the hole was covered up by the rim of the rivet instead of being filled by the rivet shaft, but I must not forget to state that this was on freight car work.

Spot welding, though at present only out of the experimental stage, promises to eliminate all this trouble. Sheets and pressings are trimmed to size, placed in jigs, representing side or end of car and welded up with a specially designed spot welding machine. These welds will stand about 30% more in shear compared to a rivet of the same size in a punched hole, and the whole structure will be stiffer than a rivetted structure of the same design, since there is no surplus space in a rivet hole that would permit the sheet to shift when under stress. These facts have been partly proven by personal experiments while connected with the American Car and Foundry Co., and further by those conducted by Chief Electrical Engineer, Mr. Osborn, of the same company. The testing of spot welded joints is as easy as the inspection of rivetted joints, but it would be advisable to have the inspectors watch the welding process, as well as inspect the weld after cooling. The former inspection will prevent a poor weld being made, by watching the flash between sheets, which is invariably a sign of perfect weld, the second inspection being confined only to rapping the weld with a hammer and judging the weld by the difference in tone to that of the unwelded portion of the sheets. Both inspection methods should supplement one another and should be especially applied to heavy welding work in carrying members of cars, since the use of spot welding in connection with steel inside finish would hardly call for more than a general inspection. There is no doubt at all that this is the future of the steel freight car, and I am certain that electrical spot welding will be successfully adopted for all steel passenger cars as well. The commercial success of this method is guaranteed, since this process will mean a considerable reduction in the price of cars, amounting to from 3 to 3½% of the price total of the car figured on a rivetted basis.

MAINTENANCE.

The maintenance of steel passenger cars is one of the most serious questions with railway companies, excepting, of course, those roads that are in a position to build their own cars and which, therefore, can take care of the repairs of their equipment with the machinery they use for the construction of new cars. Another item which was not heeded well enough in the first cars built, and which is now going to bother those members of the railway fraternity that have to keep the cars in working condition, is the question of rust protection in places not visible, between outside shell and inside finish of cars.

We know that a body kept at a certain low temperature, and afterwards transferred to a place of higher temperature with a high percentage of humidity, will sweat or condense moisture on its surface, until the body has risen in temperature to that of the surrounding air, at which point the condensed moisture will be slowly absorbed by the air. The amount of moisture taken up is largely dependent on several factors, like the ductility and temperature of the condensing surface, thickness of sheets, moisture, temperature and volume of surrounding air, etc.

In steel passenger cars the inside face of the outside steel shell is that part of the car most subject to this occurrence, and what conditions are prevalent at this particular place? The steel sheets were sandblasted, and after that given either a coat of red lead mixed with an indifferent grade of linseed oil of the quick drying "gasoline" variety, or the car was coated on the inside with two or three coats of poor varnish. On top of this was applied by means of wooden strips or o.h.s. straps a layer of ⅜ to ¾ in. hair felt insulation quilted in paper, the whole being enclosed by anything but an airtight inside finish.

In the winter the temperature in the car is kept about constant, the humidity is rising, caused by exhalation of the passengers, reduced ventilation only takes place, and the result of this is that a highly humid air current is set up in the space between outside and inside shell of car, caused by leaks in the inside finish. The outside shell is constantly cooled through the movement of the car, condensation takes place on the inside surface of the outside shell, the force and extent of which is dependent on the care and material with which the sheets have been coated. The condensation freezes between the hairfelt insulation and the outside shell. Warm weather sets in, the ice thaws, and the water settles at once in the hair felt, from which place it is hard to dislodge. Meanwhile freezing and thawing have some influence on the sheet insulation material, the coat of paint, naturally poor, has given way in the form of cracks, flaking off sets in and the moist hair felt wil. start rusting in a very short time.

A better system of rust protection has been introduced of late, consisting of the application of an elastic coat of varnish applied to the sand blasted inside surface of the outer shell, which is covered before setting with a blast of finely broken cork dust. This process can be repeated several times until the treated surface becomes almost non condensing, by reducing ductility through the cork layer, after this the hair felt is applied by means of nails previously welded to the inside surface of the outside shell, by means of their heads, the points projecting inwards. The hair felt or other insulation material is impaled on these nails and the latter bent over after the insulation sheets had been pushed to the outside sheets. This prevents the movement of hair felt on the surface of inside shell and consequently keeps the cork surface in good condition. I think it would be worth while to improve further on this system by means of a waterproof coating on top of the quilting and a careful pasting down of insulation joints in order to prevent every possibility of water condensing on the sheets.

In an experimental way the use of calcium chloride, applied in fixed receptacles between outside and inside shell, would be worth while trying, since the latter is a powerful moisture absorbing agent without doing any harm to steel or other metals. In all cases the inside finish ought to be applied as tight as possible and all fissures closed. The application of sheething to the outside of steel cars, in imitation of wooden cars, consisting of a series of sheets, pressed or drawn to the well known keystone shape and fastened to the carrying sheets by means of screws or rivets placed in the depressions of the sheets, which in turn are covered by keystone shaped steel troughs, fitting into the dovetails of the first applied sheething and placed in position by sliding them into place from the side sill edges of the car, after the troughs have been coated with a specially prepared varnish, has not proven very successful. The composition material smeared into the keystone openings of the later used wooden blocks, visible on the bottom edge of the cars, have dropped out in places in the course of time, moisture got in and you can imagine the result in some of the cases, after a lengthy exposure.

A handy tool for the repair of damaged steel cars and for any class of passenger car work as well, is one of the gas welding outfits with cutting attachments now so popular in the car shops of this continent. The system used is more or less dependent on the work to be done and the facilities on hand.

Oxygen hydrogen welding will be welcomed at those places where direct electrical current is obtainable at low prices and the use of a supplementary acetylene tank for the mixture of hydrogen with acetylene for welding purposes will permit the raising of welding temperatures from 3,900° for the oxygen hydrogen system to 4,900° which temperature is more than enough for any kind of work in the steel

passenger car repair shop. Oxygen acetylene, oxygen oil gas, oxygen blaugas, and oxygen coal oil vapor-gas welding outfits and the scope of their work are at present so well known that it is hardly worth while to go into details.

When looking forward to electrically welded (spot welded) steel passenger cars, the question of repairs is seen in an entirely new aspect. As long as the use of patches, as for instance in freight car service, would be permissible, the item of repairs would be easily enough answered, but I am sure that no railway company of the present day would permit the use of visible patched cars, or would even tolerate the use of rivets for the replacement of the new sheets. Joints of spot welded sheets are hard to separate, since there are no rivet heads to be cut off, which would permit the separation of a combination into its units. The cutting torch would have to be employed to cut the damaged sheets or rivets out, after which the remaining strips of material of the damaged sheets, welded to the uninjured sheets, would have to be separated by means of heating with the welding torch, rolling up of the impaired material, and cutting welds with torch or chisel.

In the construction of spot welded cars considerable care would have to be taken in designing the car, so that in case of repairs the repaired parts would be accessible with the spot welding machine, since rivet joints would be excluded from use, as they would not fit in with the design of the uninjured part of the car.

All these questions are, however, solvable, and they will be eventually simplified by the use of specially designed tools for this purpose, so that these apparent drawbacks will more than outweigh the cheaper construction and the greater rigidity of the joints.

(To be Continued.)

Canadian Northern Railway Earnings, Etc.

Gross earnings, working expenses, net earnings, increases, or decreases, compared with those for 1911-12, from July 1, 1912:—

	Gross Earnings	Expenses	Net Earnings	Increase
July	$1,829,700	$1,335,100	$494,600	$133,000
	$1,829,799	$1,335,100	$494,600	$133,000
Incr.	$ 353,800	$ 220,800	$133,000	.....

The mileage in operation during July was 4,297, against 3,711 in July, 1911.

Approximate earnings for Aug., $1,745,800, against $1,420,600 for Aug., 1911.

Canadian Pacific Railway Earnings, Etc.

Gross earnings, working expenses, net earnings, increases or decreases, compared with those for 1911-12, from July 1, 1912:—

	Gross Earnings	Expenses	Net Earnings	Increase
July	$12,052,398.58	$7,604,221.68	$4,448,176.90	$745,148.57
	$12,052,398.58	$7,604,221.68	$4,448,176.90	745,148.57
Incr.	$ 2,390,580.44	$1,645,431.87	$ 745,148.57	.....

Approximate earnings for Aug., $11,886,000, against $10,073,000 for Aug., 1911.

During August, the mileage operated was increased to 11,178.

Grand Trunk Railway Earnings, Etc.

Aggregate from July 1 to Aug. 31:—

	1912.	1911.	Increase.
G.T.R.	$7,650,473	$6,890,203	$760,270
C.A.R.	402,272	366,945	35,327
G.T.W.R.	1,168,503	1,124,775	43,728
D.G.H. & M.R.	393,618	364,120	29,498
Totals	$9,614,866	$8,746,043	$868,823

Approximate earnings for Aug., $4,966,415, against $4,502,674 for Aug., 1911.

Western Canada Railway Club.—At the monthly meeting, Sept. 9, J. E. Forslund, General Colonization Agent, C.P.R., read a paper on the relation of the company's land and immigration department to the traffic department.

Mainly About Transportation People.

SIR WM. C. VAN HORNE has been elected Chairman of the Metropolitan Parks Commission, Montreal.

SIR WILLIAM MACKENZIE returned to Toronto, Sept. 3, after a business trip to the Pacific coast.

E. J. CHAMBERLIN, President G.T.R. and G.T.P. Ry., has been elected a director of the Montreal Warehousing Co.

D'ARCY SCOTT, Assistant Chief Commissioner Board of Railway Commissioners, left Ottawa, Sept. 6, for a European trip.

J. R. LECKIE, G.T.R. locomotive foreman at Stratford, Ont., was married to Miss M. Hamilton at Palmerston, Ont., Sept. 5.

H. L. DRAYTON, K. C., took up the duties of Chief Commissioner of the Board of Railway Commissioners at Ottawa, Sept. 4.

CECIL B. SMITH, M. Can. Soc. C. E., who died in Toronto recently, left an estate valued at $126,870.90, to his widow and two sons.

J. S. W. DOUGALL, President Dougall Varnish Co., Ltd., Montreal, has been elected a Director of the Canada Accident Assurance Co.

A. Copony,
Chief Draughtsman, Car Department, Grand Trunk Railway.

G. D. PERRY, General Manager Great North Western Telegraph Co., Toronto, and Mrs. Perry, have been spending a short time at Brackley Beach, P.E.I.

C. W. RHODES, who acted as paymaster G.T.R. during construction of the Western division from 1880 onwards, died at Victoria, B.C., Sept. 4, aged 51.

MISS C. PARENT, daughter of S. U. Parent, formerly Chairman National Transcontinental Ry., was married to A. C. Major, of Ottawa, at Dorion, Que., Sept. 11.

T. CLARKE, for 30 years foreman of the G.T.R. yards at Point St. Charles, Montreal, and from which he retired in 1905, died in the Royal Victoria Hospital, Montreal, Aug. 29.

L. J. STREET, heretofore Vice President, Canadian Inspection Co., Toronto, Toronto, has been appointed as salesman on the Dominion Iron and Steel Co.'s staff at Sydney, N.S.

MRS. W. H. GRANT, wife of the Manager of Construction, Mackenzie, Mann and Co., Ltd., returned to Toronto early in September, after spending the summer in Europe.

SIR WM. C. VAN HORNE is reported to be interested in the formation of the Canadian Steel Package Co., a charter for which is being asked from the Dominion Government.

THOS. O'KEEFE, who is referred to in a press report as Assistant Roadmaster, Michigan Central Rd., Welland, Ont., died there, Sept. 23, from an affection of the bronchial tubes.

ANSON CAMPBELL, insurance broker, Montreal, who died in the Royal Victoria Hospital there, Sept. 2, aged 78, was for a number of years Assistant Treasurer of the old South Eastern Ry.

O. A. TRUDEAU, advertising clerk in the G.T.R. District Passenger Agent's office, Montreal, was married Sept. 16 to Miss S. Paquette. The office staff presented him with an easy chair.

MRS. D. B. HANNA, wife of the Third Vice-President, Canadian Northern Ry., returned to Toronto early in September, with her family, after spending several weeks at Lake St. Joseph, Que.

W. D. MATTHEWS, Director C.P.R., has been elected Vice-President Canadian General Electric Co., to fill the vacancy caused by the death of H. P. Dwight, President Great North West Telegraph Co.

JAS. DUNSMUIR, director C.P.R., with Mrs. and Miss Dunsmuir, arrived in Montreal, Sept. 15, from England, where they had been for the past year. They subsequently left for their home in Victoria, B.C.

DUNCAN MacPHERSON, Assistant to the Chairman, National Transcontinental Railway Commission, has resigned the chairmanship of the Canadian Society of Civil Engineers' committee on railway ties.

MISS M. G. NANTON, daughter of A. M. Nanton, formerly Managing Director, Alberta Ry. and Irrigation Co., was married in Winnipeg, Sept. 5, to Lorne Cameron, son of the Lieutenant-Governor of Manitoba.

The Countess Jacques de Lesseps, daughter of SIR WILLIAM MACKENZIE, with her son, returned to Europe in September, accompanied by her sister, Mrs. W. Beardmore, after having spent the summer in Canada.

The Rt. Hon. Sir Richard J. Cartwright, G.C.M.G., who died at Ottawa, Sept. 24, following an operation for strangulated hernia, was father of A. D. CARTWRIGHT, Secretary of the Board of Railway Commissioners.

D. C. McNAB has been appointed Deputy Minister of Railways, Telegraphs and Telephones for the Saskatchewan government, vice S. P. Porter, who was recently appointed Executive Agent, G.T. Pacific Ry., Regina, Sask.

SIR THOS. SKINNER, London Eng., director C.P.R., arrived in Quebec, Sept. 13, and proceeded to Winnipeg and other western points, in connection with the business of the Hudson's Bay Co., of which he is Deputy Governor.

J. J. HILL, ex Chairman of the Board, Great Northern Ry., was entertained at dinner in St. Paul, Minn., on Sept. 16, his 74th birthday, by citizens of that place and other friends throughout the northwest, about 1,200 being present.

J. W. SIFTON, who died at Winnipeg, Sept. 19, built the telegraph line from

Winnipeg to Fort Pelly in the seventies and was also a contractor on the C.P.R. when portions of it were being built by the Dominion Government.

The Canadian Ticket Agents' Association has enrolled the following new members recently:—C. R. Coleman, C.P.R., Truro, N. S.; C. E. Hardy, C.N.R., Sudbury, Ont.; W. A. Cameron, G.T.R., Durham, Ont.; W. R. Widdess, G.T.R., Lindsay, Ont.

G. E. WADLAND, who succeeded the late H. W. Mills, as Manager of the Sarnia Street Ry. recently, has also been appointed G.T.R. town ticket Agent at Sarnia, Ont., to succeed Mr. Mills, and has joined the Canadian Ticket Agents' Association.

V. A. HARSHAW, Superintendent C.P.R., Woodstock, N.B., while starting out on an inspection trip on his railway motor car, Aug. 28, collided with a team at a crossing, and was thrown out, but escaped with a bad bruising and some minor injuries.

M. FLYNN, for many years Master Mechanic Michigan Central Rd., was accidentally suffocated by coal gas in his house at St. Thomas, Ont., recently. One of his sons, W. H. Flynn, is Superintendent of Motive Power M.C.R. at Detroit, Mich.

A. D. McRAE, of Davidson and McRae, and associated with the Mackenzie, Mann and Co.'s industrial enterprises in British Columbia, will, it is said, be gazetted honorary Lieut.-Colonel of the 6th Regt., Duke of Connaught's Own Rifles, Vancouver, B.C.

J. A. THOMPSON, Dominion Inspector of Steamboats, died in the Jubilee Hospital, Victoria, B.C., Sept. 2, aged 65. He arrived in British Columbia in 1886, and after three years' service on coasting steamers was appointed Inspector of Steamboats there.

C. Le B. MILES, M. Can. Soc. C. E., who for some time past has been Division Engineer on Algoma Central and Hudson Bay Ry., construction builder at Michipicoten Harbor, Ont., has returned to Calgary, Alta., where he is going into private practice and contracting.

G. I. EVANS, who has been appointed Superintendent of Angus Locomotive Shops, C.P.R., Montreal, was born there, May, 1880, and entered C.P.R. service, April, 1900, since when he has been, to Mar., 1906, draughtsman; Mar., 1906, to July, 1910, Chief Draughtsman; July, 1910, to Aug., 1912, Mechanical Engineer.

F. G. MILLEN, who has been appointed Assistant Treasurer, C.P.R., Montreal, was born there, Feb. 21, 1875, and entered C.P.R. service, June 1, 1890, since when he has been, to Oct. 1, 1890, in Accounting Department; Oct. 1, 1890, transferred to Secretary's office, where he has served in various capacities, being, at the date of his present appointment, Aug. 30, chief clerk.

A. P. GILLIES, who attracted considerable notice in Toronto as the promoter of a plan for the building of a great central terminal station hotel and office building during the past two or three years, has been sent to jail at Tacoma, Wash., in default of finding bail for $10,000, pending an investigation of alleged fraud in connection with an industrial concern he was promoting there.

S. P. PORTER, who has been appointed Executive Agent, G.T. Pacific Ry., Regina, Sask., and whose portrait appears in this issue, was born in 1870, in Somersetshire, Eng., and came to Canada in 1886. He entered railway service in 1889, with the C.P.R., as trainman. From 1901 to 1907, he was homestead inspector for the Dominion government, and in 1908 he was appointed Deputy Minister of Railways, Telegraphs and Telephones for Saskatchewan, which position he resigned some few months ago.

SIR THOS. G. SHAUGHNESSY, President C.P.R., left Montreal, Sept. 4, on his annual trip of inspection over the company's lines west of that city. He was accompanied by Sir Edmund Osler, R. B. Angus, and W. S. Matthews, directors; F. F. Begg, London, Eng.; and Jas. Redmond, Montreal. George Bury, Vice President and General Manager, Western Lines, accompanied Sir Thomas from Fort William to the Pacific Coast and back. At different points of the trip the party was met by the general superintendents and other officers, who travelled over their respective divisions. Sir Thomas returned to Montreal Sept. 23.

M. J. POWER, whose appointment as General Purchasing Agent, C.P.R., Montreal, was announced in our last issue, was born at Montreal, June 19, 1877, and entered C.P.R. service, Mar. 16, 1891, since when he has been, to Nov., 1893, office boy, etc., General Passenger Department, Montreal; Nov., 1893, to May, 1897, stenographer, same department; May, 1897, to June, 1898, secretary to General Passenger Agent, Montreal; June, 1898, to Aug., 1901, secretary to

S. P. Porter,
Executive Agent, Grand Trunk Pacific Railway.

Passenger Traffic Manager, Montreal; Aug., 1901, to July, 1908, secretary to the President; July, 1908, to July 29, 1912, chief clerk and private secretary to the President.

The Montreal daily press recently announced the death of ALLAN CAMERON, in London, Eng., on Sept. 12, and stated that he held the position of General Traffic Agent, C.P.R., New York, since Jan., 1909. The dispatch from London, Eng., stated that the death had occurred there of Allan Cameron, second son of the late Hon. John Hillyard Cameron, of Toronto, aged 61. Allan Cameron, of the C.P.R. service, was born at Toronto, March 14, 1864, and was, for a time General Traffic Agent, C.P.R., New York, but in February last was appointed Superintendent Land Branch, Department of Natural Resources, C.P.R., Calgary, Alta. He still occupies that position.

B. F. SHORTLEY, who has been appointed Terminal Agent, Intercolonial Ry., Bonaventure station, Montreal, was born at Montreal, June 24, 1866, and entered railway service, Sept. 27, 1887, since when he has been, to May 1, 1900, in G.T.R. service, as switchman at St. Hyacinthe, Que., telegraph operator at various points, including three years at St. Lambert, Jct., Que., and from 1893, as train dispatcher at Montreal, Belleville, Ont., and Island Pond, Vt.; May 1, 1900, to the date of his present appointment, in I.R.C. service at Bonaventure station, Montreal, as clerk, operator, assistant to Terminal Agent, and acting Terminal Agent.

The Minneapolis, St. Paul and Sault Ste. Marie Ry. report for the year ended June 30, contains a memorial notice, recording the directors' appreciation of the late W. D. WASHBURN, a former director of the company, who died recently. In part, it reads:—"In the fullness of years and achievement, the first President of this company, and one of its directors from its organization, he passed away in Minneapolis, Minn. In his death, not only has this company lost an able and loyal conservator of its interests, but the board has also parted from a personal friend, whose presence and counsel will be deeply missed after the association of so many years. He saw the incalculable benefit to his home city and the northwest, of a highway of commerce to the seaboard by way of Sault Ste. Marie, and surmounted all apparent obstacles, and with other associates, whose interest he enlisted in the enterprise, began the construction of such a highway, and to-day the Soo line exists as a monument to his enterprise and genius."

A. COPONY, an article by whom, on suggestions and deductions from steel passenger cars, appears on another page, and whose portrait also appears in this issue, is a British subject, born in Vienna, Austria, in 1880, where he was educated in the public and high schools, and the Engineering College, whence he graduated in 1901. After serving in various capacities with some English machinery manufacturers, at their branches in Vienna and Fiume, Hungary, he went to the U. S. in May, 1907, and from that date to Feb., 1910, was engaged with the Standard Steel Car Co., Butler, Pa., as draughtsman, and assistant chief draughtsman, and at the company's Hammond works, where he was Master Mechanic, Passenger Car Department. From Feb. to Oct., 1910, he was in charge of toll designing for the American Car and Foundry Co.'s new passenger car shops at St. Charles, Mo., and later on was engaged on experimental work in the company's St. Louis shops. He resigned in Oct., 1910, on his appointment as Chief Draughtsman, Car Department, G.T.R. Western Division, and was shortly after transferred to Montreal as Chief Draughtsman, Car Department, same company.

The Canadian Ticket Agents' Association's 26th annual meeting will be held in Ottawa, Oct. 9 and 10. The headquarters will be at the Chateau Laurier, where the business meeting will be held. The social features will include a visit to the Parliament buildings, a car ride around the city, a trip on the Ottawa river, theatre and other social parties. On Oct. 11 the party will leave for Montreal, and will partake of afternoon tea on the Donaldson line s.s. Saturnia. That evening they will board the White Star-Dominion line s.s. Laurentic and leave at daybreak on Oct 12 for Quebec, where they will disperse.

W. BELL, at one time President, Guelph Junction Ry. Co., and one of the founders of the Bell Piano and Organ Co., Guelph, Ont., was found dead on the G.T.R. track near that city, Sept. 26, his body having been badly mutilated by a train.

Railway Development.

Projected Lines, Surveys, Construction, Betterments, Etc.

Alberta Interurban Ry.—There has been deposited with the Secretary of State at Ottawa a mortgage deed dated April 12, between the company and the Trust and Guarantee Co., covering the company's whole undertaking, present and future.

The Board of Railway Commissioners has approved of location plans for this line from the north line of sec. 31, tp. 24, range 28 west 4th meridian to sec. 15, tp. 29, range 23 west 4th meridian, mileage 9.93 to 66.80, and has authorized it to build along highways.

Algoma Central and Hudson Bay Ry.—The Board of Railway Commissioners has authorized the opening of the line for traffic from Hawk Lake jct. to a junction with the C.P.R. transcontinental line near Hobon, Ont., 31.5 miles. Hawk Lake jct. is at mileage 164.5 on the main line from Sault Ste. Marie, and is the point where connection is made with the company's branch line to the Helen and other mines and to Michipicoten harbor.

In connection with the extension of the line from near Pangissin to Park Lake jct., T. J. Drummond, President Lake Superior Corporation, is reported as stating, Sept. 5, that it was expected to be able to put on a regular train service through from Sault Ste. Marie in November. About 25 miles of the track had to be ballasted. North of the C.P.R., 12 miles of track had been laid and it was expected that by the end of the year track would be laid for a further distance of 48 miles to the crossing of the Canadian Northern Ontario Ry. It was expected to have the line completed to a junction with the G.T. Pacific Ry. by the end of 1913. (Sept., pg. 450.)

Burrard Inlet Tunnel and Bridge Co.—The North Vancouver city council has voted an additional $50,000 in aid of the building of the projected bridge across the second narrows of Vancouver inlet. (Sept., pg. 450.)

Central Ry. of Canada.—We are officially advised that the company has ordered in the U. S., 1,500 tons of 80 lb. steel rails for prompt delivery. This is in addition to an order previously given the Algoma Steel Co. Track laying will be started as soon as grading is completed from McAlpine to the Norton river, Ont. Ties have been delivered for the first 30 miles. All the bridges and culverts are under construction, and a contract has been given the Canadian Bridge Co., Walkerville, Ont., for the steel viaduct over the Scotch river. The station yard at McAlpine has been laid out, and a station, to be used jointly with the C. P. R., is about to be built. Construction will be pushed ahead west of South Inchorn as rapidly as possible. Construction is also under way east of McAlpine, through Hawkesbury, St. Andrews, and St. Eustache, thence on to the Back river and into Montreal. F. Stuart Williamson is Chief Engineer. (Sept., pg. 450.)

Delaware and Hudson Co.—We are officially advised that there is no truth in the press report which stated that the company was securing a large area of land on the south shore, opposite Montreal, east of the Chambly road, upon which to lay out a yard and to build a roundhouse and repair shops. (July, pg. 339.)

Dominion Atlantic Ry.—Plans for the erection of additional wing walls for a bridge at Bridgetown, N.S., and for a bridge over the Avon river at Windsor, N.S., have been approved by the Board of Railway Commissioners.

The Board of Railway Commissioners has approved of revised location plans for the line across Gaspereaux river, just east of Horton Landing, N.S., and of plans for the substructure of the proposed new bridge across the Gaspereaux river.

A contract has been entered into, under the act granting subsidies to certain railways, between the company and the Department of Railways, for the building of a line, not to exceed 15 miles, from Centreville westerly to Weston, N.S. (Sept., pg. 450.)

Edmonton, Dunvegan and British Columbia Ry.—The Board of Railway Commissioners has approved of location plans from mileage 0 to 5.13, out of Edmonton, Alta.

The Minister of Railways has approved of route maps for revised location of the line north of Edmonton for 45 miles.

It is reported that grading has been practically completed from near Edmonton to Athabasca Landing, and that track laying will be started at once. A. C. Galbraith, Provincial Superintendent of Works, is reported as stating that it is expected to have the track laid to Athabasca Landing this year.

There has been filed with the Secretary of State at Ottawa a trust deed dated July 22, made between the company, the National Trust Co., and the province of Alberta, covering the company's property as security for the 30 year 4% bonds which are guaranteed by the province. (Sept., pg. 450.)

Fort George to Barkerville.—Application is being made to the British Columbia Legislature to incorporate a company to build a railway from the Nechaco river near Fort George, southeasterly to the Fraser river, along the valley of that river to Six Mile creek, then easterly and southeasterly to Willow river, then northeasterly to Bear river, and then southeasterly to Barkerville, B.C. Burns and Walkem, Vancouver, are solicitors for applicants.

Interprovincial and James Bay Ry.—The Minister of Railways has approved of route map for this projected railway for 54 miles northerly from the terminus of the C.P.R. Kipawa branch at Kipawa, Que. (May, pg. 239.)

Erie, London and Tillsonburg Ry.—We are officially advised that J. H. Teall, the original promoter of this railway, has sold the company's charter and assets to the G.T.R.; and that construction was formally started on the line a short distance north of Port Burwell, Ont., July 30. (Sept., pg. 450.)

Esquimalt and Nanaimo Ry.—R. Marpole, Vice. President, and H. E. Beasley, General Superintendent, recently concluded an inspection of the extensions under construction. The grading on the extension from McBride jct. to Lake Qualicum is practically completed, with the exception of a section near Deep bay; about 75% of the Platt river section is completed; and progress has been made on the Trent river-Union bay section. The location of the branch line from Courtney to Duncan bay was also inspected. (Sept., pg. 450.)

Fredericton and Grand Lake Coal and Ry. Co.—Track laying is reported to have been started at Gibson, N.B., on the line to Minto, and it is expected that track laying will be started at the Minto end in a short time. Connection will be made with the C.P.R. by crossing the bridge at Fredericton. At Minto the line will connect up with the line of the New Brunswick Coal and Ry. Co., which took over the old Central Ry. of New Brunswick and which will be taken over from the New Brunswick Government. This line gives connection with the Intercolonial Ry. at Chipman. Press reports state that it is proposed to build a spur line eight miles from Minto to the National Transcontinental Ry.

The development of the coal areas is being carried on by the Minto Coal Corporation, organized by Sir Thos. Tait, with a capital of $400,000. A large number of coal properties have been taken over, and it is expected that the development work will have been so far advanced, that coal production can be begun in December. There are at present four producing collieries, having an output of 6,000 tons a month, giving traffic to the existing railway. It is estimated that the Minto coal field contains about 150,000,000 tons. (Sept., pg. 450.)

Ha Ha Bay Ry.—The Department of Railways has entered into a contract with the company, under the terms of the act granting aid to certain railways, for the building of the following lines: From a junction with the Quebec and Lake St. John Ry. in Jonquiers tp., to St. Mathias, Que., not exceeding 20 miles; from La Crosse jct. to the Saguenay river, northerly through Chicoutimi, Que., not exceeding five miles; from La Terriere jct., southerly via La Terriere village to Lake Kenogami, not exceeding 10 miles; from the existing line near Bagotville, Que., easterly to St. Alexis, Que., not exceeding 3 miles. (May, pg. 238.)

Intercolonial Ry.—Tenders are under consideration for the erection of an addition to the freight car repair shops at Moncton, N.B.

We are officially advised that the engineering staff is making a survey of the Cape Breton section of the line between Point Tupper and Sydney, N.S., with a view of bettering the gradients and alignment.

In an interview Sept. 12, W. F. Tye, formerly Chief Engineer, C.P.R., is reported as stating that he considered the Dominion Government should lose no time in extending the Intercolonial Ry. to Georgian Bay. A new double track, low gradient line from Montreal to Georgian Bay, is urgently needed. The traffic, he says, is already waiting for it, and the line is needed to relieve the congestion of the present railways. (Sept., pg. 450.)

Kettle Valley Lines.—Press reports state that Grant Smith and Co., Spokane, Wash., have been given a contract for building 57 miles of line from the lower end of the lake near Summerland, through Naramata to Hydraulic summit, near Kelowna, B.C. The reports also state that track has been laid to within 12 miles of Hope summit, from near which point it is said that a joint line will be built to Hope in conjunction with the Vancouver, Victoria and Eastern Ry. and Navigation Co. (Sept., pg. 450. See also under Great Northern Ry. Lines in Canada.)

Kootenay and Alberta Ry.—The Board of Railway Commissioners has authorized the opening of this line for freight traffic. The speed is not to exceed four miles an hour over trestles, and 10 miles an hour on the rest of the line, light power to be used, watchmen to be kept on each trestle, and the towers and foundations under truss spans to be inspected at least once a week.

This line is 13 miles, which has been built by the Western Coal and Coke Co., from Pinetree harbor, on the C.P.R.'s Crowsnest Pass line to the company's

coal mine at Beaver creek, Alta., was considerably delayed in construction, owing to a variety of causes, principally wet weather and sliding ground. The track laying was, however, completed to the mine on June 25, and a train was run over it. The line is of standard construction, with light gradients and easy curvature. Three miles of sidings have been built to the colliery and storage yards. There are some large timber structures, particularly over Langs coulee, at mileage 7, which is 195.5 ft. high, and at Mill creek, mileage 10, which is 159.5 ft. high. One big cut required the excavation of 149,000 cubic feet. The directors anticipate that as the line traverses an excellent agricultural district, its revenue from the carriage of farm produce will be an important addition to those derived from the transportation of coal. L. B. Merriam is Chief Engineer. (Sept., pg. 450.)

London and Port Stanley Ry.—In connection with the proposal to lease this line to the Lake Erie Coal Co., the directors ask that some new freight shed and station accommodation be provided at Port Stanley, Ont. The L.E.C. Co. proposes to expend $400,000 on electrifying the line in return for a 25 years lease. The directors have bought 22 acres of land for an extension of the freight yards at Port Stanley. It is expected that the lease will be signed at an early date. (Feb., pg. 68.)

Medicine Hat, Alta.—The plans of the building of the spur line from the Ansley colliery into Medicine Hat, Alta., have been completed, and application is being made to the Board of Railway Commissioners for their approval. The right of way is being acquired, and arrangements made for starting construction. Mr. Ansley states that he expects to have the line built this year. (July, pg. 339.)

Michigan Central Rd.—The Board of Railway Commissioners has approved of plans for the erection of a bridge across London street, Windsor, Ont. (Aug., pg. 412.)

Minneapolis, St. Paul and Sault Ste. Marie Ry.—Press reports state that a contract has been let for the building of a spur line of three miles to the mines on Cuyuna range, Minn.. F. Baxter, Superior, Wis., is the contractor. (Sept., pg. 451.)

Northern New Brunswick and Seaboard Ry.—A contract has been entered into between the company and the Department of Railways, under the act granting subsidies in aid of certain railways, for the building of 26 miles of railway from the Drummond mines at Austin Brook to the Intercolonial Ry., and thence to Alston Point, N.B. The line from Austin Brook to the Intercolonial Ry. has been built and is being operated. (Aug. pg. 412.)

Northern Pacific Ry.—President Elliott is reported as stating, Sept. 5, that the line from Seattle, Wash., to Sumas, on the International boundary, 120 miles, will be rebuilt next year, with reduced gradients and easier curves, and that it will be relaid with heavier steel.

Pacific Great Eastern Ry.—A commission has been appointed to settle the question of the route of the line in West Vancouver, B.C. The company has located its line along the waterfront for 2.5 miles, and the municipality desires that it be set back for from 100 to 250 ft. Application has been made to the Provincial Minister of Railways for the approval of the route of the line from Howe sound to Pemberton Meadow, 10 miles, but objection is made by the Howe Sound and Northern Ry., which has a line between the same points. Consideration of the matter was adjourned. The P.G.E. Ry. has power to acquire the H.S. & N. Ry., but so far they have been unable to come to terms.

Vice President D'Arcy Tate, is reported as stating, Sept. 5, that the funds necessary for construction had been provided, and that work would be gone on with as soon as the plans were approved. An additional survey party, under F. G. Ashe, has been put in the field to work from Lillooet southwesterly. (Sept., pg. 451.)

Pacific and Hudson Bay Ry.—The route of this projected railway for the section of the line from Bella Coola, to Natalkus lake, B.C., 230 miles, has been approved by the Minister of Railways. The line starts at Bella Coola, at the head of Burk channel, and follows the valleys of the Bella Coola and Athnarko rivers to Two Mile lake, thence crossing to the valley of the Salmon river, which is followed for some distance, thence to the valley of the Entico river to Natalkus lake. C. E. Cartwright, Vancouver, is Chief Engineer. (Aug., pg. 412.)

Quebec and Saguenay Ry.—A contract under the act granting subsidies to certain railways has been entered into between the company and the Department of Railways for the building of 62.8 miles of line from St. Joachim, Que., northeasterly.

Practically all the work on the construction of the line is reported to have been suspended owing to financial troubles. Sir Rodolphe Forget, President, is quoted as stating, Sept. 2, that trouble had been going on between the shareholders for some time, before it was decided to suspend operations. It was reported from Quebec Sept. 3, that 44 actions had been entered by employes on construction, and on Sept. 7, an action was entered against the company by O'Brien and Doheny, the general contractors, to recover $381,988.42 for work done and money paid.

The annual meeting was held in Quebec, Sept. 17. The following are the directors and officers for the current year:—President, O. B. Daoust; Vice President, H. G. Matthews; other directors:—Sir Rodolphe Forget, L. G. Morin, L. E. Morin.

St. John and Quebec Ry.—The New Brunswick Government, Sept. 10, finally approved of the plans for the building of the Gagetown-Swan creek section of the line. The Government has now approved of the plans for the whole line within the province. (Sept., pg. 451.)

Timiskaming and Northern Ontario Ry.—Track laying on the Elk Lake branch of 29 miles is reported to have reached the Jean Baptiste river, 12 miles west of Earlton, Ont., and ballasting is in progress. A large timber bridge is being built across the river, and it is expected that track laying will be resumed on the 10 miles between the Jean Baptiste river and the Montreal river, by Sept. 30. This river will be crossed at the Mountain chutes, by a steel bridge, for which a contract has been let. Grading has been practically completed into Elk Lake, and it is expected that the branch will be completed by Dec. 1. (Sept., pg. 451.)

Toronto, Hamilton and Buffalo Ry.—General Superintendent Eber is reported as stating, Sept. 10, in connection with the application being made to the Board of Railway Commissioners for an order compelling the depression of tracks in the city, "We have been trying to correct the existing conditions for some time, but it is a matter demanding careful attention and the gathering of many details from different sources. We have had engineers working for some time on the idea of depressing the tracks, but I cannot say just now what they are ready to report. They have reached no definite conclusion. It is a vital question, both to the city and ourselves, and our aim is to satisfy everybody. In my opinion the outcome depends on the city's attitude." (June, pg. 302.)

Wellington Colliery Ry.—A meeting of shareholders was held in Victoria, B.C., Aug. 30, at which resolutions were considered authorizing the directors to issue debentures, subject to the approval of the Minister of Railways, and to authorize the directors to purchase such other railways as might be desirable for the carrying on of the company's colliery business. (Aug., 1908, pg. 551.)

Toronto Union Station.

The question of the Toronto union station was down on the list of matters to come before the Board of Railway Commissioners in Toronto, Sept. 26, in connection with the city council's application for the final approval of plans, and for the fixing of a definite date when work is to be started.

Speaking of the new union station, Sept. 5, Sir Thomas G. Shaughnessy, President C.P.R., is reported to have said: "Work can be started on the building immediately. All that the C.P.R. asks is that the station be known as the union station. Our road will not run into any station that bears the name of another company. The company has already commenced work on the grade separation which must be completed before the new building can be erected."

In the course of an interview, Sept. 9, E. J. Chamberlin, President G.T.R., is reported to have said he could not state when actual construction would begin. It would take three months for the architect to prepare the plans necessary before it would be possible to call for tenders. The chief engineers of the two lines were engaged on the preparation of detailed plans. The C.P.R. would occupy the new station jointly with the G.T.R.

Railway Route Maps Approved.

The Minister of Railways has approved the following route maps:—

Canadian Northern Branch Lines Co.—Aug. 30. From tp. 18, r.l., w.p.m., to tp. 26, r.l., w.p.m., 38 miles.

Canadian Northern Ontario Ry.—Sept. 10. Through Montreal Island, about 17 miles.

Canadian Pacific Ry.—Sept. 16. From Hawarden to Floral, Alta., 46.8 miles.

Edmonton, Dunvegan and British Columbia Ry.—July 26. Revision north of Edmonton, Alta., about 45 miles.

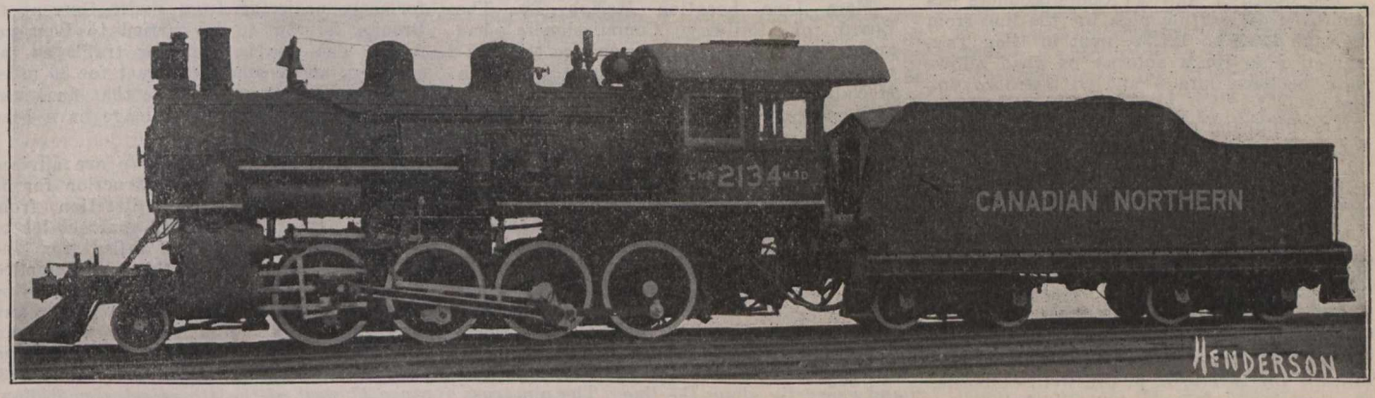
Erie, London and Tillsonburg Ry.—July 24. From Aylmer to Port Burwell, Ont., about 12 miles.

Interprovincial and James Bay Ry.—Aug. 30. From Kipawa branch, northwesterly, 54 miles.

Canadian Northern Railway Consolidation Locomotives.

The Canadian Locomotive Co. is delivering to the C.N.R. 25 consolidation locomotives for freight service, equipped with the latest type of superheater. These locomotives weigh in working order 188,600 lbs., and are of the usual type of consolidation locomotives, with semi-wide firebox over frames. Three hundred and forty-eight flexible staybolts are used in the breaking zone of firebox. The ashpan is of the C.N.R. style of hopper bottom. Outside steam pipes are used, incased within an air tight jacket secured to cylinder and smoke box. This arrangement eliminates most of the obstruction in the smoke box met with when using the inside steam pipes. The Pyle National electric headlight is used. The boiler is fed from the top, through an arrangement of check valves in base of bell stand. The tender tank holds 6,000 imperial gallons of water and 12 tons of coal. The frame is built of 10 x 13 ins. steel channels. The truck is of the equalized type, with a cast steel bolster. The equipment includes Westinghouse brakes ET no. 6 type, with two 9½ in. air pumps. The following are the principal dimensions, etc.:—

Tractive effort	35,000 lbs.
Weight in working order	188,600 lbs.
Weight on drivers	163,000 lbs.
Weight of engine and tender, total	332,600 lbs.
Wheel base, rigid	15 ft. 6 ins.



Canadian Northern Railway Consolidation Locomotive.

Wheel base, engine, total	23 ft. 9 ins.
Cylinders, diar. and stroke	23 by 26 ins.
Piston valves	12 ins.
Driving wheels, diar	57 ins.
Boiler pressure	180 lbs.
Boiler, diar. at first ring	66⅜ ins.
Firebox, length and width	114 by 40¼ ins.
Tubes, no. and diar.	179—2 ins.
Flues, no. and diar.	24—5⅜ ins.
Tubes, length	14 ft.
Heating surface, tubes and flues	1,772 sq. ft.
Heating surface, firebox	179 sq. ft.
Heating surface, total	1,951 sq. ft.
Superheater heating surface, inside tubes	360 sq. ft.
Grate area	31.8 sq. ft.
Weight on drivers—tractive effort	4.7
Total weight—tractive effort	5.38
Tractive effort x diar. of drivers—heating surface	800.88
Total heating surface—grate area	78.33
Firebox heating surface—total heating surface per cent.	7.18
Weight on drivers—total heating surface	61.02
Volume equivalent cylinder, cub. ft.	12.5
Total heating surface—volume of cylinder	199.28
Grate area	2.54
Equivalent heating surface, 1,951 sq. ft. (1.5 x 360 sq. ft.)	.2491 sq. ft.

Dominion Railway Subsidy Agreements.—The Dominion Government has entered into subsidy agreements for the following construction,—with the Canadian Northern Pacific Ry., Aug. 7, for a line from the Yellowhead pass to Vancouver and the mouth of the Fraser river, 525 miles; and with the Canadian Pacific Ry., Aug. 2, as lessee of the Calgary and Edmonton Ry., for a bridge over the Saskatchewan river, connecting Strathcona and Edmonton, Alta.

Grand Trunk Railway, Betterments, Construction, Etc.

Southern New England Ry.—Press reports state that surveys are being made under the direction of G. M. Thompson, for a line from Hoylake, Mass., eastward to the Central Vermont Ry.; and through New Hampshire, towards Boston, Mass.

St. Lambert Yards, Etc.—In connection with the work now in progress at St. Lambert, Que., press reports state that the company has bought 400 acres of land, and a long strip extending almost to St. Hubert, and that in addition to laying out yards there, locomotive and other shops will be built. These will not replace the Point St. Charles shops, but will, it is said, be utilized for G.T. Pacific Ry. purposes. One report says that the new shops will be completed within five years.

Victoria Jubilee Bridge Approaches, Etc.—Plans are under consideration by the Montreal city council for the enlargement of the yards at Point St. Charles, for which purpose it is necessary to rearrange the approaches to the Victoria Jubilee bridge. The City Engineer was directed to examine the plans and report fully.

We are advised that a contract has been let to the John S. Metcalf Co., Montreal, for a freight warehouse at the corner of Wellington and Bridge streets, Point St. Charles, Montreal. It will be 1,200 by 60 ft., concrete foundations, with brick walls and steel posts, wooden doors and roof.

Prescott, Ont.—The ratepayers of Prescott, passed a bylaw, Sept. 23, conferring an agreement between the town council and the company, for the establishment of divisional terminal facilities. Under the agreement the land owned by the company will be assessed at $16,000 a year for 25 years, and the town will provide $35,000 for the settlement of land damages, etc. The company agrees within two years to lay out terminal yards, and erect a roundhouse, repair shop and other buildings at a cost of not less than $150,000.

Diversion Near Bracebridge, Ont.—The Board of Railway Commissioners has approved of revised location plans for the line in the vicinity of Moore's crossing, near Bracebridge, Ont.

King St. Subway, Toronto.—Plans are under consideration for the reconstruction of the bridge across King street west. It is proposed to remove the present stone pillars in the centre of the roadway, replacing them by steel, and to increase the headway to 14 ft. The city council has the plans under consideration, and it is suggested that the headway might be increased to 18 ft.

Hensall, Ont., Yards.—Plans have been approved by the Board of Railway Commissioners for the rearrangement of the yards, and the building of a new station.

Port Burwell to London, Ont.—Construction is in progress at Port Burwell, Ont., on a line to Aylmer, and engineers are reported to be in the field locating a route from Aylmer to London. Press reports state that construction will be pushed so as to have the line completed to London within a year. (Sept., pg. 448.)

Grand Trunk Pacific Railway Annual Meeting.

A. W. Smithers, of London, Eng., Chairman of the Board, presided at the annual meeting in Montreal, Sept. 18. Good progress was reported on the construction of the main line, as well as on branch lines, the latter comprising approximately 2,000 miles, which the company has at present under construction in Manitoba, Saskatchewan and Alberta, which make connection at many different points with the main line. Track-laying on the main line to the Pacific Coast has reached mile 1,100 west of Winnipeg and beyond the Rocky Mountains. Track laying from the Pacific Coast at Prince Rupert easterly has reached mile 176 at Hazelton, B.C. This leaves a section to be constructed of about 460 miles, which, however, is all under contract, and the work is being carried to completion as rapidly as the character of the country and the labor supply will permit.

Following is the board as constituted for the current year: President, E. J. Chamberlin; other directors, A. W. Smithers, Sir Henry M. Jackson, Sir Felix Schuster, Sir Wm. Henry White, W. Wainwright, M. M. Reynolds, E. H. Fitzhugh, W. H. Biggar, E. B. Greenshields, Hon. R. Dandurand, W. M. Macpherson, Hon. G. A. Cox, E. R. Wood and J. R. Booth.

Jules Hone is also a director, appointed by the Dominion Government under the agreement with the company respecting the construction of the eastern division. The newly elected directors are Sir Felix Schuster and Sir Wm. Henry White, who are directors of the G.T.R. Co., and serve in their turn on the G.T. Pacific board.

Ore Shipments from Fort William.—The Northern Pyrites Mining Co., which is located near Fort William, Ont., is said to be negotiating for special arrangements with the Grand Trunk Pacific Ry. for the shipment of large quantities of pyrites ore in the near future. The proposed arrangements would necessitate the construction of ore docks and other ore handling facilities at Fort William.

A Montreal press dispatch towards the end of September, stated that the C.P.R. had placed an order with the Montreal Locomotive Works, for 125 locomotives, but up to the time of going to press we were unable to obtain any confirmation of this.

Canadian Pacific Railway, Construction, Betterments, Etc.

Second Track Work at St. John's, Que.—We are officially advised that the second track work between St. John's and Highlands, Que., 22 miles, is well on to completion. The application made to the Board of Railway Commissioners was for approval of plans for a second track from mileage 17.35 Farnham subdivision, a point between St. Gregoire and Iberville jct., but the plans submitted therewith only covered the work from the eastern end of the yards at St. John's. It is likely that the second track work will be continued easterly from St. John's to Farnham, next year, but plans for this work have not yet been approved. When undertaken the work will be covered by a new application to the Board. J. M. H. Fairbairn, Assistant Chief Engineer, Montreal, has charge of the work.

The Board of Railway Commissioners has authorized the opening for traffic of the portion of the second track from L'Acadie to north of diamond crossing G.T.R. at St. John's, Que., 3.60 miles.

Campbellford, Lake Ontario and Western Ry.—The following assistant engineers have been appointed in charge of 40 mile districts under the Engineer of Construction, C. W. P. Ramsey, viz.:—C. Luscombe, Parham station; W. H. McGaan, Belleville; G. R. Balloch, Cobourg; E. Duncan, Newcastle; H. H. Charles, Agincourt.

The Board of Railway Commissioners has approved of location plan for the line from mileage 125.5 to 127.32, west of Glen Tay, and of plan for a subway on road allowance between lots 8 and 9, Scarboro tp., Ont.

The following subcontracts have been let for grading, etc., on the line:—Mileage 41 to 43, Taylor and Thom, Enterprise, Ont.; mileage 46 to 51, P. McCoy, Croydon, Ont.; mileage 51 to 56, Irvine and Morrison, Roblin, Ont.; mile 69, A. McDonald, Shannonville, Ont.; mileage 70 to 82, Mulhern and Barrett, Shannonville, Ont.; mileage 82 to 84, McRae and Campeign, Bayside, Ont.; mileage 84 to 88, F. R. Welford, Belleville, Ont.; mileage 88 to 91, Deeks and Hinds, Belleville; mileage 91 to 105, F. R. Welford; mileage 107 to 110, E. P. Creswell, Colborne, Ont.; mileage 115 to 123, Chisholm and Morley, Cobourg, Ont. The subcontract for concrete work from mileage 40 to 55, has been let to Campbell and Lathmore, Perth, Ont.; mileage 55 to 80, to the Highland Construction Co., Toronto; for all structures mileage 80 to 106, F. R. Welford, and for the Jones creek culvert, to T. Manley and Son, Belleville, Ont.

We are officially advised that the following are sub-contractors on the first 40 miles out of Glen Tay:—Mileage 0 to 6.2, P. McCoy, Kingston, Ont.; mileage 6.2 to 7.5, J. M. Foreman, Perth, Ont.; mileage 7.5 to 8.5, McMartin and Murdock, Perth; mileage 8.5 to 9.0, Shea and Huff, Perth; mileage 9.0 to 11.5, McMartin and Murdock; mileage 11.5 to 15.0, A. and W. D. Wheaton, Amherst, N.S.; mileage 15.0 to 24.8, Toronto Construction Co., general contractors, Belleville, Ont.; mileage 24.8 to 39, Johnson Bros., Belleville; mileage 39.0 to 40.0, White and Scriven, Smith's Falls, Ont.

Toronto Yards.—The retaining wall along Front street, from Bathurst street easterly to Spadina avenue, Toronto, has been finished, and the clearing away of the sloping bank is well advanced. The switch connections are being made with the various tracks, so as to connect with the track on the acquired ground leading to the new yards on the site of the old Government house.

Toronto West Second Track Work.—Work has been restarted on the second track westerly from Toronto, which now terminates west of Islington, Ont. It is said that the line will be at once extended through Cooksville, to Hurontario street—the Port Credit Collingwood road—and that the new track will be connected by a Y with the branch line to the G.T.R. at Mimico yards.

Fordwich, Ont.—The Board of Railway Commissioners has approved of location plan for some improvements at Fordwich, a station on the Teeswater line, and local reports state that surveyors have been at work in the vicinity locating lines to Listowel, and to Blyth, on the Guelph and Goderich Ry.

Chatham to Sarnia, Ont.—Press reports state that surveys have been made for a line from Chatham, via Petrolea, to Sarnia, Ont., and that its construction is under consideration.

In a recent interview the mayor of Sarnia is reported as having stated that he had had a conversation with H. D. Lumsden, M. Can. Soc. C. E., upon railway matters, and he understood that construction would be started almost immediately on a line into Sarnia. Representatives of the Sarnia board of trade have visited Montreal recently in the interests of railway extension, and the mayor added he understood that considerable property had been acquired in the vicinity for railway purposes.

Main Line Location McNab Tp.—The Board of Railway Commissioners has authorized the company to change the location of its main transcontinental line in McNab tp., Ont.

Blind River Bridge.—The Board of Railway Commissioners has authorized the company to rebuild bridge 102.55 over Blind river, Algoma subdivision, Lake Superior division.

Lake Superior Division Second Track.—Some details were given in Canadian Railway and Marine World for July, pg. 349, with reference to the second track work on this division. Considerable progress has been made with this work, which when completed will have a considerable effect in preventing congestion at divisional points, and generally along the line. The pin truss bridge across the Big Pick river, consisting of two 160-ft. spans and two central 180-ft. spans, is being replaced by a plate girder bridge. The central spans are left the same length, but the end ones are divided into two, of 80-ft. span. The Little Pick river bridge, of two 165-ft. pin trusses with shore approaches, is having the two main spans replaced with plate girders of similar span.

It is said that some consideration has been given to a plan for diverting the line from Anglin, 22 miles west of Heron Bay, to the Little Pick river bridge, and running inland along a valley, to get away from the shelve construction along the lake front. Nothing has yet been done in the way of locating a route for such a diversion.

Fort William Improvements.—It is said that a number of additional spur tracks to serve industrial concerns are to be built at once at Fort William, Ont.

Press reports state that the construction now being carried on upon Island no. 1 form part of a large plan for the development of the company's railway and steamship facilities, which is to be carried out during the next five years at a total estimated cost of $10,000,000.

Boissevain to Lauder, Man.—The Board of Railway Commissioners has approved of revised location plans for the projected line from Boissevain to Lauder for 35.29 miles. The line will have a total length of 37 miles, and will extend from Boissevain, where the Great Northern Ry. line to Brandon crosses the C.P.R. Winnipeg-Deloraine-Lyleton line, to Lauder, where a branch runs west to Alida, Sask.

Estevan to Forward, Sask.—The Board of Railway Commissioners has approved of revised location plans for the line from Estevan to Forward, 55 miles.

Hawarden to Floral, Sask.—The Minister of Railways has approved of the route map for a line from Hawarden, 22 miles southeast of Outlook, on the line northwesterly from Moose Jaw, northerly to Floral, 11 miles east of Saskatoon, Sask., 46.8 miles.

Asquith to Conquest, Sask.—The Board of Railway Commissioners has approved of location plans for a line from Asquith, Sask., 24 miles west of Saskatoon, southerly to Conquest, a few miles west of the crossing of the Saskatchewan river at Outlook on the branch northwesterly from Moose Jaw, 35 miles.

Swift Current Southeasterly.—The Board of Railway Commissioners has authorized the opening for traffic of the extension of the Swift Current southeasterly line, from Neville to Vanguard, Sask., mileage 27.5 to 43.6.

Swift Current Westerly.—The Board of Railway Commissioners has approved location of the Swift Current branch, formerly Swift Current to Brooks branch, mileage 0 to 84.98. Brooks is a station on the main transcontinental line, 66 miles west of Medicine Hat, and it is said that the line formerly projected from Swift Current to Brooks, is now to be carried to Bassano, Alta. The line is open for traffic as far as Cabri, and is under contract for 80 miles further. Press reports state that final surveys for the remaining mileage have been completed.

Suffield Southwesterly.—We are advised that this line is under construction for 55 miles in a southwesterly direction from Suffield, Alta. The original contract let to J. G. Hargrave Co., Ltd., called for the building of 30 miles, but this was extended to cover an additional 25 miles. The line traverses the Southern Alberta Land and Irrigation Co.'s lands for 3 miles, and through homestead land for the remaining two miles, terminating in sec. 9, tp. 13, range 17 west of the 4th principal meridian, at Barvey, a post office 25 miles north of Taber. The line runs through uncultivated land, but at its proposed present terminal reaches a good farming country, right through to Carmangay, in which there is considerable settlement. The general contractor has let subcontracts as follows:—Mileage 0 to 1, Morrison and Cusack, Suffield; mileage 1 to 3, C. Chapman, Suffield; mileage 3 to 9, G. H. Webster, Calgary; mileage 9 to 10, W. B. Adams, Okotoks; mileage 10 to 12, Wallace Bros., Carlstadt; mileage 12 to 13, Olson and Nelson, Suffield; mileage 13 to 14, Swanson and Anderson, Suffeld; mileage 14 to 15, W. B. Acres, Suffeld; mileage 15 to 16, A. Anderson, Suffeld; mileage 16 to 22, Higdon and Kerr, Medicine Hat; mileage 22 to 36, E. G. Brandenburg, Suffield; mileage 36 to 38, E. Erickson & Co., Suffield; mileage 38 to 40, H. Mainland, Cayley; mileage 40 to 42, Kelly and Ferris, Taber; mileage 42 to 46, G. H. Webster, Calgary; mileage 46 to 52, F. McCleod, Calgary; mileage 52 to 55, several small pieces and the general contractor's own plant. There is approximately 1,500,000 cubic yards of earthwork in the whole. It is expected to have the work completed this year. There is one moderate sized bridge across the South Saskatchewan river.

Strathcona-Edmonton High Level Bridge.—A contract has been entered into between the C.P.R. as lessees of the Calgary and Edmonton Ry., and the Department of

Railways, under the act granting aid for the construction of certain railways and bridges, for the erection of a bridge across the Saskatchewan river, to connect the line now terminating in Strathcona, with the city of Edmonton, Alta. The construction of this bridge has been going on for some time.

Laggan to Lake Louise, B.C.—The Board of Railway Commissioners has authorized the opening for traffic of the branch line from Laggan to Lake Louise.

Galloway to Waldo Branch.—The Board of Railway Commissioners has authorized the opening for traffic of the final section of this branch, from Caithness to Waldo, B.C. This branch starts from Galloway, on the Crowsnest pass line, and runs into the coal fields at Waldo, near Elko, B.C.

Calgary to Vancouver Second Track.—Press reports have been busy for some time with regard to the surveys being made for the building of a second track from Calgary to Vancouver. The latest is that the work will include the driving of a tunnel from Bear creek, east of the Selkirk summit, to a point east of Glacier station, a distance of eight miles, at a cost of $1,500,000 a mile, and that the tunnel will have a gradient of 1% except for a short distance in the centre where the gradient will be 2%. The same report also states that plans are being prepared for a duplicate of the spiral tunnel at the big hill between Laggan and Field. These are mere rumors, as before anything is decided upon, every possible plan will be investigated.

We are officially advised that a second track is to be built from Ruby creek to Hammond, B.C., 57 miles. The contract for this work is reported to have been let to Grant Smith & Co., Seattle, Wash.

We are officially advised that the first section of the second track work east of Vancouver covers from mileage 106.8 at Hammond pit to mileage 128.7 at the eastern end of Vancouver yards, through which there is already a second track. There are no particular engineering features on this piece of work. Along Burrard inlet, between mileage 110.0 and 128.7, the line originally followed the shore. In making the second track the line has been straightened as much as posible, and the engineers have succeeded in cutting out approximately 225 degrees of curvature in 10 miles. Excavations have been hard pan and cemented gravel, slopes of which have been left practically as rock cuts. A few old slides have been struck, but by draining the land back of the railway it has been possible to stop any movements. With the exception of the bridge across the Pitt river, the bridge work on the section has been of minor importance. Grading is practically complete, steel laying is being proceeded with, and the line is being rock ballasted. It is expected that the work will be completed within three months.

Press reports state that the substructure of the Pitt river bridge is being put in, and that a contract for the superstructure has been let to the Dominion Bridge Co.

H. Vindal, Division Engineer, Vancouver, has charge of the second track construction between Ruby creek and Vancouver.

The Toronto Globe stated recently that the Canadian Northern Ry. had found the operation of the gas electric car on the Quebec & Lake St. John Ry. so satisfactory that it had ordered a number of similar cars. We are officially advised that no further orders have been placed, and it is not likely that any will be before next year, if then. It is possible that one of these cars may be put on the Central Ontario Ry. between Trenton and Picton, Ont., next summer.

Motor Car Being Tested on Schomberg and Aurora Railway.

A Galt, Ont., dispatch to Toronto papers, Sept. 19, stated that a gasoline motor car, built in the United States and imported by the Preston Car and Coach Co., has been operated between Galt, Preston and Berlin on the Galt, Preston and Hespeler Electric Ry., and added that the car had been sold to the Canadian Northern Ry. We are officially advised that the C.N.R. has not bought the car, but that arrangements were made with the Toronto and York Radial Ry. to try it on that company's line between Schomberg and Aurora, which is operated by steam.

The entrances and exits of this car are of the side centre entrance type. The car is double-ended and operated from a cab located in the corner of each end. The propulsion and regulation of the car is extremely unique and simple. The first car of this type manufactured has an engine of the four cylinder, four cycle type, cylinder dimensions 5½ x 6½, develops, approximately, 36 h.p., under 600 r.p.m., and is direct connected to a 20 k.w. compound wound differential pole generator. This combined unit is mounted on a rigid frame work of rectangular form, which is brought up from underneath the truck and mounted on a saddle or spring suspension in such a manner that the movement of the truck imparts but little strain or jar to the power plant. This method of suspension appears to be practicable, and, from an operating point of view, is satisfactory as to change or repair of equipment. The motors of this car are of the compound wound type, having a heavy series winding and are of approximately 25 h.p. each and are geared to the axle in the usual manner. These motors are so connected to the generator that it makes a very flexible unit and entirely eliminates the resistance, controller and cable methods. The connection between the generator and motors is such that as soon as the gas engine is accelerated the shunt fields of the motors are pre-energized before the armature circuits of the motors are closed. This gives a cushioning effect upon the motors without resistance, which is unattainable under the ordinary methods, and also gives a combination of units which, to a great degree, protects itself from the misuse of the operator. The later cars built, including the one being tried on the Schomberg and Aurora Ry., have 6 cylinders, 54 h.p. engine, 30 k.w. generator and two 25 h.p. motors, the selling price in the U.S. being about $11,500.

How to Analyse Railroad Reports.—A book with this title, written by J. Moody, the editor of Moody's Analysis of Railroad Investments, has been issued by the Analysis Publishing Co., 35 Nassau street, New York, at the net price of $2.50. It is written primarily from the standpoint of the investor in railway stocks, and gives in plain language the significance and meaning of every statement in the reports of railway companies, thereby enabling the investor to draw his own conclusions as to the value of the stock. The breadth of scope of the book is indicated by the fact, that after a general introduction there are chapters dealing with the physical, the income, and the capitalization factors, followed by an outline of uniform accounting requirements for operations of steam railways. The different points raised are illustrated by facts and figures gleaned from the reports of various companies, and Mr. Moody's wide experience in preparing his annual statistical analysis.

Dominion Government Railway to Hudson Bay.

Large quantities of material have been delivered at The Pas, Man., for the steel bridge which Mackenzie, Mann & Co. are building across the Saskatchewan river there for the Dominion Government railway to Hudson Bay. Tenders are being asked for the building of a freight shed at The Pas.

We are officially advised that the contract for the building of the 68 miles of line from Thicket portage to Split Lake junction, Man., has been let by the Department of Railways to J. D. McArthur, Winnipeg, who also has the contract for the building of the line from The Pas to Thicket portage, 185.5 miles.

Tenders were received to Sept. 12 for the completion of the line to Hudson Bay, either to Port Nelson, 165 miles, or to Fort Churchill, 245 miles from Split Lake junction. It is said that this contract will also be let to J. D. McArthur.

Hon. F. Cochrane, Minister of Railways, arrived in Sydney, N.S., Sept. 3, by steamship from Hudson Bay, which he reached July 28, having travelled by canoe from The Pas. At Port Nelson and Fort Churchill, he inspected the harbor facilities. We were officially advised, Sept. 18, that the press report that Port Nelson has been selected as the terminal was premature. "It may be," we are informed, "that Nelson will be selected," but no announcement had been made to Sept. 18.

Fifteen buoys and other equipment for aiding navigation at Port Nelson were shipped from Montreal by the s.s. Beothic, Sept. 7.

The Dominion Government has published a sessional return giving copies of all reports, surveys, etc., in connection with the railway to Hudson Bay, the suggested ports at Nelson or Churchill, and the navigation of Hudson straits. These give details of the navigation of the straits and bay, as prevailing during the season of 1911 and recorded by F. Anderson, during the voyages of the straits, and the schooners Clarissa C. Thorney and Burleigh; a report on the harbors at Port Nelson and Fort Churchill, prepared by A. G. Bachand and C. Savery, and H. S. Parizeau and R. Fraser respectively; and three reports by J. Armstrong, Chief Engineer of the railway. Neither of the reports gives any definite opinion as to the length of the navigation season, but they deal generally with the conditions as observed in the straits and bay, and in and around the two harbors. These reports confirm in many respects the observations of previous years as to the varying quantities of ice to be met with, and the difficulties of coming at any certain conclusions as to the period during which navigation may safely be carried on. That these conditions are more favorable some years than others is evidenced by the fact that preliminary reports from the investigating parties taking observations during the present season, indicate unusually bad ice conditions in the straits and bay. It may be gathered from all the reports at present received that the outlook for building up an ocean-carrying trade in and out of the bay, as the result of the building of the railway, is not very encouraging.

The three reports made by Mr. Armstrong set out an alternative plan by which the railway will be rendered a profitable proposition, the country through which it passes developed, and existing ports in Canada benefited. The first is a preliminary report; the second makes a comparison between the cost of building the

line to the two ports, in which it is shown that not only is the Port Nelson route the shorter by 80 miles, but that the country through which it passes is more capable of development, and that one line can be more economically operated. In the third report Mr. Armstrong shows how by linking up Hannah bay on the Quebec side of Hudson bay, by rail with Quebec, a combined rail and water route could be provided which would be shorter than the existing rail and water route via Fort William and the great lakes. At Fort Churchill there is a natural breakwater, but the navigable season is only from four to five months as compared with seven to eight months at Port Nelson. The initial development at Fort Churchill might be less difficult than at Port Nelson, but the latter place offers the best advantages for a development capable of handling from 50,000,000 to 60,000,000 bushels of grain. He concludes by recommending the development of Port Nelson.

In connection with this matter it may be noted that the Dominion Parliament and the Quebec Legislature have granted aid towards the building of a railway from Montreal to the mouth of the Nottaway river, in Hannah bay, and that the North Ry., of which F. H. Clergue is a leading promoter, is making surveys, with a view of starting construction in the spring. The Canadian Northern Ry. interests, through the charter of the James Bay and Eastern Ry. has under construction a line from Roberval, the terminus of the Quebec and Lake St. John Ry., to the mouth of the Nottaway river. It is also intended to extend the Ontario Government line—the Timiskaming and Northern Ontario Ry.—from its present terminus at Cochrane to Port Nelson, for which purpose a 10 mile strip of the territory recently given to Manitoba, with water frontage at Port Nelson, has been reserved to Ontario. This strip is now being selected by J. B. Tyrrell, who was at Port Nelson during the visit there of the Minister of Railways. (Sept., pg. 466.)

C.P.R. Orders for Rails and Fastenings.—During this year the C.P.R. has bought 185,300 tons of steel rails, which, with the fastenings, 14,347 tons, and the tie plates, 6,500 tons, make a total of 206,147 tons. These new rails are chiefly of Canadian make—being the output of the Sault Ste. Marie and the Sydney mills, but small quantities were necessarily bought in the United States. They are nearly all 85 lb. rails, and the average cost is $33 a ton, the whole order aggregating about $7,000,000. When laid, these rails will extend 1,440 miles—practically from Montreal half-way across the continent, or would reach from St. John, N.B., to within a few miles of Port Arthur. To carry them to where they will be needed would require 137 trains—averaging 50 cars to the train—and this line of trains would, if placed one after the other, extend for 50 miles. The new rails will be utilized in the various new lines and extensions of existing ones that the company is building, and in replacing old rails where needed, which in turn will be used for sidings or sent to the scrap heap.

The Union Terminals Co., Winnipeg, has built a dock track for the Lake Superior Shipping Co. there. This is the first track of the kind built in the prairie provinces, and it is expected that others will be added before long.

D. E. Brown and Macaulay, Ltd., have been appointed ticket agents for the Oregon-Washington Rd. and Navigation Co. at Vancouver, B.C. D. E. Brown was formerly General Superintendent, C.P. Trans-Pacific steamship service, there.

National Transcontinental Railway Construction.

The intention, it appears, is to have the steel laid complete from Cochrane, Ont., to Winnipeg this season. R. W. Leonard, Commissioner, is reported as stating that there is an 80 mile gap between these two points. While it is expected to have the steel laid by the end of the season, it is considered doubtful whether one line can be got into such a condition that it will be possible to operate grain carrying trains over it.

The yards at Transcona, Man., have a capacity of 5,000 cars, and this can be increased as occasion requires. The finishing touches are being put to the yards by the J. D. McArthur Co., which has the contract.

Tenders are under consideration for piping systems, pipe tunnels, pipe coverings and wiring ducts required for the car shop plant at the Transcona shops. (Sept., pg. 465.)

Grand Trunk Pacific Railway Construction.

A. W. Smithers, Chairman of the Board, G.T.R., and E. J. Chamberlin, President G.T.R. and G.T.R. Ry., returned to Montreal, Sept. 9, after a trip of inspection over the G.T. Pacific Ry. In an interview Mr. Smithers is reported to have said, that as representing the British investors he was entirely satisfied with the manner in which progress had been made. The great difficulty in connection with the construction was the scarcity of men. The contractors could find work for from 4,000 to 5,000 more than were available. There was ample construction equipment on the ground, and if the men were available there was no doubt that the line through to the coast could be completed by the end of 1913. He was confident, however, that trains would be running through from Montreal to Prince Rupert by the end of 1914.

E. J. Chamberlin is reported to have stated that the line was inspected to the track end at Tete Jaune Cache, and the construction work inspected for some distance beyond. West of Tete Jaune Cache to Fort George, there were 25 steam shovels, 40 locomotives and other necessary equipment in operation. The party then returned to Edmonton, and went to Vancouver via the C.P.R., and on to Prince Rupert by steamship, thence they proceeded by train to the end of steel, 176 miles east of Prince Rupert. The work was so far advanced that it was expected to have the track laid further east to Aldermere, early in December, and to Bulkeley summit before work would be closed down for the season.

Edmonton press dispatches state that the Canadian Stewart Co., Montreal, is preparing to sublet portions of the work on the hotel at Edmonton, which is estimated to cost $1,500,000. The specifications call for 12,000 barrels of cement, 6,000 yards of sand, 10,000 yards of gravel, and 1,500,000 bricks.

Reports from Edmonton, Alta., state that the following sub-contractors are at work between Tete Jaune Cache and Fort George:—Carlton and Co., 25 miles; Griffin and Co., 43 miles; Spend and Co., 25 miles; Simmons and Co., 50 miles. These four contractors are operating 22 steam shovels. Thirty-two large and small steel bridges will be constructed between Resplendant and Fort George. After leaving Tete Jaune Cache the road will cross the Fraser river four times before reaching the fort. The first of these bridges is 47 miles below the present railhead. At the canyon, 65 miles farther west, the survey crosses the river twice within a few miles, recrossing it at the canyon. There is also a bridge at Resplendant, making five spans over the Fraser river. A long bridge will cross the Shuswap river and one must be built over the Ghost river before trains are run into Fort George. Reports from Fort George state that a contract has been let for the clearing of 50 acres on the Nechaco river, Fort George, for yard purposes, and that work was started thereon, Sept. 5.

W. C. C. Mehan, General Superintendent at Prince Rupert, reports that all station buildings on the main line east of that city are completed as far as Van Arsdol. These are at Kaien, Phelan, Sock Eye, Tyee, Manu, Kwinitsa, Salvus, Exsrew, Shames, Amsbury, and Terrace, respectively. A 50,000 gallon permanent water tank has been located at Kwinitsa, at mileage 46, and one at Van Arsdol. New stations are in course of construction at Usk, Pitman, Hallwood and new water tanks at Nichol and Kitwanger. Stations are going up at all permanent sidings and water tanks wherever necessary. Station facilities will be complete to Hazelton shortly after the steel reaches that point. Permanent steel bridges are also complete at mileage 55, Kaitsik river, mileage 92, and Kitsumkalum river. Those still under construction are at mileage 60, Exchomsiks, mileage 87, and Zimquad river.

The Board of Railway Commissioners has authorized the opening of the line for traffic from mileage 100 to 164 east of Prince Rupert, and a later report states that owing to the low level of the water in the Skeena river, special permission has been given to operate trains as far as mileage 176, the Seeley gulch crossing. It is expected that the line will be completed into Haslemere early in October.

GRAND TRUNK PACIFIC RAILWAY BRANCH LINES.

The Board of Railway Commissioners has approved of revised location plans from mileage 12.71 to 18.48, and location plans from mileage 18.48 to 21.86, of the branch line from Harte to Brandon, Man.

The line from Regina to the International boundary near Portal, Sask., 134 miles, has been completed so far as the grading and building of structures is concerned. It was reported that 33 miles of steel had been laid to Aug. 30, and it is expected to have the whole mileage laid and ballasted by Dec. 1. At the International boundary the line will connect with a line of 22 miles, being built northerly from Niobe, N.D., by the Great Northern Ry. It is said that the G.T. Pacific Ry. trains will run through over the G.N. Ry. and its connections to Chicago, Ill., where the G.T.R. will take over the traffic.

The Board of Railway Commissioners has approved of location plans for the branch line from Regina to Moose Jaw, Sask., between mileage 40.01 and 47.74. The Mayor of Moose Jaw was advised by M. Donaldson, Vice President and General Manager, Sept. 3, that the right of way through Moose Jaw was being purchased, and when this had been arranged construction would be continued. The route has been approved by the Board of Railway Commissioners.

The Board of Railway Commissioners has authorized the opening for traffic of a further section of the Young-Prince Albert branch, between mileage 45.5 and 67. This extension carries the branch to Wakaw, Sask., and the remaining 57 miles are under construction.

Plans for the entrance of the branch line from Oban into Battleford, Sask., have been approved by the council. A yard is to be laid out, and the buildings will include a

three-stall engine house, station and freight-shed. An industrial spur track will be laid along the lane between 18th and 19th streets to 2nd avenue.

It is reported that on the branch from Battleford into the Cutknife district considerable progress has been made with grading, and that it is expected to have several miles of steel laid this season.

The Board of Railway Commissioners has approved of location plans for the line in Alberta, between mileage 27.67, at the north line of sec. 8, tp. 20, range 28, west of the 4th meridian, to mileage 111.29, at the west line of the northwest quarter of section 34, tp. 11, range 23, west of the 4th meridian. We are officially advised that the contract for the building of this line—a branch from Calgary to Lethbridge—has not yet been let. (Sept., pg. 465.)

Railway Finance, Meetings, Etc.

Alberta Ry. and Irrigation Co.—A duplicate original mortgage made between the A. Ry. and I. Co., the C.P.R. and the Royal Trust Co., securing an issue of bonds by the first named company, has been deposited with the Secretary of State at Ottawa.

Canadian Northern Ry.—There has been deposited with the Secretary of State at Ottawa an indenture dated June 20, made by the C.N.R. Co. to the National Trust Co. and the British Empire Trust Co. as trustees, and the Province of Alberta, being the first supplementary instrument in respect of an additional line of railway, supplementary to the indenture of June 10, 1909, securing 4% stock and bonds guaranteed by the Province of Alberta.

Canadian Northern Ontario Ry.—The name of the James Bay Ry. Co. has now been dropped, and the property incorporated with that of the C.N.O. Ry. The officers and directors for the current year are:—President, Sir William Mackenzie; Vice President, Sir Donald Mann; Third Vice President, D. B. Hanna; Secretary, W. H. Moore; Treasurer, L. W. Mitchell; other directors, Z. A. Lash, F. Nicholls, R. M. Horne-Payne; Assistant Secretary, R. P. Ormsby.

Duluth, South Shore and Atlantic Ry.—The report for the year ended June 30, shows revenue from transportation, $3,125,-853.22; from other than transportation, $26,621.81; total operating revenue, $3,152,-475.03; operating expenses, $2,395,160.78; net operating revenue, $757,314.25; net revenue from outside operations, $3,358.32; net revenue, $760,672.57; less taxes accrued, $217,417.86; operating income, $543,254.71; other income, $38,763.99; gross income, $582,018.70; less interest, etc., $943,565.71, thus showing a net loss of $361,547.01. The expenditures on additions and betterments during the year, were $91,528.14.

Massawippi Valley Ry.—The annual meeting was held Sept. 4. The following officers and directors were elected for the current year: President, J. G. Foster, Ottawa, Ont.; Vice President, C. W. Cate, Sherbrooke, Que.; other directors, C. D. White, F. N. McCrea, E. O. Grundy, Sherbrooke, Que.; C. H. Kathan, Rock Island, Que.; J. W. Dunklee, Boston, Mass.; J. H. Williams, Bellows Falls, Vt.; H. E. Folsom, Lyndonville, Vt.

Pere Marquette Rd.—S. M. Felton, Chicago, Ill., has been appointed a receiver, in succession to N. Erb, resigned.

Quebec and Saguenay Ry.—The annual meeting was held at Quebec, Sept. 17, when nothing but routine business was done. Following are the directors and officers for the current year:—President, O. B. Daoust; Vice President, H. G. Matthews, Manager Quebec Ry. Light and Power Co; other directors, Sir Rodolphe Forget, L. G. Morin and L. E. Morin.

Quebec Central Ry.—Gross earnings for June, $153,030.78; expenses, $117,419.85; net earnings, $35,610.93, against $129,359.06 gross earnings; $84,228.34 expenses, $45,-130.72 net earnings, for June, 1911. Aggregate gross earnings for 12 months ended June 30, $1,354,811.41; expenses, $943,976.36; net earnings, $410,835.05, against $1,208,-948.88 aggregate gross earnings; $820,803.12 expenses; $388,145.76 net earnings for same period 1910-11.

St. Marys and Western Ontario Ry.—The first lease under which this line was operated by the C.P.R. Co., was only a tentative one, on a percentage basis. This has been superseded by a lease for 999 years at a rental equal to the interest on the bonds which have been issued.

Temiscouata Ry.—Profit on operation for June, $8,057.

White Pass and Yukon Route.—W. B. Close, Chicago, Ill., of Close Bros. & Co., who represents the British shareholder, is reported as stating at Vancouver, B.C., Sept. 16, that the company proposes extending its steamboat service down the Yukon river to Fairbanks, Alaska, about 600 miles, and to establish a chain of hotels along the river. He is also reported to have said that there is no truth in the press reports, originating in Alaska, that the company had sold its railway, etc., to the Grand Trunk Pacific Ry. Co.

Wisconsin and Michigan Ry.—The Minneapolis, St. Paul and Sault Ste. Marie Ry. has not, as press reports state, acquired this railway. The line was originally built by J. R. Walsh, passed into the hands of receivers, and was purchased at a mortgage sale some months ago by John Marsh. The W. & M. Ry. operates over 135.7 miles, connecting up Iron Mountain, Peshtigo harbor and other points, and connects with the M. St.P. & S.S.M. Ry. at Peshtigo jct., Mich. It owns nine locomotives, 8 passenger cars, 303 flat cars, 37 box cars and 10 refrigerator cars.

Maintenance of Way by Contract.

Contracting maintenance of way work on railroads is being taken up on a constantly broadening scale by a number of engineering departments in the United States, and is a practice which offers many advantages to the railways and opens an attractive field for contractors. Most new lines are now built under the contract system, and it is being found that the economy of that plan does not necessarily end with the completed roadway, but that much of the annual routine work of upkeep may also be included. Ballasting has been extensively carried out in this way, tie renewals are being taken up, painting of structures has been found to work out favorably, and moving of right of way and work of like character offer further applications of the plan. Such items as these lend themselves readily to performance by contract forces under a railway inspector, who in many cases may be one of the foremen. The experience and records of every railway furnish a basis for specifications and estimates for the work, which should insure not only the desired results for the company, but such favorable working conditions for the contractors as to invite a satisfactory number of bids. With the actual conduct of the work in the hands of contractors, the work of the engineering department is considerably simplified. The organization and maintenance of large temporary forces alone is a considerable tax on that department and is something for which the contractor is often better equipped. The latter must always necessarily have a number of sources of supply developed, and also usually has a fixed following of greater or less extent. The work presents inducements to the contractor because of the absence of elements of great risk which attend much new construction, and also on account of its regularity and the possibility of taking it along with other contracts to balance the year's operations and to keep up the central organization. A consideration from the point of view of the railway, in connection with work done by local contractors, is that a large proportion of the money expended remains in the railway territory to develop it, instead of being carried out to other sections or sent abroad.

Great Northern Railway Lines in Canada.

United States Connections.—We are officially advised that the G.N. Ry. is building a line from Niobe, N.D., for 21 miles to the International boundary, near Minot, where it will connect with the line under construction by the G.T. Pacific Ry. from Regina, Sask. It is expected to have the line completed by Oct. 31. J. J. Hill is reported as having stated in New York that the G.T.P. Ry. will run its own trains to Minot, whence they will be hauled by the G.N. Ry. to Minneapolis and St. Paul, Minn., and thence to Chicago, Ill., by the Chicago, Burlington and Quincy Rd., controlled by the G.N. Ry. and Northern Pacific Ry. The trains will be delivered over to the G.T.R. at Chicago. The line from Niobe to the boundary is being built by A. A. Guthrie & Co.

Vancouver, Victoria and Eastern Ry. and Navigation Co.—The spur line to the cement works at East Princeton, B.C., has been completed, and is in operation.

Tenders are under consideration for the building of 40 miles of line from Coalmount to Coquihalla summit in the Hope monutains. The estimated cost of this piece of line is $1,500,000, and the contract will call for its completion by July, 1913. From near the summit a joint line is to be built to Hope, in conjunction with the Kettle Valley Ry. It has not been arranged which company is to build the line, but whichever it is the other is to have equal operating rights.

The Board of Railway Commissioners has authorized the company to open its line for traffic from Abbotsford easterly to Kilgard.

Considerable trouble is being experienced with a sink hole near Ardley, about five miles east of Vancouver. The trouble was believed to have been remedied, when, on Sept. 4, owing to heavy rains, the track sank about 5 ft. for 300 yards. It is intended to drive piles down to the rock, and to erect a large timber trestle over the soft place.

A proposition is under consideration for building a second track on the line from Vancouver to New Westminster. (Aug., pg. 414.)

The Fort William Dock Co. has completed the erection of another large steel coal handling tower at its dock on the Mission river, Fort William, Ont. The new structure will be able to unload 3,000 tons of coal a day from boats, and is operated by electricity. This addition, which cost $125,000, gives the company a total unloading capacity of 6,000 tons a day.

The C.P.R. has ordered 1,500 standard 40-ton steel frame box cars, from the National Steel Car Co.

Transportation Appointments Throughout Canada.

The information under this head, which is almost entirely gathered from official sources, is compiled with the greatest care, so as to ensure absolute accuracy. Anyone who may notice any error in our announcements will confer a favor by advising us.

Algoma Central and Hudson Bay Ry.—W. M. HUGILL, heretofore Chief Dispatcher, has been appointed acting Trainmaster and Car Accountant, vice J. W. Herrold, resigned. Office, Tagona, Ont.

E. P. SUGAR, heretofore dispatcher, has been appointed Chief Dispatcher, vice W. M. Hugill, promoted. Office, Sault Ste. Marie, Ont.

W. GOTRO has been appointed dispatcher at Sault Ste. Marie, Ont., vice E. P. Sugar, promoted.

Canadian Northern Ry.—ALAN FRASER, B.A. Sc., has been appointed an assistant engineer on Mackenzie, Mann and Co.'s Toronto staff, his principal work being the design of masonry and steel bridges.

Canadian Pacific Ry.—F. G. MILLEN, heretofore chief clerk, Secretary's office, has been appointed Assistant Treasurer, vice E. Alexander, appointed Assistant Secretary, as announced in our last issue. Office, Montreal.

G. I. EVANS, heretofore Mechanical Engineer, Angus locomotive shops, has been appointed Superintendent of Angus locomotive shops, Montreal, vice H. Osborne, recently appointed Assistant Superintendent of Motive Power.

W. H. WINTERROWD has been appointed Mechanical Engineer, Angus shops, Montreal, vice G. I. Evans, promoted.

A. RUTLEDGE, heretofore Superintendent, Sleeping, Dining and Parlor Cars and News Service, district 1, lines east of Toronto and Sudbury, Ont., has been appointed Assistant to General Superintendent, same department. Office, Montreal.

J. B. GRAY, heretofore Assistant Superintendent, Sleeping, Dining and Parlor Cars and News Service, district 1, east of Toronto and Sudbury, Ont., has been appointed Superintendent, same district, vice A. Rutledge, promoted. Office, Glen Yard, Montreal.

F. M. BREEN has been appointed Assistant Superintendent, Sleeping, Dining and Parlor Cars and News Service, district 1, lines east of Toronto and Sudbury, Ont., vice J. B. Gray, promoted. Office, Glen Yard, Montreal.

J. H. HUGHES, heretofore Superintendent, District 3, Lake Superior division, Schreiber, Ont., has been appointed Assistant Superintendent, District 2, Eastern division, vice C. W. Lott, transferred. Office, Smiths Falls, Ont.

L. O. TREMBLAY has been appointed Travelling Passenger Agent, North Bay, Ont., vice J. J. Anderson.

C. W. LOTT, heretofore Chief Dispatcher, district 2, Eastern division, Montreal, has been appointed Assistant Superintendent, district 2, Lake Superior division, Chapleau, Ont., vice E. J. Brien, transferred.

J. H. BROOKS, heretofore acting District Master Mechanic, North Bay, Ont., has been appointed District Master Mechanic, district 2, Lake Superior division, White River, Ont.

A. BROWN has been appointed Locomotive Foreman at Fort William, Ont., vice —. McArthur, transferred.

W. PIMLOTT has been appointed Storekeeper at Fort William, Ont., vice W. Colbourne, resigned.

W. J. FIDLER, heretofore clerk, has been appointed Storekeeper at Kenora, Ont., vice D. S. Schofield, transferred.

P. F. WEISBROD, heretofore Superintendent, district 2, Saskatchewan division, Moose Jaw, has been appointed Trainmaster, district 2, Manitoba division, Winnipeg, vice J. M. McKay, transferred.

J. B. McTAGGART, heretofore Bridge and Building Master, Moose Jaw, Sask., has been appointed Superintendent, district 2, Saskatchewan division, vice P. F. Weisbrod, appointed Trainmaster at Winnipeg. Office, Moose Jaw.

J. BAIRD, heretofore Foreman, Bridge and Building Department, Moose Jaw, Sask., has been appointed Bridge and Building Master there, vice J. B. McTaggart, promoted.

R. COOPER, heretofore Assistant Car Foreman, Moose Jaw, has been appointed Car Foreman there, vice J. B. Shelton, resigned.

A. J. IRONSIDES, heretofore locomotive driver, Saskatoon, Sask., has been appointed District Master Mechanic, district 4, Saskatchewan division, Saskatoon. This is a new position on account of the opening of an additional district.

A. C. HARSHAW, heretofore Trainmaster, Macleod, Alta., has been appointed Superintendent, Calgary Terminals.

W. J. UREN, heretofore Superintendent, district 3, Alberta division, Cranbrook, B.C., has been appointed Superintendent, district 2, Alberta division, vice C. S. Maharg, on leave of absence. Office, Calgary. On Mr. Maharg's return he will be appointed Superintendent, Calgary Terminals, vice A. C. Harshaw, who will take a vacation, after which he will receive another appointment.

G. GLASFORD, heretofore Road Foreman, Calgary, Alta., has been appointed District Master Mechanic, district 2, Alberta division. Office, Calgary.

J. M. McKAY, heretofore Trainmaster, Winnipeg, has been appointed Trainmaster, district 1, British Columbia division, vice H. W. McLeod. Office, Revelstoke.

D. S. SCHOFIELD, heretofore storekeepr at Kenora, Ont., has been appointed storekeeper at Nelson, B.C.

Dominion Atlantic Ry.—J. H. YOULD, heretofore Foreman of Shops, has been appointed Superintendent of Motive Power, vice W. Yould, retired from the service. Office, Kentville, N.S.

Duluth, South Shore and Atlantic Ry.—J. C. BEBB, formerly of the Michigan Central Rd. engineering department, Bay City, Mich., has been appointed office engineer in the bridge department, D.S.S. & A.R., Duluth, Minn., and not Assistant to Chief Engineer, vice N. Cadarette, according to the report mentioned in our last issue.

G. MERCER has been appointed Superintendent of Bridges and Buildings, vice W. M. Noon, resigned. Office, Duluth, Minn.

Grand Trunk Pacific Ry.—S. P. PORTER, formerly Deputy Minister of Railways, Telegraphs and Telephones for Saskatchewan, has been appointed Executive Agent, G.T.P.R. He will make land purchases, do other special work in Saskatchewan, and carry out other duties that may be assigned to him by the Vice President and General Manager. Office, Regina, Sask.

J. ASHCROFT has been appointed Road Foreman, Transcona to Melville and Yorkton branch.

W. E. MOHER has been appointed Road Foreman, Regina branch and district 3, Melville to Watrous, Sask.

C. D. SMITH has been appointed Road Foreman, from Watrous to Biggar, including Oban-Battleford and Biggar-Calgary branches, reporting to Road Foreman of Locomotives, Wainwright, Alta.

The following agents have been appointed:—G.T.P. Junction, Man., C. W. Jaminette; Kelliher, Sask., H. H. Lyle; Mirror, Alta., J. H. Holman; and stations have been opened, with agents, as follows:—Edenwold, Sask., J. J. Burns; Otthon, Sask., L. Mullins; Bruce, Alta., P. L. Harper; Tete Jaune, B.C., L. C. Pearson.

Grand Trunk Ry.—The following agents have been appointed:—Campbellford, Ont., R. C. Johnston; Bethany, Ont., M. M. Wier; Stoney Point, Ont., J. W. LeGallais; Goldstone, Ont., R. D. Ranney; Noyan Jct., Que., J. S. Chenail; outside agency closed at Arthabaska, Que.

Grand Trunk Ry., Grand Trunk Pacific Ry.—F. W. BERGMAN has been appointed Manager of Hotels, G.T.R. and G.T.P.R., with headquarters for the present at Ottawa. He was on Nov. 15, 1910, appointed Manager of the Chateau Laurier, Ottawa, and in March, 1912, was appointed Manager-in-Chief of Hotels. The present appointment appears therefore to be merely a change of title.

Hudson Bay Ry.—J. V. DILLABOUGH, heretofore office engineer, district F, National Transcontinental Ry., has been appointed office engineer of the Dominion Government railway to Hudson Bay, Winnipeg.

Intercolonial Ry.—B. F. SHORTLEY, heretofore operator and assistant to Terminal Agent, at Montreal, has been appointed Terminal Agent there, vice H. B. Sample, deceased.

Michigan Central Rd.—E. A. WIGREN, heretofore Auditor of Disbursements, has been appointed Assistant Auditor, vice N. B. Ackley, resigned to engage in other business. Office, Detroit, Mich.

R. R. RICHARDS has been appointed Auditor of Disbursements, vice E. A. Wigren, promoted. Office, Detroit, Mich.

F. W. SPARLING has been appointed Assistant Auditor of Disbursements. Office, Detroit, Mich.

Minneapolis, St. Paul and Sault Ste. Marie Ry.—H. B. DIKE, General Solicitor, is reported to have been appointed Assistant to the President, with office at Minneapolis, Minn.

B. NOBLE has been appointed Travelling Passenger Agent, New York City.

H. C. BURNETT, Jr., has been appointed Travelling Freight and Passenger Agent, Edmonton, Alta., vice C. H. Dodd.

National Transcontinental Ry.—W. B. CRONK, formerly Superintendent, G.T. Pacific Ry., Regina, Sask., has been appointed Superintendent of Transportation, National Transcontinental Ry., his immediate jurisdiction being over the Transcona-Superior Jct. section, and it will probably be extended to include other portions of the line as they are put in operation. He will report to the Assistant to the Chairman of the N.T.R. Commission. Office, Winnipeg.

Pere Marquette Rd.—E. N. WELLER has been appointed acting Treasurer for the Receivers, vice J. E. Howard, Secretary and Treasurer, deceased. Office, Detroit, Mich.

Toronto, Hamilton and Buffalo Ry.—H. J. VAN VLECK has been appointed Assistant Auditor, vice N. B. Ackley, resigned to engage in other business. Office, Detroit, Mich.

R. R. RICHARDS has been appointed Auditor of Disbursements, vice E. A. Wigren, appointed Assistant Auditor, Michigan Central Rd. Office, Detroit, Mich.

Wabash Rd.—G. R. LAYHER has been appointed Superintendent of Weighing and Handling of Freight. He will have supervision over the weighing and handling of all freight and will take proper action to enforce the rules relating therto. Superintendents, trainmasters, agents, yardmasters and others are directed to co-operate with him for the purpose of having the rules properly observed. Office, St. Louis, Mo.

Canadian Railway AND Marine World

ESTABLISHED 1898.

Devoted to Steam and Electric Railway, Marine, Express, Telegraph, and Railway and Canal Contractors' Interests.
Official Organ of the various Canadian Transportation Associations.

ACTON BURROWS LIMITED - Proprietors.
70 Bond Street, Toronto, Canada.

ACTON BURROWS - Managing Director and Editor-in-Chief.
AUBREY ACTON BURROWS - Secretary and Business Manager.

Associate Editor - - - JOHN KEIR
Associate Editor - - - DONALD F. KEIR
Mechanical Editor - FREDERICK H. MOODY, B.A.Sc.

United States Representative - A. FENTON WALKER
143 Liberty Street, New York City.
Canadian Advertising Representative - W. H. HEWITT

SUBSCRIPTION PRICES, INCLUDING POSTAGE:

TORONTO AND WEST TORONTO POSTAL DELIVERY, $1.25 a year.

To other places in CANADA, and to NEWFOUNDLAND AND GREAT BRITAIN, $1 a year.

To the UNITED STATES and other countries in the Postal Union, except those mentioned above, $1.50 a year, or six shillings sterling.

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NOTICE TO ADVERTISERS.

ADVERTISING RATES furnished on application.

ADVERTISING COPY must reach the publishers by the 10th of the month preceding the date of publication, if proof is required, or by the 15th if proof is not required.

TORONTO, CANADA, OCTOBER, 1912.

CONTENTS.

Among the Express Companies.

The Canadian Northern Ex. Co. has opened offices at Fiske, and Blaine Lake, Sask.

J. Richardson has been appointed line auditor, Dominion Ex. Co.'s eastern lines, with territory east of Port Arthur, Ont. Office, Toronto.

M. W. Hastie, heretofore route agent, Dominion Ex. Co., Calgary, Alta., has been appointed superintendent there, with supervision of the offices in Alberta.

L. D. Oakley has been appointed line auditor in charge of the Dominion Ex. Co.'s western lines, covering territory west of and including Port Arthur, Ont. Office, Winnipeg.

The Canadian Northern Ex. Co. has issued its transfer tariff covering points in Ontario, the rates shown on which must be used to compute the through charges on shipments destined to offices of other companies to which through rates have not been furnished, applying only from its offices. Shipments originating at the company's offices must be waybilled through to destination, and routed through the transfer point nearest to, but short of destination, and charges computed in accordance with the rules of Official Express Classification 21.

The express business in the United States has been the subject of a thorough investigation by the Interstate Commerce Commission, and the report of the Commission recently filed will result in marked reductions in express rates and notable changes in methods of conducting business, unless at the hearings, which commence Oct. 9, the express companies are able to show cause why the orders should not go into effect. The rates proposed by the Commission are based on a block or zone system, each block being about 50 miles square and the U. S. containing altogether 950 blocks. The rates are made for packages weighing from 1 to 100 lbs. between each zone and every other zone or block, the rate being the same for all cities within a block. The express companies will be required to publish a directory of express stations, showing the number of the block in which each station is located, and at every station there must be filed a single sheet tariff giving the rates from that station to every one of the 949 other blocks. The sheet must also state the local free delivery limits. For light-weight parcels the proposed reductions are considerable. The Commission will also insist on the most direct routings.

NEW METHOD OF HANDLING PREPAID PARCELS.

The Canadian Ex. Co. has recently adopted throughout its entire system of railway and steamship lines a plan having for its object the prevention of double collection of charges at destination when shipments have already been prepaid, the prevention of overcharges and undercharges, and the elimination of the occurrence of packages going astray or being found over without mark, resulting in delay in delivery and inconvenience and loss to the public. The foundation of this new plan for the correct receiving, billing and handling of shipments is the fact that waybills and package labels of distinctive colors are used. For example, all packages, the charges on which are to be prepaid, will bear a label printed on golden red paper. This served as a warning to all employes that charges are not to be again collected. Where charges are to be collected at destination a white paper label is used; for c.o.d. shipments green paper, and for shipments in bond pink paper labels. Waybills printed on paper of corresponding colors will also similarly distinguish the one class of business from the other. A waybill is made in triplicate for every consignment, one copy which contains full particulars of consignee, address, weight and charges, being pasted on the package; one copy being handed to the train messenger in whose custody the package is forwarded, and one copy retained for office use. For mutual convenience special arrangements are made with large or regular shippers to supply them with labels to be attached to shipments in advance of the call of the driver. Where a consignment consists of a number of packages a special "lot shipment" label is placed upon each package, which gives reference to the entire consignment. This it is expected will prevent packages which are a part of a consignment from going astray, and will go a long way towards removing the difficulty which the public have heretofore experienced. A similar system was put in force by all the express companies in the United States on Sept. 1, but we are officially advised that the Dominion Ex. Co. and the Canadian Northern Ex. Co. have decided not to adopt it at present.

The plan which has been adopted by the companies in the United States is in accordance with an order by the Interstate Commerce Committee, and while the Canadian Ex. Co. is following the same plan the Dominion and Canadian Northern Ex. Co.'s managements are of opinion that it will be subject to some, if not many changes, before it is perfected. In the meantime they prefer not to introduce it, but will promptly adopt any good features that may be developed after it has been tried.

Trade and Supply Notes.

The matter which appears under this heading is compiled, in most cases, from information supplied by the manufacturers of, or dealers in, the articles referred to, and in publishing the same we accept no responsibility. At the same time, we wish our readers to distinctly understand that we are not paid for the publication of any of this matter, and that we will not consider any proposition to insert reading matter in our columns for pay or its equivalent. Advertising contracts will not be taken with any condition that accepting them will oblige us to publish reading notices. In other words, our reading columns are not for sale, either to advertisers or others.

The Brown Hoisting Machinery Co., Cleveland, Ohio, has issued its catalog E, describing and illustrating the Brownhoist grab, slag contractors' grab, drag line and shovel buckets, and various kinds of tubs, showing the various manners in which they are utilized in steam and electric railway, and general contracting work, coaling and other similar plants.

The Detroit Lubricator Co., Detroit, Mich., and Windsor, Ont., has issued a general catalogue of 232 pages, which deals, among many other things, with new locomotive lubricators, with oil control valve, air cylinder lubricators, boiler valves, throttle valves, etc. Complete repair part lists are given for all the company's locomotive lubricators, with instructions for installation, operation and care. While this catalogue is complete in some respects as regards locomotive lubrication, it was impossible, owing to lack of space, to include all the information contained in the company's Bullseye Locomotive Lubricator Catalogue, a new edition of which is on the press.

Anticosti Island Ry.—This line, which runs from Ellis bay for 15 miles into the interior of Anticosti island, Que., has been built by the owner of the island, Henri Menier, of Paris, France, for logging purposes. It is standard gauge and has 4 locomotives, 1 passenger car, 20 dump cars, and 1 steam shovel.

Canadian Northern Railway, Construction, Betterments, Etc.

James Bay and Eastern Ry.—The Board of Railway Commissioners has approved of location plans for a further section of this line, now under construction from Roberval, Que., at the terminus of the Quebec and Lake St. John Ry., between mileage 30.7 and 31.4.

Canadian Northern Quebec Ry.—Application is being made to the Board of Railway Commissioners for approval of location plans for a line from Rawdon to St. Donat, Montcalm county, about 40 miles. Surveys are reported to have been completed for the line from Rawdon through Chertsey, Ste. Emilie and Notre Dame de Mercie.

Montreal Tunnel and Terminal Co.—It was expected, Sept. 12, that the negotiations between the company and the city authorities with respect to the lines between the tunnel portal and the water front would result in an arrangement being arrived at by the end of the month. It is said that the plan will provide for an overhead line from the station at Lagauchetiere street to the water front, as proposed by the company, to be built of steel and concrete, and that the track will be laid in a material which is calculated to reduce the noise of the traffic to a minimum. The overhead construction of the line to the water front, the company's representatives informed the board of control, is an essential part of the plans, as it is intended to carry the line across the river to the south shore at some future time.

It was reported Sept. 19 that boring of the tunnel was progressing at the rate of 20 ft. a day at the back of the mountain and 15 ft. a day on the city side. A 240 ft. shaft is being driven in the vicinity of Maplewood Ave., Westmount, and as soon as this has reached the level it will be possible to have four gangs at work driving the tunnel. It is expected that 20 ft. a day will be driven by each gang.

Montreal-Ottawa-Port Arthur Line.—The Minister of Railways has approved general route map for the C.N. Ontario Ry. lines on Montreal Island, 17 miles in length. These lines will form part of the through line, the Montreal-Hawkesbury section of which is under construction.

The taxpayers of Pembroke, Ont., have passed a bylaw granting $25,000 cash bonus, free water and exemption from certain taxes, in return for which the town will be made a divisional point on the line.

The Board of Railway Commissioners has approved of revised location plans for the line through Westmeath and Pembroke tps.; through White, Fitzgerald, Deacon, Lister and Boyd tps., mileage 265.34 to 285.53 from Montreal; through Boyd and Pentland tps; southerly from Capreol Jct.; through Alice and Fraser tps.; through unsurveyed territory Algoma district, mileage 268.03 to 269.3, and mileage 271.53 to 274.16 from Port Arthur.

Canadian Northern Ontario Ry.—The Board of Railway Commissioners has approved of revised location of the line in Camden tp., and has authorized the operation of traffic between mileage 145.83 and 149 and between mileage 152.13 and 152.72.

Plans have been filed with the Toronto city authorities showing how it is proposed to connect the Toronto-Ottawa line and the Toronto-Sudbury line with the new union station in North Toronto. The plans include provision for a new joint station about 2.5 miles east of Leaside Junction, and a steel girder bridge which will carry the Ottawa-Toronto line connection over the Don river.

The C.N.O.R. and the C.P.R. trains will run east together from North Toronto station as far as the west Don river, which will be crossed by means of the present bridge, which is to be double-tracked. Immediately east of this the C.N.O. Ry. will deviate, and its own tracks will branch out, that to the north passing under the C.P.R. tracks about 200 yards to the west of the C.P.R. Don bridge, and then connect with the existing line where it emerges over the Don valley, while the Ottawa-Toronto line will run easterly, crossing the Don river on a steel girder bridge about 500 yards farther down the river than that of the C.P.R., after which the line will run out towards the present line, connecting with it in close proximity to the G.T.R. Scarboro Junction station.

In connection with the line west of Toronto it is reported that contracts will be let for the section from Toronto to Hamilton at an early date, and that grading will be completed this year from Poplar Plains road, North Toronto, to the west side of the Humber river at Lambton. The final questions in connection with the route to and through Hamilton are being rapidly settled, and there is little doubt, Hamilton city officials state, that contracts will shortly be let for the work. As to the company's construction intentions from the Niagara peninsula westerly to Windsor and Sarnia, there are numerous rumors. While the company has engineers in the field looking over routes, nothing definite has been decided as to what lines to build or what places they will serve, except that a line will be built from the vicinity of Hamilton via Brantford and London. Sir Wm. Mackenzie is reported as stating that the Toronto-Hamilton line will be started soon, and that it will be pushed forward towards Niagara Falls in the spring, that the surveys have all been completed and that construction will be rushed. He added that the company has not been purchasing land at Windsor for terminal purposes, as the question of extending the lines to Detroit is a question for the future and has not yet been given consideration.

Canadian Northern Ry.—Speaking of the plans for the cut-off across Winnipeg, to which considerable opposition has developed, Sir Wm. Mackenzie is reported to have stated, Sept. 5, that the route proposed is the best that can be adopted from a railway point of view, and that the company is not considering any alternative route.

Satisfactory progress is reported to have been made with construction on the line alone the east shore of Lake Winnipeg. A train service has been put on the line as far as Inwood, on the western side of the lake, about 45 miles from Grose Isle, Man. This line, it is reported, is to be extended at an early date for a further distance of 45 miles. Press reports state that the lines on both sides of the lake are to be continued until they effect a junction at the head of the lake, when it will be decided whether an extension to Hudson bay is desirable or not.

Plans are reported to have been prepared showing considerable alterations and improvements to the station and freight sheds at Brandon, Man.

General Manager and Chief Engineer M. H. MacLeod has informed the mayor of Moose Jaw, Sask., that instructions have been given to have the line completed into that place as soon as possible.

The Board of Railway Commissioners has approved of location plans for the C.N.R. through tps. 22-19, range 29-28, west of the 4th meridian, mileage 13.21 to mileage 31.40; and through tps. 19-15, range 29-26, west of the 4th meridian, mileage 31.40 to 65.05.

Sir Wm. Mackenzie is reported to have stated in Calgary, Alta., Sept. 3, that he expected track would be laid into that city by Nov. 15. The grading was completed right into the city, and the track-laying gang had got to within 57 miles of the city. The line is coming in on the Second street west side of the south end. Sir William added that a large dead-end station would be built.

The Board of Railway Commissioners has approved of the station site and track layout at Calgary. Plans of the several buildings proposed to be erected have been submitted to the Calgary city council. Press reports state that a contract has been let to John Gunn and Sons, Winnipeg, for the building of the superstructure of a bridge across the Bow river in Calgary.

We are officially advised that a contract has been let to the Northern Construction Co. for the building of the Calgary-Macleod branch. The Board of Railway Commissioners has approved location plans for the line through Macleod, mileage 102.05 to 104.26.

Grading is being proceeded with on the line from Oliver to St. Paul de Metis, about 11 miles being practically ready for the track. It is expected to have 20 miles graded by the end of the season.

Another branch line out of Edmonton, on which grading is being done, starts from Onoway in the direction of the Peace river. The right of way is cleared to the crossing of the Athabasca river, and it is expected to have track laid to Whitecourt, 32 miles from Onoway, by the end of the year.

The Board of Railway Commissioners has authorized the opening for traffic of the line from Morinville to Athabasca Landing, Alta., 72 miles, and a train service was put in operation Sept. 2.

West of Edmonton to the British Columbia boundary, grading has been completed to Hinton, 175 miles west of Edmonton, and track has been laid to Entwistle. The superstructure of the high level bridge across the Pembina river is expected to be completed early in October, when the bridge building gang will move on to the McLeod river crossing. It is expected that steel will be laid to that point by the end of the year. Two-thirds of the grading has been done between Hinton and Fiddle creek, 40 miles, and work is in progress on the 50 miles from Fiddle creek to the summit. It is expected that track will be laid to the summit by May, 1913.

Canadian Northern Pacific Ry.—A contract has been entered into between the company and the Department of Railways, under the act passed last session of the Dominion Parliament, granting aid for the construction of a line from the Yellowhead pass to the mouth of the Fraser river, B.C., 525 miles.

C. V. Cummings, Secretary-Treasurer, Northern Construction Co., is reported as stating in Edmonton, Alta., Sept. 10, that all contracts had been awarded in connection with the building of the main line between Edmonton and the Pacific coast. Grading is expected to be completed as far west as Kamloops by the end of 1913.

Among the contractors reported to be at work on sections of the line, under the general contractors, are:—Phelan and Shirley, Palmer Bros., and Henning, Vancouver; J. Hogan, Edmonton, Alta.; Twohy Bros., McDonald Bros., Boyd and Craig, Murdoch and Co.

We are officially advised that the surveys for the location of the branch line from near Kamloops to the Okanagan valley are being rapidly pushed forward, and it is expected to have the route settled at an early date. Contractors have been looking over the approximate route with a view to tendering.

Rapid progress is being made with construction in Yale district. The 2,108 ft. tunnel near Yale is expected to be completed early in October. The contract for eight bridges and trestles, east of Yale, Rigby and Marsden, Vancouver, has been cancelled, and the work entrusted to Boyles and Co., Vancouver. It is expected that the steel will be laid to Yale by the end of the year.

There have been considerable negotiations between the company's officials and the Vancouver city council as to the location of terminals there. At a meeting of the city council, Aug. 29, a letter was read from A. D. Davidson, Land Commissioner, in which the city was asked to transfer in fee simple the balance of the False creek flats and the lots in connection with which a bylaw was passed, for $600,000; the company to reimburse the city for the amount spent in connection with the site, this not to exceed $600,000; also to fill in the flats; build a seawall on the west side of Main street bridge; waive to the city a strip of land 1,600 ft. from north to south, and 150 ft. from east to west, east of Main street bridge; give the city three streets 100 ft. each in width through the property; spend a minimum of $4,000,000 on the property; erect a union station at a cost of $1,500,000; begin work within 90 days of consent and complete it within five years; grant permission to other railways to use the station on a 5% car basis; build a double track tunnel about four miles long under the city, at a cost of about $1,000,000 a mile, the same to be operated by electricity; use electricity for operating the yards, and give a suburban service between Vancouver, New Westminster and Port Mann. The proposed agreement has been discussed at length, and several alterations made, and it was reported, Sept. 17, that terms have been all but definitely settled. Vancouver is to be the passenger terminal of the line, with local freight yards, the available room in the False creek bed being 120 acres, and Port Mann will be the freight terminal. Vancouver is to be the location of private industries, while the repair shops, roundhouses, etc., will be at Port Mann. The Vancouver city terminal is to be reached by a tunnel. The estimated cost of the various works in Vancouver is put at $10,000,000, and it is said it is to be completed in three years, instead of five, as originally proposed.

Vancouver Island Lines.—We are officially advised that a contract has been let to the Northern Construction Co. for the building of a 40 mile section of the line on Vancouver Island, starting about five miles east of Cowichan lake, mileage 100, and extending to about two miles south of Port Alberni, mileage 140. The route crosses the divide west of Cowichan lake, and descends to Nitinat river, crossing that river about three miles north of Nitinat Lake. It then runs up the Little Nitinat river, and along the Francis and Darlington lakes, then down Coleman Creek to about three miles from the Alberni canal, from which it swings easterly and descends on a maximum gradient of 1.5% to the canal, which is followed past Franklin and China creeks to mileage 140, about two miles south of Port Alberni. The character of the country is generally very rough and expensive for railway construction. The maximum gradient is 1.5%, and the maximum curvature 12 degrees. There will be no bridges of importance, except those at the crossings of the Nitinat river, Franklin and China creeks, not yet decided upon. S. O. Lewis, Victoria, B.C., is District Engineer.

The location surveys for the extension of the line from near Alberni, across the summit to the Campbell river district, have, we are officially advised, been completed. The route is subject to alteration on revision. Engineering parties are in the field looking for a satisfactory route to the upper end of Vancouver island.

Canadian North Eastern Ry.—J. F. Ross and H. Hornberg, recently arrived in Stewart, B.C., and are engaged in making a topographical survey of the country from the present end of steel of the C.N.E. Ry. through the Groundhog coal district to Redcliff and the Dominion Government telegraph line, with a view of deciding upon a route for the extension of the line.

Railway Rolling Stock Notes.

The International Ry. of New Brunswick has ordered 20 logging cars from the Canadian Car and Foundry Co.

The G.T.R. has ordered 2,000 box cars from the Pressed Steel Car Co., and 50 tank cars from the American Car and Foundry Co., for use on the Grand Trunk Western Ry., west of the St. Clair and Detroit rivers.

The G.T. Pacific Ry. has received seven ballast cars, nos. 392993 to 392999, from the Canadian Car and Foundry Co., Montreal; and two flat cars, nos. 361898 to 361899, from the American Car and Foundry Co., thus completing both orders for ballast cars and flat cars, respectively.

The G.T.R. has ordered 25 superheater mikado freight locomotives from the American Locomotive Co., to be built at Schenectady, N.Y. These will be of the 2-8-2 S. type, with cylinders 27 ins. diar. by 30 ins. stroke; driving wheels 63 ins. diar., and total weight in working order, 276,000 lbs.

The Intercolonial Ry. has ordered four switching and five consolidation locomotives from the Canadian Locomotive Co., and five consolidated locomotives from the Montreal Locomotive Works; and has received 20 flat cars from the Nova Scotia Car Works, Halifax, N.S., and two box cars from the Rathbun Co.

It is reported that the Montreal Harbor Commissioners will shortly place orders for 12 electric motors and a large quantity of rolling stock for the harbor railway system, which, it is said, is to be electrified. We are officially advised that no such orders have been placed, nor is it likely they will be placed in the immediate future; also that though electrification may take place, nothing is, at present, in contemplation.

The Central Ontario Ry. has received 25 ore cars; the Canadian Northern Ontario Ry., 50 coal cars; the Halifax and South Western Ry., 6 excursion cars; the Niagara, St. Catharines and Toronto Ry., 10 coal cars; the Canadian Northern Quebec Ry., 50 coal cars, 50 flat cars and 6 excursion cars, and the Brockville, Westport and North Western Ry., 2 first class cars and 1 combination car, from J. T. Gardner, Chicago, Ill.

The Canadian Northern Ry., between Aug. 15 and Sept. 15, ordered the following rolling stock:—5 first class cars, from the Canadian Car and Foundry Co., Montreal; 25 consolidation locomotives, and 20 switching locomotives, from the Canadian Locomotive Co., Kingston, Ont.; 25 cabooses, from its Winnipeg shops; 2 mogul locomotives, from J. T. Gardner, Chicago, Ill.; and 10 tank cars and two 60 ton wrecking cranes in the U.S.

The G.T.R. has made the following additions to rolling stock:—three baggage cars, from its Montreal shops, making 13 out of 20 ordered Mar. 31, 1911; 45 refrigerator cars, and 124 box cars, from the Canadian Car and Foundry Co.; 93 automobile cars, completing order for 250, Jan. 23, and 50 tank cars, from the American Car and Foundry Co., 341 box cars, from the Western Steel Car and Foundry Co.; and 512 steel coal cars, from the Pressed Steel Car Co.

E. J. Chamberlin, President, G.T.R. and G.T.P.R., while in Vancouver, recently, is reported to have stated that it had been definitely decided to use oil fuel on the locomotives on the Mountain section, not only because it was safer, but because it was cheaper, the company being in possession of large areas of oil lands, which would give it a perpetual supply. We are officially advised that though no arrangements have been made for using oil on the Mountain division, the matter is under consideration.

The C.P.R., between Aug. 15 and Sept. 15, received the following additions to rolling stock:—18 freight refrigerator cars, 64 vans, 627 wooden box cars, 209 steel frame box cars, 1 pile driver, 2 ballast spreaders, 8 locomotives, class P.1, 1 colonist car, 6 baggage and express cars, 4 mail and express cars, 1 box baggage car, 1 baggage and smoking car, from its Angus shops, Montreal; 339 steel frame box cars, 250 ballast cars, from the Canadian Car and Foundry Co.; 15 locomotives, class D.10, from the Montreal Locomotive Works; 12 stone cars, from the Nova Scotia Car Works; and 48 steel frame box cars from the U.S.

The Canadian Northern Ry., between Aug. 15 and Sept. 15, received the following additions to rolling stock:—154 box cars, 1 first class car, 1 second class car, 1 dining car and 5 baggage cars, from the Canadian Car and Foundry Co.; 2 passenger and mail cars, and 1 combination car, from the Preston Car and Coach Co.; 2 cafe-parlor cars, from J. T. Gardner, Chicago, Ill.; 65 box cars and 4 baggage and mail cars, from the Crossen Car Co.; 57 box cars, from the Nova Scotia Car Works; 2 consolidation locomotives from the Canada Foundry Co.; 8 consolidation locomotives from the Canadian Locomotive Co.; and 60 flat cars from the Rathbun Co.

The two dining cars, which the C.P.R. is building at its Angus shops, Montreal, will be of an entirely new floor plan. The dining room will be 38 ft. 4 ins. long, and will contain 6 tables with a seating capacity of 24, and 6 tables with seating capacity of 12. The larger tables will be 4 ft. wide and the space over the seats will be 6 ft. 4 ins., except the two end tables, where it will be 6½ ft. in each case. The smaller tables will be 2 ft. 9 ins. wide, and the aisle 2 ft. 2 ins. wide. The lighting will be by three 5-cluster lights down the centre, and 12 single globes down each side. The kitchen and pantry, etc., will occupy 33 ft. 9 ins., the refrigerator being at the rear, and arranged to be filled from the roof.

The C.P.R., between Aug. 15 and Sept. 15, ordered the following rolling stock:—1 stores supply car, 25 vans, 5 push snow ploughs, 13 flangers, 2 dining cars, 8 buffet-parlor cars, 2 compartment sleeping cars, 12 observation cars, 10 second class cars, 4 first class smoking cars, 4 first class and smoking cars, 62 suburban cars, 7 mail and express cars, 50 box baggage cars, 14 first class cars, 40 baggage and express cars, 22 tourist cars, 14 sleeping cars, 1,000 steel frame box cars, 2,000 wooden box cars, 2 locomotives, class E.2, 30 locomotives, class U.3, 5 locomotives, class D.4, from its Angus shops, Montreal; 1 steel snow plough, 5,900 steel frame box cars and 100 automobile cars, from the Canadian Car and Foundry Co.; 25 locomotives, class D.10, from the Canadian Locomotive Co.; 500 steel frame box cars, from the Nova Scotia Car Works;

and 1,500 steel frame box cars, from the National Steel Car Co.

Following are chief details of the five consolidation superheater locomotives which the Intercolonial Ry. has ordered from the Montreal Locomotive Works:—

Cylinders, diar. and stroke	22 by 28 ins.
Driving wheels, diar.	56 ins.
Wheel base, rigid	15 ft. 10 ins.
Wheel base, engine, total	24 ft. 4½ ins.
Wheel base, engine and tender, total	56 ft. 6½ ins.
Weight of engine in working order	200,000 lbs.
Weight on driving wheels	175,000 lbs.
Weight of tender	150,000 lbs.
Boiler, type	Extended wagon top
Boiler, outside diar. front end	70½ ins.
Boiler pressure	200 lbs.
Tubes, no. and diar.	242—2 ins.
Flues, no. and diar.	24—5 ins.
Tubes, length	14 ft. 2½ ins.
Superheater, type	Schmidt
Tank capacity, water	6,500 imp. gals.
Tank capacity, coal	12 tons
Maximum tractive power	41,100 lbs.

The 25 consolidation locomotives which the Canadian Northern Ry. is having built by the Canada Foundry Co., Toronto, as announced in our last issue, will be of the same general type as those previously built by the same company, of which we have already given details in previous issues. Following are the main details:—

Cylinders, diar. and stroke	24 by 32 ins.
Driving wheels, diar.	63 ins.
Boiler pressure	180 lbs.
Tractive effort, maximum	45,000 lbs.
Firebox, length and width	110 by 64 ins.
Grate area	49 sq. ft.
Tubes, no. and diar.	272—2 ins.
Flues, no. and diar.	30—5 ins.
Boiler, diar.	72 and 79 ins.
Heating surface, total	2,811 sq. ft.
Weight on drivers	206,000 lbs.
Weight of engine, total	236,000 lbs.
Height, top of rail to top of stack	15 ft., 3 ins.
Driving wheel base	16 ft., 6 ins.
Tender, type	Eight wheel
Capacity, water	6,000 imp. gals.
Capacity, coal	10 tons

Following are chief details of the 4 six consolidation freight locomotives which the Intercolonial Ry. is having built by the Canadian Locomotive Co.:—

Weight in working order on drivers	175,000 lbs.
Weight in working order, total	200,000 lbs.
Wheel base of engine, rigid	15 ft. 10 ins.
Wheel base of engine, total	24 ft. 4½ ins.
Heating surface, firebox	161 sq. ft.
Heating surface, tubes	2,122 sq. ft.
Heating surface, total	2,283 sq. ft.
Driving wheels, diar.	56 ins.
Driving wheel centres	Cast steel
Driving journals	9½ and 9 by 12 ins.
Cylinders, diar. and stroke	22 by 28 ins.
Boiler, type	Radial stayed
Boiler pressure	200 lbs.
Tubes, no. and diar.	206—2 ins.; 28—5⅜ ins.
Tubes, length	14 ft. 2 ins.
Brakes	Westinghouse, American
Superheater	Schmidt type A
Weight of tender, loaded	150,000 lbs.
Capacity, water	6,500 imp. gals.
Capacity, coal	12 tons
Tank, type	Water bottom
Truck, type	Outside equalized
Wheels, diar.	34 ins.
Wheel, type	Wrought iron, steel tired
Journals	5½ by 19 ins.
Brake beams	Simplex high speed

Following are chief details of the 25 consolidation superheater locomotives which the Canadian Northern Ry. is having built by the Canadian Locomotive Co:—

Weight on drivers	163,000 lbs.
Weight of engine, total	188,000 lbs.
Wheel base, rigid	15 ft. 6 ins.
Wheel base of engine, total	23 ft. 9 ins.
Heating surface, firebox	179 sq. ft.
Heating surface, tubes	1,772 sq. ft.
Heating surface, total	1,921 sq. ft.
Driving wheels, diar.	57 ins.
Driving wheel centres	Cast steel
Driving journals	9½ and 9 by 12 ins.
Cylinders, diar. and stroke	23 by 26 ins.
Boiler, type	Radial stayed
Boiler, pressure	170 lbs.
Tubes, no. and diar.	179—2 ins.; 24—5⅜ ins.
Tubes, length	14 ft.
Injectors	Ohio
Brakes	Westinghouse American
Superheater	Schmidt type A
Weight of tender, loaded	144,000 lbs.
Capacity, water	6,000 imp. gals.
Capacity, coal	12 tons
Tank, type	Water bottom
Truck, type	Four wheel equalized
Wheel, diar. and type	33 ins. steel tired
Journals	5½ by 10 ins.
Brake beams	Simplex

Following are chief details of the 20 six wheel switching locomotives which the Canadian Northern Ry. is having built by the Canadian Locomotive Co.:—

Weight, total	123,000 lbs.
Wheel base of engine	11 ft.
Wheel base, engine and tender	39 ft. 1 in.
Heating surface, firebox	131 sq. ft.
Heating surface, tubes	1,206 sq. ft.
Heating surface, total	1,337 sq. ft.
Driving wheels, diar.	50 ins.
Driving wheel centres	Cast iron
Driving journals	8½ by 10 ins.
Cylinders, diar. and stroke	19 by 26 ins.
Boiler, type	Radial stayed
Boiler pressure	180 lbs.
Tubes, no. and diar.	223—2 ins.
Tubes, length	10 ft. 5 ins.
Brakes	Westinghouse American
Weight of tender, loaded	86,000 lbs.
Capacity, water	3,500 imp. gals.
Capacity, coal	5 tons
Tank, type	Sloping back
Truck, type	Arch bar with steel bolsters
Wheels, diar.	33 ins.
Wheels, type	Wrought iron, steel tired
Journals	4¼ by 8 ins.
Brake beams	Steel trussed

Following are chief details of the six coupled switching locomotives which the Intercolonial Ry. is having built by the Canadian Locomotive Co.:—

Weight, total	138,000 lbs.
Wheel base of engine	12 ft.
Wheel base, engine and tender	40 ft. 5¼ ins.
Heating surface, firebox	132 sq. ft.
Heating surface, tubes	1,935 sq. ft.
Heating surface, total	2,067 sq. ft.
Grate area	27.5 sq. ft.
Driving wheels, diar.	51 ins.
Driving wheel centres	Cast iron
Driving journals	8½ by 11 ins.
Cylinders, diar. and stroke	20 by 26 ins.
Boiler, type	Straight top, radial stayed
Boiler pressure	200 lbs.
Tubes, no. and diar.	300—2 ins.
Tubes, length	12 ft. 6 ins.
Brakes	Westinghouse American
Length over all, engine and tender	55 ft. 4 ins.
Width over all	10 ft.
Height over all	15 ft. 3 ins.
Weight of tender, loaded	90,000 lbs.
Capacity, water	3,800 imp. gals.
Capacity, coal	6 tons
Tank, type	Hopper with sloping back
Truck, type	Four wheel
Wheels, diar.	33 ins.
Wheels, type	Wrought iron, steel tired
Journals	M.C.B. 4¼ by 8 ins.

Following are chief details of the 25 ten wheel locomotives, class D.10G., which the C.P.R. is having built by the Canadian Locomotive Co.:—

Weight on drivers	141,000 lbs.
Weight, total	190,000 lbs.
Wheel base of engine, rigid	14 ft. 10 ins.
Wheel base of engine, total	26 ft. 1 in.
Wheel base, engine and tender	54 ft. 10¼ ins.
Heating surface, firebox	180 sq. ft.
Heating surface, tubes	2,238 sq. ft.
Heating surface, total	2,418 sq. ft.
Driving wheels, diar.	63 ins.
Driving wheel centres	Cast steel
Driving journals	9½ and 9 by 12 ins.
Cylinders, diar. and stroke	21 by 28 ins.
Boiler, type	Extended wagon top
Boiler pressure	200 lbs.
Tubes, no. and diar.	240—2 ins.; 24—5 ins.
Tubes, length	14 ft. 4 ins.
Brakes	Westinghouse, E.T. 6
Superheater	Vaughan and Horsey
Grate area	49 sq. ft.
Superheater heating surface	408 sq. ft.
Width over all, engine and tender	10 ft.
Height over all	15 ft. 2 ins.
Length over all	65 ft. 9 ins.
Weight of tender, loaded	134,000 lbs.
Capacity, water	5,000 imp. gals.
Capacity, coal	12 tons
Tank, type	Water bottom
Truck, type	Outside equalized
Wheels, diar.	36¼ ins.
Wheel, type	Cast steel centre with retaining rings
Brake beams	Simplex

Following are chief details of the four Pacific type locomotives, which the Canadian Northern Ry. is having built by the Montreal Locomotive Works, as mentioned in our last issue:—

Weight on drivers	136,000 lbs.
Weight of engine, total	213,000 lbs.
Weight of tender	145,000 lbs.
Wheel base, driving	13 ft.
Wheel base, total engine	33 ft., 7 ins.
Wheel base, total engine and tender	68 ft., 5 ins.
Tractive power, maximum	31,100 lbs.
Factor of adhesion	4.37
Cylinders, diar. and stroke	23 by 28 ins.
Valve gear	Walschaert
Valves, diar.	14 ins.
Driving wheels, diar.	69 ins.
Driving journals	9½ and 9 by 12 ins.
Engine truck, type	Four wheel with swing centre
Engine truck journals	5½ by 12 ins.
Engine truck wheels, diar.	33 ins.
Trailing truck, type	Four wheel radial
Trailing truck journals	8 by 14 ins.
Trailing truck wheels	45 ins.
Boiler, type	Extended wagon top, radial stay.
Boiler, outside diar. front end	62 ins.
Boiler, outside largest course	70 ins.
Boiler pressure	170 lbs.
Firebox, length and width	108⅛ by 64¼ ins.
Tubes, no. and diar.	162—2 ins.
Tubes, length	20 ft.
Flues, no. and diar.	24—5 ins.
Heating surface, tubes	2,358 sq. ft.
Heating surface, firebox	160 sq. ft.
Heating surface, total	2,518 sq. ft.
Grate area	48.2 sq. ft.
Tender wheels, diar.	33 ins.
Tender journals	5½ by 10 ins.
Tender truck, type	Four wheel pedestal
Tank, type	Water bottom
Capacity, water	6,000 imp. gals.
Capacity, coal	12 tons.

Minneapolis, St. Paul and Sault Ste. Marie Railway.

The report for the year ended June 30, states that the extension from Frederic to Duluth was completed during the year and traffic is now being handled between the twin cities and Duluth. The line in North Dakota between Drake and Fordville, 130 miles, the construction of which was commenced in 1910 and temporarily discontinued on account of crop failures, was expected to be ready for traffic by Oct. 1. In connection with the new terminals at Chicago, land has been acquired, one block wide on the west side of the Chicago river between Canal and Clinton streets, and extending from 12th street to West 15th place. Contracts have been let for the construction of concrete freight houses. The property is made available by a contract with the Baltimore and Ohio Chicago Terminal Rd., for the use of that company's tracks to a connection with the M.St.P. & S.S.M.R. Chicago division. A strip of land one block wide, from Canal to Halstead streets, has been acquired for a connection between the two forementioned tracks, and considerable land has also been acquired at 50th street for yards, etc. The finance report shows gross earnings (including the Chicago division, formerly Wisconsin Central Ry.), $26,684,240.93; expenses, $16,223,291.02; net earnings, $10,460,949.91; income from other sources, $1,099,019.53; total income, $11,559,969.44, less fixed charges, taxes, etc., $6,831,030.02; surplus income. $4,728,939.42. The average mileage operated was 3,773.37, an increase of 49.03 miles. In connection with the provision of terminals at Chicago, the company and the Central Terminal Ry. Co. have executed a joint mortgage covering the property and its improvements, providing for a possible issue of $20,000,000 4% gold bonds, of which $6,000,000 have been sold, the proceeds being sufficient to complete the terminals as now planned. To provide funds for the building of the Frederic extension to Duluth, Minn., temporary advances for which had been made from the company's surplus account, $1,520,000 of M.St.P. & S.S.M.R. first mortgage consolidated gold bonds have been issued, and $1,020,000 of the company's equipment trust notes have also been issued in connection with additional equipment contracted for delivery prior to Sept. 1. To provide for temporary advances made for revision work on the Chicago division, for payment of car trust obligations and retirement of maturing bonds of underlying mortgages of the Wisconsin Central Ry., $3,500,000 of W.C.R. first and refunding mortgage bonds were issued.

Orders by the Board of Railway Commissioners.

Beginning with June, 1904, Canadian Railway and Marine World has published in each issue summaries of orders passed by the Board of Railway Commissioners, so that subscribers who have filed our paper have a continuous record of the Board's proceedings. No other paper has done this.

The dates given of orders, immediately following the numbers, are those on which the orders took place, and not those on which the orders were issued. In many cases orders are not issued for a considerable time after the dates assigned to them.

17155. July 31.—Authorizing Esquimalt and Nanaimo Ry. to build bridge 5.2 over Burnside road, near Victoria, B.C.

17156. June 24.—Authorizing C.P.R. to build spur for Jamieson Lime Co., Sand Point, Ont.

17157. July 27.—Authorizing Kettle Valley Ry. to build bridge over Okanagan river at Penticton, B.C.

17158. Aug. 1.—Authorizing Canadian Northern Ry. to cross 68 highways with its Goose Lake extension, Alta.

17159. July 31.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to cross five highways between mileage 126.60 and 155.70, Ont.

17160. July 31. Authorizing G.T.R. to build spur for Dominion Canners, Ltd., Aylmer, Ont.

17161. Aug. 1.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to cross nine highways between mileage 177.86 and 183.45.

17162. Aug. 1.—Authorizing C.P.R. to build spur for Golden West Brewing Co., Titian, Alta.

17163. Aug. 1.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to cross four highways between mileage 121.87 and 124.83, Ont.

17164, 17165. Aug. 1.—Authorizing C.P.R. to build spur for Stag Creek Lumber Co. on its Maniwaki subdivision, Que., and for Carter Mather Lumber and Supply Co., Calgary, Alta.

17166. Aug. 1.—Approving C.N. Ontario Ry. station site at Torbolton.

17167. Aug. 2.—Authorizing Medonte tp., Ont., to build highway crossing over C.P.R. Sudbury-Kleinburg branch.

17168. Aug. 1.—Approving drain plans for Woodworth award drain under G.T.R. in Malahide tp., Ont.

17169. Aug. 2.—Authorizing C.N. Branch Lines Co. to connect its Canora-Sturgis branch with C.N.R. main line at Canora, Sask.

17170. Aug. 1.—Authorizing C.N. Quebec Ry. to build across public road in St. Augustin parish.

17171. Aug. 7.—Approving Canadian Northern Ry. location through tps. 19-15, r. 29-26, w. 4 m., mileage 31.40 to 65.05, Alta.

17172. Aug. 6.—Authorizing C.N. Ontario Ry. to cross two highways on its Ottawa-Capreol line, in Field tp.

17173. Aug. 3.—Authorizing C.P.R. to build spur to its freight sheds at New Westminster, B.C.

17174, 17175. Aug. 6.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to cross forced road from Crow Lake to Sharbot Lake, Ont., and highway in Hamilton tp., Ont.

17176. Aug. 6.—Authorizing G.T. Pacific Branch Lines Co. to build spur for Pacific Pass Coal Fields, Ltd., North Alberta district.

17177, 17178. Aug. 3.—Authorizing G.T.R. to build siding into W. S. Cook & Son's premises, Belleville, Ont., and for Canadian Northern Montreal Land Co., St. Laurent parish, Quebec.

17179, 17180. Aug. 3.—Approving plans of Dominion Atlantic Ry. for additional wing walls for bridges at Bridgetown, and over Avon river, at Windsor, N.S.

17181. Aug. 6.—Authorizing Kettle Valley Ry. to cross highway northwest of Penticton, B.C.

17182. Aug. 3.—Authorizing Essex Terminal Ry. and Michigan Central Rd. to operate over crossing in Windsor, Ont., and rescinding order 16638. May 29, in same connection.

17183. Aug. 6.—Authorizing G.T. Pacific Branch Lines Co. to cross 12 highways on its Cutknife branch, Sask.

17184. Aug. 7.—Authorizing G.T. Pacific Ry. to carry traffic from mileage 100 to 164, east of Prince Rupert, B.C.

17185. Aug. 13.—Authorizing C.P.R. to build spur for G. F. Stephens & Co., Calgary, Alta.

17186. Aug. 7.—Approving Michigan Central Rd. plan for new bridge over London St., Windsor, Ont.

17187. Aug. 7.—Authorizing Dominion Atlantic Ry. to reconstruct Smiths Cove trestle, at mileage 144.1 from Halifax, N.S.

17188. Aug. 3.—Authorizing G.T. Pacific Branch Lines Co. to open for traffic its Young to Prince Albert branch, mileage 45.5 to Wakaw at mileage 67.

17189, 17190. Aug. 9, 8.—Authorizing C.P.R. to take lands in Montreal for railway purposes and for its Windsor St. station and terminals.

17191. Aug. 12.—Directing examination under oath at Toronto, of A. L. Hertzberg, Division Engineer, Ontario Division, C.P.R., re C.P.R. diverting course of Coldwater river in Medonte tp., Ont.

17192. Aug. 8.—Authorizing Canadian Northern Ry. to open for traffic its line between Morinville and Athabasca Landing, Alta., 72 miles, speed of trains not to exceed 15 miles an hour.

17193. Aug. 7.—Authorizing C.P.R. to build industrial spur across Park, Elizabeth and James streets, St. Marys, Ont.

17194. Aug. 8.—Approving C.N. Ontario Ry. stress sheets for bridge over Oavase river and C.P.R. mileage 224.2 from Ottawa.

17195. July 25.—Ordering Canadian Northern Ry., by Aug. 1, to install agent and provide temporary shelter at Briercrest, Sask., and to build station before Dec. 1.

17196. July 29.—Ordering Canadian Northern Ry., by Oct. 1, to build station and appoint agent at Ardath, Sask.

17197. Aug. 1.—Authorizing Mount McKay and Kakabeka Falls Ry. to cross Canadian Northern Ry. by temporary subway at Neebing Ave., Fort William, Ont.

17198, 17199. Aug. 12.—Authorizing C.N. Ontario Ry. to cross public roads in Bristol tp., Que., and March tp., Ont.

17200. Aug. 13.—Approving location of Canadian Northern Ry. station and freight shed at Dauphin, Man.

17201. July 25.—Authorizing Canadian Northern Ry. to build across road allowance between secs. 20-29, tp. 16, r. 26, w. 2 m.

17202. Aug. 12.—Authorizing British Columbia Southern Ry. (C.P.R.) to close crossing between 5th and 6th Aves., and open crossing at 7th Ave., Hosmer, B.C.

17203. July 31.—Authorizing C.P.R. to cross road allowance in East Flamboro tp., Ont., mileage 11.27.

17204. Aug. 9.—Authorizing C.P.R. to build seven spurs at Magog, Que.

17205. Aug. 12.—Authorizing city of Vancouver, B.C., to cross C.P.R. with Clark drive.

17206. July 25.—Authorizing C.P.R. to build bridge over its tracks at Thunder creek, Sask, 20% to be paid from railway grade crossing fund, $5,000 by the city of Moose Jaw, and remainder by C.P.R.; city to maintain road and sidewalk on bridge.

17207. Aug. 12.—Dismissing application of Fullerton Lumber and Shingle Co., Vancouver, B.C., re overcharges on lumber alleged against C.P.R. and G.N.R.

17208. July 30.—Ordering G.T.R. to protect Wellington St. crossing, Hamilton, Ont., by watchman between 9 p.m. and 7 a.m.

17209. Aug. 13.—Ordering Vancouver, Westminster and Yukon Ry. to build siding for Bradford and Taylor, Vancouver, B.C.

17210. Aug. 7.—Authorizing Brandon Electric Light Co., and owners of other warehouses at Brandon, Man., to unload cars from Canadian Northern Ry. on lane between Lorne and Princess Aves., the Electric Light Co. to maintain roadway 16 ft. wide alongside cars.

17211. July 24.—General order putting into force uniform rules governing determination of visional acuity, color perception, and hearing of railway employes on steam railways.

17212. July 31.—Authorizing Georgian Bay and Seaboard Ry. (C.P.R.) to build drain through F. Walden's lands and to take certain lands in Ops tp., Ont.

17213. Aug. 15.—Approving location of G.T. Pacific Branch Lines Co.'s Regina-Moose Jaw branch, mileage 40.01 to 47.74, Moose Jaw district, Sask.

17214. Aug. 13.—Authorizing G.T.R. to build temporary track across Montreal, Park and Island Ry., and two tracks across Upper Lachine road, Montreal.

17215. Aug. 3.—Authorizing G.T.R. to build spur for Canada Iron Corporation, near Longford station, Ont.

17216. Aug. 15.—Authorizing G.T. Pacific Branch Lines Co. to cross C.P.R. with its Harte-Brandon branch, Man.

17217. Aug. 15.—Rescinding order 16723, June 11, approving plan of interlocker by Georgian Bay and Seaboard Ry. (C.P.R.), and approving plan for signals at Atherley swing bridge, at mileage 44, over Trent canal, Ont.

17218, 17219. Aug. 9, 7.—Authorizing C.P.R. to build spurs for J. Pepin, St. Therese de Balinville parish, Que., and Harris Tie and Timber Co., Algoma district, Ont.

17220. Aug. 8.—Authorizing C.P.R. to change its main line location in McNab tp., Ont.

17221. Aug. 13.—Authorizing corporation of North Cowichan, B.C., to build two roads across Esquimalt and Nanaimo Ry.

17222. July 29.—Authorizing Canadian Northern Ry. to build crossing opposite Andrews St., Tisdale, Sask.

17223. July 29.—Ordering Canadian Northern Ry. to install temporary agent at Waseca, Sask., by Sept. 15.

17224. Aug. 14.—Approving C.N. Ontario Ry. plans for Duchesnay creek.

17225. Aug. 14.—Authorizing C.P.R. to build spur for Alberta Box Co., Calgary Jct., Alta.

17226. Aug. 15.—Extending to Sept 30, time for completion by C.P.R. of branch line into Union Stockyards, Toronto, authorized by order 15768, Jan. 11.

17227. Aug. 14.—Authorizing C.P.R. to build spur for Calgary Grain and Seed Co., Titian, Alta.

17228. Aug. 15.—Extending to Sept. 30, time for completion by C.P.R. of spur into Union Stockyards, Toronto, authorized by order 15733, Jan. 4.

17229. July 29.—Ordering C.P.R. within 60 days to build transfer track connecting with Canadian Northern Ry. at Midale, Sask.

17230, 17231. Aug. 14.—Authorizing Mount McKay and Kakabeka Falls Ry. to cross C.P.R. and G.T. Pacific Ry. at Neebing Ave., Fort William, Ont., half interlockers to be installed.

17232. Aug. 14.—Authorizing Bell Telephone Co. to erect poles and wires on certain streets in Montreal.

17233. Aug. 12.—Approving G.T. Pacific Ry. station site at Loverna, Alta.

17234. Aug. 15.—Ordering that 20% of cost of gates at King and Sherbrooke Sts., Peterboro, Ont., be paid out of railway grade crossing fund, balance by G.T.R.; city to contribute 10% of cost of installing and maintaining gates at Sherbrooke St., and 15% at King St.

17235. Aug. 16.—Rescinding order 16795, June 19, appointing arbitrators of claim of L. J. Riopel against Quebec Oriental Ry., and appointing new arbitrators.

17236. Aug. 14.—Authorizing C.P.R. to take lands for enlargement of its Glen yard, Montreal.

17237. July 18.—Authorizing C.N. Quebec Ry. to cross public road in St. Jerome parish.

17238. Aug. 17.—Slightly amending order 17019, July 16, re G.T. Pacific Ry. spur to Macleon Collieries, Ltd.

17239, 17240. Aug. 16, 17.—Authorizing C.N. Ontario R. to cross public roads in Gibbons and Field tps.

17241. Aug. 16.—Ordering Canadian Northern Ry. to maintain level crossing at 24th St., Saskatoon, Sask.

17242. Aug. 16.—Authorizing C.P.R. to build spur for Wood, Vallance, and Adams, Calgary, Alta.

17243. Aug. 16.—Approving plans of C.N.R. standard 40,000 gallon tank.

17244. Aug. 15.—Approving supplement 1 to C.N.R. standard passenger tariff 285.

17245. Aug. 15.—Approving revised location of G.T. Pacific Branch Lines Co.'s Brandon branch, mileage 12.71 to 18.48, Man.

17246. Aug. 16.—Authorizing G.T.R. to rebuild 14 bridges on its Northern and Middle divisions, Ont.

17247. Aug. 14.—Approving G.T.R. revised location over Moores crossing, near Bracebridge, Ont.

17248. Aug. 17.—Approving British Columbia Electric Ry. bylaw for appointment of officers to issue tariffs of tolls.

17249. Aug. 19.—Approving Vancouver, Victoria and Eastern Ry. standard freight tariff C.R.C. 893.

17250. Aug. 14.—Ordering Canadian Northern Ry., within 30 days to file plans of subway at Victoria St., North Battleford, Sask.; 20% to be paid from railway grade crossing fund, 70% of remainder by C.N.R., and 30% by the town, work to be finished by Jan. 1, 1913.

17251. Aug. 19.—Extending to Sept. 15, time for completion by Hamilton Radial Ry. of gravel crossings at Burlington Beach, Ont., as required by order 17132, July 29.

17252. Aug. 20.—Amending order 15766, Dec. 13, 1911, by ordering that G.T.R. maintain switch to Hay Bros' elevator at Stoney Point, Ont., police trustees of village to pay $200 towards cost of maintenance.

17253. Aug. 20.—Ordering G.T. Pacific Ry. to furnish accommodation for receiving and loading of all traffic offered at Haysport, B.C.

17254. Aug. 22.—Authorizing Central Ry. of Canada to cross 11 highways in Caledonia and South Plantagenet tps., Ont.

17255. Aug. 14.—Amending order 16653, May 31, re carrying of Birch Ave. under G.T.R., by city of Hamilton, Ont.

17256. Aug. 22.—Authorizing G.T.R. to cross road allowance between lots 22 and 23, for relocation of siding at Vineland, Ont., as directed by order 16722, June 24.

17257. Aug. 21.—Approving supplement 11 to Express Classification for Canada 2.

17258. Aug. 16.—Authorizing Ontario Hydro-Electric Power Commission to erect wires across G.T.R. at lots 5 and 6, con. 9, Yarmouth tp.

17259. Aug. 21.—Authorizing C.P.R. to build spur for General Fire Extinguisher Co., Dundas St., Toronto.

17260. Aug. 16.—Approving proposed location of C.P.R. station at Cooksville, Ont.

17261, 17262. Aug. 20.—Relieving C.P.R. from further protecting crossings at Dundas St., Cooksville, and at mileage 79, Windsor subdivision, near Tilbury station, Ont.

17263. Aug. 20.—Rescinding order 15466, Nov. 22, 1911, re provision of undercrossing by Atlantic, Quebec and Western Ry. at Breche a Manon, Que.

17264, 17265. Aug. 21.—Authorizing C.P.R. to build spur into Sims ballast pit, Sask., and for Price Bros., St. Francois Xavier de Batiscan parish, Que.

17266. Aug. 21.—Authorizing St. Marys and

Western Ontario Ry. (C.P.R.) to cross 14 highways near St. Marys, Ont.

17267, 17268. Aug. 21, 20.—Authorizing C.P.R. to build spur for Joliette Steel and Iron Foundry, Joliette, Que., and extension to spur for A. B. Cushing Lumber Co., Calgary, Alta.

17269. Aug. 19.—Ordering C.P.R. to operate trains over Main St., Minnedosa, Man., not exceeding 6 miles an hour.

17270. Aug. 23.—Temporarily approving C.P.R. standard freight mileage tariff C.R.C. no. W.1758.

17271. Aug. 23.—Authorizing C.N. Ontario Ry. to build bridge across main channel of Riviere des Prairies, mileage 40 from Hawkesbury, Que.

17272. Aug. 21.—Authorizing Canadian Northern Ry. to operate spur to Gervais coal mine, Alta.

17273. Aug. 23.—Approving plans of Canadian Northern Ry. standard no. 7 station for Eastern lines.

17274. Aug. 21.—Approving revised location G.T. Pacific Branch Lines Co.'s station site at Sander, Sask.

17275. Aug. 20.—Approving location of G.T. Pacific Branch Lines Co.'s Brandon branch, mileage 18.48 to 21.86, Man.

17276. Aug. 20.—Authorizing G.T. Pacific Branch Lines Co. to carry traffic over its Young to Prince Albert branch, between mileage 45.5, and Wakaw, 21.5 miles, and rescinding order 17188, Aug. 3, 1912, authorizing similarly.

17277. Aug. 16.—Amending order 16053, Mar. 1, re G.T.R. crossings at Tavistock, Ont.

17278. Aug. 21.—Relieving Windsor, Essex and Lake Shore Rapid Ry. from further protecting crossing 4½ miles south of Windsor, Ont.

17279. Aug. 22.—Authorizing branch to Steel Co. of Canada and Brown Boogs Co., Hamilton, Ont., to be used jointly by Toronto, Hamilton and Buffalo Ry. and G.T.R.

17280. Aug. 21.—Authorizing G.T.R. to rebuild draw span at bridge 138, District 32, Rose Point, Ont.

17281. Aug. 31.—Authorizing C.P.R. to build spur to industrial plants east of Neebing Ave., Fort William, Ont., also to cross under C.N.R.

17282. Aug. 22.—Authorizing C.P.R. to cross 34 highways on its Crowsnest Pass branch between Seven Persons and Grassy Lake, and approving revised location.

17283. Aug. 23.—Authorizing C.P.R. to connect with G.T.R. spur for D. Maxwell & Son, St. Marys, Ont.

17284. Aug. 22.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to cross and divert two highways, South Sherbrooke tp., Ont.

17285. Aug. 23.—Authorizing Canadian Northern Ry. to cross six highways on its Vonda northerly line.

17286. Aug. 23.—Authorizing C. N. Ontario Ry. to build bridge across Pike river, Field tp.

17287. Aug. 23.—Authorizing Great Northern Ry. to build crossing over highway near Fruitvale station, B.C.; station to be kept clean and heated during winter; and dismissing Fruitvale Trading Co.'s application for removal of station.

17288. Aug. 23.—Authorizing Surrey municipality, B.C., to build highway crossings across G.N.R. and Victoria Terminal and Ferry Co.'s tracks, near Cloverdale, B.C.

17289. Aug. 22.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to cross Anderson and Brock streets, Whitby, Ont.

17290. Aug. 29.—Approving Pacific and Arctic Ry. and Navigation Co., British Columbia Ry., and British Yukon Ry. joint standard passenger tariff, C.R.C. 6.

17291. Aug. 27.—Authorizing G.T.R. to build siding for Harris Abattoir Co., West Toronto, Ont.

17292. Aug. 24.—Authorizing C.P.R. to open for traffic its Galloway to Waldo branch, from Caithness to Waldo.

17293. Aug. 24.—Approving location of C.P.R. Asquith to Conquest branch, mileage 0 to 35, and authorizing 18 highway crossings.

17294. Aug. 27.—Approving C.N. Ontario Ry. revised location through White, Fitzgerald, Deacon, Lister, and Boyd tps., Nipissing district, mileage 265.34 to 285.53 from Montreal.

17295. Aug. 27.—Approving revised location of C.P.R. Boissevain to Lauder branch, Man., for 35.29 miles.

17296. Aug. 26.—Authorizing C.P.R. to build two spurs along harbor quay, Goderich, Ont.

17297. Aug. 27.—Approving revised location of C.P.R. Estevan to Forward branch, mileage 0 to 55.0, Sask.

17298. Aug. 26.—Approving Georgian Bay and Seaboard Ry. (C.P.R.) plan for arrangement of signals at swing bridge over Trent canal at mileage 44.

17299. Aug. 26.—Authorizing C.P.R. to build four bridges on its White River and Chapleau subdivisions, Lake Superior division.

17300. Aug. 27.—Authorizing C.P.R. to build second track across seven streets in Vancouver, B.C.

17301. Aug. 24.—Approving location of C.P.R. Swift Current branch, mileage 0 to 84.98, Sask.

17302. Aug. 24.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to build bridge 180.02.

17303. Aug. 24.—Authorizing Esquimalt and Nanaimo Ry. to build spur for Canadian Pacific Lumber Co., Port Alberni, B.C.

17304. Aug. 26.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to build bridge at mileage 113.95.

17305. Aug. 27.—Authorizing town of Brampton, Ont., to build highway over C.P.R. at Joseph St.

17306. Aug. 27.—Ordering C.P.R. to build station at Salmon Arm, B.C.

17307. Aug. 27.—Amending order 14877, Sept. 4, 1911, re subway under C.P.R. at Columbia Ave., Vancouver, B.C.

17308. Aug. 26.—Authorizing Canadian Northern Ry. to cross 12 highways with its Calgary southerly branch, Alta.

17309 to 17311. Aug. 27, 26.—Approving C.N. Ontario Ry. revised location through Westmeath and Pembroke tps.; southward from Capreol Jct., and through Boyd and Pentland tps.

17312. Aug. 26.—Authorizing C.N. Ontario Ry. to cross and divert public road on lot 11, cons. 2 and 3, Gibbons tp.

17313. Aug. 26.—Authorizing C.N. Ontario Ry. to build spur for Provincial Steel Co., Cobourg, Ont.

17314. Aug. 24.—Approving C.N. Ontario Ry. revised location in Camden tp.

17315, 17316. Aug. 24, 27.—Authorizing G.T.R. to build extension of siding for Lake Simcoe Ice Supply Co., Florence St., North Parkdale, Toronto, and spur for Shale Products, Ltd., Caledon tp., Ont.

17317 Aug. 24.—Approving detail plans of bridge carrying Queen St. across G.T.R. at Sunnyside, Toronto.

17318. Aug. 27.—Authorizing G.T.R. to build spur for Hall Foundry Co., Hespeler, Ont.

17319, 17320. Aug. 26.—Authorizing Toronto Eastern Ry. to cross two highways in Whitby tp., and public roads in Pickering and Whitby tps., Ont.

17321. Aug. 27.—Approving plan of Edmonton, Dunvegan and British Columbia Ry. for standard overhead crossing.

17322. Aug. 26.—Authorizing Page-Hersey Iron Tube and Lead Co., to operate travelling crane over G.T.R. Lachine canal branch, Montreal.

17323. Aug. 22.—Authorizing Canadian Northern Ry. to build ditch upon M. Wallace's property, Ochre River, Man.

17324. Aug. 27.—Approving Niagara, Welland and Lake Erie Ry. location in Welland, Ont., and authorizing crossing of Michigan Central Rd., and G.T.R.

17325. Aug. 27.—Authorizing Vancouver and Lulu Island Ry. to build second track across 22 streets and avenues in Vancouver, B.C.

17326. Aug. 27.—Ordering G.T.R. to install warning gong at Notre Dame and St. Ferdinand streets, St. Henri, Montreal.

17327. Aug. 24.—Authorizing Midland Ry., of Manitoba (G.N.R.) and G.T. Pacific Ry. to operate trains without stopping over crossing by interlocker in St. Boniface parish, Man.

17328. Aug. 29.—Recommending to Governor in Council for approval, lease between C.P.R. and Esquimalt and Nanaimo Ry.

17329. Aug. 28.—Authorizing Kings County municipality, N.S., to build crossing over Dominion Atlantic Ry.

17330, 17331. Aug. 2, 29.—Approving location of Campbellford, Lake Ontario and Western Ry. (C.P.R.) from mileage 125.5 to 127.32, and slightly amending order 16978, July 11, re crossing of Oshawa Ry.

17332, 17333. Aug. 28.—Approving Canadian Northern Ry. location through Macleod, Alta., mileage 102.05 to 104.26; and authorizing it to cross public road with its Calgary southerly line.

17334. Aug. 28.—Authorizing C.N. Ontario Ry. to cross public road in Clarendon tp.

17335. Aug. 28.—Authorizing G.T.R. to build spur for Massey-Harris Co., Toronto.

17336, 17337. Aug. 28.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to build bridge 27.28 over Fish creek, and to cross road allowance at mileage 47.45, Camden tp., Ont.

17338. Aug. 28.—Authorizing Toronto Eastern Ry. to cross public road in Whitby East tp., Ont.

17339. Aug. 28.—Rescinding order 14440, July 28, 1911, and ordering Canadian Northern Ry. to build subway across road allowance, sec. 10-15, tp. 65, r. 22, w. 4 m., Alta.

17340. Aug. 28.—Authorizing Bell Telephone Co. to maintain poles and wires on certain streets in Montreal.

17341, 17342. Aug. 29, 27.—Authorizing C.N. Ontario Ry. to cross two highways in Field tp., and approving location of station grounds at mileage 22 from Ottawa.

17343. Aug. 31.—Authorizing Canadian Northern Ry. to build its Calgary southerly line across four streets and road allowance at High River, Alta.

17344. Aug. 31.—Approving C.N. Ontario Ry. revised location through Alice and Fraser tps.

17345. Aug. 29.—Authorizing C.N. Ontario Ry. to cross C.P.R. Stobie branch in McKim tp.

17346. Aug. 30.—Authorizing Canadian Northern Ry. to cross 11 highways on its Alsask southeasterly branch.

17347. Aug. 30.—Relieving C.P.R. from further protecting crossing 2,950 ft. west of mileage 1, Sault branch, Ont.

17348, 17349. Aug. 29.—Authorizing C.P.R. to build bridges 0.4 and 126.5 on its White River and Nipigon subdivisions, Lake Superior division, Ont.

17350. Aug. 31.—Authorizing Drury, Denison and Graham tps. to extend public road across C.P.R. at Worthington station, Ont.

17351. Aug. 30.—Amending order 16961, July 4, re appropriation of lands for C.P.R. Windsor St. terminal, Montreal.

17352, 17353. Aug. 31.—Authorizing C.P.R. to build its double track across 13 highways, mileage 94.33 to 105.59, Moose Jaw subdivision; and across 26 highways on its Swift Current subdivision, mileage 23.29 to 41.99, Sask.

17354. Aug. 31.—Authorizing Canadian Northern Ry. to cross public road on its Alsask southeasterly line.

17355, 17356. Aug. 28.—Approving location of C.P.R. stations, on lot 14, con. 10, Vespra tp., and at Straffordville, Ont.

17357. Aug. 29.—Authorizing C.P.R. to build spur for W. H. Hunter, Regina, Sask.

17358. Aug. 27.—Relieving C.P.R. from erecting fences on certain portions of its Cascade, Nicola, Westminster, Mission and Thompson subdivisions, B.C.

17359. Aug. 28.—Approving C.P.R. proposed location at Fordwich, Ont.

17360 to 17364. Aug. 30, 29, 28.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to take portion of G.T.R. land at mileage 97.5; to cross 18 highways, mileage 40.47 to 114.57; approving location from mileage 174 to 176 from Glen Tay, and from mileage 121 to 124.83, and authorizing it to build bridge 178.55 over Little Rouge river, Ont.

17365. Aug. 30.—Approving G.T. Pacific Branch Lines Co.'s station site in Prairiedale, Alta.

17366. Aug. 29.—Authorizing G.T.R. to build extension of siding for Canadian National Carbon Co., Toronto.

17367. Aug. 29.—Approving plans of G.T.R. interlocking plant to protect bridge across Welland canal and railway crossing at Port Colborne, Ont.

17368. Aug. 29.—Authorizing G.T.R. to build spur for H. M. Lickey, Ltd., Gravenhurst, Ont.

17369. Aug. 30.—Ordering that crossing of Plains road, Nelson tp., Ont., by G.T.R. be protected by subway.

17370. Aug. 29.—Approving G.T.R. plans for new station and rearrangement of yard at Hensall, Ont.

17371. Aug. 31.—Amending order 17034, July 18, re new union station at Toronto, by adding that the approval granted by this order shall not be taken as authorizing G.T.R. to take C.P.R. lands.

17372. Aug. 30.—Authorizing C.P.R. to continue use of Bay of Quinte Ry. spur, Tweed, Ont., on payment of $1 a loaded car, movements of empties in opposite direction to be free.

17373. Aug. 29.—Approving location of Nipissing Central Ry. extension from Haileybury to New Liskeard, Ont.

17374. Aug. 31.—Approving Edmonton, Dunvegan and British Columbia Ry. location from mileage 0 to 5.13.

17375. Aug. 29.—Authorizing Toronto, Hamilton and Buffalo Ry. to build spur to serve Dominion Steel Castings Co., Hamilton, Ont.

17376. Aug. 29.—Approving Windsor, Essex and Lake Shore Rapid Ry. bylaw 10, authorizing E. S. Hughes, Traffic Manager, to prepare tariffs.

17377. Aug. 28.—Authorizing G.T.R. to rebuild five bridges on its Northern division, and nine bridges on its Middle division, Ont.

17378, 17379. Aug. 31, 30.—Approving G.T. Pacific Branch Lines Co. station sites at Adine, Alta., and Cedoux, Sask.

17380. Aug. 31.—Authorizing C.P.R. to build spur for Grant Smith & Co. and McDonnell, Ltd., Southesk, Alta.

17381. Aug. 30. — Authorizing Winnipeg Electric Ry. to cross Canadian Northern Ry. spur on Rue de Meuron, St. Boniface, Man.

17382. Aug. 31.—Ordering Brockville, Westport and North Western Ry. to build cattle pass for W. McLean, Elizabethtown, Ont.

17383. Sept. 3.—Extending to Nov. 1, time for completion by C.N. Ontario Ry. of interlocker crossing C.P.R. at Chaudiere Jct.

17384. Sept. 4.—Naming tariff for shipment of cream for express companies subject to Board's jurisdiction, applying west of Port Arthur, Ont., covered by Express Classification for Canada 2.

17385. Aug. 26.—Approving Niagara, St. Catharines and Toronto Ry. location from crossing of Welland canal, in St. Catharines, at mileage 0.75, to mileage 1.1 at Niagara-on-the-Lake, Ont.

17386. Aug. 28.—Approving G.T.R. plans for new station at St. Gregoire, Que.

17387. Sept 3.—Ordering G.T.R., within 30 days, to file plans showing adequate accommodation for handling freight traffic at Quebec, Que.

17388. Sept. 3.—Approving Canadian Northern Ry. station location and building at Fort Frances, Ont.

17389. Aug. 31.—Removing speed limitation on trains on C.P.R. Weyburn-Lethbridge branch, provided by order 15696, Dec. 27, 1911.

17390. Aug. 31.—Amending order 16843, June 25, re Yonge street and Avenue road subways, Toronto; land damages to be paid by city.

17391. Aug. 30.—Authorizing C.P.R. to lay sewer and water pipes across Birds Hill road, near Winnipeg.

17392, 17393. Aug. 30.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to take G.T.R. lands for right of way; and to build three bridges at mileage 143.46, 135.75 and 134.42, Ont.

17394. Aug. 28.—Approving Canadian Northern Ry. location through tps. 22-19, r. 29-28, w. 4 m., mileage 13.21 to 31.40.

17395. Sept. 4.—Authorizing Edmonton, Dunvegan and British Columbia Ry. to cross six highways, mileage 1.2 to 4.7, Alta.

17396. Aug. 16.—Authorizing G.T. Pacific Branch Lines Co. to cross road at mileage 31.7, Sask., with its Regina-Moose Jaw branch.

17397. Sept. 5.—Authorizing C.P.R. to build three additional tracks across Canadian Northern Ry. Birds Hill branch near Woods, Man., interlocking plant to be installed.

17398. Aug. 30.—Authorizing C.P.R. to build spur from Princess St. to Winnipeg Steam Heating Co., Winnipeg.

17399. Sept. 4.—Authorizing Kootenay Central Ry. (C.P.R.) to cross highways from mileage 3.37 to 45.34, northerly from Colvilli, B.C.

17400. August 30.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to take certain G.T.R. lands for right of way.

17401. Sept. 4.—Ordering Canadian Northern Ry. to build spur for Pintsch Compressing Co., Edmonton, Alta.

17402, 17403. Sept. 3.—Authorizing C.N. Ontario Ry. to build over Mississippi river and Marlborough creek, Carleton county, Ont.

17404. Sept. 4.—Authorizing British Columbia Electric Ry. to cross C.P.R. at 12th St., New Westminster.

17405. Sept. 4.—Authorizing British Columbia Electric Ry. to cross Vancouver, Fraser Valley and Southern Ry. on Nanaimo St. at 1st Ave., Vancouver.

17406. Sept. 4.—Authorizing Niagara, St. Catharines and Toronto Ry. to build spur for Canadian Warren Axe and Tool Co., St. Catharines, Ont.

17407. Sept. 4.—Authorizing city of Hamilton, Ont., to extend Birmingham St. across Hamilton Radial Ry.

17408. Sept. 5.—Authorizing G.T. Pacific Ry. to appeal to Supreme Court of Canada from order 16701, June 4, re crossing by Edmonton Radial Ry., at 21st street, Edmonton, Alta., upon certain questions of law.

17409. Sept. 7.—Authorizing C.P.R. to open for freight traffic its branch from Laggan to Lake Louise, Alta., 3.55 miles.

17410. Sept. 9.—Authorizing C.P.R. to open for traffic that portion of its Swift Current southeasterly branch from Neville to Vanguard, Sask., mileage 27.5 to 43.6.

17411. Sept. 7.—Amending orders 13509, 13582, and 13610 which authorized Canadian Northern Ry. to take certain C.P.R. lands, by providing that compensation and damages be settled by three arbitrators.

17412. Sept. 6.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to build across road allowance between cons. 7 and 8, Hinchinbrooke tp., Ont.

17413. Sept. 9.—Authorizing Canadian Northern Ry. to build across public road between secs. 25 and 26, tp. 27, r. 11, w. 3 m.

17414. Sept. 7.—Authorizing Canadian Northern Montreal Tunnel and Terminal Co. to build across public road between lot 359, Cote St. Laurent Sud, and lot 622, Cote St. Laurent Nord, subject to undertaking to keep men from tops of cars when operating this section.

17415. Sept. 6.—Authorizing G.T.R. to operate crossing of Toronto Suburban Ry. on Keele St., Toronto.

17416. Sept. 4.—Authorizing British Columbia Electric Ry. to connect with C.P.R. in Vancouver.

17417. Sept. 6.—Authorizing rural municipality 351, Progress, Sask., to build highway over C.P.R. between secs. 4 and 9, tp. 36, r. 24, w. 3 m.

17418. Sept. 5.—Authorizing Canadian Northern Ry. to build across and divert public roads between secs. 11 and 14, and secs. 10 and 15, tp. 16, r. 27, w. 4 m.

17419. Sept. 5.—Authorizing Canadian Northern Ry. to build across 30 highways on its Calgary-Macleod branch, Alta.

17420. Sept. 5.—Authorizing C.N. Ontario Ry. to build across Riviere des Prairies west channel, Ste. Dorothee parish, Que., mileage 39.6, east of Hawkesbury.

17421, 17422. Sept. 6.—Authorizing C.N. Ontario Ry. to build across public road at station 142.70, between Bristol and Clarendon tps., Que., by overhead structure, and to build bridge across creek at station 754.15, Ferris tp., mileage 223 from Ottawa.

17423. Sept. 4.—Authorizing Canadian Northern Branch Lines Co. to build across 14 highways on its Canora-Sturgis branch, Sask.

17424. Sept. 6.—Authorizing James Bay and Eastern Ry. (C.N.R.) to build bridge over and divert stream and farm road, at station 48.50, Demeules tp., Que., mileage 18.55 from Roberval.

17425. Sept. 7.—Authorizing G.T. Pacific Branch Lines Co. to build its Regina-Moose Jaw branch across four highways between mileage 40.01 and 47.74, Sask.

17426. Sept. 6.—Authorizing C.P.R. to use bridge 68 on its Muskoka subdivision, Ontario division.

17427. Sept. 3.—Authorizing C.P.R. to rebuild bridge 102.55 over Blind river, Algoma subdivision, Lake Superior division, Ont.

17428. Sept. 6.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to build across three highways from mileage 157.47 to 157.98, Ont.

17429. Sept. 7.—Authorizing Algoma Central and Hudson Bay Ry. to open for traffic its line between Hawk Lake Jct. and Hobon, Ont., mileage 164½ to 195, connecting with C.P.R.

17430. Sept. 6.—Authorizing G.T.R. to build spur for Standard White Lime Co., near Beachville, Ont.

17431. Sept. 5.—Authorizing G.T. Pacific Branch Lines Co. to build across and divert highway on its Melville-Regina branch in n.w. ¼ sec. 12, tp. 20, r. 15, w. 2 m., mileage 57, Assiniboia district, Sask.

17432. Sept. 9.—Authorizing Canadian Northern Ry. to build bridge over Assiniboine river, Winnipeg, Man.

17433. Sept. 10.—Authorizing C.N. Ontario Ry. to build across Brule creek, Springer tp., mileage 250.6 from Ottawa.

17434. Sept. 11.—Authorizing C.P.R. to build across G.T.R. at grade one mile north of St. Johns, Que.

17435. Sept. 10.—Authorizing C.P.R. to build extension to spur for W. J. Riley, at mileage 20.1, Lac du Bonnet subdivision, near Molson, Man.

17436. Sept. 4.—Extending to Oct. 30, time within which Walkerton and Lucknow Ry. (C.P.R.) may build spur for National Portland Cement Co., Brant tp., Ont.

17437. Sept. 11.—Authorizing C.P.R. to build across G.T.R. at Delson Jct.

17438, 17439. Sept. 10.—Authorizing Campbellford, Lake Ontario & Western Ry. (C.P.R.) to build across four highways from mileage 66.18 to 68.62, from Glen Tay, Ont., and to build bridge 111.

17440. Sept. 11.—Authorizing Kootenay and Alberta Ry. (C.P.R.) to open for freight traffic, speed over all trestles not to exceed four miles an hour, over rest of line 10 miles an hour; light power to be used; watchman to be kept on each trestle, and towers and foundations under Howe truss spans to be inspected at least once a week.

17441. Sept. 9.—Authorizing town of Paris, Ont., to cross G.T.R. with overhead bridge, easterly from Paris Jct.

17442. Sept. 9.—Authorizing C.P.R. to build spur for Eddy Bros. & Co., Blind River, Ont.

17443 to 17449. Sept. 10.—Authorizing C.P.R. to build spurs for Northern Aluminum Co., Parkdale, Ont. (2); E. W. Gillett Co., Toronto (2); to Pontypool ballast pit, Manvers tp., Ont.; for Dominion Government at Kipawa, Ont. (2); to build Y in old ballast pit at Algoma, Long tp., Ont.; and spurs for Gus Pech Foundry & Mfg. Co., Regina, Sask., and Taylor Forbes Co., Guelph, Ont.

17450. Sept. 10.—Authorizing G.T.R. to build siding for Breakwater Co., in Bertie tp., Ont.

17451. Sept. 7.—Authorizing C.N. Ontario Ry. to cross Nosbonsing and Nipissing Ry. with overhead bridge in Ferris tp., mileage 217.9 from Ottawa.

17452. Sept. 10.—Approving location of C.N. Quebec Ry. station grounds at Portage du Fort.

17453, 17454. Sept. 12.—Approving revised location C.N. Ontario Ry. Sudbury-Port Arthur line through unsurveyed territory in Algoma district, mileage 271.53 to 274.16, and in Thunder Bay district, mileage 268.03 to 269.3, from Port Arthur.

17455. Sept. 12.—Authorizing James Bay and Eastern Ry. (C.N.R.) to build across two highways in Ouiatchouan tp., Que.

17456. Sept. 12.—Approving Campbellford, Lake Ontario & Western Ry. (C.P.R.) plan of subway on road allowance between lots 8 and 9, con. 4, Scarboro tp., Ont.

17457. Sept. 13.—Amending order 17190, re C.P.R., expropriating lands for its Windsor street station, Montreal.

17458. Sept. 12.—Approving Canadian Northern Branch Lines Co.'s location through tps. 19 to 24, r. 1 and 2, w.p.m., mileage 36.58 to 74.47.

17459, 17460. Sept. 12.—Authorizing C.N. Ontario Ry., to open for traffic its line, in Camden tp., mileage 152.13 to 152.72, and mileage 145.83 to 149, from Toronto.

17461. Sept. 12.—Approving James Bay and Eastern Ry. (C.N.R.) extension from Roberval, Que., mileage 30.7 to 31.4.

17462, 17463. Sept. 12.—Approving Alberta Interurban Ry. location, from north line of sec. 31, tp. 24, r. 28, to east line of tps. 27-28, r. 27, w. 4 m., mileage 9.93 to 38.36, and from the latter point to sec. 15, tp. 29, r. 23, w. 4 m., from mileage 38.36 to 66.80; and authorizing to build along highways.

17464, 17465. Sept. 13.—Approving Dominion Atlantic Ry., plans showing substructure of bridge over Gaspereaux river, at Horton Landing, N.S., and approving revised location across Gaspereaux river, just east of Horton Landing.

17466. Sept. 10.—Approving G.T. Pacific Branch Lines Co. location from north line of sec. 8, tp. 20, r. 28, w. 4 m., mileage 27.67, to west line of n.w. ¼ sec. 34, tp. 11, r. 23, w. 4 m., mileage 111.29.

17467. Sept. 10.—Authorizing G.T. Pacific Branch Lines Co., to build across 10 highways on its Calgary-Boundary branch, mileage 36.2 to 111.1, Alta.

17468, 17469. Sept. 13.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to build four bridges, and to build across Kingston road, or road allowance between cons. 1 and 2, Clarke tp., Ont., by means of an arch, at mileage 142.35, from Glen Tay.

17470. Sept. 13.—Approving Canadian Northern Ry., station site and track layout at Calgary, Alta.

17471. Sept. 14.—Approving city of Toronto's plan changing grade of Coxwell avenue subway.

17472. Sept. 13.—Authorizing Toronto Suburban Ry. to cross under G.T.R., at Weston road, Weston, Ont.

17473. Sept. 14.—Authorizing Vancouver and Lulu Island Ry. to open for traffic its second track from Twenty-fourth avenue, Point Grey, to Eburne, B.C., 4½ miles.

17474. Sept. 13.—Authorizing C.N. Ontario Ry, to cross C.P.R. overhead, near Pembroke.

17475. Sept. 11.—Authorizing G.T.R. to rebuild bridge at mileage 171.07, near Arnprior, Ont.

17476. Sept. 14.—Approving revised location of G.T. Pacific Branch Lines Co., Cutknife branch, through s.e. ¼ sec. 36, tp. 43, r. 18, w. 3 m., mileage 9, West Saskatchewan district.

17477. Sept. 12.—Ordering C.P.R. to divert Toronto and Sydenham road, northerly to Fifty side road, crossing railway at right angles, 1¼ miles north of Berkley station.

17478. Sept. 12.—Ordering C.P.R. to install gates and keep day and night watchman at King street crossing, Woodstock, N.B.

17479. Sept. 14.—Authorizing C.P.R. to build bridge at mileage 10.4, Farnham subdivision, Eastern division.

17480. Sept. 14.—Approving C.P.R. standard timber overhead crossing plan.

17481, 17482. Sept. 12, 16.—Authorizing C.P.R. to lay new track across public road south of cadastral lot 125, change location of present track, build additional track across the public road south of cadastral lot 191, change location of its station at St. Hyacinthe, Que., and to build spur for L. Villeneuve & Co. on Maude St., Montreal.

17483. Sept. 14.—Authorizing Canadian Northern Ry. to build its Goose Lake extension across public roads between secs. 7 and 8, tp. 31, r. 14, w. 4 m.

17484 to 17486. Sept. 17.—Authorizing Alberta Interurban Ry. to cross G.T. Pacific Ry., in secs. 10-11, tp. 24, r. 29, w. 4 m., approving location from mileage 0 to 5.49, and from fifth meridian east to north line of sec. 31, tp. 24, r. 28, w. 4 m., mileage 2.28 to 9.93.

17487. Sept. 14.—Authorizing G.T. Pacific Ry. to build its Calgary-Boundary branch across 52 highways, from mileage 27.67 to 111.29, South Alberta district.

17488. Sept. 16.—Authorizing Michigan Central Rd. to build two passing tracks between cons. 6 and 7, Crowland tp., Ont.

17489. Sept. 16.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to build across four highways in Sidney tp., Ont.

17490. Sept. 17.—Extending to Oct. 15, time for Canadian Northern Ry. to complete fencing, cattle guards, crossing signs, etc., from Grosse Isle, Man., to end of track, 31 miles.

17491. Sept. 16.—Amending order 15449, Sept. 15, 1911, to provide half interlocking plant instead of full interlocking plant, where Winnipeg Electric Ry. crosses C.P.R. Selkirk branch, on Selkirk avenue, and McPhillips street.

17492. Sept. 16.—Amending order 17384, Sept. 4, re express charges on cream, to make it apply between all points west of and including Port Arthur, in Ontario, Manitoba, Saskatchewan, and Alberta, instead of between all points west of Port Arthur.

17493. Sept. 16.—Suspending supplement 10, to M.C.R. local and joint commodity tariff, C.R.C. 1743, pending hearing by Board.

17494. Sept. 16.—Authorizing National Transcontinental Ry. Commissioners to operate over crossing of C.P.R., near St. Leonards, N.B.

17495. Sept. 17.—Approving C.P.R. plan of covered platform at Windsor, Ont.

17496. Sept. 17.—Approving Michigan Central Rd. plan of culvert on west town line road, Maidstone tp., Ont.

17497. Sept. 17.—Authorizing G.T.R. to build siding and spur for Knechtel Furniture Co., Hanover, Ont.

17498. Sept. 17.—Extending to Sept 30, the time for Dominion Atlantic Ry. to install electric bell at crossing east of Berwick station, N.S.

17499. Sept. 17.—Authorizing C.P.R. to

build spur for Canadian Western Lumber Co., at Fraser Mills, B.C.

17500. Sept. 16.—Approving location of C.P.R. station at Twin Butte, B.C.

17501. Sept. 17.—Authorizing C.P.R. to build bridge 86.16, over Woman river, Lake Superior division, Ont.

17502. Sept. 17.—Authorizing Kootenay Central Ry. (C.P.R.) to open for traffic portion of its line from Colvalli, to Fort Steele, B.C., mileage 0 to 23.06.

17503, 17504. Sept. 17, 16.—Approving G.T. Pacific Ry. revised location from lot 4077 to sec. 22, tp. 15, mileage 347.5 to 372.4, and from lot 880 to Sa-La-Quo Indian reserve, mileage 449.18 to 452.94, east of Prince Rupert, B.C.

17505, 17506. Sept. 17.—Authorizing C.P.R. to build spurs for N. Blue, at Pilot Butte, Sask., and for city of Moose Jaw, Sask.

17507. Sept. 18.—Authorizing Saskatchewan government to build highway across Canadian Northern Ry., north of sec. 14, tp. 43, r. 20, w. 2 m.

17508. Sept. 18.—Authorizing G.T. Pacific Branch Lines Co. to build its Melville-Regina branch across highway, and divert road in Pasquah Indian reserve, mileage 52.7, Assiniboia district, Sask.

17509. Sept. 17.—Approving Canadian Northern Ry. revised location through tps. 43 and 44, r. 4, w. 3 m., mileage 28.18 to 37.96, Sask.

17510. Sept. 18.—Approving C.N. Ontario Ry. plan of abutments for bridge over Wistiwasing river, Chisholm tp., mileage 214.65, west of Ottawa.

17511. Sept. 16.—Authorizing Shepard council no. 12 Z 4, Alta., to build highway across C.P.R., between sec. 23, tp. 23, r. 27, and sec. 18, tp. 23, r. 28, w. 4 m.

17512 to 17515. Sept. 17, 18.—Approving Campbellford, Lake Ontario and Western Ry. (C.P.R.) plan of 20 ft. double plate girder span on concrete abutments for bridge 158; and authorizing it to build across road allowance between cons. 4 and 5, Hinchinbrooke tp., Ont., mileage 29.2, from Glen Tay, and to divert portion across its line; to build bridge 146.16, and to cross road allowance between lots 16 and 17, con. 1, Darlington tp., by a bridge, at mileage 150.37 from Glen Tay.

17516. Sept. 10.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to cross G.T.R. overhead, in lot 23, con. A, Hamilton tp., mileage 121.52, from Glen Tay, Ont.

17517. Sept. 17.—Ordering G.T.R. to protect William street crossing, London, Ont., by day watchman.

17518. Sept. 18.—Authorizing G.T. Pacific Branch Lines Co. to build between its Battleford and Cutknife branches, to cross highways and establish terminals at Battleford, Sask.

17519, 17520. Sept. 18.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to build across road allowance between lots 2 and 3, con. 1, Hope tp., mileage 125.36, and across 10 highways, from mileage 110.96 to 121.26, and 156.74 to 156.84, from Glen Tay, Ont.

17521. Sept. 17.—Authorizing C.N. Ontario Ry. to build bridge across Ottawa river, at Portage du Fort, mileage 59.8 from Ottawa.

17522. Sept. 18.—Amending order 17221, Aug. 13, re building of two roads across Esquimalt and Nanaimo Ry., at North Couripan, B.C.

17523. Sept. 19.—Authorizing C.P.R. to build 500 ft. siding near Bryce avenue, Toronto.

17524. Sept. 18.—Authorizing C.N. Ontario Ry. to cross C.P.R. overhead, on lot 6, con. 4, McKim tp., Ont.

17525. Sept. 18.—Approving location of C.P.R. station at Jeannette, Ont.

17526. Sept. 19.—Relieving C.P.R. from further protecting crossing 2½ miles west of Arthur, Ont.

17527. Sept. 18.—Authorizing C.P.R. to build spur for Milverton Furniture Co., Milverton, Ont.

17528. Sept. 18.—Approving change in location of C.P.R. station at Batiscan, Que.

17529. Sept. 18.—Authorizing G.T.R. to build two additional tracks across Cote St. Paul road, Montreal.

17530, 17531. Sept. 18.—Approving G.T. Pacific Ry. revised location through Noon-La Indian reserve, mileage 395, east of Prince Rupert, and from lot 478 to n.w. ¼ lot 6028, mileage 49.26 to 58.17, Fort George district, B.C.

17532. Sept. 20.—Authorizing C.P.R. to open for traffic its double track from L'Acadie to north of G.T.R. diamond crossing at St. Johns, Que., about 3.60 miles.

17533. Sept. 21.—Extending for 60 days time within which G.T.R. may complete new station and rearrange yard at Hensall, Ont., as ordered by order 17370.

17534. Sept. 19.—Authorizing C.N. Ontario Ry. to build across public road overhead, on lot 18, between r. A and 1, Westmeath tp., Ont.

17535. Sept. 19—Authorizing Canadian Northern Ry. to build its Goose lake extension

17536. Sept. 19.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to build bridge 62.8.

17537 to 17541. Sept. 21.—Authorizing C.N. Ontario Ry. to build across public road on lot 275, St. Benoit parish, Que.; road between cons. 16 and 17, Chisholm tp., mileage 213.46; across Twelve Mile creek, Trafalgar tp., mileage 27.64 west from Toronto; across Winter road, lot 27, con. 7, Ferris tp., mileage 219.09, and across Credit river, mileage 15.19 west of Toronto.

17542. Sept. 18.—Approving revised location of C.P.R. Swift Current northwesterly branch, Sask., from mileage 93, to 111.9; and authorizing crossing of 25 highways.

17543. Sept. 21.—Authorizing C.P.R. to build additional track, north of main line, across public road west of Cache Bay station, Springer tp.

17544. Sept. 21.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to cross Turlow Ry., or Canada Cement Co.'s spur by a bridge in Thurlow tp., Ont., mileage 72.14.

17545. Sept. 20.—Relieving Michigan Central rd. from providing day and night watchman at crossing one mile west of Forks creek, Ont.

17546. Sept. 21.—Authorizing G.T.R. to build additional track across Wharf road, Bowmanville tp., Ont.

17547. Sept. 20.—Authorizing C. N. Pacific Ry. to build across C.P.R., near Lytton, B.C.

17548. Sept. 19.—Ordering G.T.R. to build station at Whitehall, Ont.

17549. Sept. 21.—Rescinding order 16460, which authorized C.P.R. to build spur for Inland Coal and Coke Co. at Merritt, B.C.

17550. Sept. 20.—Authorizing Progress rural municipality 351, Sask., to build highway over C.P.R. Macklin-Kerrobert line, between secs. 18 and 19, tp. 35, p. 23, w. 3 m.

17551. Sept. 20.—Authorizing city of Edmonton, Alta., to open Eighth street east, across Edmonton, Yukon and Pacific Ry.

17552. Sept. 21.—Ordering G.T.R. to restore joint rate per ton on brick from Bradford, Pa., to Windsor, Ont., in force prior to Apr. 20.

Birthdays of Transportation Men in October.

Many happy returns of the day to:—

R. A. Burford, cashier, C.P.R. ticket office, New York City, born at Brooklyn, N.Y., Oct 4, 1878.

T. C. Burgess, Commercial Agent, G.T.R., Minneapolis, Minn., born at New York City, Oct. 2, 1853.

G. E. Burns, Freight Claims Agent, Eastern Lines, C.P.R., Montreal, born at St. Thomas, Ont., Oct. 6, 1863.

K. J. Burns, Assistant General Freight Agent, Great Northern Ry., Vancouver, B.C., born at Rochester, Eng., Oct. 11, 1878.

F. F. Busteed, C.E., Engineer in charge of C.P.R. revision and tracking, west of Calgary, Kamloops, B.C., born at Battery Point, Que., Oct. 10, 1858.

C. E. Cartwright, M. Can. Soc. C.E., ex-Division Engineer, C.P.R., Vancouver, B.C., born at Toronto, Ont., Oct. 13, 1864.

G. S. Cooke, Superintendent, Grand Trunk Pacific Ry., Melville, Sask., born at Montreal, Oct. 27, 1875.

L. V. Druce, Commercial Agent, G.T.R. and G.T.P.R., Vancouver, B.C., born at London, Eng., Oct. 20, 1873.

C. E. Dewey, General Freight Agent, Grand Trunk Pacific Ry., Winnipeg, born at Cheshunt, Eng., Oct. 2, 1873.

J. Earls, ex-Secretary and Treasurer, Canadian Freight Association at Toronto, born in Ireland, Oct. 30, 1838.

C. E. Friend, General Auditor, Canadian Northern Ry., Winnipeg, born at Brighton, Eng., Oct. 12, 1871.

W. P. Fitzsimmons, Commissioner of Industries, G.T.R., Montreal, born at Detroit, Mich., Oct. 27, 1868.

A. H. Harris, Special Traffic Representative, C.P.R., Montreal, Que., born in Devonshire, Eng., Oct. 15, 1855.

G. Hodge, General Superintendent, Eastern Division, C.P.R., Montreal, born there Oct. 2, 1874.

J. H. Hughes, Assistant Superintendent, District 2, Eastern Division, Smith Falls, Ont., born at Charlottetown, P.E.I., Oct. 7, 1865.

J. W. N. Johnstone, General Passenger Agent, Reid Newfoundland Co., St. John's, Nfld., born at Campobello, N.B., Oct. 4, 1878.

S. Way Kent, Ticket Agent, C.P.R., Paris, Ont., born in Brant County, Ont., Oct. 23, 1879.

W. M. Kirkpatrick, Assistant Freight Traffic Manager, Eastern Lines, C.P.R., Montreal, born at Kingston, Ont., Oct. 8, 1874.

W. B. Lanigan, Assistant Freight Traffic Manager, Western Lines, C.P.R., Winnipeg, born at Three Rivers, Que., Oct. 12, 1861.

J. W. Leonard, Assistant to Vice-President, C.P.R., Montreal, born at Epsom, Ont., Oct., 1858.

C. F. Lunan, Assistant Commissary Agent, C.P.R., Calgary, Alta., born at Sorel, Que., Oct. 2, 1879.

Sir William Mackenzie, President, Canadian Northern Ry., Toronto, born at Kirkfield, Ont., Oct. 30, 1849.

W. T. Marlow, Import Freight Agent, C.P.R., Montreal, born at Limerick, Ireland, Oct. 25, 1872.

R. Marpole, General Executive Assistant, C.P.R., Vancouver, B.C., born in Montgomeryshire, Wales, Oct. 9, 1850.

H. Paton, President, Shedden Forwarding Co., Montreal, born at Johnstone, Renfrew, Scotland, Oct. 5, 1852.

D. Pottinger, I.S.O., Assistant Chairman, Government Railways Managing Board, Moncton, N.B., born at Pictou, N.S., Oct. 7, 1843.

H. G. Reid, Master Mechanic, C.P.R., North Bay, Ont., born at Pembroke, Ont., Oct. 27, 1863.

W. S. Rollo, joint agent, G.T.R., and Central Vermont Ry., St. John's, Que., born at Dundee, Scotland, Oct. 8, 1852.

J. K. Savage, Superintendent, District 1, Saskatchewan Division, C.P.R., Regina, born at Forreston, Ill., Oct. 5, 1876.

Sir Thomas G. Shaughnessy, K.C.V.O., President, C.P.R., Montreal, born at Milwaukee, Wis., Oct. 6. 1853.

T. Duff Smith, Fuel Agent, Grand Trunk Pacific Ry., Winnipeg, Man., born at Barking, Essex, Eng., Oct. 2, 1868.

A. B. Spence, Travelling Auditor, Reid Newfoundland Co., St. John's, Nfld., born at Harbor Grace, Nfld., Oct. 21, 1882.

E. Sterling, Superintendent, Districts 2 and 3, British Columbia Electric Ry., New Westminster, born at Thornbury, Ont., Oct. 3, 1875.

W. S. Taylor, ex-Treasurer, C.P.R., Montreal, born at Dornoch, Sutherlandshire, Scotland, Oct. 18, 1839.

E. N. Todd, Division Freight Agent, Eastern Division, C.P.R., Montreal, born at Huntington, Que., Oct. 17, 1879.

A. W. Wheatley, Manager, Canadian Locomotive Co., Ltd., Kingston, Ont., born at Ashford, Kent., Eng., Oct. 12, 1870.

L. H. Wheaton, Resident Engineer, Dartmouth branch, Intercolonial Ry., Dartmouth, N.S., born at Sackville, N.B., Oct. 5, 1866.

G. B. Wyllie, Travelling Passenger Agent, Illinois Central Rd., Buffalo, N.Y., born at Toronto, Ont., Oct. 15, 1855.

Railway Lands Patented.—Letters patent were issued during JJuly, covering railway lands in Manitoba, Saskatchewan, Alberta and British Columbia, as follows:

Canadian Northern Ry.	1,070.88
Canadian Pacific Ry. roadbed and station grants	203.62
Kootenay Central Ry.	4.25
Qu'Appelle, Long Lake and Saskatchewan Rd. and Steamboat Co.	2.736.37
Total	4,015.12

A press report from Calgary, Alta., states that the elevators owned by the Alberta Pacific Elevator Co., the West Coast Grain Co., and the Globe Elevator Co., have been sold to an English syndicate, headed by Sir Max Aitken. The total elevator capacity is given as 3,000,000 bush., the largest elevator included in the transaction being the last mentioned company's terminal at Calgary with a capacity of 400,000 bush.

Electric Railway Department.

Street Railway Construction on Granville Street, Vancouver.

By C. B. Vorce, Construction Engineer, British Columbia Electric Railway.

Granville street, Vancouver, B.C., is a principal business street, over which six car lines or about 150 cars an hour pass. The tracks on this street between Robson and Drake streets, half a mile, were riding so badly that their reconstruction was imperative. It was not advisable to rebuild during operation, and as there is a double track car line only two blocks away, the

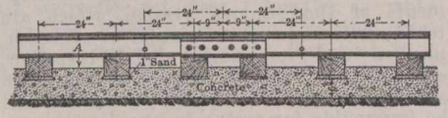


Fig. 1.—Longitudinal Section of Track.

Board of Public Works granted the company permission to abandon traffic during construction, providing it was restored in 24 days.

The street was paved with wood blocks laid on 6 ins. of concrete, and each rail of the double track was carried on a concrete girder 2 ft. wide and 15 ins. deep. Owing to the nature of the foundation these girders were not heavy enough to carry the weight imposed upon them and on account of this the company adopted the type of construction shown by figs. 1 & 2. This construction consists of a 6 in. concrete slab which is laid over the entire track allowance, 18½ ft. wide, upon which 91 lb. T rails 7 ins. high are laid on 6 x 8 in. by 8 ft. ties spaced 2 ft. centre to centre. The track was then surfaced to grade on a sand cushion averaging 1 in. deep and the concrete was brought up to the under side of the pavement. By referring to the standard cross-section, fig. 2, it will be seen that the bottom of the concrete slab is 20 ins. below the rail grade.

The reconstruction of the tracks called for taking out and replacing the following quantities: 5,100 sq. yds. of wood block paving, 10,200 lin. ft. of rail or 5,100 lin. ft. of single track, 1,800 cu. yds. or 5,100 sq. yds. of concrete, 600 cu. yds. of earth and the laying of 2,400 cu. yds. of concrete, one-half mile of double track, 850 sq. yds. of granite flangeway blocks and 4,250 sq. yds. of wood blocks.

As the concrete had to set 10 days before traffic could be turned back on the street, this necessitated the completion of the work above outline, except the paving, in 12 days, and not 14 days, as two Sundays intervened. The work was carried on day and night, and a schedule, fig. 3, was prepared showing the rate of progress which must be made on each of the operations in order that the work should be completed within the time limit. This schedule was so closely followed that all the work, except the paving, was finished one hour before the time called for by the schedule, and during the 10 days the concrete was setting the street was repaved so that when traffic was restored all the work was completed. The company has a large construction force, which does the greater portion of its work, so it was certain of the speed with which the various operations, with the exception of breaking up the concrete, could be accomplished.

The company had just built a piece of new track which called for the removal of about 300 sq. yds. of concrete of a similar nature, which had been laid by the same contractors. This piece of concrete was removed by hand and it took 15 men 6 days to do the work. As the schedule called for the removal of about 32 sq. yds. of concrete an hour, it was seen that some mechanical means must be used, and the following scheme was adopted:

The dipper arm was taken off the company's electrically driven automatic shovel and the pile driver leads, about 20 ft. long, were hung from the end of the boom, being held in position by two braces running back to the main frame of the shovel. A hammer weighing 2,600 lbs., with a wedge shaped cutting edge about 8 ins. deep running parallel to the track, was specially cast. The cutting edge was placed this way in order not to injure the remaining concrete in the street. This scheme worked excellently and no trouble whatever was found in breaking up the concrete as rapidly as it could be taken away.

The concrete breaker, which could swing through 350°, was placed on one track and on the other track the derrick car was

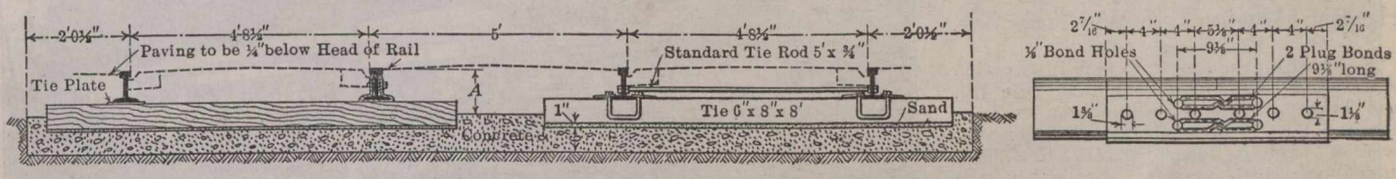


Fig. 2.—Cross Section of Track and Details of Bond Drilling.

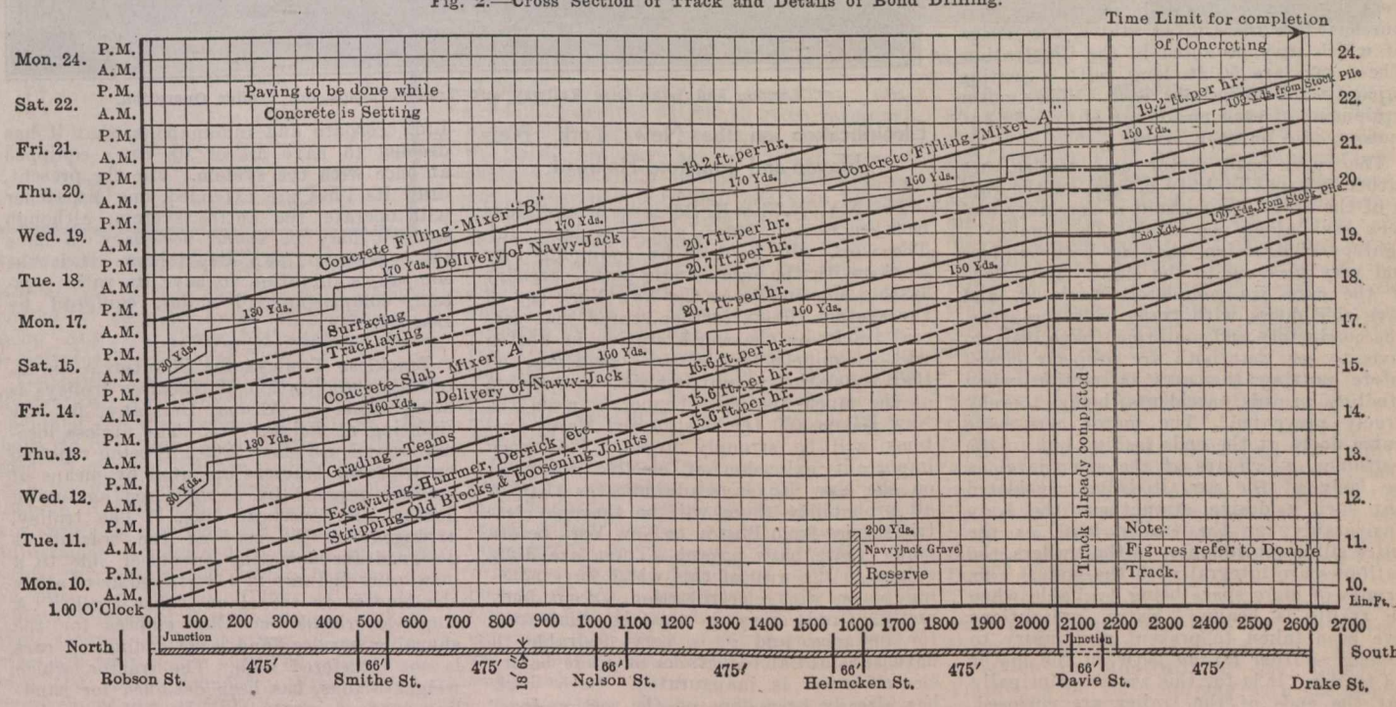


Fig. 3.—Chart Showing Progress of Work on Granville Street.

placed. This derrick car had a 60 ft. boom, which could also swing through 360° and could move itself up and down the track. This car was used to break up the larger pieces of concrete and load them on flat cars placed behind the concrete breaker, also to unload skips in which were placed the smaller pieces of concrete and earth, this material being dumped into wagons standing alongside. The concrete breaker and derrick car backed up on the old track as soon as the concrete was broken up for a rail length ahead of them.

The price of common labor was $3 a day of 10 hours, and teams received $8 a day shift of 10 hours and $9.50 for night shift. The average haul for teams was ¾ of a mile and for the track cars about 2 miles. The cost of the work was as follows:

Digging up wood blocks, 8 9-10 cts. per sq. yd.

Tearing up old track, 11 cts. per ft. of single track.

Breaking up concrete, 40 cts. per sq. yd., or $1.13 per cu. yd.

Excavation, loading and dumping, 82½ cts. per cu. yd.

Removing material by teams and work train, 65 cts. per cu. yd.

G. R. G. Conway, M. Can. Soc. C. E., is Chief Engineer of the B.C.E.R. Co., and the work was carried on under the supervision of C. B. Vorce, M. Am. Soc. C. E., Engineer of Construction, assisted by H. J. Tippet, Engineer Maintenance of Way, and A. J. Kennedy, Roadmaster.—Engineering and Contracting.

Handling Interurban Traffic With Trailer Cars.

As shown in the accompanying illustration of cars on the London and Lake Erie Ry. and Transportation Co.'s line between London and Port Stanley, Ont., the trailer system of handling dense traffic has been introduced this summer. Earlier in the year, two motor cars and two trailers were purchased in the United States, the design of which may be noted in the illustration. These cars are 50 ft. long, with a seating capacity of 58 people each. The motor equipment of each motor car is four 50 h.p. motors, two on each truck.

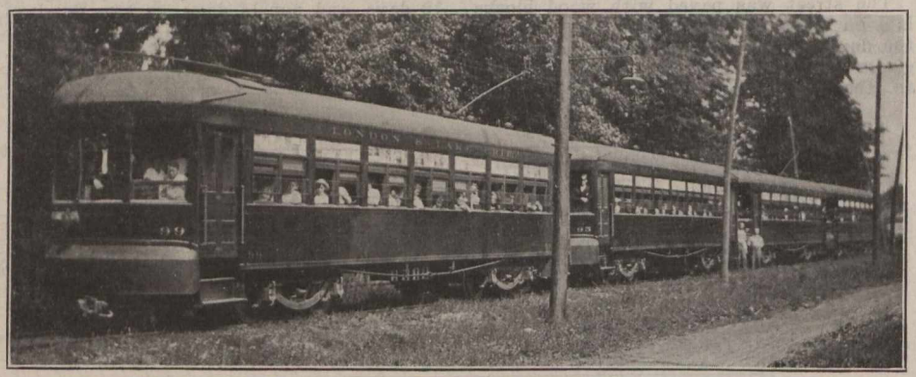
The cars, both motor and trailer, are rather unusual in body design, as the roof is of the arch type without a clerestory and deck sash along the sides. This makes a lighter construction that is both simpler and very pleasing to the sight. Both ends of the cars are completely enclosed, and have side doors with traps over the steps. The conductors and motormen have instructions to see that both are properly closed before putting the cars in motion when handling crowds, accidents being thereby largely prevented. The motor cars have centre doors at the ends leading out to the vestibules, which are at the same level as the body of the car, it being considered that such a design strengthens the body considerably for the trailer haul, as the centre sill is continuous. In the trailers, the vestibules are integral with the body. This permits of more space being available when the traffic is heavy. Extra precautions have been taken to prevent any injury to passengers from falling between the motor and trailer. It is for this reason principally that the ends of the trailer are enclosed. The end windows have cross bars at a convenient height for resting the elbows.

Another especial feature of the design is the efficient placing of the seats. The walls between the side posts are made particularly thin, and into the recess thus formed, the seats are set. With the windows open and the elbows resting on the sill, the passenger is able to sit up very close, leaving ample space for the occupant of the inner seat without the latter sitting half out over the aisle as in the usual design of cars. The fact that the seats are set into the space between the side posts gives an additional width to the centre aisle of some six inches, giving a particularly clear passageway down the centre, which is of particular value when a big crowd is being handled.

No tests have been made as regards efficiency of the motor when operating alone, as compared to the former two-motor cars, but experience elsewhere would seem to demonstrate that it is as economical as the latter. When operating with trailers, these four-motor cars have been able to stand up in the schedule with the tw-motor cars, and have given no trouble.

A new feature in the cars is the application of the combination air hose coupler, in which the two air connections to the trailer from the motor are made automatically by the coupler, the air connections being right in the side faces of the couplers, which are of an unusual design.

The cars are intended primarily for summer operation when the traffic from London to Port Stanley, the southern terminus of the line at Lake Erie, is particularly heavy. Provision has been made for their operation in the winter, when required, as they are all equipped with heaters and ventilators.



London and Lake Erie Railway and Transportation Co. Trailer Operation.

Electrification on the New York, New Haven and Hartford Railroad.

The N.Y., N.H. & H. Rd. is to be electrified between Boston, Mass., and Providence, R.I. The work will be done by equipping four tracks with the same single phase catenary system now in use at the New York end of the system. It is further stated that several tracks at the south station in Boston will be equipped for electrical operation, and that legislation permitting the construction of the much discussed tunnel between the New Haven and the Boston and Maine systems will be strongly urged. This very important extension of electric operation on the New Haven road indicates that in all probability there will be through electric service from Boston to New York before many years have passed. There are difficulties in the way of this which have nothing to do with electrification, except indirectly. Grade crossings must be eliminated, for instance, and it is very desirable to have substantial reductions in grade before electrification is inaugurated. Such work has already been done on the section from Boston to Providence, and consequently it is expected that the electrification of that line can be completed during 1913, including a large generating station at Providence and another at Readville, Mass. From Providence to New Haven the present conditions are not so favorable for electric operation, however, and it is likely that before the steam operation of passenger trains is abandoned there electric operation on the two ends of the road will be pretty well standardized.

Automatic Signalling and Train Dispatching in Indiana.

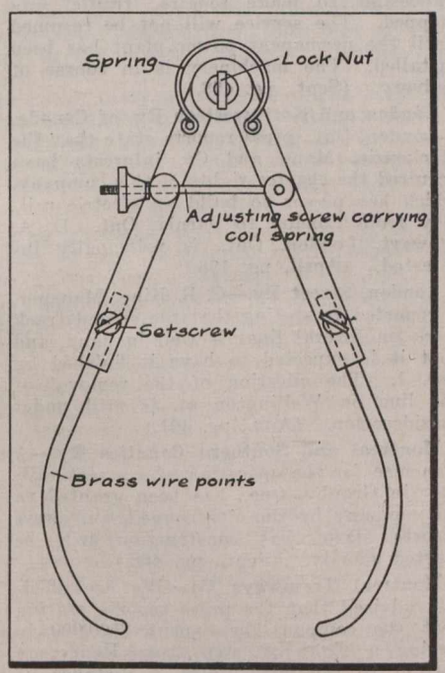
After a thorough examination of the Simmen system of railway signalling and train dispatching as operated for the last three months on 18 miles of the Indianapolis and Cincinnati Traction Co.'s lines, official approval has been granted by the Railroad Commission of Indiana for its continued use. The traction company is ordered to install and have the same system in operation by Dec. 31, on its Indianapolis-Greensburg division from the junction at Indianapolis to Greensburg. In connection with this order, the Commission recommends to the traction company that any further improvements and developments of the Simmen system, which are to be made under the direction of the Commission and its block signal inspector, should have special reference to such arrangements of the apparatus that it will be impossible for trains in one direction to receive signals intended for trains running in the other.

In view of the Commission's approval the traction company has advised the manufacturer of this system, Northey-Plummer, Ltd., Toronto and Indianapolis, that it has decided to have all of its lines equipped at once with the system. For the present, until its lines are extended, one dispatcher will operate the entire system, although later it may be found necessary to have the services of two dispatchers. It is the company's intention to have its entire system, comprising 107 miles, equipped by Dec. 31.

Trackless Trolleys for Shunting.—An interesting application of trackless trolleys is being made at Altona, Germany, for the shunting of freight cars. The fireless locomotives in use since 1909 are being replaced by trackless tractors operated by means of trolleys pressed by a rigid rod against a double pole overhead line. The trolley, arranged on the roof of the tractor, is designed for deviating on either side to a maximum distance of 11½ ft., so as to allow the tractor to travel on either track. A single overhead line thus suffices for the shunting service, and the loading of cars is not interfered with. The tractor, which weighs 6 tons, has been designed for handling up to 6 cars with their full load at a speed of 1.86 to 3.73 miles, and is worked by a 25 h.p. continuous current motor at 550 volts, driving all four wheels through a 10:1 worm gear. The coupling device is operated from the driver's stand, so that the brakeman need not pass between the buffers. The shunting line is ¾ mile long, and reaches as far as the boundary of Hamburg.

Non-Magnetic Calipers at the London Street Railway Shops.

Machinists employed on the repair of motor parts are all familiar with the trouble usually experienced from the tools employed becoming magnetized and their sensitiveness thereby greatly decreased, unless extra precautions are taken to counteract any of the bad effects resulting. This is especially true of calipers. When turning down say a motor axle, the calipers may feel as if they are gauging correctly over the sides of the axle, when in reality, the calipers are set larger than the diameter of the shaft just calipered and considered correct. This deception arises from the fact that the axle, being strongly magnetized, draws one or other of the caliper points towards it, with the other point free from the side of the axle entirely. Yet at the same time, the calipers will feel as if they are correctly set over the axle, as when they are drawn across, the touching point drags so heavily, from the fact that it is magnetized, that the operator is deceived into believing they are correctly set, when,



Non-Magnetic Calipers, fitted with Brass Points.

as a matter of fact, they are only approximating the diameter by as much perhaps as ⅛ in. Any error above that would no doubt be detected by the eye.

The calipers shown in the accompanying illustration were made by H. Hussey, machinist in the London (Ont.) St. Ry. shops, to overcome the difficulties just outlined. The upper ends are made ½ in. square, with the upper ends locked ¼ in. lock nut. Looping over the top from leg to leg, there is a spring to keep the legs normally apart. Adjustment is obtained from an adjusting screw, carrying a coil spring between the leg pins. In the lower ends of the legs there are inserted flattened pieces of brass wire, secured by set screws. These brass wires are bent to the shape of caliper ends, with the points rounded. With such an arrangement, no trouble at all is experienced from magnetization, brass being a non-magnetic metal.

The Regina Municipal Ry. on Saturday, Aug. 31, carried 10,800 passengers, the largest number carried on any ordinary day since the line was opened.

Electric Railway Finance, Meetings, Etc.

British Columbia Electric Ry.—Gross earnings for July, $538,840; operating expenses, $333,045; net operating earnings, $205,795; renewal funds, $51,502; net earnings, $154,293; approximate income from investments, $35,000; net income, $189,293, against $409,330 gross earnings; $258,265 operating expenses; $151,065 net operating earnings; $38,012 renewal funds; $113,053 net earnings; $25,000 approximate income from investments; $138,053 net income for July, 1911.

Calgary Municipal Ry.—Passenger earnings for Aug., $56,813.90; miscellaneous earnings, $817.85; total earnings, $57,631.75; operating expenses, $33,349.46; balance, $24,282.29; contingent account and interest and sinking fund, $8,144.91; net profits, $16,137.38, against $35,513.55 passenger earnings; $425.80 miscellaneous earnings; $35,939.35 total earnings; $18,232.29 operating expenses; $17,707.06 balance; $7,060.30 contingent account and interest and sinking fund; $10,646.76 net profit, for Aug., 1911.

Cape Breton Electric Co.—Gross earnings for July, $33,115.85; operating expenses and taxes, $16,973.96; net earnings, $16,141.89; interest charges, $4,495.83; balance, $11,646.06; sinking and improvement funds, $1,206.67; balance for reserves, etc., $10,439.39, against $31,215.49 gross earnings; $16,384.68 operating expenses and taxes; $14,830.81 net earnings; $4,512.50 interest charges; $10,318.31 balance; $1,140 sinking and improvement funds; $9,178.31 balance for reserves, etc., for July, 1911. Construction charges for month, $3,468.29.

Halifax Electric Tramways Co.—Press reports from Halifax, N.S., state that the majority stock of this company has been acquired by E. A. Robert, President Montreal Tramways Co., and associates, and that the other shareholders will be offered 160 for their stock. Railway traffic receipts for Aug., $26,140.26, against $25,594.16 for Aug., 1911.

London St. Ry.—Gross earnings for July, $28,205.35; expenses, $18,711.63; net earnings, $9,493.72; deductions, $2,450; net income, $7,043.72; for August, gross earnings, $27,551.52; expenses, $18,071.52; net earnings, $9,480; deductions, $2,450; net income, $7,030. Aggregate gross earnings for eight months ended Aug. 31, $197,565.29; expenses, $138,285.20; net earnings, $59,280.09; deductions, $19,268.50; net income, $40,011.59.

Toronto Ry., Toronto and York Radial Ry., and allied companies.—Gross earnings for July, $712,456; operating expenses, maintenance, etc., $329,607; net earnings, $382,849, against $630,663 gross earnings; $296,723 operating expenses, maintenance, etc.; $333,940 net earnings, for July, 1911. Aggregate gross earnings for seven months ended July 31, $4,725,174; net earnings, $2,418,921, against $4,198,956 aggregate gross earnings; $2,139,145 net earnings, for same period 1911.

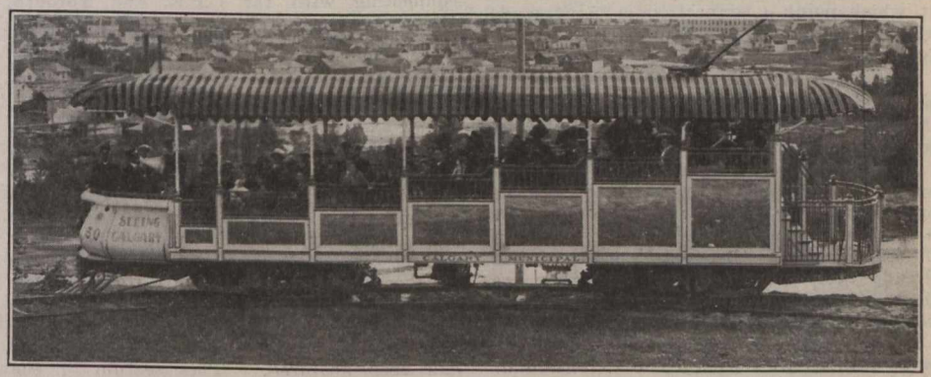
Winnipeg Electric Ry.—Gross earnings for July, $315,362; operating expenses, $163,930; net earnings, $151,432, against $322,751 gross earnings; $152,108 operating expenses; $170,643 net earnings, for July, 1911. Aggregate gross earnings for seven months ended July 31, $2,124,066; net earnings, $992,562, against $2,204,357 aggregate gross earnings; $1,096,193 net earnings for same period 1911.

Personal Paragraphs.

B. L. JONES, who has been General Manager and Treasurer of the Niagara Gorge Rd., Niagara Falls, N.Y., and the Lewiston and Youngstown Frontier Ry., has been appointed Vice-President and General Manager of both companies.

V. E. HAVENS, heretofore General Superintendent, Oswego Division, Syracuse, Lake Shore and Northern Rd., has been appointed Acting General Manager, Buffalo, Lockport and Rochester Ry., with office at Rochester, N.Y.

E. S. FASSETT has resigned the General Managership of the United Traction Co. of Albany, N.Y., to go into business.



Calgary Municipal Railway Scenic Car.

The Calgary Municipal Ry. Scenic Car, an illustration of which appears on this page, and which was adopted on the recommendation of T. H. McCauley, Superintendent, has proved more profitable than was anticipated. One hour trips are run over different routes for six or eight hours, on fine days, and the car is accompanied by a conductor who describes the points of interest to the passengers. A charge of 25 cents a passenger is made for the trip. The car, which cost $7,500, was built by the Preston Car and Coach Co.

The Regina city council is reported to be considering the purchase of an additional eight cars.

The joint board operating the Port Arthur and Fort William Electric Ry. has reported to the Port Arthur city council on the necessity of purchasing six or seven more cars, and a snow plough. The council referred the matter to the Commissioner of Public Utilities.

The Quebec Public Utilities Commission announced Sept. 10, that by November there will be only 454 single truck cars in operation in Montreal, as the Montreal Tramways Co. is complying with the Commission's order not to build any more, and to retire those in service at the rate of 50 a year. The Commission is also enforcing an order that all cars over 30 ft. long, and weighing more than 25,000 lbs., shall be fitted with air brakes, and that all cars operating on severe gradients shall be equipped with an emergency brake.

Electric Railway Projects, Construction, Betterments, Etc.

Bassano Electric Power and Development Co.—We are advised that the proposition for the building of a electric railway from Bassano, Alta., is probably "past history." It is expected that the franchise granted to Mr. Whiting has been lost, and that nobody else would care to take up "such a proposition as running an electric car from Bassano to the C.P.R. dam, unless it be the C.P.R." At any rate there is no vitality in the proposition at present. (June, pg. 308.)

Battleford, Sask.—A proposition was submitted to the city council of Battleford, Sask., Sept. 2, by —. Fitzgerald, on behalf of a British syndicate, for the building of an electric railway in the city. The matter is under consideration.

Berlin and Northern Ry.—A bylaw authorizing the expenditure of $6,000 towards the cost of a county bridge across the Grand river at Bloomingdale, Ont., in connection with the extension of the old Berlin and Bridgeport Electric Ry., was passed by the Berlin town council, Aug. 31. (Aug., pg. 421.)

Brandon, Man.—Track laying is being proceeded with on the municipal electric railway lines being built in the city. The first section of line to be laid is on Princess ave. and First st. easterly to Frederick st., at which point a connection is being made with the track previously laid on Rosser ave. (Aug., pg. 421.)

The British Columbia Electric Ry. moved its headquarters staff to its new office block at Hastings and Carrall streets, Sept. 3.

A cable has been received from the directors in London, Eng., to the effect that the very best terms upon which the company is prepared to negotiate for a consolidation of franchises in Greater Vancouver, has already been submitted, and that they are unable to consider any arrangement which would modify those terms.

Press reports state that construction is to be started at once on the extension of the Fraser st. line in South Vancouver to River road, and that plans for an extension from Clayburn to Mission City are under consideration.

The British Columbia Minister of Railways has approved of general location plans for a line from Port Moody northeasterly to the Vancouver Power Co.'s Coquitlam dam.

The Puget Sound Bridge and Dredging Co., Seattle, Wash., has closed a contract with the B.C.E.R. Co. for the construction of a large dam on Jordan river. The dam will form a part of the Jordan river hydro-electric system, which the B.C.E.R. Co. is developing to secure an output of 36,000 h.p. The dam will be 800 ft. long and 115 ft. high. It will be of the Ambursen type of construction, this form having been selected by G. R. G. Conway, Chief Engineer of the B.C.E.R. Co. in preference to a solid concrete construction. The contract calls for an expenditure of approximately $500,000. Preliminary operations have been started and it is expected the work will be completed in eight months.

The Board of Railway Commissioners has authorized the opening for traffic of the second track from 24th Ave., Point Grey to Eburne, 4.5 miles.

The Board of Railway Commissioners has authorized the Vancouver and Lulu Island Ry., which is operated under lease from the C.P.R., by the B.C.E. Ry., to lay its second track across 22 streets and avenues in Vancouver. (Sept., pg. 468.)

Burrard, Westminster, Boundary Ry. and Navigation Co.—W. McNeill, chairman of the board, is reported as having stated, Sept. 12, as follows:—That construction of the projected electric line between Slave river and Pitt river, B.C., will be started next year; that the further surveys necessary to carry the line from Pitt river into Vancouver are to be started at once; that he had been in consultation with the Provincial Minister of Railways in reference to the building of a single track across the Pitt river, with turnouts at each end, and a draw span to permit of navigation; that the substructure would be built so as to permit of the widening of the bridge to carry a second track, as well as to provide for ordinary traffic; that the bridge work will be started in the spring, and will be completed in a year thereafter; that it is expected to complete the line early in 1915, and that it will be operated by electricity supplied by the Western Canada Power Co., which holds the charter. (May, pg. 251.)

The Dunnville, Wellandport and Beamsville Electric Ry. Co. has a charter to build a line from Port Dover, across the Niagara peninsula to St. Catharines, Ont. The route surveyed shows a line from Port Dover to Dunnville, where connection will be made with the G.T.R.; thence to Moulton, connecting with the Michigan Central Rd., and Wabash Rd.; thence to St. Anns, connecting with the C.P.R. and Toronto, Hamilton and Buffalo Ry., thence to Beamsville and St. Catharines. The company has also power to build branch lines to Welland, 12 miles; to Jordan harbor, 3 miles, and to Port Maitland, 4 miles. The entire country through which the line runs is very level, with the exception of the Niagara hill at Beamsville, where the maximum gradient is 3%, and the country from Jordan to St. Catharines is rather more difficult. The average gradient throughout the line is ½%. The main line has been located on a private right of way practically for the whole distance, and the right of way, from Dunnville to St. Anns, with the exception of two or three parcels, has been acquired. This section of the line will be 16 miles long, and the municipalities have voted $20,000 towards its construction. Construction is said to be well advanced, and it is expected to have the 16 miles completed and in operation by the end of the year. The construction is equal to that of steam roads, and the bridges are built to carry the largest freight cars weighing, when loaded, 148,000 lbs. It is intended to operate gas-electric motor cars over the line.

The company has a capital of $400,000, and is empowered to issue bonds to the amount of $20,000 a mile for the whole line, with an additional $10,000 a mile for the section from Jordan to St. Catharines. An issue of 5% bonds in denominations of $100, $500 and $1,000, with a bonus of an equal amount of common stock, is now being made.

The officers and directors are:—President and General Manager, J. A. Ross, Wellandport, Ont.; Vice President, A. McLaren, St. Catharines, Ont.; other directors:—C. W. Barwell, Port Dover, Ont.; J. W. Holmes, Selkirk, Ont.; W. Young, Ottawa; Secretary, M. R. Campbell, Wellandport, Ont.; Solicitors, J. R. Roaf, Toronto, and Bradford and Bradford, Dunnville, Ont. (Sept., pg. 468.)

Hamilton, Ont.—A proposition has been submitted to the city council by A. M. Snyder for the building of an electric railway from King and Catharine streets to the mountain top, to be operated by hydro-electric power. The line can only be built if the Hamilton Street Ry. fails to build such a line if called upon to do so by the city council. (Sept., pg. 468.)

Hamilton Street Ry.—Application is being made to the Hamilton, Ont., city council for power to extend the line along King st. west, to a new industrial suburb which is being opened up. (June, pg. 308.)

Lake Erie and Northern Ry.—We are officially advised that no tenders have yet been accepted for the building of the line; however, it is expected to start work on the construction of the Brantford-Galt section this season. It is intended to build and operate the line temporarily as a steam road, pending a decision as to the system of electric operation to be adopted.

The line will extend from Port Dover via Brantford to Galt. The location plans show a maximum gradient of 1% and a maximum curvature of six degrees. The cut and fill work will average about 20,000 cubic yards a mile. There will be two large bridges on the line, one 450 ft. long, the other 438 ft. W. P. Kellett, Brantford, Ont., is Chief Engineer. (Sept., pg. 468.)

Lethbridge Municipal Ry.—The electric railway in Lethbridge, Alta., was put in operation Aug. 18, with a temporary power installation. The generator broke down after three days' operation, and as it was impossible to make repairs, traffic was stopped. The service will not be resumed until the permanent power plant has been installed. The machinery is in course of delivery. (Sept., pg. 468.)

London and Northwestern Ry. of Canada.—London, Ont., press reports state that the Mackenzie, Mann and Co. interests have acquired the charter rights of this company, which has power to build an electric railway from London to Sarnia, Ont. D. A. Stewart, London, Ont., is principally interested. (April, pg. 196.)

London, Street Ry.—C. B. King, Manager, is reported as stating that the second track work on several lines is well in hand, and that it is expected to have it finished by Dec. 1. The question of the removal of the line on Wellington st. is still under consideration. (Aug., pg. 421.)

Montreal and Southern Counties Ry.—A franchise for the operation of a street railway in Granby, Que., has been granted to the company by the city council, and press reports state that construction will be started shortly. (Sept., pg. 468.)

Montreal Tramways Co.—We are officially advised that the press reports stating that the company has spent $500,000 in buying a right of way from Henderson station to the city limits, a distance of about two miles, and that a stub line is to be built along it, are incorrect. (Sept., pg. 468.)

Moncton Tramways, Electricity and Gas Co.—We are officially advised that a car service was started over a section of the Moncton and Buctouche Ry. (a steam line) Sept. 10. The cars are run along Harper St., from the King St. line, in Moncton, to the M. and B. Ry., thence along that company's tracks through Lewisville, Sunny Brae and Humphreys, N.B. With regard to the proposed loop line in the city, we are officially advised that nothing has been decided.

A meeting of shareholders was held at Moncton recently for the purpose of confirming a bylaw passed by the directors authorizing the issue and sale of a portion of the unissued capital stock at a discount, in connection with the sale of certain bonds or debentures. (Sept., pg. 468.)

Morrisburg and Ottawa Electric Ry.—At a special meeting of shareholders in Ottawa, Aug. 29, J. G. Kilt, R. J. Biggar, Ottawa; and J. W. Bogert, Morewood, Ont., were added to the directorate. R. A. Bishop resigned from the directorate, but retains his position as Secretary-Treasurer. The plans

for the entrance of the line into Ottawa were under consideration, but no decision was reached. One of the directors is reported as stating after the meeting that no proposition had been made for an amalgamation with the Ottawa and St. Lawrence Electric Ry. (Sept., pg. 468.)

Niagara, St. Catharines and Toronto Ry.—The Board of Railway Commissioners has approved of location plans of the extension of the line from the crossing of the Welland canal, St. Catharines, mileage 0.75, to Niagara-on-the-Lake, Ont., mileage 11.

We are officially advised that construction will be started at once on the building of the new line from St. Catharines to Niagara-on-the-Lake, the location plans for which have been finally approved by the Board of Railway Commissioners. It is expected to have the extension ready for operation early in 1913. (Aug., pg. 421.)

Niagara, Welland and Lake Erie Ry.—The Board of Railway Commissioners has approved of location plans for the line in Welland, Ont., including crossings of the G.T.R. and Michigan Central Rd. (Aug., pg. 421.)

Nipissing Central Rd.—The location plans of the extension of the line from Haileybury to New Liskeard, Ont., have been approved by the Board of Railway Commissioners.

The Cobalt town council, Sept. 4, approved of the company's proposal to connect its line with the Timiskaming and Northern Ontario Ry. at North Cobalt and to run its cars over the steam railway tracks to Cobalt station. (Aug., pg. 421.)

Regina Municipal Ry.—Good progress is reported to have been made on the extensions of the electric railway in Regina, Sask. Steel was expected to be laid on Dewdney St.-Mounted Police barracks section, and on the Victoria Ave. section by the end of September, and substantial progress has been made on other sections. Supt. Doughty is preparing plans for building further extensions during 1913. Press reports state that the plans will provide for the expenditure of about $600,000 on new construction.

A proposition is under consideration by owners of real estate for the building of about six miles of line, the same to be handed over to the city for operation on completion. (Aug., pg. 421.)

Ottawa Electric Ry.—The Ottawa city council was informed Sept. 6 that the company proposed to start work on several extensions in the spring of 1913. (June, pg. 309.)

Ottawa, Rideau Lakes and Kingston Ry.—Press reports state that surveys are to be made at once for the building of a branch from the projected main line at Lombardy, to Perth, Ont. The cost of the work will, it is said, be borne by the municipalities. (Sept., pg. 468.)

Port Arthur and Fort William Electric Ry.—The ratepayers of Port Arthur, Ont., passed bylaws Sept. 16 to issue debentures as follows:—$4,300, to extend the electric railway on Queen st., from Algoma st. to High st.; $2,600, to extend the electric railway from its present eastern terminus to Hodder ave.; $34,000, to extend the electric railway easterly to Hedge siding; $32,200, to construct a belt line electric railway; and $12,500, to open up a new street from Hodder ave. to Hedge siding, in connection with the second and third of the proposed extensions. (Sept., pg. 468.)

Sandwich, Windsor and Amherstburg Ry.—The Walkerville, Ont, town council has granted the company permission to lay a second track on Wyandotte st., from Kildare road, to the western limits of the town. (July, 1911, pg. 685.)

Saskatoon Municipal Ry.—We are officially advised that the contract entered into between the city and the Stone and Webster Engineering Co., Boston, Mass., provides for the building of 12 miles of single track in the city; the installation of two 300 k.w. motor generator sets, together with the necessary switchboard apparatus, etc., in the present power station, and the construction of a brick and timber car barn for 18 single truck cars. (Aug., pg. 422.)

Simcoe Ry. and Power Co.—We are officially advised that the company has developed a water power at the Big Shute on the Severn river, and is transmitting power to Midland, Penetang and Orillia, Ont. It is proposed to build a transmission line to Collingwood, Barrie and other points. At present a duplicate transmission line is being built from the Big Shute to Waubaushene. Nothing has been done under the company's railway charter, and another officer of the company adds, "There is nothing doing." (Sept., pg. 468.)

Stratford St. Ry.—It is said that the negotiations between the Mackenzie, Mann & Co. interests and the company have been abandoned, owing to failure to come to terms with the Hydro-Electric Commission as to power, and that an endeavor is to be made to secure a new franchise from the Stratford, Ont., city council. (July, pg. 368.)

Toronto and York Radial Ry.—The Toronto city council is taking steps to take over the portions of the company's lines within the city limits in East Toronto, and on the Lake Shore road, at the expiration of the franchises in November. (Aug., pg. 422.)

Toronto Eastern Ry.—We are officially advised that about seven miles of grading have been completed west of Bowmanville, and that it is hoped to have the grading and track laying from Bowmanville to Pickering completed this year. (Sept., pg. 468.)

Toronto Suburban Ry.—Plans are under consideration for the laying of a new single track line on Pacific ave., to Dundas st., West Toronto. The whole of the company's existing lines are, it is said, to be relaid to standard gauge.

Considerable grading has been done on the extension west of Islington, but progress is not so rapid as was anticipated owing to difficulties in acquiring the right of way, and the scarcity of teams and men. No further sub-contracts have been let by Ewan Mackenzie, the general contractor. (Sept., pg. 468.)

Winnipeg Electric Ry.—We are officially advised that the company is extending its tracks on Broadway, Winnipeg, from Osborne st. to Sherbrooke st.

The municipality of St. Vital, Man., has granted a franchise to the company for 30 years, for the operation of an electric car line, which must be in operation to St. Vital road by Nov., 1913, and completed throughout the municipality by Nov., 1914.

The Winnipeg Electric Ry., which owns the Winnipeg, Selkirk and Lake Winnipeg Ry., has secured from the Winnipeg city council, the right of way of the city's line to Stony Mountain, Man. Additional land has been secured to connect the company's line with the newly acquired property, and for the extension of the line to Stonewall, a total distance of 17 miles. Press reports state that work is to be started at once on the building of the line, as the agreement with Rockwood municipality calls for operation of cars by Dec. 1. (Aug., pg. 422.)

The Quebec Ry., Light, Heat and Power Co.'s employes' annual picnics were held at Cape Tormente, Sept. 15 and 22.

Electric Railway Notes.

The Hamilton city council is calling upon the Hamilton Street Ry. to add about a dozen new cars to its rolling stock.

The Sarnia, Ont., Street Ry. began re-operating its line Sept. 11, after having been out of business for six weeks owing to the destruction of the power house.

The Grand Valley Ry., which has not been operated in its entirety since March, is again running its cars over the whole line from Brantford to Galt, Ont.

The Winnipeg Electric Ry. has been declared by a decision of Chief Justice Mathers to possess all the rights of the Manitoba Electric and Gas Co., so far as the city of Winnipeg is concerned.

The Lethbridge Municipal Ry. has received five single truck city cars, equipped with Westinghouse 101-B-2 motors, single end operation, with pay-as-you-enter vestibules at the rear ends, from the Preston Car and Coach Co.

The Lethbridge Municipal Ry. was only able to run its cars for three days, Aug. 18 to 21, owing to the breakdown of the temporary power plant. The passengers carried numbered 15,082, and the receipts were $1,037.35.

The Guelph Radial Ry. has ordered a standard long broom, single truck, snow sweeper, with standard steel underframe, steel tired wheels, double end control, equipped with Westinghouse 101-B-2 motors, from the Preston Car and Coach Co.

The New Brunswick Board of Public Utility Commissioners has approved of the following rates of fare on the Moncton Tramways Electricity and Gas Co.'s line: Single fares, 5c.; ordinary tickets, 6 for 25c.; workmen and children's tickets, 8 for 25c.

F. C. Clarke, of New York, has been appointed Chief Engineer, Toronto Ry., Toronto Power Co. and Electrical Development Co. of Ontario, succeeding W. H. Fisher, who has been acting temporarily since W. B. Boyd resigned a short time ago.

The Montreal Tramways Co., by one of its shareholders, has entered an action with a view of preventing the city carrying out a contract with the Canadian Autobus Co., on the ground that the M.T.C., as owning the Montreal Street Ry., should have the option of refusing to enter into such a contract.

In fining the driver of a team for obstructing an electric car at Regina, Sask., Sept. 9, the police magistrate found that the driver had an opportunity of turning out before he did, but expressed the opinion that the cars had not an exclusive right of way on any street in the city. The electric railway is owned by the city.

The city of Saskatoon, Sask., has ordered 12 single truck motor passenger cars in the U.S., for its municipal railway. They will measure 34 ft. 4 ins. over bumpers, 21 ft. 4 ins. over corner posts, and will be equipped with electric heaters, electric bell ringer system, reversible rattan cross seats, headlights, window guards, storm sash, curtains, hand straps, registers, destination signs, trolley catchers, life guards, trackscrapers, and mounted on no. 72 single trucks.

The Regina, Sask., city council's street railway committee recommends the purchase of the following rolling stock for 1913 delivery:—Eight double truck cars at $6,500 each; six single truck cars at $4,500 each; one snow sweeper, $4,100; one 5,000 gal. sprinkler, $6,000; six gravel dump cars at $700 each; 18 garbage cars at $450 each; 4 construction flat cars at $1,000 each, and 1 construction motor car, 28 ft. long, $2,500.

Marine Department.

The Canadian Pacific Railway's New Trans-Pacific Steamships.

The first of the two steamships which are being built as additions to the C.P.R. Co.'s trans-Pacific fleet, the Empress of Russia, was launched at Glasgow, Scotland, Aug. 28, the christening being performed by Mrs. H. W. Beauclerk, of Montreal, eldest daughter of Sir Thos. Shaughnessy, the C.P.R. Co. being represented by G. McL. Brown, European Manager, in the unavoidable absence of A. Piers, Manager of Steamships, who was in Canada at the time. The second vessel, the Empress of Asia, will probably be launched in October.

These vessels will connect with the C.P.R.'s western terminus at Vancouver, and will steam direct to Yokohama, thence to Kobe and Nagasaki, where bunkers will be replenished for the round trip to Shanghai, Hong Kong, and back. Coal will again be shipped at Nagasaki for the return trip via Kobe and Yokohama to Vancouver. This programme involves very large radius of action, the distance between Vancouver and Nagasaki being over 5,000 nautical miles. The problem of carrying sufficient coal for a high rate of speed for so long a distance, together with adequate allowances of space and weight of cargo, passengers, stores and fresh water, is a serious one, especially in view of the decision to increase the sea speed from the 16 knots of the present services to 18 knots for the new vessels. The present trans-Pacific traffic was until recently carried on by the three screw vessels, Empress of China, Empress of India and Empress of Japan, each 450 ft. long and of about 6,000 tons gross register and built in 1891. The Empress of China was wrecked some few months ago, leaving only the two other vessels on the route.

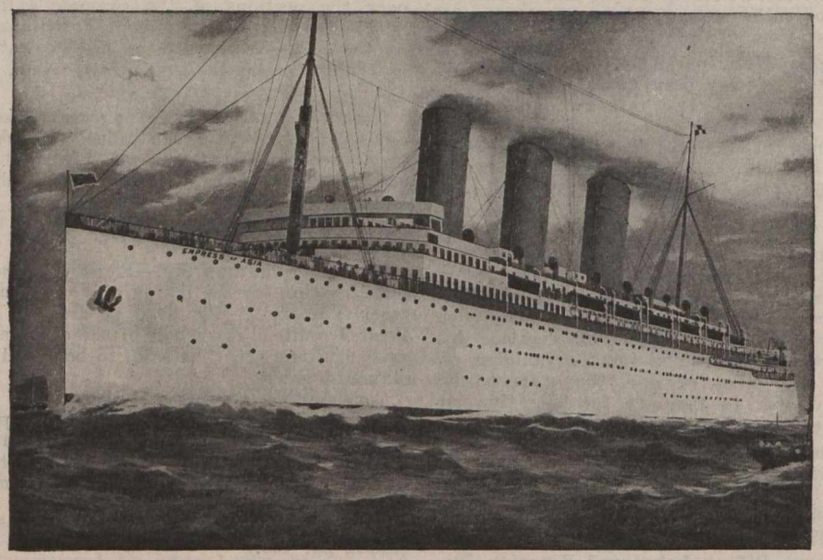
These two new vessels, which will be ready to go into service early next summer, are very much larger than any of the present fleet, being 590 ft. long, 68 ft. beam, and 46 ft. deep, with about 15,000 gross tonnage. The turbine system of propulsion has been adopted by the C.P.R. for the first time, in these vessels which are to be propelled by four screws by four sets of turbines, and will have an average speed of 18 knots an hour. They will embody all the latest improvements, both for the safety and comfort of passengers. On a load draught of 29 ft. they will carry ample coal for the trip from Vancouver to Nagasaki, together with about 3,000 tons of cargo deadweight, and 1,500 tons of passengers, baggage, stores and fresh water.

In the construction of these vessels a radical departure from the current structure has been made in building them with cruiser sterns and the rudders entirely underhung. This form of stern, besides giving the vessels a very distinctive appearance, increases the effect of length of water line, thereby assisting propulsion, and also adds considerably to the available deck space at the after end. They will have five decks and in addition a long combined forecastle and bridge deck. Above the bridge deck will be located the principal first class public rooms, with the officers' quarters and navigating bridge overhead. In the dining saloon tables will be arranged to suit the demands of various passengers. Very small tables will be provided to accommodate two and four persons and larger ones for parties of six will be arranged in alcoves, while there will be still larger tables for other parties.

Accommodation will be provided for 200 first class, 100 second class and 800 third class passengers, the two latter classes being for Asiatics. A number of single as well as double berth rooms will be provided so that the growing class of passengers who desire privacy can be taken care of. There will also be a number of suites consisting of bed room, sitting room and bath room. Besides the usual spacious dining saloon, lounge, cafe, library and writing room, a large gymnasium will be provided on the upper deck. It is to be fitted up with a large variety of exercising machines. Another feature adopted for the first time will be the laundry, which will be found of great convenience, especially in the hot weather on the Chinese coast.

The hold, orlop and lower decks beyond the machinery spaces will be arranged to carry general cargo. On the main deck forward the ship's mail room will be fitted the full breadth of the ship, and spaces for portable steerage or cargo. Amidships on this deck will be stowed the ship's stores

The vessels will have a double bottom, orlop, lower, main, upper and shelter decks. Above the latter there is to be a long, combined forecastle and bridge, the bridge deck gating bridge over. There will be two pole and cold chambers; abaft this will be accommodation for stewards and firemen. Between the firemen's quarters and the stern, provision will be made for carrying valuable cargoes of silk. Five hundred Asiatic steerage, in suitably divided compartments, large airing and dining accommodation, ample cooking and pantry space, and commodious wash places will be arranged for on the upper deck aft and amidships on the port side. On the starboard side aft of amidships staterooms for four persons will be fitted up for second class passengers. Forward of these on the same side will be a number of rooms for first class passengers. The upper deck forward will be taken for the accommodation of seamen and petty officers. On the shelter deck just forward of midships will be the first class reception room and cafe, 44 by 64 ft., with large embarking gangways on either side of the ship. Access to all the first class accommodation and public rooms will be gained from this reception room. Immediately forward on this deck will be large staterooms for two and three persons. Adjoining the cafe on the aft side will be the main saloon, 74 by 64 ft., lighted from



Canadian Pacific Ry. Trans-Pacific s.s. Empress of Asia.

being extended to the stern on side stanchions. Above the bridge deck will be a promenade deck about 350 ft. long on which will be the principal first class public rooms, with the officers' quarters and navimasts and three funnels, straight stem, and as before mentioned, cruiser stern. In order to secure the safety of the vessels in the unlikely event of collision or grounding, the hulls are to be sub-divided by numerous watertight bulkheads, closely spaced in accordance with the recommendations of the bulkheads committee, in such a manner that even should any two adjacent compartments be simultaneously laid open to the sea, the weather deck would still be about 18 ft. above water. In addition, the usual complement of lifeboats and lifebelts will be carried, and there will be an installation of wireless telegraphy. The vessels are being constructed under the supervision of Lloyd's Register Society and will be classed by them 100 A1, three deck and shelter deck, with freeboard restricted to conform to the bulkhead spacing.

the sides from a number of beautifully designed windows nearly 5 ft. wide, and from above by a large well, 26 by 16 ft. The tables will be arranged to suit the demands of various passengers, from small ones for two and four persons to semiprivate tables for six arranged in alcoves, and larger tables for larger parties. In the central part of this deck will be the main kitchen, the pantries, cold larders, bakery, etc., equipped with all the latest hygienic and labor saving devices necessary for effectively serving the first and second class passengers. To minimize the running to and fro a number of electric lifts will be erected between the main kitchens and the various stores, and the number of 'b deck' pantries will be installed on the bridge and promenade decks above. Abaft the galley and adjoining the turbine hatch, within easy reach of the promenade on the shelter deck will be the engineers' quarters, so arranged as to give the maximum comfort to the engine room staff in hot weather. Within easy reach of their cabins on the upper deck, and leading

direct to a covered promenade on the shelter deck, will be second class entrance and lounge, which in turn will lead to the second class saloon. These rooms will be fitted in a large, airy deckhouse about 50 by 48 ft. and 9 ft. high, lighted on three sides by large plate glass windows. At the aft end of the shelter deck, isolated from the first and second class, a large covered airing space for Asiatic steerage will be provided. The hospitals, laundry, embalming room, etc., will be at the extreme aft end of the ship on the shelter deck.

Ascending the grand staircase from the reception room the first class staterooms on the bridge deck will be reached. These rooms will be enclosed in a complete steel deckhouse 340 ft. long. Each of these rooms will be 10 by 9 ft., with sleeping berths for two persons, and a couch so arranged as to be easily converted to a bed should it be found necessary. The sleeping berths again are so designed that should one passenger only engage the room, all evidence of the other berth will be hidden, leaving only a single brass bedstead. Another feature will be that two staterooms can be converted into one suite, with dressing room (with hot and cold water) adjoining. Surrounding the deckhouse will be one of the first class promenades, on either side of the house on the straight this promenade will be 430 ft. long, with a maximum width of 8 ft. At the aft end for 100 ft. it will extend from side to side of the ship. Encircling the promenade at the forward end of the deckhouse a screen will be erected at the ship's side and across the ship 8 ft. in front of the house, with large observation windows, which will give a sheltered promenade 240 ft. long. Forward of the screen the bridge deck will continue to the forecastle deck, and will be fitted with powerful cable holders and capstans for quick and efficient handling of the vessel. At the head of the grand staircase will be the promenade deck, with a deckhouse 320 by 44 ft., in which will be first class staterooms for one and two persons, parlor suites of two, three and four rooms, all self contained with bathroom, dressing room and lavatory accommodation. At suitable intervals in the deckhouse other stairways will be fitted, giving easy access to the first class on the bridge deck below and the saloon on the shelter deck. Midway in the length of the deckhouse will be the lounge, 48 by 38 ft and 14 ft. high at the centre. Further aft a writing room will be introduced and at the aft end a smoking room and verandah cafe 57 by 40 ft., and 14 ft. high. Around the deckhouse will be an open promenade with screen protection at the forward end, similar to that fitted on the bridge deck. On the house top, with an internal stairway from the deckhouse on the promenade deck, a large gymnasium, 16 by 28 ft., will be fitted up with exercising machines. The officers' accommodation and navigating bridge, forward on the house tops, have received special consideration, in view of the length of the voyage and the variety of climates the ship will pass through. All the latest devices for the quick handling and control of the vessel will be installed. A dining room, served by an electric lift from the ship's main pantry, and a cosy smokeroom will be among the arrangements provided to conduce to the officers' comfort. The outstanding features of these vessels will be the size, design and quality of the public rooms, parlor suites, special and ordinary staterooms, also the large proportion of the second class and Asiatic accommodation. The public rooms in the one ship will be of English design and in the other of French. Among other special features worth mentioning are the various methods of heating and ventilating the ships. Each first class room or public room can be heated and ventilated on the thermo tank principle, and also the second and the steerage accommodation, about 20 of these tanks being distributed throughout the length of the vessels. Natural ventilation will also be provided in various sections. Electric radiators and electric fans can be used in the state or public rooms should conditions so demand.

The sanitary accommodation will be of the most improved description, each group of lavatories being fitted with an ample number of baths, showers, washbasins, etc., supplied with hot and cold sea and fresh water passing through specially designed filters. A powerful electric suction fan in each section will keep the lavatories fresh. The electric generating plant will consist of five independent sets of engines and dynamos, provides a complete system of electric lights, radiators, and power for the large stokehold fans, also for the ventilating fans throughout the ship, and the silent working cranes and winches for rapid handling of cargo. Signalling at sea can be carried on by a semaphore on the bridge, of the type used in the British Admiralty for short distances. A Morse lamp for night signalling and the long range Marconi system will be installed.

The propelling machinery will consist, as above stated, of four turbines, embodying the most recent improvements in design and construction to ensure the maximum economy of fuel consumption on service attained. The port wing shaft will be driven by a h.p. turbine which will exhaust into a l.p. turbine driving the starboard wing shaft. The two inner shafts will each be driven by a l.p. turbine, which will have a powerful astern turbine incorporated in the same casing. The introduction of a l.p. turbine to the installation will provide a much wider range for the expansion of the steam, and will effect a marked improvement in steam consumption as compared with the usual arrangement of turbines, driving either three or four shafts, hitherto adopted in large mail steamships and naval vessels. Hitherto these have been fitted with either one h.p. turbine, exhausting to two l.p. turbines, or two h.p. turbines, exhausting to two l.p. turbines. For manoeuvring when entering or leaving harbors, independent high pressure steam connections will be provided on each l.p. ahead turbine. An independent high pressure steam connection will be provided on the l.p. turbine, which, combined with a suitable arrangement of valves, will enable the h.p. turbine to be cut out, or should the l.p. turbine be out of action, the h.p. turbine will be able to exhaust direct into one or other or both of the l.p. turbines.

The four turbines will be situated in one watertight compartment, and in a separate compartment immediately aft, two condensers will be placed, together with the circulating pumps, dual type wet and dry air pumps, evaporators and distillers. The circulating and air pumps will form two distinct and separate sets, each set working in conjunction with one condenser, and independent of the other, but they will also be arranged with suitable cross connections, so that either set of pumps may, in case of emergency, work in conjunction with both condensers. The installation of auxiliary machinery will be exceptionally large, and, as in the case of the turbine installation, has been designed with a view to securing the greatest economy in fuel consumption and convenience in working. The feed water system for the boilers will comprise two twin filters of the gravitation type, through which the water from the air pumps will be discharged on its way to the hotwell tanks; and two hotwell pumps, which will discharge the feed water, first through a surface feed water heater, and afterwards through a contact feeder from which the four feed pumps will take their supply and discharge direct to the boilers. The feed water will be heated by the exhaust steam from the auxiliary machinery throughout the ship, the steam from the ship's heating systems and drainage systems from steam pipes, etc. The system evolved is the result of careful consideration, and will ensure that all waste heat from the auxiliary steam and exhaust systems will be utilized in heating the feed water instead of the heat being carried away by the circulating water from the condensers.

For harbor use, a separate auxiliary condenser with circulating pump, air pump, feed filter and feed pump will be fitted, to admit of the corresponding auxiliary machinery used on service being opened out for cleaning and examination as necessary. All the bearings for the turbine and line shafting will be connected to the forced lubrication system, and the oil supply will be maintained by four large oil pumps which will discharge the oil through special coolers before entering the bearings. Separate pumps will be fitted for circulating cold sea water through the oil coolers. Drain tanks, into which the oil will gravitate from the bearings and settling tanks, for separating any water or impurities from the oil, will be fitted in the condensing room. The pumps for ship's service will consist of two general service pumps, three sanitary hot and cold water pumps, two bilge pumps, two fresh water pumps and a ballast pump.

The refrigerating machinery and electric machinery will be situated in a separate compartment aft of the condenser room. In view of the service in which these vessels are to be engaged, the installation of refrigerating machinery will be very large, and will comprise two machines of the CO2 type. The electrical generating machinery will consist of four independent units, each of which will comprise a compound wound dynamo, driven by an enclosed forced lubrication compound engine.

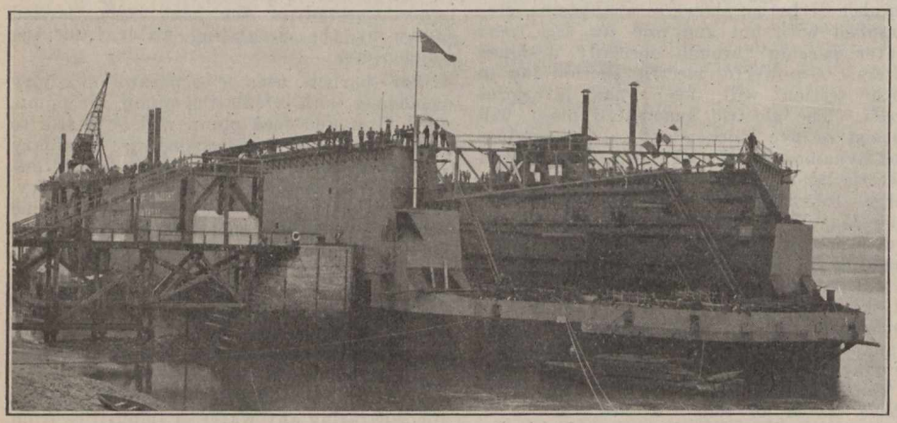
Steam will be generated in six large double ended boilers and four single ended boilers, situated in three separate compartments and working under forced draught, the air supply being maintained by an installation on the main deck. Two pole masts and three large and well proportioned elliptical funnels, one for each boiler compartment, will give the vessels a strikingly handsome appearance. For dealing with the ashes at sea, ash ejectors will be fitted in each stokehold, and in each boiler compartment a specially designed ash ejector pump for supplying the water under pressure to the ejectors will be fitted. Steam ash hoists of a silent type will also be fitted in each boiler compartment for harbor service. The ash hoisting arrangements have received special consideration, in order to minimize the noise which is so objectionable, and this machinery will therefore be removed entirely from the vicinity of the passenger quarters.

The report of the British Government commission, headed by Lord Mersey, which investigated the loss of the s.s. Titanic has been published in pamphlet form under the title "Shipping Casualties (Loss of the s.s. Titanic)." It may be purchased from Wyman & Sons, Ltd., Fetter lane, London, E.C., price 7½d.

Work was commenced early in September on the construction of the wharf at Port Moody. It is expected that it will be completed during October, when there will be no difficulty in bringing ocean going vessels right alongside. There is a depth of 60 ft. in the harbor. The contract price is $8,500.

The Floating Dry Dock for Montreal.

The dry dock, of which some particulars have already been given in Canadian Railway Marine World, which is to be established at Montreal as a part of Canadian Vickers Ltd., dry dock and shipbuilding plant, left Barrow-in-Furness, Eng., for Montreal, Aug. 29, in tow of two powerful steam tugs, specially engaged from a firm in Holland, who make a specialty of this class of work. One of the tugs is equipped with a wireless telegraph installation, so that immediately the tow enters the area of communication, reports of the progress will be kept up. The arrival on this side was expected about the end of September, or early in October, the longer, or extreme southern route being taken, so that in case of accident, the Azores might be made.

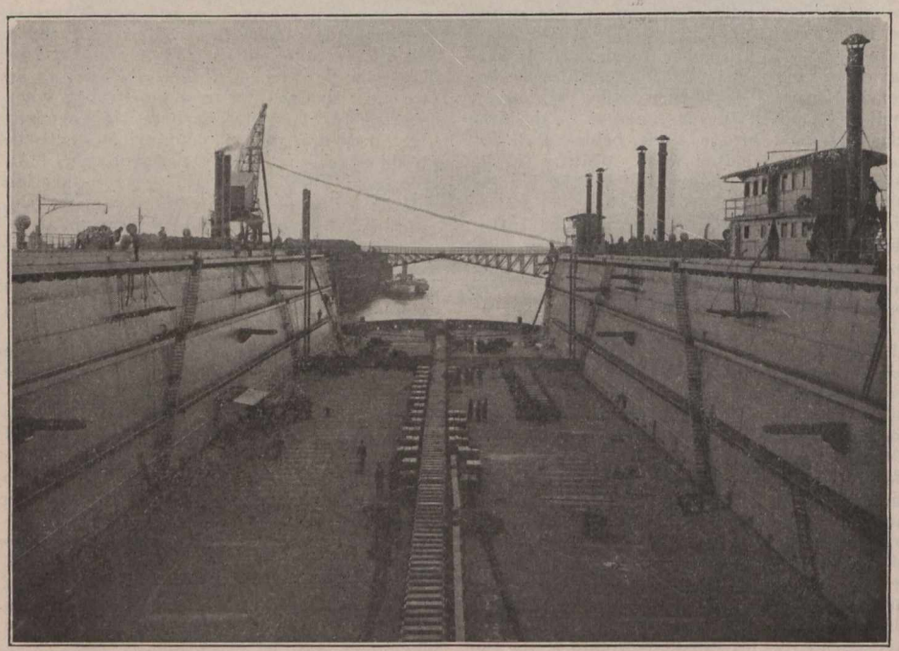


Floating Ship Dry Dock, Duke of Connaught, for Montreal.

The dock is of the double sided, self docking type, on the bolted sectional principle, consisting of a pontoon or lifting portion, and parallel side walls, built on and forming a part of same, and the whole divided into three complete, separate sections, which when bolted together form the complete dock. These sections are so arranged that when the dock is separated into three parts, any two of them can dock the remaining third between them, and for this purpose, each section is fitted with independent pumping machinery, so that it can act as an independent unit. The construction has been so carried out that it is suitable for lifting a modern British battleship, the pontoon deck having been specially stiffened for the support of a large portion of the weight of the vessel on the side, or bilge, as well as the central keels.

The pontoon consists of a rectangular structure, plated all round except the portion of the deck directly under the walls, and stiffened internally by longitudinal and transverse girders. It is divided into three sections, the two end sections having their outer extremities built in the form of a point or bow, ending in a working platform arranged on plate and braced girders. The bottom plating, except under the walls, runs transversely, and is connected with the plating of the sides and points by chine angles, and the top or deck plating, which is arranged in the same manner, is similarly connected with the face of the side wall. The pontoon is divided into four compartments, by three longitudinal intercostal water tight plate bulkheads, and transversely it is divided into 54 bays, of which 17 are in each end section, by transverse girders, consisting of plate bulkheads. Special lattice girders are used in the compartments under the walls, instead of plate girders. In addition to the bulkheads, the deck and bottom platings are stiffened by a series of longitudinal frames running fore and aft over the length of the pontoon, intercostal between the transverse girders. Under the wall, in addition to the transverse lattice girder, intermediate transverse ordinary frames are placed 2½ ft. apart, and prolonged upward, forming the ordinary frames of the walls. The centre bulkhead between the transverse girders, is stiffened by vertical breathing plates, also stiffened and connected to a longitudinal curtain plate. Outside this last mentioned framing, the pontoon deck and bottom are stiffened by longitudinal framings of angles connected to the transverse bulkhead stiffeners by gussets and diagonals. These extend to the face of the wall, and in the centre section several of these frames are provided with plates riveted to them to take the load from the side keel blocks. The intermediate longitudinal bulkheads are formed of vertical plates, intercostal between the girders to which they are attached, as they are also to the top and bottom plating. In order to facilitate the complete withdrawal of all water in the pontoon, shallow troughs, forming a gutter, are fitted. The walls of the dock are plated horizontally and have a batter on the inside wall. The top deck of the walls is plated longitudinally, and is connected to the side plating by double chine angles. All the machinery of the dock is placed on an engine deck about 16 ft. below the top deck, and made water tight. Each wall is divided, in addition to the joint chambers, into 10 water tight divisions by plate bulkheads, in line with the bulkheads of the pontoon, of which they are a continuation. A docking land is formed at each end of the wall, on which the central portion can rest when being self-docked. The framing of the walls is both braced and ordinary. The frames consist of single angles stiffened by vertical web plates, the front and cross frames being cross connected by diagonals and gussets. The ordinary frames of the walls consist of single angles back and front, cross connected by horizontal struts. About a foot below the top deck a running deck is arranged from one end of the dock to the other, outside the stanchions, to enable the ropes to be handled easily, and timber heads and other fittings required for berthing vessels are placed on this deck. Two other platforms, known as the painting and shoring platforms, are placed 15 and 29 ft. respectively, below the running deck.

Each end of the centre section and each square end of the terminal sections is provided with a joint chamber, so that the sections can be joined, or parted. For dealing with trading vessels, not of large weight or dimensions, the dock has been designed so that it can be worked in two independent units of unequal size, and to enable a rapid connection of the two portions to be made, cast steel rocking joints, in the form of knuckles, are fitted to the level of the keel blocks. The pumps are driven by steam supplied by boilers carried on the dock, each installation consisting of two boilers, two engines and pumps placed in specially built chambers on one of the walls. The pumps are of the centrifugal type, 17 ins. diar., and are seated on the main drain at the bottom of the dock, from which compartment pipes are led to each separate water tight division. Each compartment is governed by its own separate valve, and the main inlet pipe and pump discharge pipe are governed by separate screw-down valves and a non-return flap valve on the outside. The compartment valves of each section of the dock are operated from a valve house located on the top deck of each section, by the Westinghouse electro-pneumatic system, based on the principle of operating presses by com-



Floating Ship Dry Dock for Montreal; Interior.

pressed air, and controlling same from a distance by valves operated by electro-magnet. Each valve house is connected by telephone with its engine room and with the others when the dock is working as a single unit. Each section is also provided with a direct acting steam pump arranged to draw from the sea, capable of providing a full stream of water for fire service or washing down vessels. These are also connected to the main drain so that they may be used as a drainage service for completely emptying the compartments. Two similar steam pumps are also fitted on the opposite wall of the dock.

Steam heating is provided to prevent freezing of water in the compartments, and each water tight compartment is equipped with an indicating system to show, in the valve house, the level of water in the compartment, and a similar arrangement is supplied to show the draught of water over the keel blocks. Four steam capstans are provided on each of the two walls, the spindles being carried down vertically to the level of the pontoon deck, where, in a small chamber in the wall, cable lifters are fitted, so that the mooring cables may be hauled in or paid out when the dock is being moved. Donkey boilers are fitted on the opposite wall to that on which the main boilers are fitted, to provide steam for the capstans and fire pumps on that wall. On the top deck of this wall a three ton electric travelling gantry crane is placed, arranged to traverse the whole length of the wall, and at both ends of the combined dock two flying gangways or swinging bridges are placed, giving access to each wall. The dock is lighted throughout by electricity, the outside lighting being by bracket standards with a cluster of lamps, the box terminals are fitted on the walls, from which lamp clusters can be taken by flexible leads for lighting any particular point. The current is to be supplied by cables from the shore.

The dock is supplied with the usual bollards and timber heads, and roller fenders are also fitted to protect the walls from an entering vessel. Eight mechanical side shores, four on each wall, are provided, which can be screwed in or out by a standard fitted on the top deck. The keel blocks are strongly made and closely spaced to take the weight of the heaviest vessels, and ladders are fitted leading from the upper deck of the dock to the pontoon deck, and to the various compartments.

Following are the general dimensions of the dock:—

Length over platforms	600 ft.
Length over pontoons	550¼ ft.
Width over all	135 ft.
Depth of pontoon at centre	17 ft.
Length of side walls	470½ ft.
Height of side walls above pontoon deck	42 ft.
Width of side wall at base	17¼ ft.
Width of side wall at top	12½ ft.
Clear width between roller fenders	100 ft.
Draught of vessel	27½ ft.
Lifting capacity	25,000 tons.

The accompanying illustrations show the interior of the dock, and the completed dock as viewed from the water.

This dock is the fourth largest in the world, the largest with a lifting capacity of 40,000 tons, and the second largest, of 35,000 tons, being owned in Germany, while Great Britain owns the next largest, the twin docks of 32,000 tons lifting capacity each.

Gaspe Bay Developments.

An important development is taking place in Gaspe bay, Que. With a view to provide for ocean steamship traffic, work is proceeding on the construction of a breakwater at Sandy beach, on the south coast, the contract for which was given to Horace Dussault, of Quebec, in April, 1910, for $273,985. The structure consists of two parallel cribs, 15 ft. wide at top, 18 ins. above low water mark, with a 12 ft. trestle on top of the cribs. The breakwater will be 1,000 ft. long and 95 ft. wide at top, starting at the 15 ft. line and running to the 50 ft. line of water at low water. J. T. Bertrand, District Engineer, Public Works Department, is in charge, and progress estimates have been received for $157,360, of which $144,310 has been paid. As far as can be ascertained, no arrangements have been made for any line of vessels to use the Gaspe route. A spur track has been built from the Atlantic, Quebec & Western Ry. to the Sandy bay breakwater.

Arrangements are being made by which some of the steamships operated by Henri Menier, proprietor of Anticosti island, will run between that place and Gaspe, carrying fish for shipment from Gaspe by rail. M. Menier will probably have a wharf of his own, either at or near Gaspe Basin.

Instructions for Vessels When Approaching Canadian Ports.

The Government having taken into consideration the fact that local, or other circumstances may arise in which it may be necessary, on account of periodical exercises, manœuvres, or otherwise, to forbid all entrance to certain ports of the Dominion, notice is given that on approaching Canadian shores, or any of the following ports, viz.:—Halifax, N.S.; Quebec, Que.; Esquimalt, B.C.; a sharp look out should be kept for the signals being displayed, and the distinguishing and other signals made by them. If entrance to a port is prohibited, three red vertical lights by night, or three red vertical balls by day, will be exhibited in some conspicuous position, in, or near to its approach, which signals will also be shown by the vessels appointed for examination purposes. If these signals are displayed, vessels must either proceed to the position marked "examination anchorage" on the Admiralty charts, and anchor there, or keep the sea. At the ports beforementioned, searchlights are occasionally exhibited for exercise, and instructions have been given to avoid directing movable searchlights during practice on vessels under way, but mariners are warned that great care should be taken to keep a sharp look out for the signals indicated, when searchlights are observed to be working.

Under certain circumstances it may become necessary to take special measures to examine vessels desiring to enter the ports or localities referred to, and in such case, vessels carrying the distinguishing flags, or lights, already mentioned, will be charged with the duty of examining vessels which desire to enter the ports, and of allotting positions in which they shall anchor. As the institution of the examination service at any port will never be publicly advertised, special care should be taken in approaching the ports, by day or night, to keep a sharp look out for any vessel carrying the distinguishing flags or lights, already mentioned, and to be ready to bring to at once when hailed by her, or warned by the firing of a gun or sound rocket. By day, the distinguishing flags of the examination steamer will be a special flag, white and red horizontal surrounded by a blue border, and the blue ensign; also three red vertical balls if the port is closed; three white vertical balls if the port is open. The lights mentioned will be carried in addition to the ordinary navigation lights, and will show an unbroken light round the horizon.

Masters are warned that before attempting to enter any of these ports where the examination service is in force, they must in their own interests, strictly obey all instructions as to entry given to them by the examination steamer, and in the absence of any instructions from the examination steamer, they must proceed to the position marked "examination anchorage" on the Admiralty charts and anchor there, or keep the sea. In case of fog, masters of vessels are enjoined to use the utmost care, and the examination anchorage itself should be approached with caution. The pilots attached to the ports will be acquainted with the regulations to be followed.

Any vessel approaching a defended port in the Dominion, when searchlights are being worked, and finding that they interfere with safe navigation, may make use of the following signals, either singly, or combined,—by flashing lamp, four short flashes followed by one long flash, or by whistle, siren or fog horn, four short blasts followed by one long blast. Whenever possible both lamp and sound signals should be used. On these signals being made the searchlights will be worked so as to cause the least inconvenience, either being put out, raised, or their direction altered. The signals should not be used without real necessity, as unless the vessel is actually in the rays of the searchlight, it is impossible to know which searchlight is affected.

The Canadian Interlake Line's Vessel Fordonian.

The vessel Fordonian, which has been built at Glasgow, Scotland, for the Canadian Interlake Line Ltd., for operation by the Merchants Mutual Line in the lake trade, is on its way to Toronto, having left Glasgow, during September. She is of the ordinary type of lake and canal vessel, but is equipped with a Carels-Diesel engine of the four cylinder, two cycle type, of 800 b.h.p., developing 200 b.h.p. per cylinder. In vessels of this type, the machinery space is considerably reduced, being only about one third of that of steam driven vessels, and economy of fuel is also an important consideration.

The Fordonian is the first vessel of this particular type to be built at Glasgow, and it is stated that she will have a radius of navigation, on the same bunker capacity as a steam driven vessel, of at least four times that of the latter, in addition to the time saved by being able to make an immediate start, and having no standby charges.

The whole of the machinery was built at Glasgow, with the exception of the cylinders, and the engine is built up of the highest powered units yet seen in a British marine heavy oil engine.

Her dimensions are:—length, 250 ft.; breadth, 42 ft. 8 ins.; depth, moulded, 16 ft. 10 ins. to main deck and 26½ ft. to awning deck.

The U. S. Lake Survey reports the levels of the Great Lakes in feet above tidewater, for August, as follows: Superior, 609.49; Michigan and Huron, 508.58; Erie, 572.45; Ontario, 246.66. Compared with the average August levels for the past ten years, Superior was 9.25 ft. below; Michigan and Huron, 9.45 ft. below; Erie, 0.24 ft. below; Ontario, 9.94 ft. above. It was anticipated that during September, Superior would rise 0.1 ft.; Michigan and Huron, 0.2 ft.; Erie, 0.3 ft., and Ontario, 0.4 ft.

The East Side Fish Co.'s steam tug, which is being built at Collingwood, was launched there, Sept. 17. She is 77 ft. long, and equipped with fore and aft compound engines with cylinders 9 and 18 ins., diar., by 14 ins. stroke. She will be operated out of Port Stanley in the fishing trade on Lake Erie.

Statistics of Canadian Shipping.

The total number of vessels on the Canadian register for the year ended Dec. 31, 1911, was 8,088, measuring 70,446 tons, being an increase of 184 vessels and 19,517 tons over 1910. There were 3,444 steamers, with a gross tonnage of 588,741, included in the list, which, at an assumed average value of $30 a ton for the net registered tonnage, represents $23,113,380. The number of new vessels built and registered in Canada was 339, representing 27,736 tons net register, which, estimated at $45 a ton, gives $1,148,120 for new vessels. During the year 279 vessels were removed from the register, lists of which, together with details of new registrations, were given in Canadian Railway and Marine World, throughout the year. It is estimated that 41,447 men and boys, inclusive of the masters of the vessels, were employed on Canadian registered vessels during 1911. The number and tonnage of vessels, according to provinces, are as follows:

	Sailing ships and steamships	Steamships	Gross tonnage of steamships	Net tonnage of sailing ships and steamships
Ontario	2,014	1,472	255,628	236,877
Quebec	1,511	490	128,523	193,682
Nova Scotia	2,105	296	35,916	142,631
British Columbia	1,227	873	112,511	122,264
New Brunswick	966	200	39,890	55,872
P. E. Island	149	20	4,407	9,683
Manitoba	96	86	8,348	6,373
Yukon district	15	3	3,132	2,708
Saskatchewan	5	4	381	356
Totals	8,088	3,444	58,8741	770,44

In a list showing the net registered tonnage of the shipping of the various maritime nations of the world, Canada appears as the ninth.

Of the vessels which were removed from the Canadian register during 1911, 21 were sold to foreigners, 37 were wrecked, 15 stranded, 12 lost, 78 broken up, 10 abandoned at sea, 3 sunk in collision, 12 foundered, 31 were burnt, 2 condemned, 31 reported out of existence, 2 dismantled, 17 were transferred to Newfoundland, and 8 to Barbadoes.

Ports of registry are distributed as follows:—Ontario, 38; Nova Scotia, 21; New Brunswick, 7; Quebec, 6; British Columbia, 4; Prince Edward Island, Manitoba, Saskatchewan and Yukon territory, one each.

The ports having a net tonnage of 10,000 and over, are as follows:—

	Vessels. Sailing.	Steam.	Net tonnage.
Montreal	803	297	141,274
Victoria, B.C.	325	203	65,350
Toronto	352	285	57,513
Vancouver, B.C.	686	531	45,573
Quebec, Que.	618	158	45,097
St. John, N.B.	330	105	39,953
Ottawa	390	253	31,014
Windsor, N.S.	72	15	24,161
Lunenburg, N.S.	332	30	22,743
Kingston, Ont.	208	139	22,092
Halifax, N.S.	433	100	21,765
Midland, Ont.	30	24	16,214
Parrsboro, N.S.	87	7	15,659
Hamilton, Ont.	40	37	14,930
Collingwood, Ont.	78	73	14,659
Yarmouth, N.S.	310	38	13,624
Port Arthur, Ont.	80	55	11,159
S. S. Marie, Ont.	69	59	10,318

The vessels built and added to the register during 1911, according to provinces, were as follows:—

	Vessels.	Tonnage.
Ontario	42	10,086
British Columbia	98	7,781
Nova Scotia	136	5,340
Quebec	30	2,726
Manitoba	3	902
New Brunswick	25	774
Saskatchewan	1	66
Prince Edward Island	4	61
Totals	339	27,736
Totals, 1910	294	22,283

Canadian Notices to Mariners.

The Department of Marine has issued the following:—

65. Aug. 23. 180. Ontario, Detroit river, off southern end of Fighting island, spar buoy replaced by gas buoy. 181. Ontario, Lake Superior, east end, Whitefish bay, Ile Parisienne, light and fog alarm established. 182. Ontario, Lake Superior, Thunder bay, Port Arthur, Bare point, breakwater under construction, lights.

66. Aug. 24. 183. New Brunswick, Bay of Fundy, Grand Manan island, Ross island, Grand harbor, Fish Fluke point, character of light. 184. Nova Scotia, Avon river, Windsor bridges, arrangement of lights changed, new bridge being built. 185. Nova Scotia, south coast, Cross island, change in character of light. 186. Quebec, River St. Lawrence, Portneuf-en-bas lighthouse, slats placed in skeleton frame. 187. Newfoundland, south coast, St. Lawrence harbors, Middle head, fog alarm established.

67. Aug. 24. 188. British Columbia, Chatham sound, entrance to Prince Rupert, Holland island, lighthouse under construction; temporary light.

68. Aug. 26. 189. Quebec, River St. Lawrence, Beauport bank, conical buoy replaced by gas buoy. 190. Quebec, River St. Lawrence, Montreal harbor, Ile Ronde range, Ile Ste. Helene, lighthouse established.

69. Aug. 27. 191. Ontario, Lake Superior, eastern end, outer Pancake shoal, bell buoy replaced by gas and bell buoy. 192. United States of America, Lake Erie, Buffalo harbor approach, lightship established.

70. Aug. 27. 193. British Columbia, Thompson river, Kamloops lake to Little Shuswap lake, buoys and day beacons established.

71. Aug. 29. 194. British Columbia, Vancouver island, west coast, Clayoquot sound, Templar channel, telephone connection between Lennard island light-station and Tofino. 195. British Columbia, Vancouver island, east coast, Cordova bay, uncharted rock. 196. British Columbia, Strait of Georgia, Porlier pass, arc of visibility of front range light on Race point increased. 197. British Columbia, Chatham sound, Dundas islands, Hudson Bay pass, uncharted rock. 198. United States of America, Washington, Juan de Fuca strait, Neah bay, whistling buoy replaced by gas and whistling buoy, light discontinued.

72. Aug. 31. 199. Quebec, River St. Lawrence, St. Thomas channel, dredging, rearrangement of buoys, gas buoys established.

73. Sept. 5. 200. New Brunswick, south coast, Bay of Fundy, Musquash harbor, buoys established. 201. New Brunswick, south coast, Bay of Fundy, Cape Spencer, reported irregularity of light contradicted. 202. New Brunswick, east coast, Northumberland strait, Kouchibouguac bay, St. Louis gully, Kouchibouguacsis river, change in position of range lights. 203. New Brunswick, east coast, Kouchibouguac bay, Kouchibouguac river, change in position of range lights. 204. Prince Edward Island, south coast, Hillsborough bay, Charlottetown harbor, buoy re-established. 205. Newfoundland, Labrador, Belle isle, south end, position of main light, erratum in list of lights. 206. England, west coast, Trevose head light, alteration in character. 207. England, south coast, Lizard head, submarine fog signal established off.

74. Sept. 6. 208. British Columbia, Lama passage, Campbell island, Napier point, day beacon erected. 209. British Columbia, Queen Charlotte islands, entrance to Houston Stewart channel, beacon to be moved from Koya point to Danger rocks.

75. Sept. 7. 210. Quebec, Gulf of St. Lawrence, Magdalen islands, Grindstone island, Etang du Nord lightstation, new lighthouse, change in character of light.

76. Sept. 11. 211. British Columbia, Queen Charlotte islands, Skidegate inlet, hydrographic information.

77. Sept. 12. 212. Ontario, Lake Erie, Port Burwell, change in position of back range light of inner range. 213. Ontario, Lake Erie, shoal off entrance to Port Stanley, caution. 214. United States of America, St. Lawrence river, Ogdensburg harbor, Ogdensburg light, red sector to be installed.

78. Sept. 13. 215. Ontario-Michigan, Detroit river, Livingston channel, aids to navigation to be established.

The White Star Steamship Britannic.

The Atlantic liner, which is being built at Belfast, Ireland, for the White Star Line, and which will be named the Britannic, will in general features be similar to the Olympic, but of somewhat larger tonnage. There will also be various improvements introduced into the new vessel, resulting from the experience gained from the Olympic, and profiting by the lesson of the Titanic disaster. The Olympic will also be altered at an early date with a view to making her what her owners believe will be the safest ship in the world. The general structural changes will be very few, the strength of the Olympic under all weather conditions having proved entirely satisfactory. In two important respects, however, both vessels are to bear evidence of the recent change in expert and public opinion as regards protection against the effects of collision, both by the introduction of a complete inner skin extending to a considerable height above the load line throughout the most vulnerable portions of the vessels, and also by the increased height and number of watertight bulkheads, so as to render both ships as nearly unsinkable as possible.

The inner skin will consist of heavy plating, well stiffened, extending for more than half the length of the vessel, from the watertight bulkhead in front of the forward boiler room to the after end of the turbine engine room, the inner skin being strongly connected to the outer shell by longitudinal plates and angles and specially strong connections at bulkheads and watertight divisions. The space between the outer and inner shells will be the width of the web frames at present in the ship, and this reinforced structure will run from the tank top, i.e., from the top of the double bottom, to a point well above the load water line. In addition, an extra watertight bulkhead will be introduced, and several of the existing bulkheads carried up to the bridge deck.

The additional strength and safety afforded by these methods will be easily appreciated. Hitherto it was considered sufficient if a vessel could float with any two compartments pierced; but the olympic and Britannic, besides having this extra protection against serious damage, will, it is claimed, be able to float with any six compartments flooded; and with these special provisions it is not considered within the possibility of chance that so many compartments could be in this condition.

The Chief Engineer states, that every effort is being made to complete the excavation and the work on the locks of the Panama canal by June 30, 1913. He expects to see the level of Gatun Lake at 85 ft. some time in Sept., 1913. If this be accomplished and the first boat be successfully put through the canal, announcement will be made that it is in condition to pass shipping. This, he says, will allow of a year's try-out before the formal opening.

Allan Line Changes.

A number of changes in the directorate of the Allan Line have been announced recently, Sir H. Montagu Allan, one of the principal directors, and Bryce J. Allan, who has acted as Manager at Boston, Mass., for the past 25 years, have retired from active connection with the company. Sir Montagu Allan, is reported to have said, in connection with his retirement, that he had been impelled to take the step of leaving the management in the hands of Hugh, and Andrew A. Allan, because he wished to have more time to devote to other affairs.

Hugh Allan, who left Montreal a few years ago to take up his residence in London, Eng., it is reported, will continue to act as chairman of the company, and Andrew A. Allan will continue to represent the board in Canada. Andrew H. Allan, of Montreal, has been appointed Manager at Boston, Mass., succeeding Bryce J. Allan, and has left Montreal to take up his new duties. A number of minor changes are in contemplation.

Reports as to the amalgamation of the Allan Line with the C.P.R., are met by the statement of G. Hannah, Passenger Manager of the line at Montreal, that he personally believes that the so-called fusion is a newspaper story, and that no official notice of it has been received at the Montreal office, which would have been notified if it had taken place.

Atlantic and Pacific Ocean Marine.

The Allan Line steamships' first sailing from Halifax, for the winter season, is fixed for Dec. 7.

During August, 56 ocean going steamships arrived at Montreal, having a combined gross tonnage of 393,369 tons.

The C.P.R. s.s. Lake Champlain ran into a sandbank in the St. Lawrence river, off Dominion Park, Montreal, Sept. 3, and was released early the next morning without damage.

The New Zealand Shipping Co.'s s.s. Wakanui, which was scheduled to sail from Montreal, Sept. 15, was discovered to be on fire, Sept. 13. The damage to cargo is estimated at $25,000.

The Allan Line s.s. Mongolian, while outward bound from Liverpool, Eng., for Halifax, N.S., is reported to have run aground in the River Mersey, Aug. 31. The accident was due to the breaking of a tow rope, and no damage was done beyond the delaying of the sailing for a day.

The Canada Line, operating steamships between Canadian ports and Hamburg, Bremen and Rotterdam, which recently contemplated making additions to its service, has announced that such extensions are no longer to be considered, owing to standing agreements with the C.P.R. and other companies.

The Allan Line's steamships Alsatian and Calgarian, which are under construction at Glasgow, Scotland, are expected to be ready for service in May and August, 1913, respectively. The vessels are each of about 18,000 tons gross register, with engines of about 20,000 h.p., and will average about 20 knots an hour.

A press report from Victoria, B.C., states that the recently formed Pacific Canadian Steamship Co. intends to suspend its service between Victoria, Vancouver and Salina Cruz, for a time, owing to the disturbances in Mexico having interfered with trade, and to the fact that all space on Atlantic freighters has been secured for export of cotton for some time.

G. A. Gibbs, member of the British Parliament, who was visiting in British Columbia recently, stated that, on the opening of the Panama canal, he hopes to see the establishment of a direct steamship line between Vancouver and Bristol, Eng., and mentioned that Bristol is one of the great wheat importing ports of the old world, and with the new Avonmouth docks there, it is in a better position than previously to handle large imports.

D. W. Campbell, of Montreal, Manager, Elder Dempster Co., in Canada, was in Vancouver, recently, for the purpose of studying conditions there, especially in relation to the effects likely to be produced by the opening of the Panama canal. He is reported to have stated that, in his opinion, the opening of the canal will not result in any appreciable decrease of shipping rates, either by the Panama route or the Suez route, and also that he does not consider that any large volume of wheat will seek an outlet by the Pacific coast, mainly for the reason that on an average of eight out of ten years, vessels on the St. Lawrence route are glad to carry grain at ballast rates.

Maritime Provinces and Newfoundland.

The Reid Newfoundland Co. has chartered the U.S. steamship Mexican for its service between Lewisport and Bay of Islands.

During the summer, dredging has been proceeding through the Grandoon flats, in Miramichi bay, N.B., where a cut 200 ft. wide, with a general depth of 22 ft., has been made for 3.3 miles. The cut is being widened to 300 ft., and extended to a 20 ft. contour to make a total length of 3½ miles. The work will be completed before the winter sets in.

The Millerton Extract Co., Ltd., has been incorporated in New Brunswick, with $98,000 capital, and office at Millerton, among other things to own and operate vessels, wharves, dry docks, etc., and to carry freight and passengers. J. W. and T. C. Miller, E. P. Williston, Newcastle, N.B.; V. Burrill, Shawinigan, Que.; and Jas. McKechnie, Montreal, are the incorporators.

A motor lauch, one of five being built at Dartmouth, N.S., for the Marine Department, was launched there, Sept. 5. She will be equipped with engine of 40 n.h.p., developing a speed of about 12 knots an hour. Her dimensions are, length 45 ft., breadth 12 ft., draught 4½ ft., and there will be accommodation for a crew of 10. The second vessel is well on the way, and will shortly be launched.

The s.s. Sagona, which has been acquired for the mail service between Halifax, N.S., and St. Pierre, Miquelon, was built at Dundee, Scotland, early this year, sailing for the sealing grounds in the service of the Newfoundland Produce Co., Feb. 25. The agreement is with the French government, and covers 10 years. The ports of call are as before, with the addition of St. John's, Nfld. She has a net tonnage of 420, with cargo capacity of 920 tons deadweight, and accommodation for 46 first class and 36 third class passengers.

A press report from Ottawa states that tenders for the construction of a car ferry steamboat, for service across the Northumberland strait, between New Brunswick and Prince Edward Island, have been received from a number of British and U.S. firms, and it is possible that the contract will be awarded shortly. The same report states that on account of the currents and the force of wind, ice and water in the winter, the scheme has been declared by some to be impracticable. All points involved under these heads are dealt with in the report made to the Minister of Railways by Prof. Kirkpatrick, which is given fully on another page in this issue.

Province of Quebec Marine.

The Mackay-Hall Steamship Co.'s steamboat Eastwood collided with the s.s. Rjnarock, near the mouth of the Saguenay river at Tadousac, Sept. 12, during a fog.

The Sincennes-McNaughton Line's steam tug Aurelie G., recently built at Glasgow, Scotland, sailed for Montreal, Sept. 15. During her trials she made an average speed of 11 knots an hour.

The Montreal Harbor Commissioners have decided to increase the capacity of their elevator no. 1, by the fall of 1913, so that with the recent completion of the no. 2 elevator with a capacity of 2,640,000 bush., they will have a total capacity of 5,140,000 bush.

The Postmaster General, in response to a deputation from Quebec, in relation to proposed improvements to the port, stated that the Government was considering the immediate reorganization of the Harbor Commission, which will likely be reduced and placed on the same footing as that at Montreal. He considers it will be better to leave other matters in abeyance until the reorganization has taken place.

The Montreal Harbor Commissioners are reported to have decided to place orders shortly for 12 electric motors and a large quantity of rolling stock for the harbor railway system, which it is said is to be electrified. We have been officially advised that no orders for motors and rolling stock have been placed, and that the matter of electrification is not at present under consideration, though it may be taken up in the future.

During August, 3,664 permits were issued for vessels to pass through the Lachine canal, against 3,406 for August, 1911. Following is a classification of the traffic—wheat, 2,341,393 bush.; oats, 1,723,609 bush.; flour, 94,907 barrels; eggs, 2,166 cases; butter, 907 packages; cheese, 50,752 boxes; apples, 811 barrels. As compared with August, 1911, there were increases in the amounts of oats, cheese and apples, and decreases in the remainder.

Ontario and the Great Lakes.

The Norton Griffiths Dredging Co., Ltd., recently incorporated, has acquired the Daly and Hannan Dredging Co., of Prescott, Ont.

The Mackay-Hall Steamship Co.'s steamboat Robert R. Rhodes ran aground near Alexandria bay, Sept. 12.

Detailed plans for the proposed improvements at Hamilton harbor have been forwarded to the Public Works Department, and it is expected that tenders will shortly be asked for.

W. D. Ross, at one time mate and pilot on a passenger vessel running between Buffalo and Port Robinson, before there were any railways in the district, died at Welland, Sept. 13, aged 91.

It is reported that the C.P.R. will inaugurate a car ferry service between Grafton, Ont., and Charlotte, N.Y., in connection with its new lake shore line. Under present arrangements, C.P.R. traffic is forwarded to south shore ports by the Toronto, Hamilton and Buffalo route.

The recommended draughts for the Sault Ste. Marie canals have been increased by 2 ins., making the draught for the United States Poe lock, and the upward bound draught for the Canadian lock, 19 ft., and the downward bound draught 19 ft. 5 ins.

This is the first time for three years that the Poe lock has had a draught of 19 ft.

Construction on the breakwater off the entrance to Goderich harbor, south of the channel, is proceeding. Six cribs have been put in place, and reach to a height approximately equal to the water level, and the work of building the superstructure is following on closely. The northeast end of the breakwater is 1,140 ft. from the southwest end of the south pier at the entrance to the harbor.

The U. S. steamboat Britannic, owned by H. McMorran, Port Huron, Mich., ran ashore at Weavers point, near Morrisburg, Ont., recently, and was reported to have been abandoned as a total loss, after several attempts to refloat her. Later reports state that she had not been definitely abandoned, and that she is to be transferred to the Canadian register. She was built in 1888, her dimensions being, length 219 ft., breadth 36ft., depth 20 ft.; tonnage, 1,121 gross, 921 register.

The Merchants Mutual Line, Toronto, has secured writs of caveat from the Admiralty Court, and has paid a deposit of $1,000 a vessel, to exempt vessels operated by it, from possible seizure, thus insuring against loss of time. The vessels covered are: Acadian, Canadian, Renvoyle, A. E. McKinistry, owned by Canadian Interlake Line, Ltd.; A. E. Ames, Beaverton, H. M. Pellatt, J. H. Plummer, Mapleton and Saskatoon, owned by the Merchants Mutual Line, Ltd.; and D. A. Gordon, owned by the International Steamship Co.

At the annual meeting of the Lake Shippers Clearance Association, in Winnipeg, recently, the report showed profits on grain shipments, $2,404.24; commission as agents at Duluth, Minn., $1,027.03; switching and stores earned for shippers, $15,671.55; Government fees for registration, $2,499.26; bank interest, $1,493.68; total, $23,132.41.

The wreck of the steamboat Joliet, which has been a menace to navigation in the St. Clair river, near Sarnia, for some time, has been broken up and removed, and there is now a clear depth over the site of the wreck, of 25 ft., ascertained by sweeping. The vicinity was swept for a depth of 30 ft., and only a small obstruction was found with less than 30 ft. of water over it. This is being removed without further notice.

The contractors have completed the deepening of the western half of the Ballard reef channel in the Detroit river, and are commencing work on the eastern half. In consequence, all the gas buoys marking the latter channel have been moved 300 ft. to the westward. The western side of the channel, for temporary use by vessels of light draught, on the eastern side of, and adjoining Ballard reef main channel, has been marked by five black spar buoys, carrying lanterns, and located opposite the red spar buoys on the eastern side of the channel. Lanterns have been placed on the red spar buoys on the eastern side of the channel for light draught vessels.

The Keystone Transportation Co.'s steamboat Keybell was launched at Collingwood, Sept. 18. She is of full canal size, her dimensions being:—length, 258 ft.; beam, 42½ ft.; depth, moulded, 20 ft., with a carrying capacity of 3,300 tons, or about 110,000 bush. of wheat. She is built of steel throughout, and will be equipped with triple expansion engines with cylinders 16, 26 and 44 ins. diar, by 36 ins. stroke, supplied with steam by two Scotch boilers, each 11½ by 10½ ft., under a pressure of 180 lbs. per sq. in. She is of the single deck type, on the arch and web frame system, with holds unobstructed by pillars, and the grain cargo will be handled by the clam-shell bucket system. A full equipment of derricks and gear for the speedy handling of cargo, electric lighting plant and the usual auxiliaries, will be installed. She will be utilized for the great lakes trade, and on the Atlantic coast, for which she was designed by John Reid and Co., of Montreal, L. McMillan of that company acting as superintendent of construction.

The Peoples Line steamboat Frontier, which is at Polson Iron Works, Toronto, for overhauling, was recently reported to be waterlogged at Port Dalhousie, where she had been sent for repairs. Her condition, however, is stated to have been exaggerated. She was originally known as Empress of India, and was built at Mill Point, Ont., in 1876, for the Lake Ontario Navigation Co., Picton, Ont., which company is not now in existence, the route covered by its vessel now being operated by the Lake Ontario and Bay of Quinte Steamboat Co., Kingston, Ont. The dimensions of the Empress of India, were:—length, 170 ft.; breadth, 26 ft.; depth, 8.5 ft.; tonnage, 579 gross, 336 register, and she was driven by paddle wheels. She was rebuilt at Picton, Ont., in 1899, and renamed Argyle, being then owned by the Argyle Steamship Co., Toronto, her dimensions being:—length, 185.1 ft.; breadth, 26 ft.; depth, 9.7 ft.; tonnage, 700 gross, 374 register. She has been operated on various routes, during 1910 and 1911, between Toronto and Olcott Beach, N.Y., and during this year, when her name was changed to Frontier, from Toronto to Lewiston, N.Y., on the Niagara route. W. Evans, Steamboat Inspector, Toronto, is reported to have said recently that the vessel was absolutely seaworthy and in good condition when under his inspection in June, and he had received no communication from either the captain or engineer, whose duty it was to report if anything was wrong. He considered that the vessel had been improperly handled and had been allowed to run down for want of proper care and proper repairs, due to her having passed through so many hands, and not all men with practical steamboat knowledge.

British Columbia and Pacific Coast Marine

During August, 74 vessels arrived at and departed from Prince Rupert, in connection with the coastwise trade.

H. M. Davy, engineer, Dominion Public Works Department, is in charge of surveys and borings which are being made in Vancouver harbor.

The C.P.R. vessel which is under construction at Esquimalt, for the British Columbia coast service, is to be named Princess Maquinna.

The Marine Transportation Co. has commenced a service between Vancouver and California ports in the freight trade, with its s.s. Rupert City.

The Vancouver Terminals Co. is stated to have submitted to the Vancouver city council, a plan for the construction of about 12 miles of dock accommodation at Point Grey.

The British Columbia Transport Co., Ltd., with head office in London, Eng., and with a capital of £50,000, has been licensed to carry on business in British Columbia, with office in New Westminster, and E. J. Fader as its attorney.

The last steamboat scheduled to make connections at Gibbon for St. Michael, this year, will leave Dawson, Sept. 15, and the last vessel of the season to leave Dawson is booked to sail on Sept. 26, thus closing navigation on the Yukon river for the year.

It is reported that the White Pass and Yukon Route proposes to extend its steamboat service down the Yukon river to Fairbanks, Alaska, about 600 miles, and to establish a chain of hotels along the river. The report that the company was about to sell its railway to the G.T. Pacific Ry. has been officially denied.

Telephone communication has been established by the Dominion government for the protection of shipping, between the light station on Lennard island and the government telegraph office at Tofino. There is a land line from the light station to a cove on the northeast of Lennard island, a cable from the latter point to a cove on the west side of Low peninsula, and a land line from Low peninsula to Tofino.

The Dominion Public Works Department received tenders, Sept. 5, for the construction of a breakwater at Ogden point, Victoria. It will extend from Ogden point for 2,580 ft., running southerly for 330 ft., and thence westerly for 1,500 ft., curving northwesterly for 750 ft. On the completion of this work, the construction of five concrete piers will be taken up, together with the necessary warehouses and freight handling facilities, for the general betterment of the harbor.

The Coquitlam Terminal Co. is reported to be carrying out a survey of the channel in the Coquitlam harbor with a view to possible developments. The proposed chan-

Sault Ste. Marie Canals Traffic.

The following commerce passed through the Sault Ste. Marie Canals during July, 1912:

Articles			Canadian Canal	U. S. Canal	Total
Copper	Eastbound	Short tons	50	13,784	13,834
Grain	"	Bushels	2,254,384	666,255	2,920,639
Building stone	"	Short tons			
Flour	"	Barrels	365,080	691,805	1,056,885
Iron ore	"	Short tons	5,014,081	2,490,078	7,504,159
Pig Iron	"	"		6,260	6,260
Lumber	"	M. ft. b.m.	3,350	100,079	103,429
Silver ore	"	Short tons			
Wheat	"	Bushels	3,661,395	1,850,093	5,511,488
General merchandise	"	Short tons	6,826	21,578	28,404
Passengers	"	Number	4,520	5,789	10,309
Coal, hard	Westbound	Short tons	107,116	314,585	421,701
Coal, soft	"	"	405,201	1,676,664	2,081,865
Flour	"	Barrels			
Grain	"	Bushels		100	100
Manufactured iron	"	Short tons	42,252	33,803	76,055
Iron ore	"	"			
Salt	"	Barrels	6,713	36,743	43,456
General merchandise	"	Short tons	101,455	115,706	217,161
Passengers	"	Number	5,693	4,777	10,470
Summary.					
Vessel passages	"	Number	1,136	2,174	3,310
Registered tonnage	"	Net	3,765,427	4,499,563	8,264,990
Freight—Eastbound		Short tons	5,214,167	2,835,431	8,049,598
" —Westbound		"	656,983	2,146,271	2,803,254
Total freight		"	5,871,150	4,981,702	10,852,852

nel will extend from the Fraser mills to the Pitt river bridge, and the harbor, as at present planned, will extend from St. Marys hill to the Pitt river bridge. It is intended to have a channel 1,000 ft. wide. The survey will, it is estimated, cost $10,000. Soundings show an average depth of water of 30 ft. from the Fraser mills to the bridge, at which latter point, the depth is increased to 55 ft. It is stated that the results of the survey will be turned over to the Government to form the basis of a Government work.

The Coquitlam Shipbuilding and Marine Railway Co. has been organized with $500,000 capital, for the purpose of establishing a ship building yard for vessels up to about 800 tons, and repairing vessels up to 700 ft. long. L. D. Shafner, of Bridgetown, N.S., who is interested in the company, is reported to have stated that it is fully financed, that he has acquired 8½ acres at the junction of the Pitt and Fraser rivers, and that work will be commenced immediately. The plan is to build sailing vessels chiefly, ranging from 300 to 800 tons, equipped with auxiliary power, suitable for the lumber trade, between British Columbia ports and the West Indies, via the Panama canal.

Capt. E. H. Todd, of the s.s. Strathspey, has communicated to the British Admiralty, the British Board of Trade and the U. S. Hydrographic office, information relating to the navigation of the Fraser river, which is intended to correct false impressions as to the safety of navigation on the river. He states that his vessel, which is 4,432 tons gross, 2,852 tons net, entered the channel fully loaded with 6,000 tons of steel rails from Sydney, N.S., drawing 22 ft. at high water, and went up to Port Mann without having less than 2 ft. of water beneath her keel. The tidal influence is never such as to materially affect the speed, or steering, and navigation is never impeded by ice at any time of the year. Lights are well placed, pilots are skilful and trustworthy, there are several engineering shops at New Westminster, and considerable works are in progress there which will make it a thoroughly up to date port.

The contract for the construction of a steamship for the Customs service on the Atlantic coast, for which tenders were recently received, has been awarded to J. I. Thorneycroft and Co., Southampton, Eng., the price being £56,300.

List of Steam Vessels Registered in Canada during July, 1912

Name.	No.	Where and When Built.	Engines, etc.	Length	Breadth	Depth	Gross Tons	Reg. Tons.	Port of Registry	Owners.
Active	130382	Port Clinton, O., 1904	Screw 3 n.h.p.	54.9	12.5	....	34	29	Amherstburg, Ont.	J. Fraser and I. M. Hackett, Amherstburg, Ont.
Adine II	130933	Stamford, Conn., 1910	" 4 "	55.6	10.9	6.8	21	14	Montreal	J. K. L. Ross, Montreal.
B. C. L.	130773	Michipicoten, Ont., 1911	" 2 "	44.0	12.0	5.2	18	9	Sault Ste. Marie, Ont.	H. F. Huxtable, Michipicoten, Ont.
B.C. Express	130883	Soda Creek, B.C., 1912	Paddle 10 "	121.3	27.9	4.8	449	283	Victoria, B.C.	British Columbia Express Co., Ashcroft, B.C.
Bernice	131061	Tancook, N.S, 1912	Screw 1 "	40.2	9.8	5.0	11	10	Lunenburg, N.S.	J. Langill, M.O., Tancook, N.S.
Cecil P.L.	130957	" "	" 1 "	41.4	10.4	5.5	12	11	"	V. Langille, Tancook, N.S.
DavisMcNab	130589	Mahone Bay, N.S., 1912	" 3 "	68.6	17.5	8.7	53	34	Halifax, N.S.	McNab Resort Co., Halifax, N.S.
Elgomar	131028	Vancouver, B.C., 1912	" 2 "	38.0	10.4	4.5	14	9	Vancouver, B.C.	H. M. Burritt, Vancouver, B.C.
Estey	131073	Lunenburg, N.S., 1912	" 1 "	43.8	10.8	5.0	11	10	Lunenburg, N.S.	N. Silver, Lunenburg, N.S.
Fredna	131143	Vancouver, B.C., 1912	" 1 "	34.7	7.6	3.7	9	7	Vancouver, B.C.	E. E. Cunningham, Vancouver, B.C.
Gene	131144	" " "	" 2 "	40.0	9.5	4.7	16	11	"	C. Wakley, Vancouver, B.C.
Hosie	131077	Tancook, N.S..,1912	" ½ "	40.0	10.0	5.0	11	10	Lunenburg, N.S.	S. Wilneff, M.O., Tancook, N.S.
John R. Stover	130431	Collingwood, Ont., 1911	" 27 "	75.0	18.2	8.1	94	45	Sarnia, Ont.	Blind River Towing Co., Blind River, Ont.
Joyful	130499	New Westminster, B.C., 1912	" 8 "	49.0	14.0	5.1	31	18	New Westminster, B.C.	Canadian Tug Boat Co., Vancouver, B.C.
Kawasemi	126794	Steveston, B.C., 1910	" 24 "	39.0	8.8	4.5	11	8	Vancouver, B.C.	L. Freer, Vancouver, B.C.
Kid	131036	U.S.	" ½ "	28.8	9.0	3.7	9	8	"	E. Emmerson, North Vancouver
Laval Ferry	131102	Montreal, 1912	" 3 "	33.8	10.0	3.2	9	6	Montreal	A. Bonenfant, Bout de L'Isle, Que.
Lois M.C.	131065	Tancook, N.S., 1912	" 1 "	40.4	10.2	6.0	13	12	Lunenburg, N. S.	A. Cross, Tancook, N.S.
Marina	131051	Chicago, Ill..1891,	" 154 "	310.5	39.1	21.3	2410	1578	Port Arthur, Ont.	J. Whalen, Port Arthur, Ont.
Massachusetts	130927	Detroit, Mich., 1882	" 92 "	244.0	36.9	18.6	1530	937	Montreal	F. E. Hall, Montreal, Que.
Merah II.	130930	Lachine, Que., 1912	" 2 "	37.0	9.7	4.6	12	8	"	C. de W. Reid, Lachine, Que.
Oak Leaf	130590	Bayside, N.S., 1912	" 2 "	67.8	14.8	7.5	39	28	Halifax, N.S.	N. B. Fader, Bayside, N.S.
Ocoba	130248	Liverpool, N.S., 1912	" 1 "	30.8	8.2	4.5	15	11	Liverpool, N.S.	J. C. Bartling, Liverpool, N.S.
Pronto	131039	Vancouver, B.C., 1912	" 2 "	36.0	8.2	3.6	5	3	Vancouver, B.C.	W. Turner, Vancouver, B.C.
Quathiaski No. 5	131040	Steveston, B.C., 1912	" 4 "	52.7	13.3	6.4	37	25	"	W. E. Anderson, Quathiaski Cove, B.C.
Rosalie, L.	130928	Sorel, Que., 1912	" 28 "	61.4	15.7	8.7	74	38	Montreal	Sincennes-McNaughton Line, Montreal
St. Lawrence II.	131141 130958	Vancouver, B.C., 1912	" 1 "	31.2	8.3	3.6	8	6	Vancouver, B.C.	W. N. Hoyt, Vancouver, B.C.
Shianne		Tancook, N.S., 1912	" 1 "	47.2	13.0	7.0	23	21	Lunenburg, N.S.	L. Duggan, et al., East Dover, N.S.
Sir Douglas	130989	Chatham, N.B., 1912	" 6 "	45.0	11.0	4.8	18	12	Chatham, N.B.	C. Reinsborrow, Chatham, N.B.
Sombrio Queen	130884	Victoria, B.C.,1911	" 2 "	36.0	8.6	4.6	8	4	Victoria, B.C.	J. C. Pendray, Victoria, B.C.
W. L. Forest	132613	Goderich, Ont., 1912	" 37 "	68.0	17.6	9.6	84	57	Goderich, Ont.	W. Birmingham, Goderich, Ont.
W.L.Murphy	131121	Pembroke, Ont., 1912	" 4 "	88.6	18.0	6.5	80	49	Ottawa	J. Ryan, Pembroke, Ont.

List of Sailing Vessels and Barges Registered in Canada during July, 1912

Name.	No.	Where and When Built.	Rig.	Length	Breadth	Depth	Reg. Tons	Port of Registry.	Owners.
Angus W. Robertson	130936	Montreal, 1912	Scow	110.1	28.1	7.9	199	Montreal	M. J. Haney, et al, J.O., Toronto.
C. W. Mason	131066	Lunenburg, N.S., 1907	Schr.	42.8	10.6	5.2	11	Lunenburg, N.S.	C. Mason, Eastern Point, N.S.
D'Arcy Leamy	130939	Montreal, 1912	Scow	100.1	27.9	7.0	154	Montreal	M. J. Haney, et al, J.O., Toronto.
Edward I.	126936	Toronto, 1906	"	103.0	28.2	7.6	193	Quebec, Que.	La C. Generale du Port de Chicoutimi, Que.
Edward II.	126937	" "	"	103.0	28.2	7.6	193	"	" " " " "
Edward III.	126938	" "	"	103.0	28.2	7.6	193	"	" " " " "
Edward IV.	126939	" "	"	103.0	28.2	7.6	193	"	" " " " "
Edward V.	126940	" "	"	103.0	28.2	7.6	193	"	" " " " "
Edward VI.	131011	" "	"	103.0	28.2	7.6	193	"	" " " " "
Gyno	126880	Meteghan, N.S., 1912	Sloop	35.0	16.0	5.0	11	Digby, N.S.	F. Thomas, Westport, N.S.
H.C.R.	126297	Tancook, N.S.,1911	Schr.	43.6	12.7	6.8	18	Canso, N.S.	H. Kavanagh, M.O., Canso, N.S.
Hugh Quinlan	130937	Montreal, 1912	Scow	110.1	28.1	7.9	199	Montreal,	M. J. Haney, et al., J.O., Toronto
U. S. M.	130785	Cap Rouge, N.S., 1912	Schr.	45.0	12.2	7.8	16	Port Hawksbury, N.S.	J. Semon, Cap Rouge, N.S.
Leta J. Schwartz	130959	Lunenburg, N.S., 1912	"	106.8	26.3	10.4	95	Lunenburg, N.S.	J. Schwartz, M.O., Lunenburg, N.S.
M. G. Morgan	130666	Jardineville, N.B., 1912	"	36.0	12.0	5.0	12	Richibucto, N.B.	E. Scott, Jardineville, N.B.
Margaret E.	131075	Tancook, N.S., 1912	"	39.8	11.0	5.5	11	Lunenburg, N.S.	N. Fleming, Ketch Harbor, N.S.
Mattapex	131064	" " "	"	42.0	10.3	5.3	12	"	C. Scott, Indian Harbor, N.S.
Michael J. Haney	130938	Montreal, 1912	Scow	110.1	28.2	8.7	213	Montreal	M. J. Haney, et al, J. O., Toronto.
Osoris	130940	Dorval, Que., 1912	Yawl	20.6	10.3	4.8	7	"	J. B. Patterson, Montreal.
P. W. D. No. 7	130249	Scotland, 1872	Dredge	130.0	20.0	11.0	47	Liverpool, N.S.	Minister of Public Works, Ottawa
P. C. Mason	131067	Lunenburg, N.S., 1909	Schr.	42.8	10.6	5.2	11	Lunenburg, N.S.	P. Mason and C. Mason, Jr., Eastern Point, N.S.
Plymouth Rock	131076	Tancook, N.S., 1912	"	48.0	13.5	7.0	24	"	O. Scott, M.O., East Dover, N.S.
Provincial No. 1	131001	St. John, N.B., 1912	Dredge	70.1	26.6	6.1	168	St. John, N.B.	Provincial Development Co. Beaconsfield, N.B.
R.M.& S.Scow No. 2	130315	Morrisburg, Ont., 1912	Scow	70.0	20.2	4.3	44	Toronto	R. Miller & Sons, Toronto.
St. Clements	130786	Eastern Harbor, N.S.1912	Schr.	47.0	12.3	6.4	12	Port Hawkesbury, N.S.	Robin, Jones & Whitman, Halifax, N.S.
T. 4	131142	N. Westm'ster, B.C., 1909	Scow	60.0	22.0	6.2	102	Vancouver, B.C.	C. A. Thompson, Vancouver, B.C.
Thorella III.	131101	Dorval, Que., 1910	Sloop	39.8	8.1	2.3	4	Montreal	W. C. Findley, Montreal.
Three Cousins	131062	Tancook, N.S., 1909	Schr.	41.2	10.2	5.6	13	Lunenburg, N.S.	H. Leslie, M.O., East Berlin, N.S.
Vagabond	130640	U.S.	Sloop	35.9	11.1	3.1	7	St. John, N.B.	A. E. Everett, St. John, N.B.
Vernie, S.	131063	Tancook, N.S., 1907	Schr.	38.5	9.9	4.8	10	Lunenburg, N.S.	A. Stevens, Tancook, N.S.

Electrically Propelled Vessel of the Lake Trade.

The development of the Canadian canal freight vessel offers as interesting a puzzle to the naval architect and marine engineer as any other class of boat. Nothing is more interesting than to notice how local conditions, such as exist on the Rhine, Danube, St. Lawrence or Mississippi, and other of the great natural waterways of the world, with their canal systems, prescribe a peculiar type of boat. The dimensions of the Canadian canals are of course fixed by the size of the locks through which it has to pass, but as the rush of trade at the beginning and end of the navigation season becomes more and more serious, every inducement is offered in the construction of new types to increase the deadweight carried each trip on the limiting draft of 14 ft. Hence, no doubt, the experiments now being carried on with various types of internal combustion engines, which by their lightness in weight (both of the engine itself and its fuel), enables a considerable addition to be made to the deadweight.

The latest proposal, which was referred to in Canadian Railway and Marine World for September, is that now being built in England for the Montreal Transportation Co., in which the propelling power will be generated by twin sets of Diesel engines, each of 300 break h.p. direct coupled to an electric generator, which will furnish current to the propelling motor keyed on to the propeller shaft just ahead of the thrust block. Speed change and reverse will be controlled by a simple treatment of switches which can be handled either from the bridge or engine room without reference to the generating engines, which run steadily in one direction under governor control. Either engine may be cut out for adjustment and there will, of course, be no reverse complication. The introduction of the electrical drive will, it is claimed, enable all the advantages of a twin screw arrangement to be obtained without interfering in any way with the usual form, dimensions and revolutions of the single propeller of the lake type, which has been specially designed, after years of experience with steam, to enable the canal type of boat to be quickly manœuvred in the canal channels and locks. This is a feature of great importance which, it is said, cannot possibly be obtained with a direct Diesel drive. The new vessel, which will be called the Tynemount, is to be delivered in Montreal early in the season of 1913, and its advent on the lakes will be awaited with interest. Unquestionably, marine propulsion appears to be on the eve of developments of a most revolutionary nature.

Dominion Hydrographic Steamship for the Atlantic Coast.

The contract for the construction of a hydrographic steamship for service on the Atlantic coast, for which tenders were recently received by the Naval Department, has been awarded to Swan, Hunter and Wigham Richardson Ltd., Wallsend-on-Tyne, Eng., the vessel to be completed by July 1, 1913.

A full description of this vessel was given in Canadian Railway and Marine World for July, and an illustration was given in the August issue, but we have been officially advised of the following amended particulars:—length between perpendiculars, 170 ft.; beam, 33½ ft.; draught, 11 ft.; displacement, 1,050 tons; average speed, 12 knots an hour.

The Projected Welland Ship Canal.

The route of the projected Welland ship canal has only been very generally decided upon, and there are several points which have yet to be carefully considered, and definitely settled. As soon as this has been done, the plans will be submitted to the Minister of Railways and Canals for approval. The canal generally will follow the present one from Port Colborne to Thorold, Ont., and from thence by a new route, almost direct to McCalla's Grove, situated three miles east of Port Dalhousie, the locks all being located between Thorold and Lake Ontario. The new canal will cross the present canal below lock 11 on the same level, so that smaller vessels will be able to enter either at Port Colborne or at McCalla's Grove.

The total length of the projected new canal is 25 miles, in which there will be seven lift locks, each 800 by 80 ft., and each with a lift of 46½ ft., with 30 ft. of water on the sills. J. L. Weller, M. Can. Soc. C.E., St. Catharines, Ont., is the engineer.

The Rule of the Road at Sea.—A manual on the rule of the road at sea and precautionary aids to mariners, by D. H. Hayne, has been published by the Co-operative Publishing Co., Baltimore, Md. The subject matter is, generally speaking, a digest of the rules and regulations of the Bureau of Navigation, Steamboat Inspection Service, the War Department, Bureau of Lighthouses and Coast and Geodetic Survey and the Hydrographic Office of the U.S., with general definitions, comments and applications of the U.S. laws regarding navigation, and comparisons with British navigation laws. While the work is of interest to deep sea navigators, covering as it does, the subject of icebergs, and other matters of recent public interest in that connection, it appears to be chiefly written for motor boat operators, small sailing craft, and yachtsmen. The price is $3.25, including postage.

The Profession of the Engineer.—In a volume of addresses to engineering students, J. A. L. Waddell and J. L. Harrington have collected and arranged a large number of papers and addresses written or delivered by well-known authorities on many phases of the life and work of civil, electrical, mechanical and mining engineers. The object of the editors is the providing of sound advice to students of engineering and young engineers, so as to indicate how to obtain the full benefit of the course of instruction, how best to conduct themselves at college and in after life, and how to start a successful professional career. The work has been adopted as a text book in a large number of colleges in the United States, and although only issued in 1911, has already reached a second edition. It is issued at the nominal price of $1—the cost of printing—by Waddell and Harrington, Kansas City, Mo.

The President of the British Board of Trade has appointed a departmental committee on boats and davits to report on the most efficient method of stowing, launching and propelling ships' boats.

Basing the estimate on the amount of fuel required by the s.s. Selandia of 2,500 h.p., and assuming a consumption of 11½ tons of oil a day, it is estimated that the s.s. Mauretania would require 313 tons of fuel a day, or 1,487 tons for a run across the Atlantic. It is estimated that if the Mauretania had a double hull, with 1 ft. between the two skins, she would have storage space in her sides of about 56,240 cu. ft., which would be sufficient to contain the oil necessary to carry her across the Atlantic.

Telegraph and Cable Matters.

The G.T. Pacific Telegraph Co. has opened offices at Baird, Ont., Otthon, Ebenezer and Oban, Sask.

S. F. Butzer has been appointed manager, Great North Western Telegraph Co.'s office at Sherbrooke, Que., vice H. F. Byrd.

The Canadian Northern Telegraph Co. has opened offices at Birch river, Man.; Edam, Marengo, Meota, Mistatim and Waseca, Sask., and has closed its offices at Mafeking, Man., and Fuller, Sask.

The Great North Western Telegraph Co. has opened an office at Sixteen Island Lake station, Que., and has closed its offices at Crystal Beach, Donald, Gorrie, Petawawa camp, Rosseau, Royal Muskoka hotel, Zurich, Ont., Cap Sante, Les Eboulements wharf, Manoir Richelieu, Montfort station, Pointe au Pic and Verdun, Que. Its office heretofore known as St. Constant jct., Que., will in future be known as Delson jct.

Wireless telegraph service will be instituted between New York city and Norway, according to an announcement of the Marconi Co. of America. The United States plant will be owned and operated by the company, while the Norwegian station will be government property. The receipts of the two stations are to be pooled and divided equally between the company and the Norwegian government. The company will receive $350,000 for the foreign station, exclusive of site and foundations (about the price to be paid by the British government for each station in its proposed imperial system), and will secure a royalty of 10% of the gross receipts for 25 years.

Further negotiations between the C.P.R. and its telegraphers regarding rates of pay, etc., were reported to have been concluded, Sept. 18, the company having granted an all round increase of 12%, including overtime, and establishing a 10 hour day standard, instead of 11 hour, as hitherto. D. McNicoll, Vice-President, is reported to have stated that a definite settlement of all matters at issue had been arrived at, and a final agreement would be drawn up. It was also stated that the minimum wages paid to operators at the smaller stations was $65 a month, and for night operators $53 a month, the agents at larger stations receiving $80 to $110 a month, and operators $70 a month under the old schedule. The board of conciliation, which dealt with the matter some time ago, recommended an increase of 10%, which the company accepted, as mentioned in our last issue.

It is announced that the Western Union Telegraph Co., on account of representations made by the Postmaster-General of Great Britain and Canada, has made reductions in cable rates, as follows,—for cables in plain words, the present deferred rate of 12c. a word, reduced to 9c., and instead of being subject to 24 hours' delay, will be transmitted with only the delay necessary to give priority to the full rate cables; a lettergram service will be inaugurated, the rate being 72c. for 12 words, and 5c. for each additional word, to be delivered on the morning of the day following handling; the week end letter cable rates will be, $1.08 for 24 words, with 5c. a word additional, delivery on Monday; press cables reduced from 10c. to 7c. a word (already in force, but the nine hours' deferment is eliminated). In addition to the foregoing there will be a special press rate, between 12 midnight and 6 a.m., of 5c. a word, and these rates are also applicable between 1 and 4 p.m., Montreal time, equivalent to 6 and 9 p.m., London time, and messages are not subject to deferment.

Car Ferry Service Between Prince Edward Island and New Brunswick.

By A. K. Kirkpatrick, M. Can. Soc. C.E., Professor of Civil Engineering, Queen's University, Kingston, Ont.

The various routes examined between Prince Edward Island and the main land of New Brunswick, with a view to establishing a car ferry, are as follows: Richibucto to West point, Richibucto head to West point, Buctouche to West point, Shediac or Pointe du Chene to West point, Shediac or Pointe du Chene to Summerside, Cape Tormentine to Summerside, Cape Tormentine to Carleton head, Pugwash to Carleton head, Pugwash to Charlottetown, Wallace harbor to Charlottetown, Brule harbor to Charlottetown, John bay, Amet sound to Charlottetown, Pictou to Georgetown, Pictou to Murray harbor, Pictou to Charlottetown, which will be taken up separately.

ICE CONDITIONS. The bord or shore ice forms at all ports and will be taken up when considering each harbor, as it varies in each case, due to the configuration of the shore, depth of water, and exposure.

The pan, rafted, berg, gulf, and lolley ice may be considered under one head, although it varies in quantity in the different places, due to the tides, winds, and shape of the shore, etc.

Pan ice, being the areas of flat ice which forms in the straits and drifts back and forth with the tides and wind, and varies in thickness 6 to 20 ins., would not prove a serious obstruction to a car ferry built on ice-breaking principles.

Rafted ice, or piled ice, is the ice that is piled one cake upon another, usually at the outer edge of the bord ice, where a large field of pan ice, under motion due to the winds and tide, meets an obstruction in its path, such as the edge of the bord ice. Rafted ice may be formed between two large fields of pan ice of which one or both are in motion. The pan cannot be stopped at once, and the immense force behind drives the ice in front, on top, and under the bord ice, in some places grounding in 25 ft. of water, and piling up 10 or 12 ft. above water level. If this takes place at low temperature, this piled ice is frozen into a solid mass.

The rafted ice usually forms at headlands, and grounds on the reefs extending out from the headlands, forming a protection to the bord ice under the lee. It also forms at the edge of the bord ice on straight stretches or bays, where there is sufficient fetch to permit the field or heavy pan ice to get in motion due to the heavy wind, therefore not necessarily forming to the same extent in the same place each year. This rafted ice forms some of the objections of the proposed terminals, and the overcoming of these difficulties may be provided for in the design of the vessel.

Berg ice is only encountered in the spring, when the break up occurs, and is chiefly composed of the rafted ice along the bord ice, which piles on the reefs, breaking loose and drifting with the tide. The evading of these is a matter of navigation.

Gulf ice may be encountered after the break up occurs, and chiefly consists of heavy fields of pan ice, bord ice and rafted ice, from along the shores of the gulf, breaking loose and being driven by the winds into the tidal currents of the straits.

Lolley ice, though not dangerous to navigation, which may slow down the speed of a large steamer, for which provision has to be made in designing the details of the engines, is encountered in the Northumberland strait when the weather is favorable to its formation. From a rough examination of the crystals, and inquiring as to the conditions of the weather previous to its appearance, I conclude that it is a mixture of anchor and frazil ice. It appears in the form of a heavy dense slush, and sometimes to the depth of 10 or 15 ft., and is buoyant enough to bear up a man when standing on an oar or a plank placed on the ice. The frazil ice crystals are probably formed in the cold water when the temperature of the atmosphere is very low, and a wind stirs the water surface and prevents the surface ice from forming.

The anchor ice, with its sponge like form, is formed on the bottom during very cold, clear nights when the radiation is great. When the sun rises high and its rays penetrate to the bottom, it frees the masses formed, or they break away from the bottom owing to the force of the current.

The ice drifts back and forth with the tide and wind, but the preponderance of the drift is eastward. The young ice forms in the western portions of the straits, and eventually fetches up in the eastern end of the straits, and gains in thickness from snow and frost as it ages.

Car Ferry Marquette and Bessemer No. 2, Forcing Through Piled Ice, on Lake Erie.

The littoral drift is principally southward and eastward, due to the prevailing winds and configuration of the shore, and in developing some of the harbors along the straits the littoral drift has to be seriously considered when designing permanent improvements.

RICHIBUCTO HARBOR, N.B. Bord ice forms only a short distance out from the entrance, and is liable to go out a couple of times during the winter, depending on the direction and force of the wind, and on account of its exposed position. A north to northeast wind, with a large field of pan ice, is liable to cause heavy rafted ice across the entrance. The ice in the harbor makes to the depth of from 18 to 24 ins. The old entrance to the east is now partially closed and has only about 10 ft. of water over the bar at low water, and it is only a matter of time until it will be completely closed by the littoral drift. The new entrance to the east of the breakwater may be improved by the construction of a jetty, but on account of the exposed position at least 24 ft. of water would be required at this entrance across the bar. This depth would be difficult to maintain, on account of the littoral drift, also the stopping of the drift to the west of the breakwater is eventually going to weaken the sand beach to the east of the jetty if built, and cause a break, which will weaken the ebb and flow through the channel on which it would rely for its maintenance. This harbor would be very difficult, if not impossible, to make in a north to northeast gale and an ebb tide, on account of the sea and shoal water. Once inside there is a good protection and plenty of water. Good position for a slip could be secured, and when once dredged could easily be maintained.

AT RICHIBUCTO HEAD, N.B., the bord ice forms at from 1,000 to 1,500 ft. out from the shore, and is liable to heavy rafted ice on account of the exposure. Gulf ice may be met with in the latter end of March and April, when the winds are favorable for its movement to this point. This occurs occasionally, not annually. An artificial harbor, as well as about nine miles of railway, would have to be constructed, including the bridging of the Richibucto river, if it were to be considered for one of the termini of the car ferry service. The bord ice forms as far out as the outer bar, and sometimes rafts heavily at this point, and is liable to go out a couple of times during the winter, depending on the wind and tide. East and west breakwaters would have to be built, enclosing a sufficient area to allow for the manoeuvring of a large vessel, and the exposure that it has and the distance required to go out to get deep water, would make this proposition a very expensive one, and with a northerly gale it would be a question whether the harbor could be entered.

BUCTOUCHE HARBOR, N.B., is protected by a sand beach, along the shore of which there is considerable littoral drift. The entrance is at the east end of the spit and is obstructed by a stone ledge upon which there is only 12 to 14 ft. of water at low tide. There is also an outer bar of sand, on which there is only 14 to 18 ft. of water at low tide. All that can be counted on in the

inner harbor is 16 to 18 ft. at low water. To give 20 ft. of water at low tide to this harbor and its approach would entail a very large expenditure, and great difficulty and expense in maintaining an entrance channel, on account of the littoral drift.

POINTE DU CHENE, N.B. The bord ice forms for about 1¼ miles out from the present pier, and is subject to raft ice under favorable conditions, with a northeast to southeast wind. There are several rock ledge shoals covering the entrance to this harbor, and it is 2¼ miles from the pier head before a depth of 20 ft. at low water can be obtained. This would necessitate the dredging of a channel 2¼ miles long, a part of which would probably be through solid rock. This channel, when dredged, would be expensive to maintain, on account of its exposed position and the littoral drift, as it is exposed to the northeast sea until under the lee of the breakwater or railway wharf.

CAPE TORMENTINE, N.B. The bord ice at Cape Tormentine forms at a straight line from the outer end of the shoals at Cape Jourimain and Tormentine reefs, upon which the ice piles and grounds, and forms a protection to the bord ice. There is a strong tidal current at this point, and between here and the island shore a curious condition of the tide is found, slack water occurring at both shores first, and the reversal of the tides and slack water working out towards the centre, so that the reversing of the tide in the centre of the straits is from 1 to 1½ hours later than on either shores. This condition of current has a tendency to open up leads in the pan ice when the straits are full. A considerable amount of lolley ice is encountered here during severe cold weather. Rafted ice may form at this point when a large field of pan ice is moving under a northeast gale at the flow of the tide. An extension to the present pier would be required, with slip and apron, and a short breakwater protecting them from the seas from the east, the amount of dredging varying with the length of pier extension. The tide varies from 3 to 6 ft. fall in neap and spring tide, with a 3 knot current in the straits.

PUGWASH, N.B. Bord ice forms for about half a mile outside of Pugwash reef, and it is liable to rafted ice with winds from a northerly direction, ice in the roads forming about 18 ft. in thickness. There is a clay bar across the entrance opposite Fishing point lighthouse. A channel would have to be dredged across this bar and the roads, to the channel side of the middle grounds to deep water in the harbor, this distance being about a mile. There are some rock ledge shoals covering the entrance to this harbor about two miles from the bar. The only position available for the slip and railway connection is just outside of the present wharves at Oxley point. The tide at this point is from 4 ft. neap to 7 ft. spring, and causes a current at the narrow part of the channel of about 3 miles an hour. There would be great difficultv in turning a vessel in the narrow river, with the strong current.

WALLACE HARBOR, N.B. Bord ice forms about a mile out, and is subject to rafting with a northeast wind. Harbor ice makes about 18 ins. thick. There is a sand bar covering the entrance, which would require to be dredged. There is from 25 to 35 ft. of water at low tide inside the bar.

The harbor is exposed to a wind from the northeast to east, but a landing slip could easily be protected by a short breakwater. The Dominion Coal Co. contemplate building a coal pier at this point, which will necessitate dredging a channel through the bar and berth of the pier. The greatest difficulty would be in getting a low line for the railway, with shunting grounds, in proximity to the slip. The shore is bald and quite high and of sandstone formation. The connecting link to the Intercolonial Ry. would be about 7 miles.

TATAMAGOUCHE HARBOR, N.B., is exposed to the east wind, and is very shallow and would require extensive dredging and is out of the question for the formation of a harbor.

BRULE POINT, N.B., which is on Tatamagouche bay, is exposed to northerly winds, and would require breakwaters to be built and a considerable amount of dredging to get the necessary draught of water. The connecting link to the I. R. C. would be about 7 or 8 miles in length, through bald country.

BRULE HARBOR, N.B., which is a part of Tatamagouche bay, is well protected, but would require a channel to be dredged for about ⅞ of a mile and a turning basin at landing slip. The railway to connect Brule harbor with the I. R. C. would be about 5 miles long.

SALISBURY POINT, N.B., or John bay, which is part of Tatamagouche bay, has 20 to 25 ft. of water at low tide, at reasonable distance from the shore, and, with the breakwater, good protection could be obtained for a landing slip. The railway connecting link would be about 3 miles.

The ice conditions for Tatamagouche harbor, Brule point, Brule harbor and Salisbury point are all similar, being in Tatamagouche bay. The bord ice forms across the entrance to the bay, from 18 to 24 ins., and raft ice piles on the shoals and at the edge of the bord ice. There is a deep water entrance to Amet sound, less than a mile wide, and flanked by the Amet and Waugh shoals, through which there is a heavy current due to the tides, and it would be a difficult place to enter during thick or foggy weather.

PICTOU HARBOR, N.S., has good water inside of bar. Channel crooked over bar, but well lighted with range lights; 2½ to 3 knot current over bar. Bord ice sometimes forms from Lagan point to McKenzie head, and is liable to rafting, with a northeast wind. Heavy drift ice is liable to choke up in the bay formed between Pictou island and the mainland. Tides, spring rise 6 ft. and neap 4 ft. Ice forms in the harbor from 12 to 18 ins. thick.

GEORGETOWN HARBOR, P.E.I. There is good water in this harbor, but it is exposed to a southeast blow. The bord ice forms from 12 to 24 ins. thick, about a mile out, and is subject to rafting with a southeast wind. The bord ice, for a considerable distance in from its edge, is liable to move out several times during the winter, if tide and wind are favorable. Heavy field ice is liable to jam into the harbor, with northeast or southeast winds. A landing slip could be protected by making the easterly leg long enough to provide shelter behind it. There is no current to speak of in this harbor. Tides, spring rise 5 ft., neap 3¼ ft.

MURRAY HARBOR, P.E.I. Bord ice forms across the entrance of this harbor, and is liable to raft heavily. The entrance is exposed to the east winds and is narrow and flanked by shoals. There is a bar across the entrance, through which a channel would have to be dredged. There would be great difficulty in maintaining this channel on account of the littoral drift. When once inside there is good protection, but considerable dredging would be required to deepen and straighten the channel and give a turning basin. There is a branch of the P.E.I. Ry. to this point.

CHARLOTTETOWN, P.E.I. There is good water inside this harbor and land locked when inside the narrows. Ice forms from 18 to 24 ins. thick. Current 2½ knots at spring tide ebb, through Battery point to quarantine hospital. Bord ice forms from Point Prim to St. Peter's island, and is subject to rafting. Under favorable conditions the first ice may raft in one or more windrows inside of the final edge of bord ice to the depth of from 4 to 8 ft. There is a good site for landing slip east of the railway wharf, with plenty of room for turning basin. Tide, spring rise 9 ft. and neap 8 ft.

CAPE TRAVERSE, P.E.I. There is too much littoral drift at this point, and too far to go to obtain deep water.

CARLETON HEAD, P.E.I. The bord ice forms from 18 to 30 ins. thick from the outer end of the piled ice on the reef at Carleton head, to a corresponding point out from Cape Traverse. The early ice is liable to raft in one or more windrows inside of this line. In 1903 the most severe conditions were reported, when it is claimed that the rafted ice grounded in 25 ft. of water in some places. The conditions of the tidal currents and ice in the straits are the same here as at Cape Tormentine. Good water is to be had for a landing slip about 2,000 ft. east of Carleton head, under protection of the point and at a short distance from the shore. This would necessitate the building of a connecting link with the P.E.I. Ry., Cape Traverse branch, of about 2 miles. Tide, spring rise 5 ft. and neap 3 ft.

SUMMERSIDE OR BEDEQUE HARBOR, P.E.I. Bord ice forms from Sea Cow head to the Muscouche banks, with a probable rafting of earlier ice in one or more windrows inside of this line. Under favorable conditions the rafted ice at the edge of the bord ice may be quite heavy. The harbor is well protected when inside of the breakwater. There is considerable littoral drift from the west. The channel would require straightening and deepening inside of the breakwater, part of which work the Public Works Department contemplates doing during 1912. A suitable site can be obtained for a landing slip, with railway connection.

WEST POINT, P.E.I. The bord ice forms in a long, easy sweep from the shoal off West point to Cape Egmont, and is subject to heavy rafting and piling under favorable conditions, when the piled ice will ground in four fathoms of water and is from 20 to 50 ft. wide. This point is exposed to winds from the south and west and with a gale from north to northeast the heavy seas swing round the point and cause a heavy undertow. Two breakwaters would have to be constructed enclosing a large enough area for turning basin. About 10 miles of line would have to be built to connect with the P.E.I. Ry. There is considerable littoral drift to the south and east. The drifting ice is seldom very heavy, and nearly always some open water may be seen, the position of the ice depending on the wind and tide. The current varies from 3 to 4 knots, the heaviest being during the June tides.

TRAFFIC. The summer and fall trade with Cape Breton and the Nova Scotia mainland, especially from the east end of P. E. Island, will not be affected by the car ferry service no matter where the ferry is established, as the water rates will be less than the rail rates. It is the summer shipments to points south and west, and the winter shipments to all points that will be benefitted by the ferry service. With the opening up of continuous winter communication the produce now rushed out in the fall or held over until spring will find an outlet during the winter at better prices, and will very likely affect the direction of the traffic, the bulk of it passing through Moncton on its way to Boston, Montreal, Ottawa and the Cobalt district, Ont. The heaviest passenger travel will also be through Moncton, so that the most

direct route to Moncton, with the most feasible crossing of the straits, should be the one which will benefit the greatest percentage of people on the island. Such being the case this will eliminate the Georgetown and Pictou route. the Charlottetown and Pictou route and the Murray harbor and Pictou route.

HARBORS NOT FAVORABLE. The harbors that are not favorable for the terminus of the car ferry route are as follows:—

Richibucto, on account of its exposed entrance, and difficulty in maintaining a sufficient depth of water over the bar.

Richibucto head, on account of its exposed condition, and difficulty and expense in building and maintaining an artificial harbor, and the construction of about nine miles of railway.

Buctouche harbor on account of its exposed entrance, the expense of removing the solid rock bar across the entrance and the difficulty and expense in making and maintaining sufficient depth of water across the bar.

Pointe du Chene, on account of the expense and difficulty in maintaining a dredge channel 2¼ miles long with a 20 mile exposure and at right angles to a heavy sand drift.

Pugwash, on account of being cramped for room, and the difficulty of turning a large vessel in the narrow channel in a swift current, and the rock ledge shoals covering the entrance to the dredge channel which would require to be about a mile long.

Tatamagouche, on account of being shallow.

Brule point, on account of its exposed position, and amount of breakwater and dredging required.

Murray harbor, on account of its exposure and difficulty of maintaining a channel across the bar.

West point, on account of its exposed position, and the difficulty of building and maintaining an artificial harbor.

ROUTES. The harbors that are considered unfavorable eliminate the following routes: Richibucto to West point, Richibucto head to West point, Buctouche harbor to West point, Pointe du Chene to Summerside, Pugwash to Charlottetown.

The following routes are eliminated on account of the ice conditions and length of haul for the preponderance of the traffic: Georgetown and Pictou, Murray harbor and Pictou, Charlottetown and Pictou.

This leaves Cape Tormentine, Wallace harbor, Brule harbor, and Salisbury point on the mainland, and Charlottetown, Carleton head and Summerside on P. E. Island, to be considered, with the various routes that might be established between these points. The mileage of the various routes remaining to be considered is as follows:

CHARLOTTETOWN AND TATAMAgouche Bay Routes. In these routes, a course common to all, which is about 20 miles long, is from light to light. One of the drawbacks to this common route is the uncertainty of the tidal currents, and their effect on running a compass course in thick or foggy weather, as evidenced by the grounding of the Earl Grey at Tonny river, her crippled condition very likely contributing to the accident. Another drawback is the shoals which beset the entrance to either harbor. For these reasons it would be safer to have a shorter route and one by which the termini could be approached by signal as well as lights.

CARLETON HEAD TO CAPE TORMENtine. The tidal currents are stronger at this point than at any other, being 3½ knots, but the shortness of the route, a distance of 8 miles, and the openness of approach, would enable the making of the landing stage by sound, during thick or foggy weather. The difference of mileage of Charlottetown and Summerside, from Sydney, Halifax to Moncton via Carleton head and Cape Tormentine, as seen in the table of mileage of various routes, is that Charlottetown is further from Sydney by 145 miles, from Halifax by 66 miles, and nearer to Moncton by 30 miles, than by the shortest route, i.e., by Salisbury point. Summerside is further from Sydney by 81 miles and Halifax by 2 miles, and nearer to Moncton by 94 miles than by the Charlottetown-Point Salisbury route, and as the bulk of the Sydney trade will still be done by water the difference in mileage bears a small part.

SUMMERSIDE AND CAPE TORMENtine Route. The length of this route is about 20 miles, and would increase the haul on freight secured east of Emerald junction by 14 miles and decrease the haul secured at Summerside and west by 19 miles. But the objection to this route is the danger in navigating the straits in thick or foggy weather, due to the liability to overrun, or under run, one's course owing to the uncertainty of the tidal currents, especially near change and full, and the increased distance in which ice may be encountered.

ROUTE RECOMMENDED. Having considered all the conditions as to harbors and their improvements and maintenance, the routes, their lengths, safety of navigation and probable preponderance of traffic, I am of the opinion that the Cape Tormentine and Carleton head route will be the best and safest route of all those to be considered, will serve the convenience of the greatest number of people, and can be operated daily under all weather conditions by a properly designed steamer, adequate shore signals, and landing facilities.

[Editor's Note. Acting on the recommendation in the above paragraph of the report the Minister of Railways and Canals has selected the Carleton head-Cape Tormentine route. Carleton head is on the south coast of P. E. Island, and on the north shore of Northumberland strait, about 3 miles northwest of Cape Traverse, which is the terminus of the P.E.I. Ry. Cape Traverse branch, which leaves the main line at Emerald junction, 31 miles west of Charlottetown and 16.8 miles east of Summerside, the branch being 11.8 miles long. A connection of about 2 miles will have to be built from this branch, from between Albany and Cape Traverse to Carleton head. Cape Tormentine is on the northern coast of New Brunswick and south shore of Northumberland strait. It is reached by the New Brunswick and Prince Edward Island Ry., which runs from the Intercolonial main line at Sackville, N.B., 36 miles. The N.B. & P.E.I. Ry. will probably be acquired by the Government and made part of the I.R.C. system. The direct distance across the strait from Carleton head to Cape Tormentine is about 9 miles. —Editor.]

	To Sydney.	To Halifax.	To Moncton.	Via
Charlottetown	244	173	159	Salisbury point.
	247	176	152	Brule harbor.
	271	200	135	Wallace harbor.
	389	239	129	Cape Tormentine.
Summerside	292	221	207	Salisbury point.
	295	224	200	Brule harbor.
	319	248	183	Wallace harbor.
	372	223	113	Cape Tormentine.

DESCRIPTION OF CAR FERRIES. The following is a short description of some of the car ferries and ice breakers built in various parts of the world:

The Maryland in the fifties ferried the Philadelphia, Wilmington and Baltimore cars across the Susquehanna and transferred to the East river, New York. Capacity, 2 tracks, 14 freight cars.

The Louise was built in the sixties, was built to run between San Francisco and the Oakland Rd.

The Transfer was built in the early seventies to transfer cars across the Detroit river between Amherstburg and Grosse isle, for the Chicago and southern railways.

The Express, the first ice breaker, was built in 1887 at Oscarshamn, Sweden. Length 139 ft., beam 22½ ft., draught, loaded, 11½ ft., i.h.p. 400, speed 11 knots.

The Isbrytaren, an ice breaker, was built in 1881 in Sweden, to keep open Cathenburg harbor. Length 131½ ft., beam 34 ft., draught 12½ ft., i.h.p. 700.

The Oland was built in 1883 at Stockholm. Length 105 ft. 5 ins., beam 24 ft., draught 7 ft., i.h.p. 290, speed 10 knots.

The Bryderen was built in 1885 at Malmo, Sweden. Length 142 ft., beam 32 ft., draught 13 ft., i.h.p. 900, speed 11 knots.

Cape Charles was placed in the early eighties by the New York, Philadelphia and Norfolk Rd. as a transfer steam boat on the route from Cape Charles to Old Point Comfort, across the mouth of Chesapeake bay. Length 259 ft., beam 36 ft., draught 7 ft., capacity 4 passenger cars, speed 18½ miles.

The Solano was put in service in the eighties across the Straits of Carquiney on the line of the Northern Rd., leased to the Central Pacific Rd. The current in these straits runs at 8 miles an hour and the range of tide is 9 ft. Length 424 ft., beam 64 ft., draught 6½ ft., capacity 48 freight cars, or 24 passenger cars, length of run 1 mile.

The Switzer was built in 1885 at Copenhagen. Length 135 ft., beam 25 ft., draught 9¾ ft., i.h.p. 800.

The Starkodder was built in 1885 at Copenhagen. Length 150 ft., beam 27 ft., draught 10 ft., i.h.p. 900, twin screws, speed 11 knots.

The Ice Boat No. 2, a side wheeler, was built in Philadelphia, about 1886. Length 196 ft., beam 29½ ft., draught 10¼ ft.

The Finnish Government designed a steam boat to take the place of the Express. Length 181½ ft., beam 27 ft., draught 13 ft., speed 11½ knots, i.h.p. 650, four bladed cast steel propeller.

The Detroit, a car ferry ice breaker, was built in 1905. Capacity 24 cars, tracks 3, length 308 ft., beam 64 ft., draught 14 ft., screws twin at each end, owner Michigan Central Rd., run Detroit, Mich., to Windsor, Ont.

The Drottning Victoria, a car ferry built in 1909, one of the four of this class between Sassnitz, Germany, and Trelleberg, Sweden, distance 65 miles. Length 370 ft., beam 53½ ft., draught 16½ knots, h.p. 4,400, not an ice breaker. Built at Walker-on-Tyne, England., owners, German and Swedish governments.

The Odin, a car ferry, was built in 1909, to ply between Korson and Nybork, Denmark. Length 293 ft., beam 48½ ft., draught 12½ ft., twin screws, i.h.p. 1,800, speed 15 knots, load 300 tons of cars.

The Christian IX., a sister ship to the Odin, was built in 1908.

In Denmark there are eight connections of railway ferries, their sailing distances ranging from 1 to 26 miles. Over 18 car boats are owned by the Government for working the traffic over these routes. Special ice breakers are in use to keep navigation open during the winter.

The Elsinore was built to act as ferry and ice breaker, her dimensions being: Length 179 ft., beam 43 ft., draught 10 ft., single track capacity 7 cars, single screw at each end.

Four car ferries were built later to accommodate the traffic, two by the Danish government, and two by the German government, two screw boats and two paddle boats, the paddle boats for use in summer only. Length 280 ft., beam 60 ft., draught 13½ ft., i.h.p. 2,600, speed 14 knots.

The car ferry system has also been adopted at the following points: Across the Straits of Messina, the Nordser canal in Holland, also from the Rugen island to Stralsund in Pomerania, and at other points given in this report.

The Ontario no. 1, car ferry and ice breaker on Lake Ontario, cost $370,000, cars 24, staterooms 100 passengers, length 320 ft., beam 56 ft., draught 15 ft., speed 15 miles, screws twin aft, owner Grand Trunk Ry., built 1906.

The Ermack, ice breaker, not a car ferry. Length 305 ft., beam 71 ft., draught 23 ft. Three stern propellers and one bow propeller, i.h.p. 2,500 each set of engines, with 8,000 h.p., speed 15¼ knots. All engines running 16½ knots forward propeller 13 ft. diameter. All propellers, nickel steel blades (tensile strength 80,000 lbs. per sq. in.). Has steamed through field ice 18 to 24 ins. thick with 6 ins. of snow on top at speed of 8 knots. Went through 1-3 of a mile of rafted ice 20 to 25 ft. thick in two hours. On her trip to Spitzbergen she encountered Polar ice 12 to 14 ft. thick, through which she forced her way at 2½ knots an hour.

The Urimack is a sister ship to the Ermack and has engines of i.h.p. 10,000, triple screws, two at the stern and one at the bow. She is used to keep open navigation through 45 miles of ice to Vladivostock harbor.

The Neva is another Russian boat of the same dimensions and power as the Ermack.

The Finnish ice breaker Sampo. Length 232 ft., beam 45 ft., draught 18 ft., i.h.p. 2,500.

Experience with the Ermack, Urimack, Neva and Sampo has shown that pack ice of practically any thickness can be negotiated. The Ermack on one occasion encountered pack ice 34 ft. thick, 9 ft. being above the level of the field through which she successfully forced her way.

The Baikal, an ice breaker and car ferry on Lake Baikal, Russia. Length 290 ft., beam 53½ ft., draught 18½ ft., 2 screws aft and one forward.

The Delaware, an ice breaker. Length 232 ft., beam 45 ft., draught 13 ft., speed 15 miles, aft engines 2,400 i.h.p., forward engines 400 i.h.p. Two screws aft and one forward, has also a water line deck without camber or sheer, to give additional stiffness, and prevent her being crushed in by moving ice packs.

The St. Ignace, built in 1889. Length 235 ft., beam 52 ft., bow and stern propellers, capacity 10 freight cars, speed 15 miles. This was the first boat built with a bow propeller.

The Sainte Marie, built in 1893. Length 305 ft., beam 53 ft., bow and stern propellers, capacity 18 freight cars, speed 16 miles an hour.

The St. Ignace and the Sainte Marie were designed by Frank Kirby, and built at Detroit, Mich., for summer and winter navigation in the Straits of Mackinac, for the Duluth, South Shore and Atlantic, the Michigan Central and Grand Rapids and Indiana railroads, to make the connecting link between the upper and lower peninsulas of Michigan, the run between Mackinaw city and St. Ignace being 8 miles. Pere Marquette no. 2, no. 15, no. 19 and no. 20, are all similar and were designed by R. Lagan.

The Pere Marquette no. 20. Length 350 ft., beam 56 ft., draught 14 ft., i.h.p. 2,500 each, twin screws aft, speed 14 miles, 4 tracks, 30 steel coal cars.

The photograph of the Marquette and Bessemer no. 2 forcing her way through piled ice on Lake Erie gives some idea of the class of steam boat used on the Great Lakes for car ferry service. Two of these vessels were lost about 18 months ago, one on Lake Erie, and the other on Lake Michigan. The cause for the one on Lake Erie has never been determined as she has not been found and all hands perished. The loss of the one on Lake Michigan was attributed to leaving the bow port hole lights open when leaving the harbor, and not being discovered until too late to close against the inrush of water, and not being provided with collision bulkhead she filled and foundered.

No. 1 for carrying coal in bulk loaded from tracks on her decks. Length 255 ft., beam 43 ft.

No. 14 has three tracks and is an open deck, and used for transferring cars across the Detroit river. Length 351¾ ft., beam 52 ft.

No. 1 and no. 14 were designed by Frank Kirby, all for the Pere Marquette Steamship Co.

THE TYPE OF VESSEL that would be best adapted for the Northumberland straits would be one between the design of the Delaware and the Bessemer and Pere Marquette types. It should have an ice crushing bow, with bow propeller of special nickel steel, and engines of 200 i.h.p., twin screws aft, with engines of 2,500 i.h.p. each, sea cocks as designed for encountering lolley ice, heavy ice, belt plating, stiffening deck without camber or sheer at water level, to protect hull against pinching by moving ice flows, two railway tracks to accommodate 5 freight cars each, and to load and unload over the stern, and accommodation for passengers as well as crew. This would necessitate a boat about 280 ft. long, 50 ft. beam, 16 ft. draught light and about 18 ft. draught under full load, which would be able to negotiate any of the ice conditions to be found in the straits. Approximate mathematical calculations as to the proper shape of forefoot of ice breaking steamer, and the thickness of ice a given steamer is capable of breaking, were worked out by R. Runenburg, and may be found in Proceedings of the Institute of Civil Engineers, paper 2371, 1891.

CONFIRMATION. Might I suggest that this report be confirmed in its various details as follows: By E. Tiffin, General Traffic Manager, I.R.C., as to the traffic; by F. P. Brady, General Superintendent, I.R.C., as to maintenance and operations; by W. B. Mackenzie, Chief Engineer, I.R.C., who has made a study of this question for some years, and has some valuable information collected, as to the construction, etc.; also by some independent master mariner who is conversant with the navigation of the straits.

I believe that their confirmation of this report would materially strengthen it, and help to allay the feeling of discontent and disappointment that is sure to arise in the places which have been looking forward to having the terminus of the car ferry established at their port.

The foregoing report was made to the Minister of Railways and Canals, who commissioned Prof. Kirkpatrick to investigate the question.

An Ottawa dispatch of Sept. 4, stated that the Railways Department had received several tenders for the construction of the car ferry, from British and U.S. firms.

Lake Vessels and Pilotage Dues in Montreal Harbor.

It is probable that, during the next session of Parliament, amendments will be made to the Canada Shipping Act, regarding pilotage dues in Montreal harbor, in so far as vessels trading from the great lakes are concerned. It is contended that the present regulations constitute a discrimination against vessels from the lakes entering Montreal harbor, as they are compelled to take on a pilot at the mouth of the Lachine canal, or pay the pilotage dues, and also pay a moving charge when changing from one point of the harbor to another, while vessels trading from Quebec are not compelled to take on a pilot, nor pay pilotage dues.

In this connection representatives of the Dominion Marine Association, the Shipping Federation of Canada, and the Pilotage Association, recently met the acting Premier and the Deputy Minister of Marine, to discuss the fulfilment of an arrangement made earlier in the year, whereby assent would be given to the abolition of the pilotage moving charge in any part of Montreal harbor, if the owners of lake vessels would support a scheme for the arrangement and enforcement of regulations governing the traffic in the harbor. The regulations were prepared, revised and sanctioned by both the Dominion Marine Association and the Shipping Federation, and the interview was arranged chiefly to settle the limits within which exemption should be given from the moving charge which lake vessel owners contend is simply a tax on the vessel. The Dominion Marine Association asked that the agreement arrived at be carried out if the regulations now proposed were put in force. The Shipping Federation and the Pilotage Association however contend that exemption from the moving charge should be confined within the limits covered by the regulations. Ultimately it was decided that the approved regulations should be put in force, and that the moving charge be abolished, only within the same limits, which include that part of Montreal harbor extending from its western limit as far east as the eastern limit of the section which includes the Sutherland pier, just east of the Tarte pier. The Dominion Marine Association remains opposed to the imposition of the charge within any part of the harbor, and stays on record as in favor of its complete abolition.

Internal Combustion Engines for Dredges.—A somewhat new line of development in the application of internal combustion engines is the operation of dredges, and two dipper dredges operated in this manner are now at work on drainage ditch excavation in Iowa. The dredges are in general standard designs of the Marion Steam Shovel Co., which supplied the machinery, the special feature being the application of oil engines instead of steam engines for the hoists. The engines were supplied by Fairbanks-Morse & Co. The dredges were built for D. C. Stephens, contractor, of Buffalo, N.Y., and the design of the hull was modified to suit the engine equipment. Compressed air is used in raising steam in the auxiliary boiler.

The Dominion Government has approved the Montreal Harbor Commissioners' by-law prescribing a system of signals, consisting of semaphores by day and lights at night, for use in the Montreal harbor from the Tarte pier to the Lachine canal. Hitherto small vessels have passed from point to point without any system, causing a number of minor accidents, and endangering shipping.

The Diesel Engined Vessel Eavestone.

The preliminary trials of the vessel Eavestone, built at Middlesbrough, Eng., for Furness Withy and Co., which took place recently, are considered to have been extremely successful. Her dimensions are:—length, 276 ft.; breadth, 40½ ft. moulded beam, with a deadweight capacity of 3,600 tons. She is engined by Carels-Diesel engines of the four cylinder, two cycle type of 850 h.p., with a service speed of 115 r.p.m., being practically a duplicate of the engines supplied for the Canadian Interlake Line's vessel Fordonian.

The construction is comparatively simple, there being an open crank pit, with box columns supporting the cylinders, and the open crossheads working the air scavenging pumps. Comparing the vessel with a similar one of the steam driven type, the extra space available for cargo on a 30 days' trip amounts to about 400 tons, due to the less space taken by the machinery. In the course of the trials, the engine was kept running at full load for over nine hours and no trouble of any kind was experienced, and on her maiden trip to Antwerp, Holland, the governor was set for 86 r.p.m., and when the propeller was thrown out of the water, the maximum speed was 92 r.p.m., coming back to 86 r.p.m. in less than five seconds.

It is said that Furness Withy and Co. may place the vessel on its Canadian service.

PATENT ACT.

TAKE NOTICE that manufacture of Nut-Locks constructed in accordance with Canadian Patent No. 128,091, issued September 13, 1910, to Milton Bartley, has been commenced in Canada by W. H. Banfield & Sons, of the City of Toronto, who are prepared to supply any demand for the same at a reasonable price. Ridout & Maybee, 59 Yonge Street, Toronto, Attorneys for the Patentees.

Railway and Allied Associations, Clubs, Etc.

The names of persons given below are those of the secretaries.

Canadian Car Service Bureau, J. E. Duval, 401 St. Nicholas Building, Montreal.

Canadian Freight Association (Eastern lines), G. C. Ransom, Canadian Express Bldg., Montreal.

Canadian Freight Association (Western Lines), W. E. Campbell, 502 Canada Building, Winnipeg.

Canadian Railway Club, J. Powell, St. Lambert, Que. Meetings at Montreal 2nd Tuesday each month, 8.30 p.m., except June, July and August.

Canadian Society of Civil Engineers, C. H. McLeod, 413 Dorchester St. West, Montreal.

Canadian Street Railway Association, Acton Burrows, 70 Bond Street, Toronto.

Canadian Ticket Agents' Association, E. de la Hooke, London, Ont.

Central Railway and Engineering Club of Canada, C. L. Worth, 409 Union Station, Toronto. Meetings at Toronto 3rd Tuesday each month, except June, July and August.

Eastern Canadian Passenger Association, G. H. Webster, 54 Beaver Hall Hill, Montreal.

Engineers' Club of Montreal, R. W. H. Smith, 9 Beaver Hall Square, Montreal.

Engineers' Club of Toronto, R. B. Wolsey, 94 King St. West, Toronto.

Nova Scotia Society of Engineers, A. R. McCleave, Halifax, N.S.

Quebec Transportation Club, J. S. Blanchet, Quebec.

Western Canada Railway Club, W. H. Rosevear, 25½ Princess St., Winnipeg. Meetings at Winnipeg 2nd Monday each month except June, July and August.

The Victoria Tug Co., Ltd., has been incorporated under the British Columbia Companies Act, with $56,229, and office at Victoria, to carry on a general steamship and passenger and freight business.

Transportation Conventions in 1912.

Oct.—American Railway Bridge and Building Association, Baltimore, Md.

Oct. 7-11.—Association of Transportation and Car Accounting Officers, Chicago, Ill.

Oct. 7-11.—American Electric Railway Association, Chicago, Ill.

Oct. 8-9.—Canadian Ticket Agents' Association, Ottawa, Ont.

Oct. 8-11.—Railway Signal Association, Quebec, Que.

Oct. 15-17.—American Railway Bridge and Building Association, Baltimore, Md.

Oct. 17-19.—American Association of Dining Car Superintendents, Denver, Col.

Oct. 23-25.—Society of Railway Financial Officers, Atlantic City, N.J.

Nov. 6-10.—Association of Railway Electrical Engineers, Chicago, Ill.

Nov. 15.—American Railway Association, Chicago, Ill.

Nov. 15-16.—American Association of Freight Traffic Officers, Chicago, Ill.

Nov. 19-21.—Maintenance of Way Master Painters' Association, Chicago, Ill.

Dec. 12-13.—Association of Transportation and Car Accounting Officers, Louisville, Ky.

The Merchant Service Guild of British Columbia has recommended to the Minister of Marine that the passage in the Seymour narrows, known as the Maude island channel, be closed, on account of the danger to navigation caused at certain stages of the tide by swirls extending out into the main channel. The channel is about one twelfth of a mile wide, and it is stated that the blocking could be carried out at small cost.

During July, four employes were killed, and six were injured in the course of their work in connection with the navigation of Canadian waters. Of the fatalities, two were due to drowning, and one each to a fall, and to being struck by machinery, while of the non-fatal accidents two each were due to machinery, and falls, and one each to an explosion of kerosene, and to falling material.