

Canadian Railway and Marine World.

August, 1912.

The Railway Viaduct and New Union Station at Toronto.

The railway viaduct through the lower part of Toronto, with the new union station, both of which were originally ordered by the Board of Railway Commissioners in June, 1909, are now assured and construction will soon be in progress, all the plans for the changes having been completed in a general way and approved by the Board of Railway Commissioners.

The original order of the Board of Railway Commissioners in June, 1909, called for a four-track viaduct from west of John St. to or near Berkley St., with three tracks either side of the viaduct at the present level of the Esplanade, with all necessary crossovers, the centre line of this viaduct to be located on the southern boundary of the Esplanade, this four-track portion of the work to be undertaken jointly by the G.T.R. and C.P.R. Independent of this, the C.P.R. was ordered to elevate two tracks from

of its trains into a station to be built in the northern part of the city, and thus get away from the down town trouble. This matter is still under consideration. In view of this desire to take some of its passenger traffic to the north end of the city, the company took exception to its inclusion in the viaduct and union station scheme, and appealed the matter to the Board of Railway Commissioners, which last May ordered the work to be continued under the original order, with an extension of time for the completion of the project, the original two years having already expired. At the same time, the Board approved the G.T.R. plans as the more desirable, and ordered that they be followed instead of the plans for the same proposition supplied by the C.P.R.

The grade separation work at Toronto is divided into two separate portions, parts 1 and 2. Part 1 is the portion that

ing had a greater slope, so that at Strachan Ave., about 200 ft. from the crossing, the rails have been raised about 2 ft. This small rise has not made the raising of the bridge necessary, although a removal of the old bridge, with a more modern bridge to replace it, is under consideration, only such a move is apart from the viaduct scheme.

The 0.25% down grade continues beyond Bathurst St. This portion of the line in the old roadbed was through a cutting, which will be filled to the required depth, without the use of concrete retaining walls, which are necessary through the greater part of the viaduct length. The new rail level at Bathurst St. will be about 4 ft. above the former level, calling for the raising of the overhead bridge at that point a corresponding 4 ft. The highway from the north will have a small ramp, in place of the present practically level approach

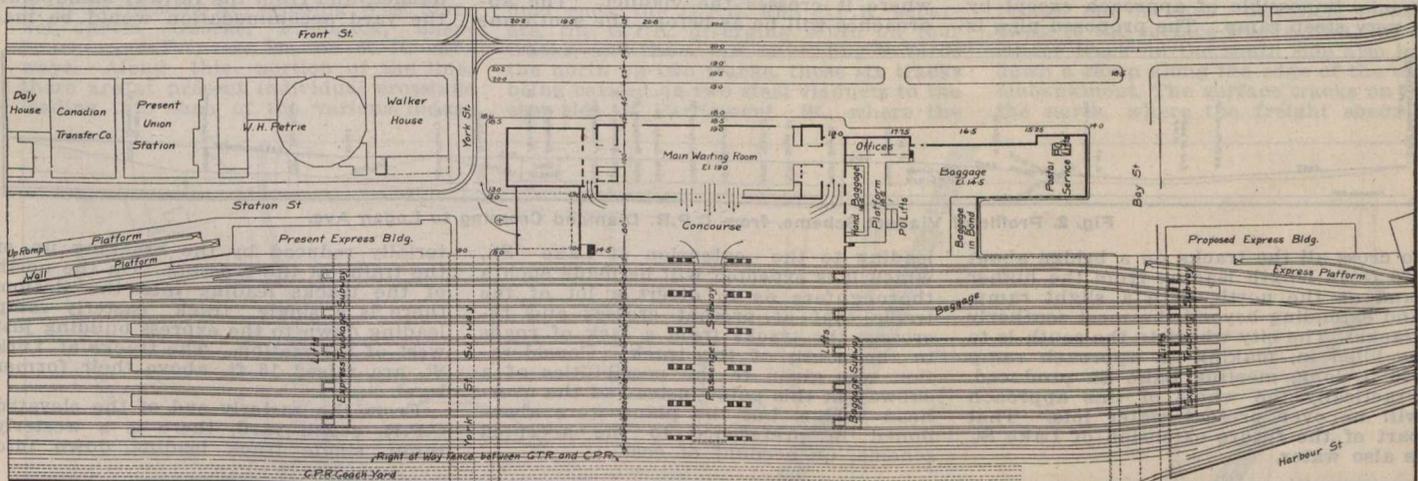


Fig. 1. Plan of New Union Station, showing the Trackage, and Passenger and Baggage Facilities.

the easterly end of the four-track viaduct to near Queen St., with necessary viaducts over certain intervening streets. The corresponding section of the G.T.R. line was also ordered elevated on a two-track viaduct from the same point to Logan Ave., crossing the streets en route on viaducts. All streets were to pass under the tracks with the exception of John St. and Spadina Ave., both of which were to cross the tracks on bridges, to be constructed jointly by the two railway companies. The city was ordered to pay one-third the cost of the viaduct including the elevation of the C.P.R. passenger car yard and G.T.R. Don sorting yard. The same proportion of the cost of the bridges at Spadina Ave., John St. and Eastern Ave., and the elevation of the substructure under the new Union Station was also ordered to be borne by the city. In addition to these liabilities on the part of the city, no damages can be collected by the latter for any city property taken for the proper carrying out of the scheme. Any question of damages between the two companies is to be reserved for settlement by the Board.

At that time the C.P.R. was contemplating taking at least a large number

is now nearly completed, stretching from Mimico on the west to the C.P.R. diamond crossing near Strachan Ave. in the city. Progress reports on this work have been made from time to time in these columns, and the issue of May last, contained an illustrated description of the extent of the work and the means by which it was being carried on. This portion of the work was done under a separate order from that relating to part 2 through the centre of the city.

The new profile the line assumes through the city is shown in Fig. 2, and a plan view of the new alignment and trackage arrangement as at present developed is shown in fig. 3, sections 1 to 4. It will be noticed that the work extends from the junction with part 1 at the C.P.R. diamond crossing on the west, to Logan Ave. on the east, where the line again strikes grade. Grade is struck on the C.P.R. line at Eastern Ave.

From the west, the line in part 1 of the work descends on a 0.4% grade until it strikes the junction with part 2 at the C.P.R. diamond crossing, where the downward grade changes to one of 0.25%, the elevation at that point being 24.0. The original down grade from the cross-

from the from the ridge of land along the north side of the railway right of way. The southern approach, at present a long ramp, will be made slightly steeper. The C.P.R. and the old Northern line of the G.T.R., which meet the main line just west of Bathurst St. require a very small fill, as the elevation of this line back from Bathurst St. is higher than the main line from Hamilton. At Strachan Ave., the Northern and C.P.R. lines cross at grade, while the other is in a long cutting as described.

A short distance east of Bathurst St., the line takes to the viaduct, the concrete retaining wall commencing at elevation 14.0. From that point to near Spadina Ave., the line is practically level, where at elevation 15.0 the line ascends on a 0.4% grade. To the north of the four through tracks that are elevated on the viaduct, there are the tracks at grade leading in to the G.T.R. freight yards and shops. It is the intention to leave these tracks as at present until such time as the work is completed, when the whole arrangement of surface tracks will be changed to better the yard conditions, to conform to the better through facilities

provided by the viaduct. Likewise, the tracks to the south leading to the G.T.R. old Northern wharves are to be left as at present for future rearrangement.

Under the present arrangement, only the tracks to the north of the G.T.R. shops are crossed by a highway bridge, 170 ft. long, an embankment leading from the southern end of this bridge to

leading westward to the G.T.R. shops and yard, and on the south there is a single track one leading easterly to the C.P.R. yard and roundhouse. Like the other yards mentioned, this large G.T.R. yard to the north will also require rearrangement on the completion of the viaduct scheme. From the point where the south ramp leads off, the viaduct

such an arrangement is undoubtedly more convenient for making up the trains, with no ramps to negotiate, but the principal reason lay in the matter of disposing of York St. Under the proposed arrangement, York St. passes under all the tracks, except the few leading into the C.P.R. freight house, in a subway. Were the car yards on the level, all

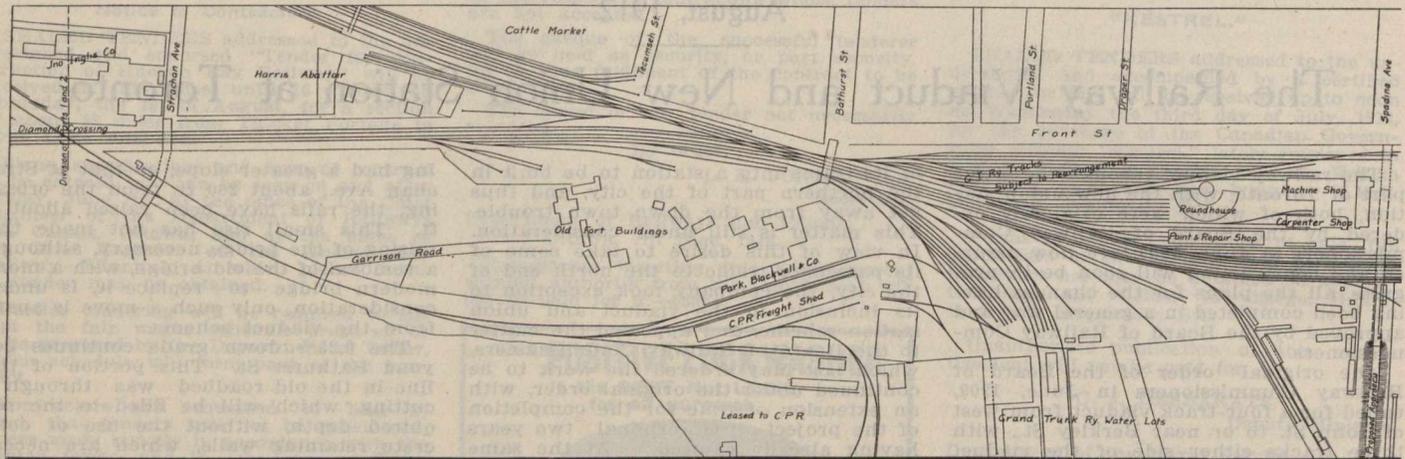


Fig. 3. Sec. 1. Plan of Viaduct Scheme from C.P.R. Diamond Crossing to Spadina Ave.

grade, the through tracks being crossed at grade. The proposed arrangement necessitates an entire change at that point, as the tracks being raised there about 6 ft. would make the city wharf immediately to the south of the through tracks impossible of approach except by a very steep ramp. The proposed plan is

widens to five tracks, the fifth one leading into the elevated C.P.R. passenger car yard to be mentioned later.

At John St., the track level has been raised 11 ft., with a corresponding raising of the overhead bridge at the point where it crosses the viaduct. The approaches will be as before, the south one

these tracks would have to be crossed by the street on the level, reducing the effectiveness of the whole scheme of level crossing elimination. The shunting around of the cars in the making up of the trains would be a constant source of danger, and from the railway standpoint, the yard accommodation would be ma-

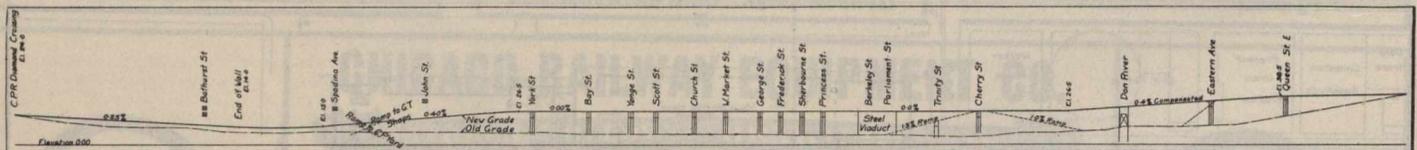


Fig. 2. Profile of Viaduct Scheme, from C.P.R. Diamond Crossing to Logan Ave.

to cross all the tracks on a bridge about 770 ft. in length leading from the higher land on the north, with a slight ramp, and extending beyond the most southerly tracks. The city wharf to the south is to be filled in, making an approach ramp 700 ft. long, meeting Lake St. produced. Practically the whole of this approach will be over present water lots. That part of the future extension of Lake St. is also water.

leading to the extension of Lake St., which it is expected will be made such a thoroughfare as to divert a lot of the traffic that at present crosses and re-crosses the tracks from a lack of roads to the south of the track. Consideration was given to the possibilities of a subway at this point instead of the overhead bridge, but the plans were abandoned in preference to the accepted scheme, on account of cost.

terially reduced by the breaking up of the trains at the crossing. On the north of the tracks leading into the station, there is a single track easterly ramp leading down to the express building just west of the station. The tracks at York St. are raised 16 ft. above their former level.

From the easterly end of the elevated C.P.R. coach yard, there is a westerly ramp, single track leading down into

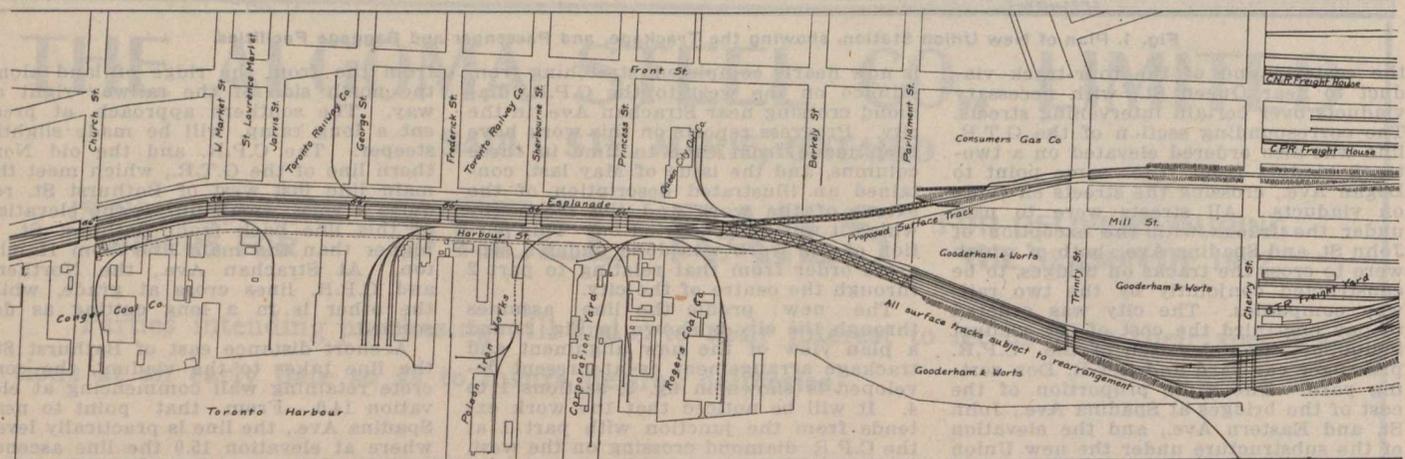


Fig. 3. Sec. 3. Plan of Viaduct Scheme from between Scott and Church Sts. to Don freight yards.

The through line continues on the ascent on the 0.4% grade to near York St., where the level is attained at elevation 26.5. Between Spadina Ave. and John St., there are two ramps leading down from the four-track viaduct. On the north side, there is a double track ramp

From John St., the tracks on the viaduct diverge, the northern portion running through the new union station, and the southern lot forming the new C.P.R. passenger car yard. Various considerations entered into the reasons for the raising of this yard. In the first place,

the C.P.R. freight shed. This ramp leads off from Bay St., where the street is taken under the wide stretch of tracks in an 80 ft. subway. Just east of Bay St., on the north side, there is a new express building, on the level of the viaduct. Yonge St. is crossed on an 80 ft. subway,

shorter than Bay St, from the convergence of the tracks. The subways from this point on, are all 66 ft. wide. At Scott St., the tracks have converged to six, which continues to Church St., where they come down again to four. Near Yonge St., there are two steel trestles leading off from the viaduct to fruit warehouses, the double track one on the

tries will have access thereto. Along this street, there are to be three surface tracks, two on the north and one on the south side of the street to be operated by the C.P.R. for handling the traffic from the industries along the street, various spurs running into the factories. Similarly, on the north side of the viaduct, along the Esplanade, there are

tracks. Likewise, the distance between Berkeley and Parliament Sts., is so short that a retained viaduct would be more costly.

From the east end of the steel viaduct, the G.T.R. four tracks sweep southerly and loop northward, forming a small elevated yard at the curve. The north side of the viaduct, from the point where it

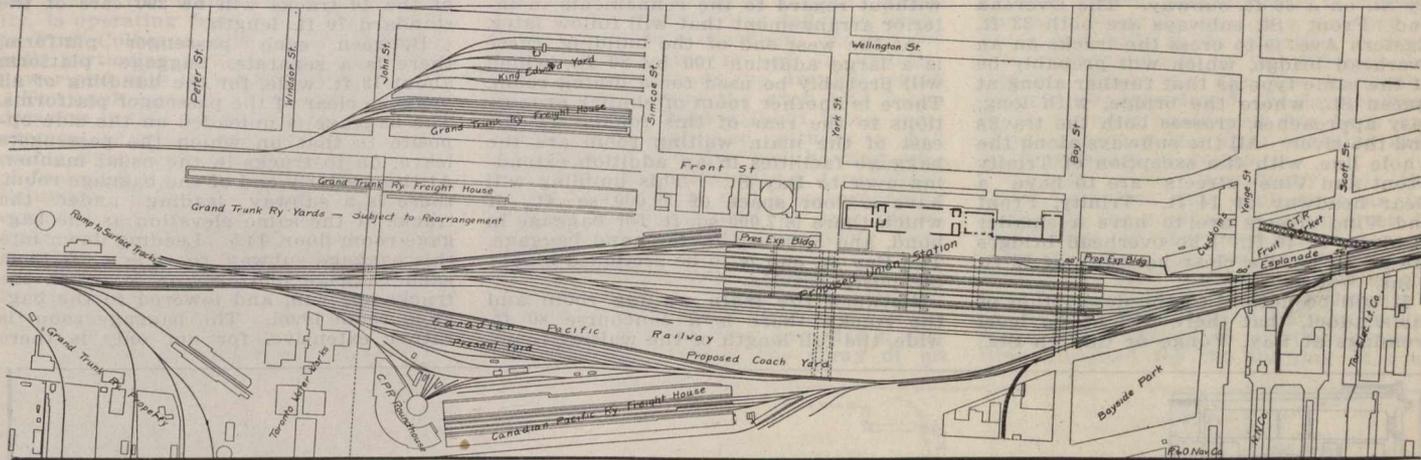


Fig. 3. Sec. 2. Plan of Viaduct Scheme from Spadina Ave. to between Scott and Church Sts.

north side leads into the G.T.R. fruit warehouse, and the single track one on the south into the fruit warehouse on the wharf.

The four track viaduct, with concrete retaining walls, continues to within 300 ft. of Parliament St., crossing West Market, Jarvis, George, Frederick, Sherbourne and Princess Sts. on 66 ft. subways. Along this portion of the line, there are at present individual crossings leading into each of the various indus-

three surface tracks, one on the north side and the other two on the south side of the street for the industries along the street, these lines being operated by the G.T.R. From the point 300 ft. west of Parliament St., where the concrete viaduct ends, the G.T.R. and C.P.R. separate, the G.T.R. diverging south on four tracks, and the C.P.R. diverging towards the north on two tracks, these six tracks being carried on two steel viaducts to the east side of Parliament St., where the

leaves the steel work to the Don River bridge, is retained by concrete walls, while the south side is merely embanked. Trinity and Cherry Sts., both pass under the tracks in subways. From a central point on the north side, there are two ramps, one in each direction, leading down to the surface tracks. The east end ladder track on the south side also leads down a ramp along the edge of the earth embankment. The surface tracks on both the north, where the freight sheds are

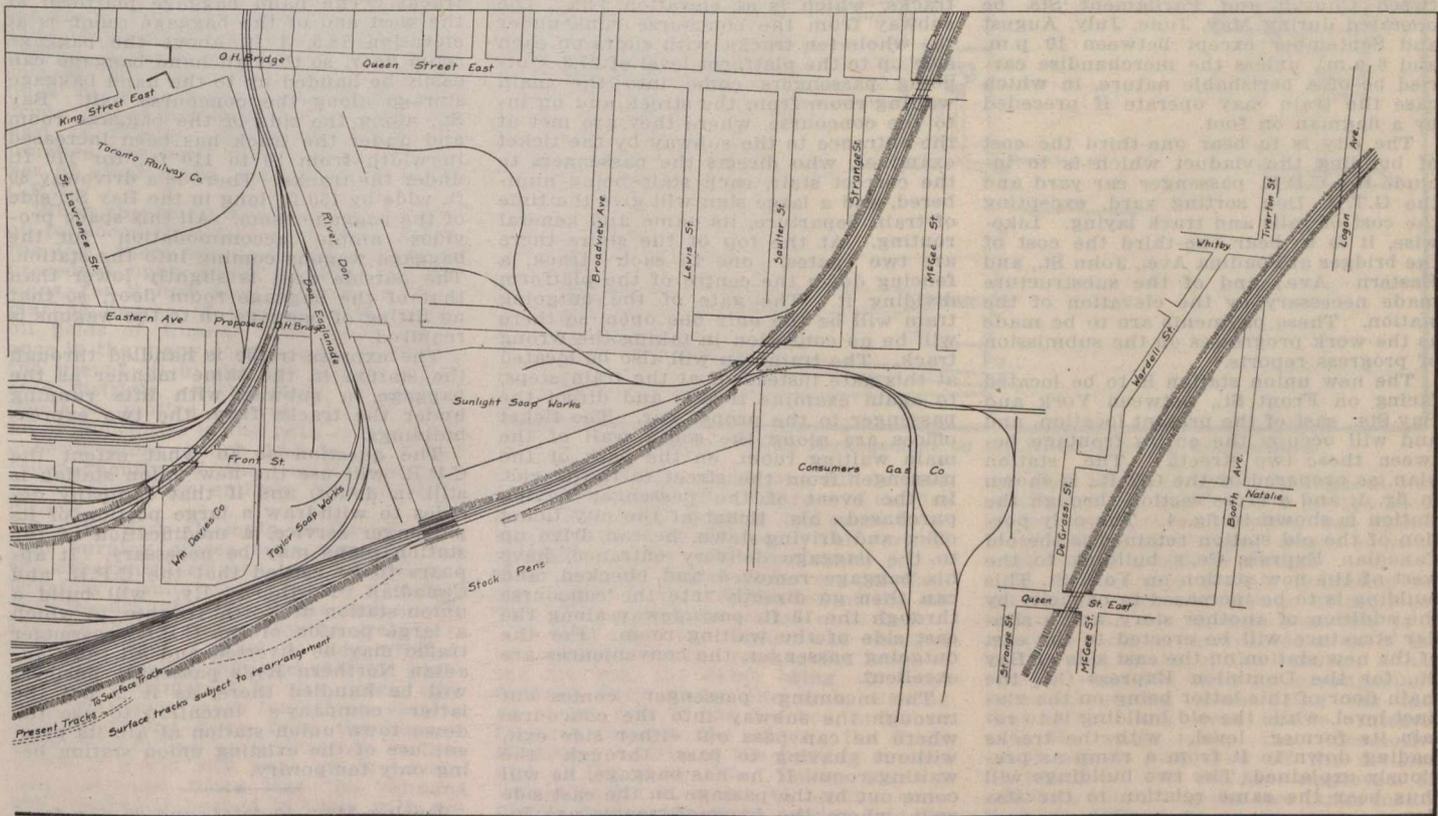


Fig. 3. Sec. 4. Plan of Viaduct Scheme from Don Freight Yards to Logan Ave.

tries located along the bay front. This viaduct scheme would cut off most of them from communication with the Esplanade, so this difficulty is to be remedied by the city putting through a new street, called Harbour St., just south of the viaduct, so that each of the indus-

viaduct continues as before. The prime reason for the carrying of this short stretch of the viaduct on steel lies in the fact that it is at this point that the surface tracks on the north and south sides of the viaduct up to this point cross over to the ramps leading up to the elevated

located, and on the south sides, are subject to re-arrangement on the completion of the viaduct scheme. From the Don easterly, there is a four-track viaduct on an earth embankment, crossing Eastern Ave. and Queen Sts. on 66 ft. subways. The grade up to Queen St., is 0.4% com-

pensated. At Queen St., the elevation is 39.5, the line at that point gently sloping up to meet the old level at Logan Ave.

The C.P.R. line where it leaves the steel viaduct at Parliament St., is carried on an earth embankment up to the point at which it again strikes grade at Eastern Ave., with the exception of the short stretch of reinforced concrete viaduct where the double track line crosses Trinity St. on a 66 ft. subway. The Overend and Front St. subways are both 33 ft. Eastern Ave. is to cross the tracks on an overhead bridge, which will probably be of the same type as that further along at Queen St., where the bridge, with long, easy approaches, crosses both the tracks and the river. All the subways along the whole line, with the exception of Trinity Front and Vine streets are to have a clear headway of 14 ft. Trinity, Front and Vine streets are to have a smaller headway of 10 ft. The overhead bridges are all to have a clear headway of 22 ft. 6 ins.

It will be noticed in the description of the viaduct, that there will be no level crossings at Bay, Yonge or Church Sts.,

about 300 by 100 ft. in which is the main waiting room. As the elevation figures on the plan show, the waiting room floor is at practically the same level as that of the street. At either end of this main structure, there are smaller rooms which will probably be allocated for lavatories, etc., when the details of the design are finally worked out. The plan, as shown, merely gives the general arrangement, without regard to the refinements in interior arrangement that will follow later.

At the west end of the building, there is a large addition 100 by 80 ft., which will probably be used for a dining room. There is another room of similar proportions to the rear of this room. To the east of the main waiting room are the baggage facilities in an addition extending over to Bay St. This building will have a floor space of 59,000 sq. ft., of which there is 7,000 sq. ft. for baggage in bond, and 5,000 sq. ft. for hand baggage. The Bay St. end is to be sectioned off for the postal service.

Between the main waiting room and the tracks, there is a concourse 80 ft. wide, the full length of the waiting room.

length over the centre of each track the width of the smoke stack, and at such a height as to just clear the stack. The double-track spans rest on columns down the centre of the passenger platforms. These passenger platforms are about 20 ft. in width, leaving a 10 ft. space along each side of the central dividing fence, which should prove ample for each track. The standing capacity of the 10 tracks will be 290 cars of the standard 70 ft. length.

Between each passenger platform, there is a separate baggage platform about 12 ft. wide, for the handling of all baggage clear of the passenger platforms. The baggage is unloaded on the side opposite to that on which the passengers leave, on to trucks in the usual manner. At the westerly end of the baggage room, there is a subway leading under the tracks at the same elevation as the baggage room floor, 14.5. Leading down into this baggage subway, there is a lift from each baggage platform on to which the trucks are run, and lowered to the baggage room level. The baggage room is rather extensive, for not only is there

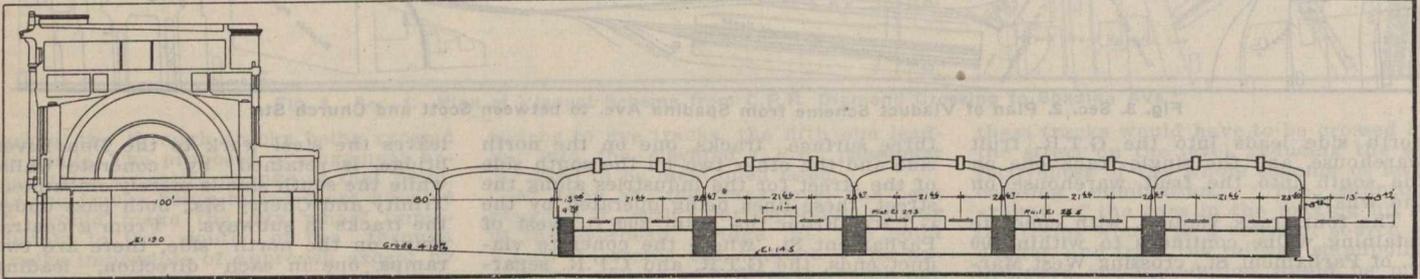


Fig. 4. Cross Section through Union Station and Passenger Subway under Tracks, showing Interior Arrangement.

all the surface tracks crossing streets being further east. The Board has ordered that none of these surface tracks between Church and Parliament Sts. be operated during May, June, July, August and September except between 10 p.m. and 6 a.m., unless the merchandise carried be of a perishable nature, in which case the train may operate if preceded by a flagman on foot.

The city is to bear one-third the cost of building the viaduct which is to include the C.P.R. passenger car yard and the G.T.R. Don sorting yard, excepting the cost of rails and track laying. Likewise, it is to bear one-third the cost of the bridges at Spadina Ave., John St., and Eastern Ave., and of the substructure made necessary by the elevation of the station. These payments are to be made as the work progresses on the submission of progress reports.

The new union station is to be located facing on Front St., between York and Bay Sts., east of the present location, and will occupy the entire frontage between these two streets. The station plan, as prepared by the G.T.R., is shown in fig. 1, and a cross section through the station is shown in fig. 4. The only portion of the old station retained is the old Canadian Express Co.'s building to the west of the new station on York St. This building is to be increased in capacity by the addition of another story, and a similar structure will be erected to the east of the new station on the east side of Bay St., for the Dominion Express Co., the main floor of this latter being on the viaduct level, while the old building is to retain its former level, with the tracks leading down to it from a ramp as previously explained. The two buildings will thus bear the same relation to the station.

The station building is to be located 80 ft. back from the street curb. Along this curb, there is to be a 23 ft. sidewalk, instead of the former 13 ft., back of which will be a 45 ft. driveway, separated from the station building by a 12 ft. sidewalk along the wall. The central part of the station building is a large structure

This concourse slopes down with a 4.10% slope from the waiting room elevation of 19.0, to that of the subway under the tracks, which is at elevation 14.5. The subway from the concourse runs under the whole ten tracks, with stairs on each side up to the platform level of 27.3. Outgoing passengers come into the main waiting room from the street, and on into the concourse, where they are met at the entrance to the subway by the ticket examiner, who directs the passengers to the correct stair, each stair being numbered, and a large sign will give the time of train departure, its name and general routing. At the top of the stairs there are two gates, one to each track, a fencing down the centre of the platform dividing it. The gate of the outgoing train will be the only one open, so there will be no confusion in taking the wrong track. The trainman will also be located at this gate instead of at the train steps, to again examine tickets and direct the passenger to the proper car. The ticket offices are along the south wall of the main waiting room, on the path of the passenger from the street to the tracks. In the event of the passenger having purchased his ticket at the city ticket office and driving down, he can drive up to the baggage delivery entrance, have his baggage removed and checked, and can then go directly into the concourse through the 19 ft. passageway along the east side of the waiting room. For the outgoing passenger, the conveniences are excellent.

The incoming passenger comes out through the subway into the concourse where he can pass out either side exit, without having to pass through the waiting room. If he has baggage, he will come out by the passage on the east side wall, where the baggage rooms are located. The station has been well designed for the relieving of the waiting room for needless through passage.

All the tracks in the station are through tracks, with no stubs. The 10 tracks are 1,500 ft. long, and are covered with the Bush low type two-track span train shed, with openings the full

the space in the building at the end of the main waiting room, but there is a large space extending out under four tracks. The hand baggage platform at the west end of the baggage room, is at elevation 18.5, 4 ft. above the baggage room floor, so that all hand baggage can easily be handed up to the hand baggage storage along the concourse exit. Bay St., along the side of the baggage room and under the track has been increased in width from 80 to 110 ft., for 110 ft. under the tracks. There is a driveway 80 ft. wide by 150 ft. long in the Bay St. side of the baggage room. All this space provides ample accommodation for the baggage wagons coming into the station. The outside area is slightly lower than that of the baggage room floor, so that no lifting of baggage on to the wagons is required.

The express traffic is handled through the station in the same manner as the baggage, a subway with lifts running under the tracks from the two express buildings.

The question as to what extent the C.P.R. will use the new union station is still in doubt, and if that company decides to withdraw a large portion of its passenger service, a modification of the station plans may be necessary. It appears to be settled that the C.P.R. and Canadian Northern Ry. will build a union station at North Toronto, to which a large portion of the C.P.R. passenger traffic may be diverted and all the Canadian Northern Ry.'s passenger business will be handled there, as it is not the latter company's intention to use the down town union station at all, its present use of the existing union station being only temporary.

During May, 19 fatal, and 29 non-fatal accidents were reported, in connection with Canadian railways. Of the fatalities, six were due to being run over, three each to falls and to being struck by trains, two each to being crushed between cars, and to falling material, and one each to a collision, to jumping from a locomotive and to a fall.

OIL BURNING LOCOMOTIVES ON THE CANADIAN PACIFIC RAILWAY.

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

For the second time this year the subject of oil for fuel is being discussed in these columns, the previous instance being in the April issue, when the oil burning motor car which the Grand Trunk Ry. is operating from Black Rock, N.Y., to Port Colborne, Ont., was described with particular reference to the motive power end with its oil fired boiler.

The equipment to be described on this occasion is that of the C.P.R., the management of which has for some considerable time been contemplating the use of fuel oil for locomotives on the British Columbia Division. Those at present equipped and in the course of equipment number 90, of which 14 are for the Esquimalt and Nanaimo Ry., on Vancouver Island. Seven stationary boilers for pumping plants at oil storage plants on the B. C. division, are also being equipped for oil burning.

In view of the widespread interest being evinced in the use of oil for fuel, not only in Canada, but more particularly in the southwestern part of the United States, it is the intention to include here a brief history of the use of fuel oil for railway motive power, from the time its use has been so seriously considered, this period being confined for the most part to the last decade, or slightly longer.

It is said that the first serious attempts at the use of oil fuel in the United States were in 1894 on the Southern Pacific Rd., although the Santa Fe lines experimented as far back as 1887, these early attempts being the result of a scarcity of coal and an abundance of crude oil, making the use of the latter highly desirable if some method of employing it that would prove as satisfactory as the use of coal could be devised. The results of many years of patient experimental work have been crowned with success, so that today, nearly all the lines in the southwestern States use crude oil as locomotive fuel, with the best of results. Since that time, the practice has been taken up by a number of other roads, among which is the C.P.R.

When the first attempts at the use of oil for locomotive fuel were instituted in the U.S., there was a certain amount of precedent upon which to base the designs, for it had been employed with a marked degree of success in the Baku oil fields of Russia. The great difference in the many conditions surrounding the use of oil in the two widely separated districts, with their distinctive ideals in motive power, left a great many difficulties in the path of the early experimenters, which had to be solved independently of the results obtained under the other entirely different conditions.

In the first attempts at its use, the coal burning grates were retained, but the experimenters soon learned that satisfactory results could not be obtained with the draught spread over such a wide area as that presented by the grate surface, and that it must be concentrated. The uncontrolled influx of cold air proved very detrimental to the flues, and, what was even more important, surplus oil in dripping down from the burner, instead of falling on a retaining surface where it might still burn off to advantage, dropped down into the ashpans and frequently burned in them with destructive results. Tight ashpans have been known to flood, and the overflow on the roundhouse floor and pit furnished an ever present source of danger from conflagration. The oil over everything gathered up a lot of unnecessary dirt, making the use of the old grate bars an undesirable feature of oil burning equipment.

In the earliest attempts, the burner was placed at the rear of the fire box, the same as the burner of the G.T.R. oil burning motor car referred to earlier. The flame was directed forward under an arch, by which it was deflected backward and up into the flues. Except for light running, this proved an undesirable arrangement, as the draught would lift the flame over the arch and cause it to enter the flues without being completely consumed, and without a full utilization of the fire box heating surface area. The result was a dense black smoke at the stack, and a corresponding decrease in the amount of heat drawn from the oil from its incomplete combustion.

This unsatisfactory arrangement was replaced with a "flash hole" arrangement whereby a small hole in the grate, which was bricked over, provided a vertical draught to meet the spray of oil

1904 it was discovered that additional draught was required to completely consume the vapor. This was accomplished by admitting a draught of air through a hood in the fire box door, which mixed with the upwardly deflected spray, adding sufficient air when the spray was already partially consumed to complete the combustion. This arrangement constitutes what is called the horizontal draught system. Essentially, it is the system at present in use on a number of roads, but with slight variation to meet the individual ideas of the different designers. Since the day the horizontal draught was introduced, the development in oil burning equipment has been one of refinement rather than anything radically different in design.

Coming more specifically to the C.P.R. practice, the equipment as installed on the company's locomotives, to the design of the mechanical department, based on the results of the findings of the motive power officials of the Southern Pacific Rd., will be described. In the first place, the oil burning equipment being applied to existing locomotives designed for the burning of coal,

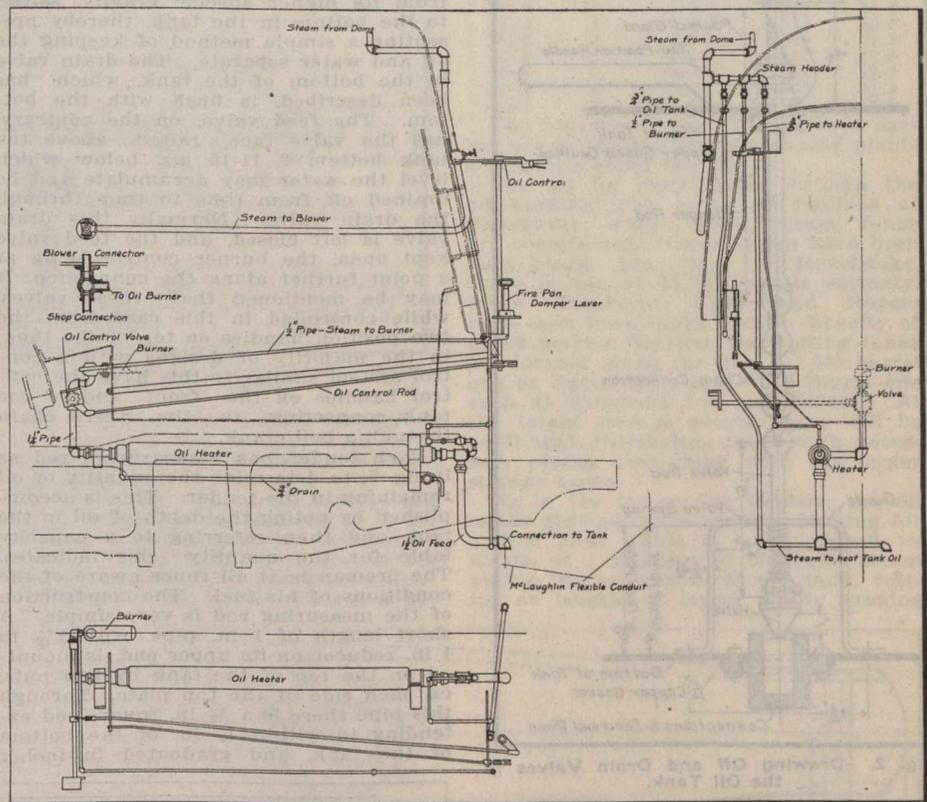


Fig. 1. Piping Arrangement on C.P.R. Oil Burning Locomotives.

from the burner, which was still located in the same position at the rear of the fire box. The brick arch in the same location was likewise retained. The vertical draught striking the horizontal jet of spray at right angles gave very satisfactory results in the combustion of the oil. This arrangement prevailed until 1903.

In that year, the burner was changed in position from the rear to the front of the fire box, the flame being directed forward from under the arch, circling up at the rear of the fire box, and then forward through the flues, the flame striking all parts of the heating surface and at the same time being given a longer period in which to become completely consumed before passing into the flues. While this was an improvement on the then existing methods, there was still a great deal of difficulty experienced from incomplete combustion of the oil vapor when the locomotive was working hard, even with this longer path in which to burn. Various changes in the shape of the arch were tried with varying degrees of success, until finally in

the idea borne in mind throughout was to change the construction of the locomotive as little as possible, but rather to adjust the oil burning details so as to work into the existing design.

In consequence of this limitation on the design being required to fit old locomotives, the oil storage reservoir is a separate tank so constructed as to fit into the coal space of the tender. Other reasons exist for such an arrangement, principal among these being the fact that if the tank were made integral with the water tank, the locomotive could not be employed off the division on which oil was the fuel employed. In addition, combining the two tanks makes it more difficult to undertake repairs. The tanks of the C.P.R. locomotives are built up of 1/4 in. plate throughout, and are divided into eight communicating compartments, as in water tanks, with a central dividing wall and three cross walls, all of 1/4 in. plate. The inside over all length is 13 ft. 3 ins., and width 9 ft. 5 ins., with a depth at front of 5 ft. 3 ins., and at the rear of 3 ft. 6 ins. The

capacity of the tank is 3,000 imp. gals. The tank is filled through a cast iron manhole in the top, on which there is hinged a cast iron door, held down on the manhole, which has an 18 in. opening, by four ½ in. swing bolts, which drop back on the top of the tank when the cover is opened for filling.

In the bottom of the tank, there are two pipe openings, one of which connects with the locomotive, as may be noted in fig. 1 showing the application of the oil burning equipment to the fire box. On each side of the tank centre line, there is a valve of the form shown in fig. 2. That on the left is for the feed, and that on the right is for draining off water or draining the tanks, this latter valve leading into a short length of pipe outside the rail, where the oil may be thrown away, or, by a further connection, drawn off into a storage tank, when for any reason the tank is to be cleaned or repaired. The construction of the valves is simple. A cone on the lower end of a valve rod, guided in a bridged frame on the bottom of the tank, fits into a corresponding opening

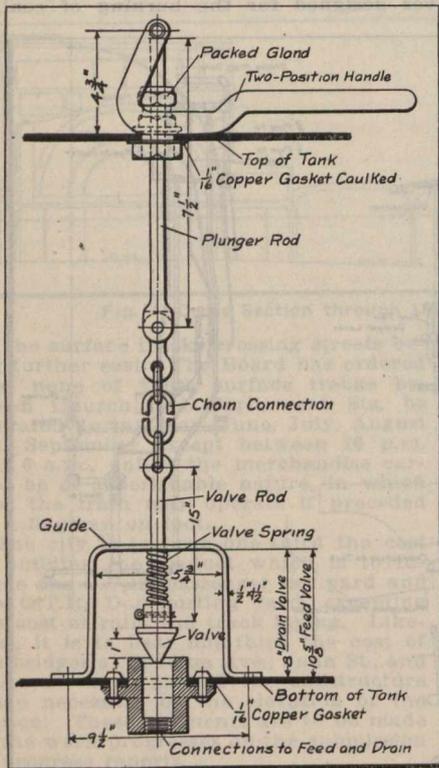


Fig. 2. Drawing Off and Drain Valves in the Oil Tank.

in a cast member rivetted to the bottom of the tank. An upper plunger rod is connected to this valve rod by a length of chain, this upper plunger rod being guided in the top of the tank through a packed gland which prevents the oil and oil fumes from escaping around this rod. A two position handle of the form indicated, raises or lowers the valve into the open or closed position. When the handle is vertical, the valve is held closed by the coiled spring wound on the valve rod, bearing on the top of the valve and on the under side of the bridged guide. These valves have thus only two positions—wide open and closed. The two openings in the top of the tank between these two are for a ½ in. pipe connection from the locomotive for the heating steam. The oil in the tank in cold weather tends to coagulate and will not run freely. To overcome this difficulty, two different methods of heating the oil are in use. The first is similar to the one described in connection with the G.T.R. oil burning motor car, where there was a steam coil in the oil tank,

encircling the oil valve outlet. The method employed in this case, which is the one in most general use, has the steam pipe, in this case ½ in., extending down into the oil nearly to the bottom, where it branches with a T connection, and on the end of each branch there is a downwardly projecting elbow from which steam is blown through the oil around the drawing off valves, keeping it in a freely flowing fluid state as required. The principal objection to this method of heating the oil lies in the

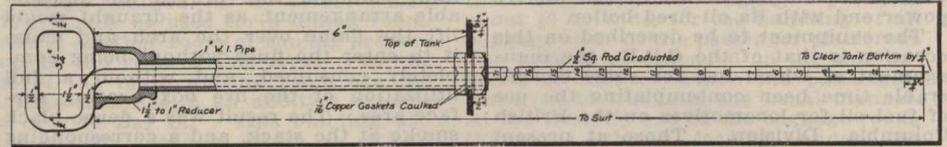


Fig. 3. Gauge for Reading the Depth of Oil in Tank.

fact that the condensed steam mixes with the oil in the tank, instead of passing off through the coils as in the radiation method of heating. This water in the oil must be prevented from passing off into the burner with the oil. Water, from its higher specific gravity, settles to the bottom in the tank, thereby presenting a simple method of keeping the oil and water separate. The drain valve in the bottom of the tank, which has been described, is flush with the bottom. The feed valve, on the contrary, has the valve face raised above the tank bottom 2 11-16 ins. below which level the water may accumulate and be drained off from time to time through the drain valve. Normally this drain valve is left closed, and the feed valve kept open, the burner control being at a point further along the connection. It may be mentioned that these valves, while controlled in this case from the two position handles on top of the tank, in the majority of designs with a control system similar to this have the control handles on the front end of the tank connecting to the valve chain through a bell crank.

Each tender has a measuring rod as in fig. 3, to determine the quantity of oil remaining in the tender. This is accomplished by noting the depth of oil in the tank and then referring to a capacity table for the quantity this indicates. The fireman is at all times aware of the conditions of his fuel. The construction of the measuring rod is very simple. A short length of 1 in. pipe, with 1½ to 1 in. reducer on its upper end, is mounted on the top of the tank by two nuts, on each side of the top plate. Through this pipe there is a ½ in. square rod extending to within ¼ in. of the bottom of the tank, and graduated in inches

er, where the flow of oil is regulated by the fireman, before passing into the burner. Steam for various auxiliary purposes is drawn from the steam dome through the piping to be seen at the top of this illustration. From a steam header on the back sheet of the fire box, the different connections branch off. Referring to the end elevation in fig. 1, the ⅜ in. connection on the right leads to the heater. The third, or ¾ in. connection, leads down and through another flexible conduit to the tank, pro-

viding steam for the heating of the oil in the tank before drawing off. The middle, or ½ in. pipe of this battery of three, provides steam to the burner for the atomizing of the oil. To meet these requirements, steam for the blower can be drawn from the dome. Provision is likewise made for steaming the boiler when cold by a shop connection to a 3 way valve on the outside of the smoke box, a connection running back along side the boiler to the header mentioned. Through the 3 way valve steam can be drawn from the shop main and passed to the burner and also to the various heating connections.

The type of heater or oil "super-heater" used is shown in fig. 4. This second heater is required to maintain the free flow of the oil to the burner and to keep the oil from thickening between the time it leaves the tank heater and the time it reaches the burner. This heater is essentially a steam jacketted oil pipe. Through the centre there is a 7 ft. length of 1½ in. pipe, connecting at the right end through a tee to the oil tank main, and at the other end to the oil burner pipe. Encasing this, there is a 6 ft. 2 in. length of 3 in. pipe, attached to the inner pipe at the left end by a 3 to 2½ in. reducer, with a 2½ in. bushing tapped 1½ in. to receive the inner pipe. The other ends of the two pipes have a packed gland connection to permit of any variation in length between the inner and outer pipe lengths from unequal expansion. This packed connection is similar to that of the other end, except that the bushing, instead of being internally threaded, is bored to receive the outer diameter of the 1½ in. pipe, and counter bored for packing, which is forced into the space with a 2½ in. pipe cap bored the 1½ in. pipe size. Steam

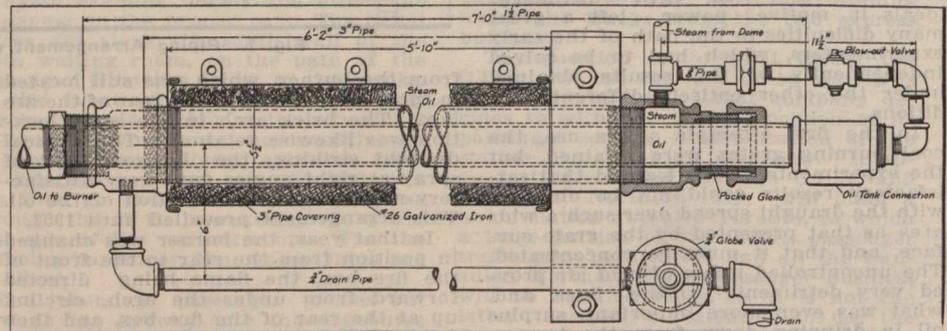


Fig. 4. Heater for Maintaining the Oil in a Fluid State.

through its length. The raising of this rod from the supporting pipe gives the fireman the required knowledge.

Reference to fig. 1 shows the arrangement of the oil burning apparatus as applied to the fire box. Oil from the tank passes through a 1½ in. McLaughlin flexible conduit, and on through similar piping to an oil heater and thence to an oil control valve near the oil burn-

ers the annular space around the inner pipe through a ⅜ in. steam connection in the right reducer, and the condensation is drawn off through a ¾ in. pipe connection at the other reducer, this latter pipe being controlled by a ¾ in. globe valve. The steam pipe has a by pass connection into the end of the inner pipe, provided for the purpose of blowing out any dirt accumulation that

may gather inside this oil space. It is controlled by a blow out valve.

The "superheated" oil passing on from the heater, is controlled by an oil feed or firing valve near the burner. The form of the valve, as shown in fig. 5, closely resembles a plain taper turn cock, the main point of difference resting in the shape of the passage through the inner or turning part. Of necessity, the

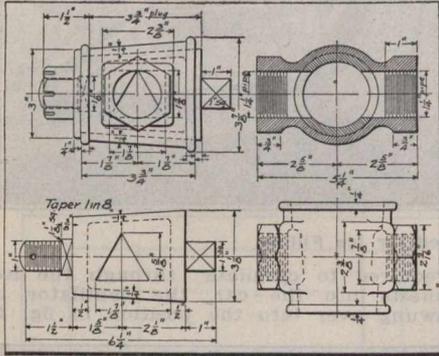


Fig. 5. Feed Valve for Close Adjustment.

valve, to be efficient, must be capable of a very close control, and this has been obtained in a very satisfactory manner by making the inner passage triangular in section, so that the supply may be regulated within very close limits, especially when under light operation, the oil flow being concentrated in the tip of the triangular passage.

The arrangement of the oil valve control mechanism may be seen in fig. 1. A horizontal oil control rod on the end of the valve lever connects with a lever on the lower end of a vertical shaft at the rear left hand corner of the fire box, on the upper end of which there is the regulating quadrant in fig. 6. This quadrant has a 90 deg. throw, with a notched engaging surface into which the engaging pin in the handle grips. This lever is connected to the vertical rod referred to, by a squared end fitting a corresponding opening in the handle, the whole being pinned together. Near the notched rim of the quadrant on the "closed position" side, there is a short circumferential slot, in which a block may be clamped in the position desired. As shown by the detail of the stand by block and catch, the handle contains a spring plug that engages in the notch in the upper end of the clamped block, but which at the same time may be moved past the catch when desired. When the locomotive is standing by at a terminal or for any protracted period between runs, a small sustaining flame is all that is required, just sufficient to keep the flame burning. This position is first determined, and the block in the quadrant set, so that the fireman can almost automatically set the valve in the stand by position with a consequent saving in fuel oil.

Experiments have shown that the best types of burner for locomotive use are those using a wide, flat flame, with the oil supplied at low pressure. In this particular, railway practice differs from stationary practice, for, in the latter, it appears to matter very little what shape the flame assumes. The wide, flat flame is here desirable so that the whole interior of the firebox may be completely lapped by the flame. Better combustion is also to be had with a low pressure from the oil with an outside mixing type of burner. With the inside mixing type of burner an oil pressure in the tank must be maintained if the best results are to be obtained from the combustion of the oil. This has been tried in locomotive practice, maintaining a pressure in the tank with compressed air. Satisfactory results were to be had from an oil burning standpipe, but the increased amount of trouble introduced in the auxiliary apparatus required to

maintain the air pressure in the tank, did not warrant its continued use, especially when equally satisfactory results were to be had with the outside mixing heater, in which the tank pressure is dispensed with.

The type of burner which is used on the British Columbia lines of both the C.P.R. and the Great Northern Ry., is the VanBoden-Ingalls, which is in use on the Southern Pacific lines. It is an outside mixer, and is shown in fig. 7. Oil entering the upper chamber from either the upper or lower pipe connection depending on the piping (the one not used is plugged), passes forward, dribbling down on a corrugated surface table at the front end, from which it is picked up by a jet of steam coming through a thin wide slit in the lower chamber, the steam in passing over the corrugated surface of the table atomizing the oil and spraying it over a wide area in the fire box. The steam enters the burner from the rear around the lower oil connection core. The burner is made of cast brass, as the porosity of cast iron makes it unsuitable, the steam penetrating the partition between the two chambers, causing the flame to act in an ir-

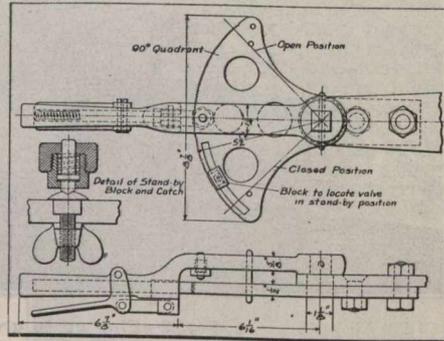


Fig. 6. Quadrant for the Fireman's Control of Feed Valve.

regular manner. The burner is carried in the forward end of the brick pan, projecting the flame backward as mentioned earlier.

The brick pan which replaces the old grate bar arrangement is made of 1/4 in. plate, and is attached to the interior of the fire box all around, some few inches above the mud ring, by cast steel brackets attached to the latter. This is a de-

ted through griddings in the sloping sides of the fire brick pan about 5 ft. from the burner. These griddings, one on each side, consist of a cast iron frame containing three rows of 1/2 in. deep openings to extend through the bricks about 2 ins. square, 8 in a row. These two draughts focus with the nearly horizontal fan shaped spray at nearly the same point.

Through the fire door there is also a small opening through which the flues may be cleaned by the fireman by the insertion of a small funnel containing fine sand, the draught drawing the sand into the flues, the sharp cutting edges removing effectively the oily carbon deposits that result from the use of oil as a fuel. This operation is performed by the fireman every few miles, depending upon the load.

The C.P.R. is equipping 90 locomotives with oil burning apparatus, these being of the following classes and general dimensions:—

Class.	No. in Class.	Type.	Heat. surface.	Grate area.
N-3	41	2-8-0	3,001	49.5
R-1	6	0-8-8-0	3,417	59.0
D-9	16	4-6-0	2,850	49.6
D-3	2	4-6-0	1,291	23.4
D-4	11	4-6-0	1,299	28.0
L-3	1	2-8-0	1,731	32.0
L-5	3	2-8-0	1,872	32.5
U-3	1	0-8-0	1,544	52.0
V-1	2	0-8-0	2,005	32.7
D-5	6	4-6-0	1,593	31.8
A-5	1	4-4-0	1,150	17.0

The balance of the 97 mentioned earlier are at the stationary pumping plants at 7 points along the line.

The oil for distribution through the oil burning area is to be received at Vancouver, where large storage tanks are constructed. Other tanks have been built along the line. At Revelstoke, there is one of 22,000 barrels capacity, while Kamloops, Field and Rogers Pass each have tanks with a capacity of 15,000 barrels. Smaller distributing tanks are located along the line, a 1,000 barrel one at Notch Hill, and a 600 barrel one each at Sicamous Jct. and Golden. At the larger storage points, there will be additional distributing tanks with necessary piping connecting with the larger storage tanks.

As in the locomotive tenders, the oil in the storage tanks requires heating for a free flow. This is accomplished by means of a gridding of crosswise steam piping in the bottom of the tank, resting on lengths of larger piping running

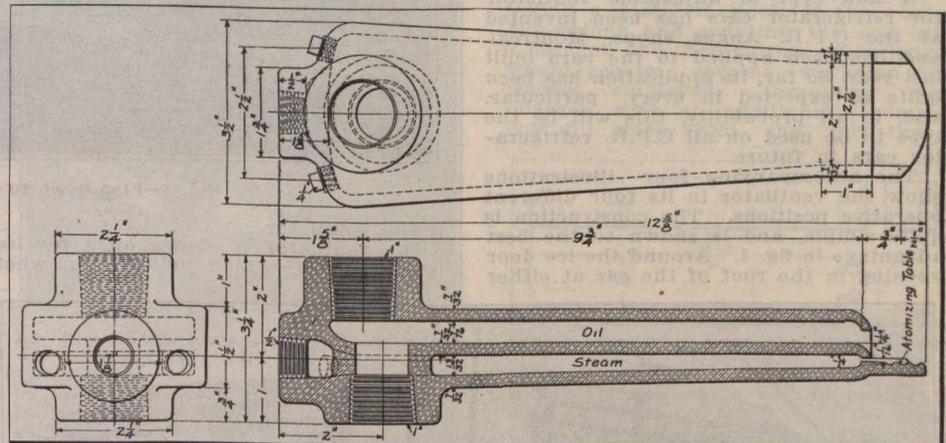


Fig. 7. The Burner for the Burning of the Oil.

sirable arrangement, as the rivets through the mud ring are thus left exposed where they can easily be got at for caulking.

Experiments conducted to determine the best point at which to bring in the draught of air that is to combine with the spray of oil have shown that the most satisfactory results are to be had when the air combines at a point where the spray comes to a focus some 5 or 6 ft. from the burner. In the installation under consideration, the draught is admit-

ted at right angles. The steam connection is at the centre.

The oil standpipe for the filling of the tender tanks which is shown in fig. 8 resembles the standard water column very closely. The pit in which the standpipe is located is of concrete, and is covered over at the top, with a cold air opening down through this decking to the bottom of the pit. Around the central length of extra heavy 8 in. pipe there is a heating jacket, 12 1/2 in. inside diameter, made of No. 22 galvanized

sheet iron, this annular space communicating at the bottom with the pit. A wall heater in this pit creates a current of warm air to pass up around the vertical pipe, the air entering cold through the 4 in. pipe. The discharge end of the standpipe is provided with an oil drip pan which can be swung clear while filling.

All the oil burning equipment, with the exception of the burner, which was purchased outside, was made in the company's Angus shops, Montreal, most of the component parts being constructed from standard shapes, plating and

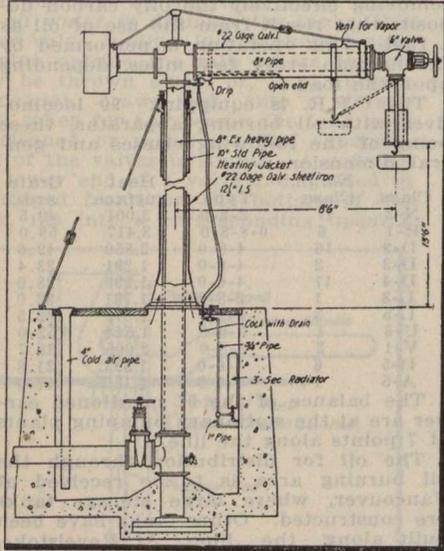


Fig. 8. Oil Standpipe and Heating Arrangements.

pipings. The cost of fitting the locomotives out for oil burning is about \$800 each, which includes material as well as labor, but does not include the stationary plants. To change the locomotives back to coal burning would necessitate an entire new ashpan, costing about \$180, as it is now necessary to apply self-cleaning pans.

Adjustable Ventilators for Canadian Pacific Railway Refrigerator Cars.

A new type of adjustable ventilator for refrigerator cars has been invented at the C.P.R. Angus shops, Montreal, and has been applied to the cars built last year. So far, its application has been quite as expected in every particular, and, in all probability, this will be the type to be used on all C.P.R. refrigerator cars in future.

The accompanying four illustrations show the ventilator in its four different operative positions. The construction is quite simple, and is shown to the best advantage in fig. 1. Around the ice door opening in the roof of the car at either

this frame, there is a hood-shaped door that can swing down over the top of the wire screening about twice the depth of

attachment that in no way interferes with the old arrangement.

When a considerable volume of air is

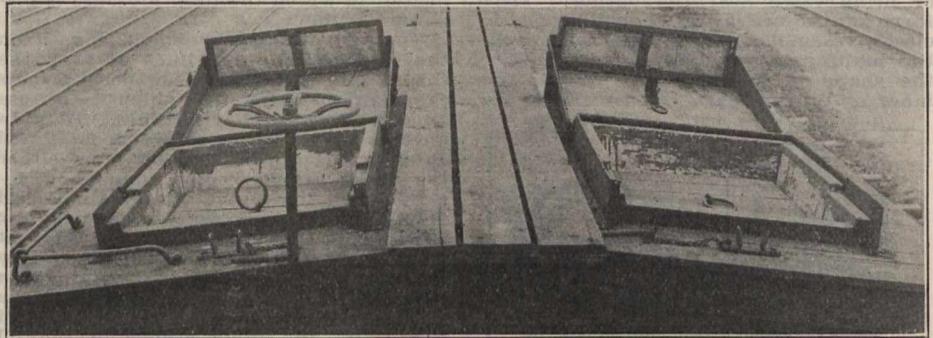


Fig. 1—Ventilator opened for Ice Filling.

frame, the sides fitting closely over the edges of the frame. Near the front of this hinged cover, there is a frame of

required to circulate through the ice chests into the car, the ventilator is swung over into the position in fig. 2,

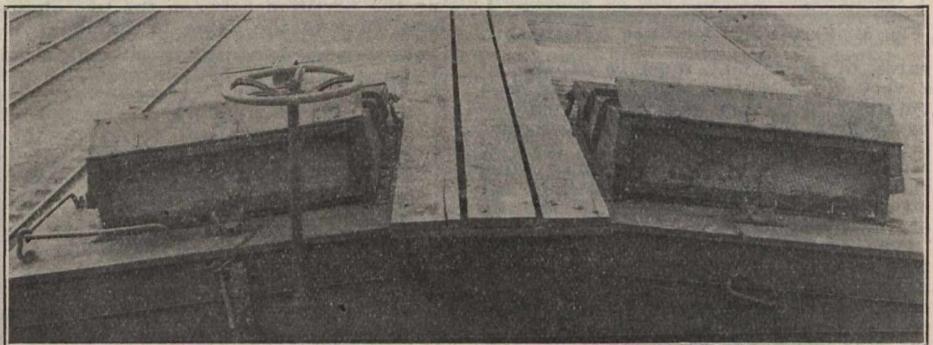


Fig. 2—Flap up to give Maximum Ventilation.

the front part of the swinging cover, and which is hinged to the cover as shown. This comprises the complete mechanism

with the hinged screen on the cover swung into its vertical position. On the front end of the cover there is a swing-

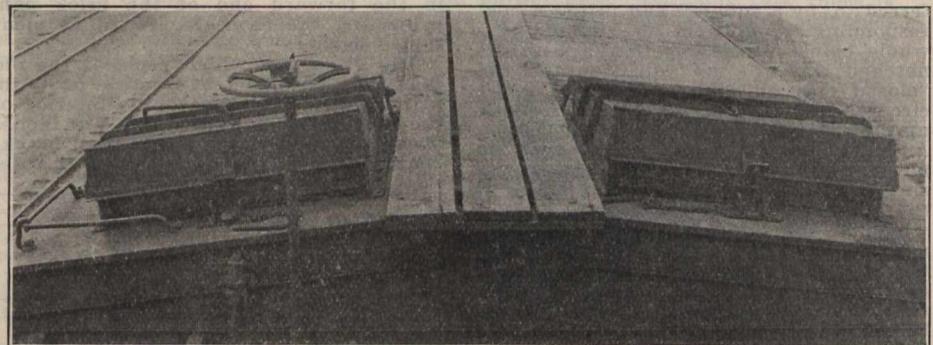


Fig. 3—Flap down to give Minimum Ventilation.

of the ventilator.

The ventilator is shown open for ice filling in fig. 1, which indicates in what

ing flap, which for maximum ventilation is swung up as shown in this illustration.

For a reduction in the amount of ventilation, this end flap may be lowered into the position shown in fig. 3. The ventilating opening is thereby reduced to the small opening under the bottom of the flap. Intermediate amounts of ventilation may be obtained by varying the amount of this opening by means of raising or lowering the flap into the desired location.

To completely cut off all ventilation, the screen door in the cover is swung up flush with the top of the cover and there secured by the lugs shown in the centre of the swinging door in fig. 1. This permits the swinging door to come down flush on top of the hole framing into the position of fig. 4, where it can be secured as indicated.

This new type of ventilator permits of a wide range of ventilating currents of air for different classes of perishable freight under the varying climates to which the cargo is subjected during its transportation.

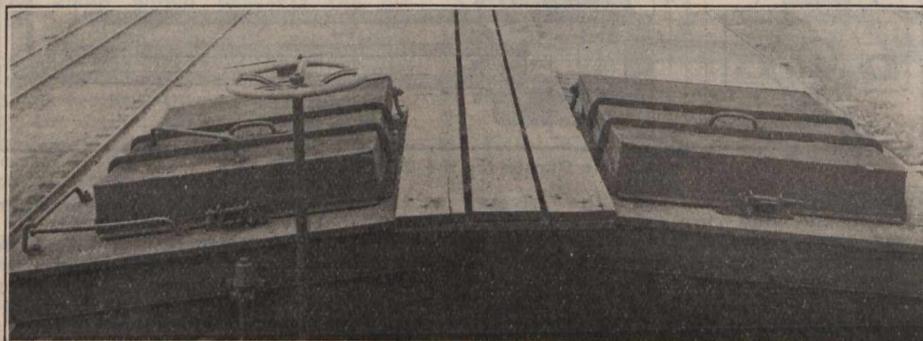


Fig. 4—Ventilator Closed and Clamped Down.

end, there is a metal frame on all but one side, viz., the end towards the end of the car, which is open nearly flush with the decking. Hinged at the rear of

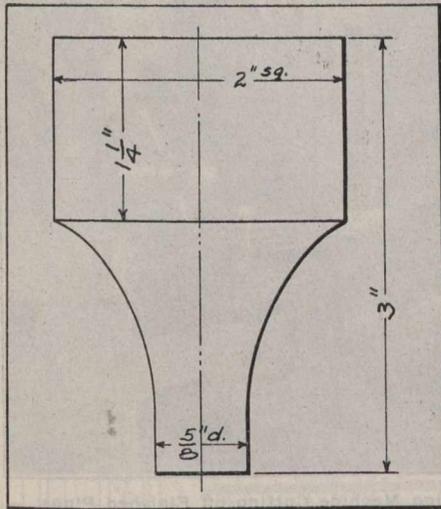
a simple manner the ventilator may be applied to old refrigerator cars, as no change of design is necessitated in the main structure, the new device being an

Railway Mechanical Methods and Devices.

Punch for Ripping Frogs at Central Vermont Railway Shops.

Ripping up worn-out frogs in the blacksmith shop, or in the switch and frog shop at large railway centres, would seem to be one of the least sought after of the many repair jobs arising in such shops, judging from the expression of opinions obtained from the foremen. The large unwieldy members are most difficult to handle from their awkward shape.

J. Martin, Foreman Blacksmith in the



Punch for Ripping Frogs under Steam Hammer.

C.V.R. shops at St. Albans, Vt., experiencing these same difficulties in the repair of frogs, cast about for some better means of ripping them up. The method he devised is very simple, and it is strange that it has not been put into more general practice. A punch of the form shown in the accompanying illustration is the only special tool required, and even it is simply made, being forged from the end of a 2 in. square bar without any machining, in the same manner as that used in forming the various tools employed by the blacksmith. The upper end of the punch and also its face are squared.

The frog to be dismembered is placed upside down on the anvil of a steam hammer, the binding plate being thus uppermost. The rivets holding the rail parts on to this plate are in pairs, each side of the rail web. In consequence, were a single punch to be employed to drive out the countersunk rivets one at a time, there would be a sagging tendency on the side of the rail from which the rivet was being withdrawn, tipping the whole frog over on that side. Mr. Martin's method is to use the punches in pairs, holding them in tongs over the adjacent rivets on each side of the web. The blow of the hammer on the punch head is thus balanced on each side, with no tendency as before to tip over. A single blow of the hammer is sufficient in the majority of cases to knock out the pairs of rivets. The frog, suspended by block and tackle, is easily moved about into the necessary positions for the removal of each pair, so that it takes but a few minutes to completely rip up a frog for the scrap heap. The frogs, for the most part, are rivetted together with $\frac{5}{8}$ and 11-16 in. rivets.

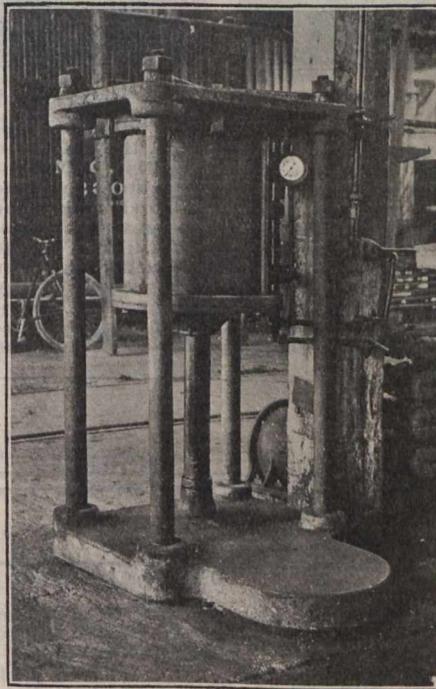
In the assembling of the new frogs, the rivets to be used are heated by a method that while not exactly new, is used in so few shops as to be worthy of

mention. Occupying the whole of the flame section of the forge fire, there is a grid plate, filled with rivet size holes closely spaced. Down through these holes the body and end of the rivet project, the head resting on the plate. The part to be heated the most is thereby exposed to the heat more than the head. A great number of rivets can be heated at a time.

Testing Coach Springs at the Michigan Central Railroad Shops.

Springs for railway coaches are made with a wide variation in carrying capacity, and in the majority of shops, no definite or accurate tests are made on the completed spring to determine whether or not it will stand up under the specified conditions of service, the determination in the repair shop being more or less a haphazard one.

Generally, some approximate method of testing is adopted. That in former use at the Michigan Central Rd. shops at St. Thomas, Ont., is interesting. The completed springs, after being inserted in place under the car, were subjected to a load by having a gang of men get into the car and cause it to sway from side to side, the free space between the springs being noted during the operation. This approximate method, while



Air Press with Double Reading Gauge for Testing Coach Springs.

by no means determining the full capabilities of the spring, gave a fair indication of its reliability to stand up under actual service conditions.

It remained for J. Mitchener, Coach Shop Foreman, to devise a more reliable device which at the same time is simpler and handier. This tester is shown in the accompanying illustration. The method of testing the springs is as follows:—The end of the coach for which the springs are intended is first raised by means of two air jacks, one on each side, so that each jack carries exactly the same load as the spring. In order that the air pressure under each jack may be absolutely the same, resulting in each side rising uniformly without

swaying movement, the two jacks are joined by a tee connection to the same air valve, making the air pressure absolutely the same in each. A pressure gauge in the tee connection gives the air pressure required to raise the car. Knowing the area of each jack plunger, the weight of one quarter of the car, i.e., the weight to be carried by each spring, is determined.

In order to test the springs under this load, without placing them under the car, as in the former manner, the air press shown in the illustration was made. It is a simple air cylinder and plunger with necessary piping for the air, the whole device being rigged up in the shop, a good portion of the make-up consisting of old parts. The spring to be tested is placed on the table, and the plunger forced down on it, the air gauge registering the actual pressure of the air. This gauge has a double reading—pounds per square inch, and total load; the latter is a factor of the former on account of the plunger area forming a uniting constant. Thus the actual load on the spring may be directly read on the gauge. When the desired load (corresponding to that determined by the jacks) is applied, the free space in the spring is measured, and if it is as required by specification, it is passed. As a rule, 3 ins. is the required free space. The spring, after this test, is ready to be placed in position without any further work.

Tie Plug Forming Machine in the G.T.R. Montreal Shops.

A wood working machine for forming tie plugs in quantities is in operation in the G.T.R. shops at Point St. Charles, Montreal, J. Hendry, Master Car Builder, which was devised by one of the workmen in the wood working department. The plugs as formed are shown in the accompanying illustrations, and also the machine in two stages of operation.

Vast quantities of tie plugs are annually required on such a large system as the G.T.R., and to produce them in the manner followed at many points, by taking a piece of stock of the correct dimensions and pointing the end with a hatchet, and then cutting off to length, would require several workmen constantly employed, increasing labor charges, with an additional increased cost for stock from the fact that it

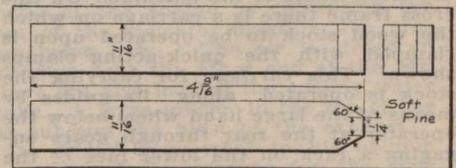


Fig. 1—Tie Plug from Tie Plug Forming Machine.

would require to be of the proper dimensions before coming into the hands of the workman. With this new machine, 25 plugs are produced at a time from a 4 x 4 in. piece of stock as rapidly as the operator can adjust the stock and operate the machine. The daily capacity of the machine runs up to nearly 100,000 plugs. It is the practice of the shop to operate it for some three or four days until a considerable stock has been formed to draw on, and then dismantle it until such time as a further stock is required. For those who do not know the use of these plugs, it might be mentioned that they are used for filling up the holes left by the rail spike when it is withdrawn for re-driving in a more solid

portion of the tie when the section hands are repairing the alignment of the tracks. The exposed hole must be plugged if the subsequent decay of the tie at that point is to be retarded as much as possible.

Fig. 1 outlines the shape of the plugs. They are constructed usually of soft pine although at times the harder woods are employed for that purpose. The body of the plug is 11-16 in. square, tapering on two sides at one end with a 60 deg. slope to a 1/4 in. point. The customary length is from 4 to 5 ins.

The machine in two stages of operation is shown in figs. 2 and 3. Essentially, there are three sets of saws operat-

tical slotting completed, this saw carriage is raised to its highest position. The operator then moves the stock carriage along the ways, meeting first the gang of four saws revolving in the horizontal plane, which slots the stock at right angles to the previous cut. Continuing the forward movement of the stock carriage as in fig. 3, the single saw cuts off the finished plugs, thus completing them in batches of 25. The carriage is then drawn back, the stock loosened and pushed forward as before to the stop, and the operations repeated. The capacity of the machine is limited only by the speed and dexterity of the operator

Stand for Air Motor Used by Pere Marquette Railroad.

The Pere Marquette Rd.'s mechanical department has devised a neat little scheme for bearing the weight of the air motor while the latter is tapping holes vertically upwards, as, for example, when tapping staybolt holes in the fire-box crown sheet. As the illustration shows, the body or main part of the stand consists of a piece of 4 in. pipe, A, about 2 ft. long, having two wrought iron caps screwed on the ends. The cap to the right serves as a stand, while that to the left is longer and bored out to act

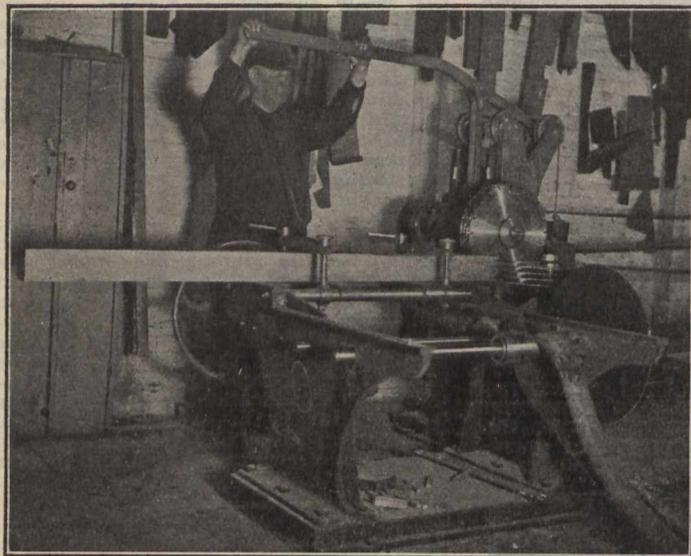


Fig. 2—Tie Plug Forming Machine Ready for First Cut.

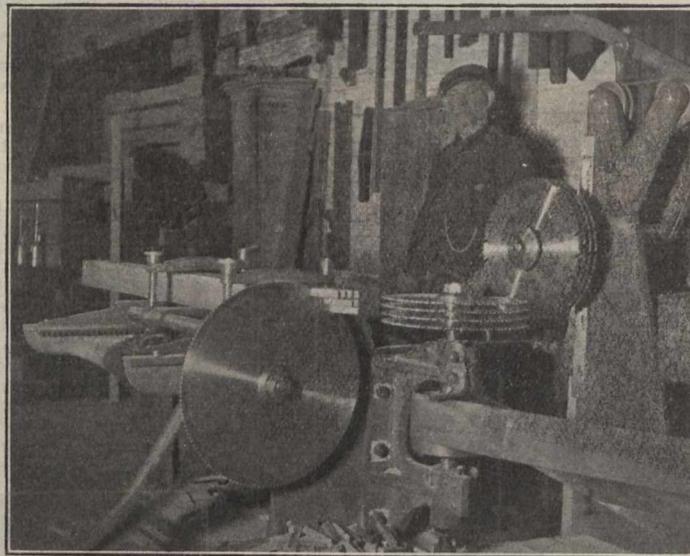


Fig. 3—Tie Plug Forming Machine Cutting off Finished Plugs.

ing in three planes at right angles to each other. The gang of saws to the rear in fig. 2 is carried on a horizontal shaft operating in bearings on a carriage that can slide vertically on the post to the rear. This carriage is kept normally in its upper position on the guiding ways by a counterweight at the rear of the carriage post, and is lowered by the operator by the cross lever at the top, on which the operator in the illustration has his hands.

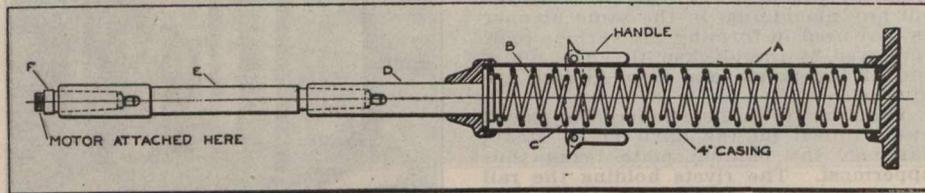
On a stationary shaft immediately in front of the rear side of these last saws there is a further gang of four saws revolving in a horizontal plane. To the rear side of this gang there is a single stationary saw revolving in a vertical plane at right angles to the first gang of saws, supported near the outer end of the cross frame of the machine. On this cross frame there is a carriage on which the wood stock to be operated upon is clamped with the quick-acting clamps shown. This carriage for carrying the stock is operated along its guides by means of the large hand wheel below the operator at the rear through gears engaging a rack on the lower face of the carriage.

The operation of the machine is as follows:—With the rear gang of saws in their highest position and the stock carriage at the rear of its travel, the stock piece is pushed under the clamps against a stop on the vertical carriage at the rear, which may be noticed below that carriage under the rear gang of saws in fig. 3. When the stock is located endwise against this stop, and against the rear face of the carriage, the clamps are brought down on it. With the stock carriage in this position, the upper gang of saws is brought down through the stock, the four saws slotting the end of the stock into five sections. In the separating washers between these four saws, there are projecting cutters to give the 60 deg. bevel to the ends of the plugs of the shape indicated in fig. 1. The ver-

The diameter of the saws of the upper gang is greater than the depth of the cut to the inner bevelling cutter requires, so that the saw cut enters into the next section of the stock end. The reason for this is obvious, making it possible to continue the sharpening of the saws to a considerably smaller diameter than they originally had, without in any way affecting their usefulness.

A further improvement to the machine is in contemplation. Pulling the

as a plunger guide. Inside the 4 in. pipe casing there are two springs, B and C, formed of 1/4 in. steel, and coiled to give a free length a few inches in excess of the length of the casing. Resting on these springs is the plunger D, guided in the upper head as before mentioned. The plunger D has a No. 4 Morse taper holding the socket E, various lengths of which can be made to accommodate the different jobs that must be undertaken, or else the one average length



Stand for Supporting Air Motor while Tapping.

vertically operating saw carriage at the rear up and down all day, as is being done in fig. 2, is fatiguing to the operator. To relieve him of this arduous part of the work, this carriage is to be power operated by means of cone clutches on one of the shafts when thrown into engagement revolving a vertical threaded lead screw for raising or lowering at will. Double cones will make it power operated in both directions.

J. J. McDonald, a G.T.R. conductor, was arrested in Toronto recently on charges of defrauding the company of fares, etc.

The Timiskaming and Northern Ontario Ry. commission has announced that it has adopted the ruling of the Geographical Board of Canada, as to the spelling of Timiskaming, and in future the name as referring to the railway will be so spelt, the folders, stationery and rolling stock being changed to correspond.

may be blocked up to the job in an improvised way. These sockets E, are also given a Morse taper No. 4, to hold the head F, which is threaded on its outer end to fit the handle end of the motor. The motor, being screwed on to this head, forms a solid and rigid unit, guiding the tap accurately into the hole.

All who have had difficulty from imperfectly fitting staybolts, due to the hole being ovalled from incorrect tapping by the old method of having the workman support the motor, will appreciate the value of this idea. In addition, the spring being of medium strength, keeps the tap right up into the hole, materially reducing the tendency of the tap to strip the thread before gripping. Consequently, a more perfect thread, less liable to leak, is made possible.

The Central Railway and Engineering Club, Toronto, held its annual outing recently, to Erin, Ont.

Remodelling of the C.P.R. Place Viger Station and Yards, Montreal.

Most of the work of remodelling the C.P.R. Place Viger station and yards with a view to increasing their capacity and making them more convenient, has been completed, and the new arrangement in the immediate proximity of the station is shown in the accompanying plan. The new arrangement of the terminals and trackage is shown solid, and the old arrangement, now replaced, is shown dotted.

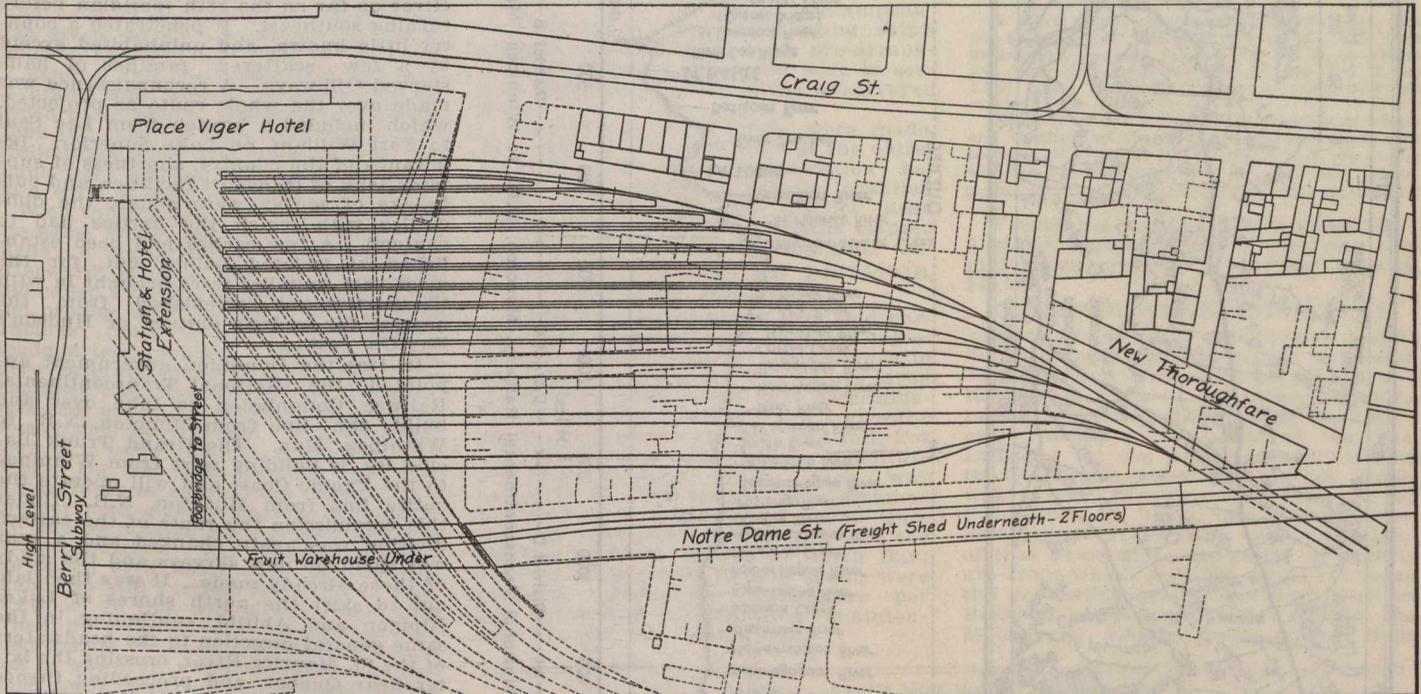
Formerly, the tracks entering the terminals from the right along the water front, branched off at an angle of about 45 degs. into the station yard, this arrangement taking up a great deal of ground without the best utilization of the space occupied. The station tracks were likewise not at all convenient to the waiting room. The freight shed space to the south, below Notre Dame street, was also very much cramped, and was not utilized to the best advantage, from the fact that most of the tracks were short spurs.

When the excavation had been completed, tracks were laid from the east end of the yard towards the then existing tracks, from which the traffic was then diverted. The old tracks being removed, the new ones were extended to the station building extension, which projects south from the old combined station and hotel. The station is now entirely separate from the old building, which is used solely for hotel purposes.

In the passenger terminals there are 10 tracks, with 10 platforms, accommodating 80 cars. A four track car storage yard provides for 48 more. Between the car storage tracks and the Notre Dame street bridge there are four freight tracks with a capacity of 83 cars, used for team freight. Under the bridge there is located a long 2 story shed for freight and fruit. This shed is served by a roadway on the north side and trackage on the south, which becomes a part of the new freight yard with terminal sheds at present under construction to the south of the bridge. This 2 floor shed under the bridge is used for bonded freight. It is 800 ft. long, and has windows and continuous sliding doors on the track side, and 20 separate

The Diesel Locomotive.

In a recent address before the American Society of Mechanical Engineers, wherein he described the progress being made with the acceptance of the Diesel engine as a standard means of developing power, Dr. Rudolph Diesel, the inventor of this type of internal combustion engine, described a locomotive constructed the early part of this year in Germany in which the Diesel engine is the motive power. The locomotive in outward appearance closely resembles an all-steel car, and weighs 85 tons. The wheel arrangement is of the 4-4-4 type, two Diesel engines set at an angle of about 45 degs. at the centre of the car driving on to a jackshaft between the two pair of drivers, this jackshaft being the crankshaft of the engine. Connecting rods from the jackshaft drive the driving wheels. Between these two inclined cylinders, there are two scavenging air pumps driven from the same shaft. Two horizontal air cylinders on the floor in front are driven from two small vertical Diesel engines, this com-



Old and New Arrangements of Terminal Facilities at C.P.R. Place Viger Station, Montreal.

The plan of enlargement made a radical change in the terminals, it being determined that the best arrangement under the circumstances would be to bring the tracks in parallel to Notre Dame and Craig streets, for which purpose considerable property surrounding the yards had to be purchased, the extent of this land absorption being indicated by the dotted blocks in the illustration.

Notre Dame street originally ran along the crest of a rise in the ground parallel to the shore line, between the shore line and Craig street. In the old arrangement, the tracks came through from the shore line to the Craig street level by cutting through this mound, and carrying the highway across on a bridge. The new arrangement necessitated the reduction of the ground level over the whole area of the new terminals, to the level of the former trackage, so that Notre Dame street is now carried across the lowered yards on a viaduct, beneath which are freight sheds. Notre Dame street was temporarily diverted while the excavation work was being pushed forward. The street on the viaduct is at practically the same level as before.

sliding doors on the team side. The sides are galvanized iron, supported on a steel frame. The fruit shed at the west end of this freight shed is built under the old portion of the bridge, and is heated, so that fruit shipments can be properly handled both winter and summer.

The freight yards to the south of the bridge, which are now nearing completion, will contain long freight sheds parallel to the street, occupying the ground right down to the Harbor Commissioners' property, the whole yards occupying a space nearly three times as great as that portion shown in the illustration above Notre Dame street.

W. J. Chapman, formerly assistant timekeeper at the C.P.R. freight sheds, Fort William, Ont., has been charged with the theft of \$1,017.51, by means of irregularities in the pay rolls. He was arrested in San Francisco.

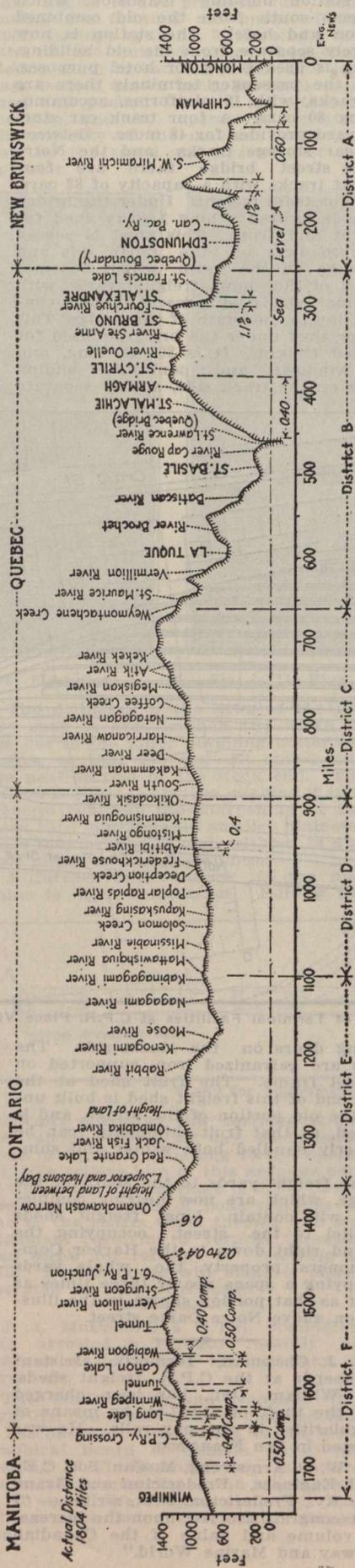
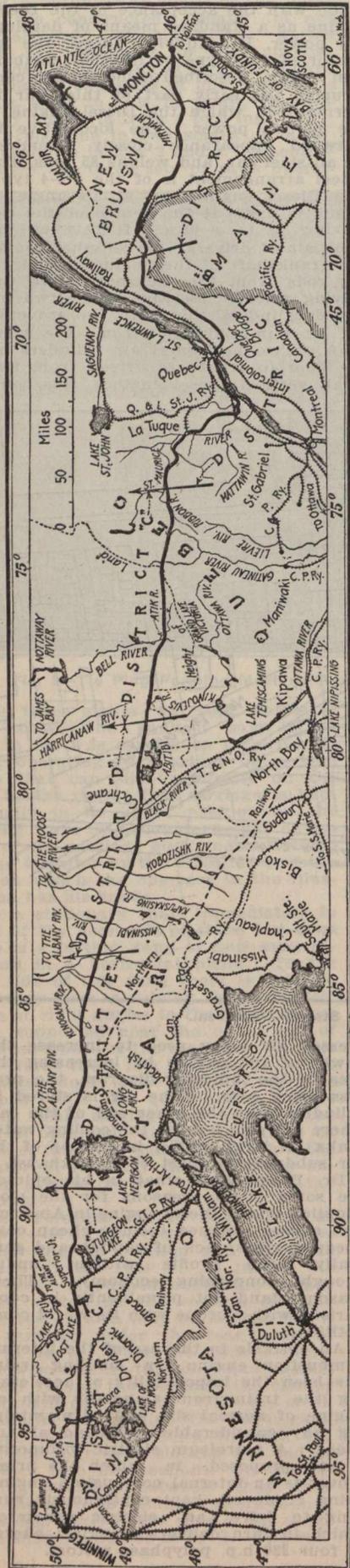
H. W. D. Armstrong, M. Can. Soc. C.E., Chief Engineer, Fredericton and Grand Lake Ry., Fredericton, N.B., writes,—"I must congratulate you upon the increasing volume and value of the Canadian Railway and Marine World."

pressed air being used to increase the power of the engine by increasing the area of the indicator diagram, the process being new. The air is stored in cylinders near the other end of the car, where are also located the cooling water tanks. A large muffler in the top of the car subdues the blast of the exhaust.

Dr. Diesel gave what in his opinion are some of the reasons for the slow adoption of the Diesel engine in America. The causes assigned include cheap coal, cheap engines, lack of capital, and generally good profits without undue thought concerning economy. These reasons stand out prominently in comparison with Europe with its world competition.

An obstacle to the use of the internal combustion engine for hauling trains has been the impossibility of accelerating the train from standstill with an engine of normal size and of maintaining any considerable overload at any speed. A petroleum electric locomotive is now proposed, in which the prime mover is an internal combustion engine, using crude oil, kept continuously running to drive an electric generator, which in turn delivers electrical energy to four 220 h.p. polyphase motors.

The Construction of the National Transcontinental Railway.



Figs. 1 and 2. Map and Profile, National Transcontinental Railway, Moncton, N.B., to Winnipeg, Man., 1,804 miles.

In 1902 a company was formed in Quebec to build a railway from Atlantic tide-water, on the Saguenay River, to Port Simpson, on the northwest coast of British Columbia. The line was to be known as the Trans Canada Ry. In the following winter, three parties were placed in the field, one at either end, and the third party north of Lake Winnipeg. Several hundred miles were surveyed and some knowledge of the character of the country was obtained. Early in 1903, the newly formed Grand Trunk Pacific Ry. Co. took over the scheme and the parties were recalled. A new and more southerly route was then projected, extending from Winnipeg westerly to Edmonton, and thence to some undetermined point on the Pacific Coast, and easterly from Winnipeg to a junction with the Grand Trunk Ry. at North Bay, on Lake Nipissing.

This easterly division swung north along the waters of Lac Seul and the Ogoki River as far as the 88th meridian before turning southeast. It penetrated a country little known, and uninhabited except by a few scattered families of half-starved Ojibways. A reconnaissance was made over the whole route as projected, which included a branch from Lac Seul to Fort William, on Lake Superior. Ignorance of the country, shortness of supplies, lack of transport facilities, and outbreaks of scurvy were among the difficulties with which the parties had to contend. A few caches had been established at isolated points, but, for the most part, supplies were brought in with the parties and replenished from the nearest fur-trader's outpost or Hudson's Bay Co. post.

In 1904 the Dominion government appointed the National Transcontinental Railway Commission to take over and build the line from Moncton, N.B., to Winnipeg, Man. The Grand Trunk Pacific Ry. is building west from Winnipeg to the Pacific Coast and will operate the entire line from Moncton, N.B. Under this commission the route of the eastern division was again changed and a year was spent on new surveys and the study of those already made. It was then laid out to skirt the north shores of Lakes Nipigon and Abitibi, continuing in the same general direction to the headwaters of the St. Maurice River, crossing the latter near Quebec, and proceeding thence in as direct a line as possible, without leaving Canadian territory, to Moncton, at the southeastern corner of New Brunswick. There it connects with the Intercolonial Ry., which is owned and operated by the Dominion Government and which extends to the Atlantic ports of St. John, N.B. and Halifax, N.S.

While contracts were let and construction was commenced at Winnipeg and Quebec as early as 1906, final location through the remote districts of northern Quebec and Ontario was not completed until late in 1908, and revisions have since been made from time to time. Before the most economical location was staked out, before even a satisfactory line could be projected, an enormous belt of country had to be explored and mapped. From Lake Nipigon eastward to the St. Lawrence valley, two main routes were selected for exploration. The one eventually adopted has been described above. The other followed a more or less direct line, passing close to the south shore of Lake Abitibi, touching the north end of Grand Lake Victoria, an expansion of the Ottawa River, and proceeding thence across the Gatineau and Lievre Rivers to the Mattawan and St. Maurice. An alternative route in New Brunswick, by the St. John River valley, was also surveyed.

The total distance from Moncton to

Winnipeg was estimated to be about 1900 miles, on what was assumed to be the most direct feasible route. The problem of definitely locating this route was not an easy one, as for more than half the distance the line of general directness ran through an unsurveyed, unsettled and practically unknown region cut up in all directions with a network of lakes and rivers, many of them not shown on any existing maps, and when so indicated, often found to be entirely misplaced. The engineers, had, therefore, in many cases to make their own maps, as the surveys proceeded, and had in all cases to correct and complete existing maps.

SURVEY WORK AND LOCATION.

During the autumn of 1904 and the following spring, some 34 survey parties were equipped and sent out, and before the end of 1905 there were 45 parties in the field, consisting of about 18 men each, not counting a large number of men engaged in transporting supplies by canoe and packing in summer and by dog train in winter. Each survey party had an engineer in charge, transitman, leveller, topographer, draughtsman, rodman, picketman, two chainmen, cook and eight or nine axemen and packers. Each party was given certain governing points to connect, and was instructed to thoroughly exhaust the possibilities for the most favorable and reasonably direct line between these points. Barometric explorations and compass lines were followed by preliminary lines run with transit, and plans were plotted with 10 ft. contours on a scale of 400 ft. per in.

With those plans, and with profiles on the same scale, projected locations were made on the most favorable lines and afterward actually run on the ground and called a "first location." These plans and profiles were plotted in the field, and tracings (with reports) were sent to headquarters monthly. These reports were carefully gone over by the Chief Engineer and Assistant Chief Engineer, necessary changes suggested, and instructions issued accordingly. Whenever the head of a party completed what he considered the best possible "first location," the engineer in charge was changed and another man given a chance to improve the line by making his best attempt at a revised location. The original head of the party, or a third man, was given a chance to still further revise for a final location. In this way it was found that a healthy rivalry was established and good results obtained. Revision of location is, however, never considered as finished until construction is well under way, as it is often found, after the line is cleared, that slight changes will effect a very considerable saving.

An equation table giving definite values for savings in distance, curvature, rise and fall, etc., was furnished all parties in the field, so that, having the estimated cost of construction of any two or more lines, the better one to adopt from all points of view could be at once determined. This table is given further on.

The earlier explorations and reconnaissances were made by compass and barometer, followed by transit with stadia, or chain and level. Steel-band chains were used for distances in final location. The parties consisted usually of 18 men in settled districts to 24 men in unsettled districts, six of the latter number being packers. In general, they were sent into the field in pairs, at intervals of about 80 to 150 miles, with instructions to run, respectively, east and west from some more or less well defined point. In the more remote localities, it was found impossible to fix these points at all accurately, owing to the non-existence of reliable maps; nor could the course of the indicated route be followed closely owing to the presence of some unsuspected large body of water or other topographical obstruction. Consequently, much difficulty was encountered in joining up

the surveys of two approaching parties. At the head of the St. Maurice, the Tete de Bulle Indians were found to possess an unusual aptitude for cartography, and by following their rude maps, a junction was effected with the party running east from the Gatineau.

Working in a country so cut up with lake and river expansions as to be more than 50% water, absolutely unmapped and unknown, and some 250 miles from the nearest railway, two parties overlapped several miles, one being 10 miles north of the other, before communication was established between them and a connection made. A rough stadia traverse, 80 miles long, following the old Indian canoe route from Lake Abitibi to the Kenojevis River, and occupying 11 days, furnished course and distance between surveys which had started nearly 200 miles apart. In the Kenogami District, one of the earliest G.T.P. Ry parties exhausted their provisions, and searched three days without finding a line, which had been blazed north from a supply cache, to which they tied in their reconnaissance. They left behind them as a record of their experience a string of lakes bearing the suggestive names: "Storm," "Ice," "Poverty," "Stampede" and "Relief." By discharging ship's rockets simultaneously on a pre-arranged night, quick connections were in several instances effected across unsurveyed gaps.

Observations for latitude were made, of course, but as there were at the outset no means of intercommunication between the parties in remote localities, other than through the district head quarters, on the C.P.R., months elapsed before these could be interchanged.

VALUES FOR EQUATING DISTANCE, ETC., IN LOCATION.

It has been noted above that field parties were furnished with equation tables showing definite values for savings in distance, curvature, etc. The values given below were used in the final determination of location. Tables 1 and 2 give the values for distance and rise and fall. For calculating the justifiable expenditure per mile, 10 daily trains each way (equal to 20 daily trains) were assumed for the line between Moncton and Quebec, and also between Winnipeg and the junction with the branch to North Bay; between other points 12 daily trains were assumed. Justifiable expenditure per mile takes into consideration maintenance of rails, ties, ballast, etc.

TABLE 1.—VALUE FOR EQUATING DISTANCE.

Class	Train mile	ft. per daily train per annum	Value per ft. per mile*	Capitalized value per train per annum per ft. per mile*	Saving per daily train			Justifiable expenditure per mile of saving in distance	
					per annum	per mile of short-ening.	per annum	12 daily trains	20 daily trains
A	0.30	2.0c.	\$0.50	\$2600	\$104	\$31,200	\$52,000		
B	0.50	3.4c.	0.85	4500	180	54,000	90,000		
C	0.60	4.0c.	1.00	5300	212	63,600	106,000		
D	1.00	7.0c.	1.75	9200	368	110,400	184,000		

*Capitalized values per mile to nearest \$100 and interest 4%. One daily train each way equals two daily trains.
 A. Distances so short as not to affect track or train wages, aggregating less than two miles.
 B. Distances affecting train wages, but not so great as to affect the number of stations or sidings. From two to five miles.
 C. Distances so great as to affect number of stations and sidings required. From 5 to 75 miles.
 D. Distances so great as to affect number of engine districts. Over 75 miles.

VALUES FOR EQUATING CURVATURE (ALL TRAINS)—The elimination of 1° of curvature will save 16c per daily train per annum (including passenger and freight trains); equal to a capitalized value of \$4 per degree. Justifiable expenditure per degree of saving in curvature; \$48 for 12 and \$80 for 20 daily trains. If a curve is in a particularly dangerous place, which necessitates a watchman or other additional expense, the value of its elimination must be considered separately. One degree of curvature means one degree of central angle, regardless of radius of curve. It is assumed that expense due to curvature is in proportion to the total central angle.

ASSUMED COSTS PER FREIGHT TRAIN MILE, Engine Mile, Etc.—Train mile, \$1. Engine mile, 35c., both assisting and running light; 40c. if assisting both ways, with no light running. Minimum cost for assistant engine when not at division point or used for yard work, \$18 per day or \$6,600 per annum. Light running 25c. per engine mile. Switching 30c. per engine mile. Doubling grades, 90c. per engine mile straight distance, or 45c. per additional engine mile.

TABLE 2.—VALUE FOR EQUATING RISE AND FALL (ALL TRAINS).

(Freight train velocity limits: max., 30 m.p.h.; min., 10 m.p.h.)

Class	Value	Justifiable expenditure per ft. of saving in rise and fall for	
		12 daily trains	20 daily trains
A. Minor grades	\$0.12	\$3	\$36
B. Minor grades	0.48	12	144
B. Ruling grades	0.88	22	264
C. Minor grades	1.00	25	300
C. Ruling grades	1.40	35	420

A. All rise and fall up to 30 ft.
 B. Where grades require shutting off steam, but not application of brakes in descending. This class includes all rise and fall of over 30 ft. on grades less than 0.6%, and between 30 and 100 ft. on 0.6% grades and steeper grades of small drop not covered under Class C.
 C. Where grades require the application of brakes and shutting off steam in descending. This class includes all rise and fall of over 100 ft. on grades of 0.6% and a proportionate fall on steeper grades.

VALUES FOR RAILWAY GRADE CROSSINGS—Justifiable expenditure to save one normal grade crossing of another railway, \$40,000.

TRANSPORTATION AND SUPPLY.

Much of the early organization had to do with transport and supply problems. Through New Brunswick, Manitoba and the settled portions of Quebec existing railways, roads and steamship lines gave easy access to all parts of the line. LaTuque (at the head of navigation on the St. Maurice River), St. Gabriel, Maniwaki and Kipawa (terminals of the C.P.R. branch lines), and North Timiskaming, at the extreme end of the lake of that name, were the points of departure from which radiated canoe routes to the vast wilderness of northern Quebec. Between Lakes Nipigon and Abitibi, the Moose and Albany Rivers spread their

finger-like branches southward to within short distances of the C.P.R. main line, furnishing water routes which were reached by canoe and portage from Bisco, Woman River, Chapleau, Missinabi, Grasset, Montzambert and Heron Bay. Lake Nipigon affords comparatively easy access to a hundred mile stretch across its northern drainage area; while to the west, Ignace, Dinorwic, Dryden and Kenora were used as shipping points to Sturgeon and Minnitaki-Lakes, and the Wabigoon and Winnipeg Rivers.

In the autumn of 1904 and winter of 1905, from 40 to 50 completely equipped parties were placed in the field between

Moncton and Winnipeg. Some of these hardly reached their destination before being overtaken by the freeze-up, and were forced to return and cut trails in order to bring up sufficient supplies to carry them over the winter. A transport department was organized, and as soon as the condition of the roads and lakes permitted, large quantities of provisions and outfit were pushed north to the furthest limit of lumbering operations over existing bush roads, and stored in main transport depots, or in warehouses of the Hudson's Bay Co. From these, part of the supplies were forwarded by dog sleigh and packer, and the balance distributed by canoe after the ice had gone out in the following June.

Caches were established from time to time at intervals of from 20 to 40 miles; log shacks were erected and a couple of men placed in charge of each. These were generally located on some canoe route, and being maintained permanently, as long as the surveys lasted, constituted an important aid in their prosecution. Regular systems of mail service were provided later, following the supply routes, but during the long freeze-up, lasting from about the middle of October to the middle of December, and to a less extent throughout the break-up, extending over the greater part of April and May, insecurity of ice on river and lake practically put a stop to communication with the outside world. Throughout most of Quebec and western Ontario, innumerable waterways, many of them rendered navigable for canoes by beavers, provided an easy method of moving camp. But across the interminable muskegs and spruce-covered swamps of the clay belt, parties had in summer to depend solely on the tump line to pack their supplies and outfit.

Medical officers were stationed at wide intervals, but there was little sickness that could not be cured by a blue pill. The most serious discomforts endured were black flies in summer, and a few intensely cold days in midwinter when the mercury sometimes touched 60° below zero. Accidents due to upsetting canoes and breaking through ice were unfortunately, too common. In the first three years of the survey, 27 lives were claimed by the frigid waters of river and lake, at that time the only highways. Narrow escapes were of almost daily occurrence. On several occasions, parties were caught by the freeze-up on their way out, canoes being abandoned, and treacherous river crossings negotiated on hands and knees. Two men tried to run a 30-ft. chute on the Gatineau. One jumped on to a rock, and the other was rescued with difficulty from the pool below after the canoe had been dashed to pieces. Another canoe broke in half while descending the Woodchuck rapids on Bell River, and the occupants paddled five miles into camp seated one in either piece.

GRADES AND ALIGNMENT.

At the outset it was decided that the railway should conform to a high standard. Grades were not to exceed 0.4% opposed to eastbound traffic (which is the heavier), nor 0.6% against westbound traffic. The curvature was limited to 6°, and all curves of 1° and over were connected to their tangents with easy spirals. The 6° limit for curves was used only where topographical conditions prevented easier curves being used at reasonable cost. Grades were compensated for curvature at the rate of 0.4% per degree, so that on 6° curves the maximum grade (eastbound) was 0.16%. Vertical curves were introduced at summits and sags, the rate of change in grade being 0.1% and 0.05%, respectively.

Pusher grades were adopted at two points only and are quite short. The whole line between Moncton and Winnipeg (with the slight exception of short approaches to the Quebec Bridge on 1% grades) was definitely located with the

above mentioned very easy maximum grades. But 146 miles from Moncton, it was found that by the insertion of about 12½ miles of 1.1% grade adverse to eastbound traffic, a saving could be made of 17.2 miles in distance, nearly \$2,000,000 in construction and \$1,250,000 in capitalized operating value. At another point (in Quebec) 286 miles from Moncton, a similar grade 10 miles long, adverse to eastbound traffic, was found to effect a saving of 18.8 miles in distance, about \$500,000 in construction, and over \$750,000 in capitalized operating value. These possibly temporary grades were adopted with the corresponding saving in distance and cost. If the future traffic of the road justifies the expense, these two short links of standard grade can be built at any time.

In comparing rival routes, values based on assumed capitalized cost of maintenance and operation were given to savings in distance, curvature, and rise and fall as noted above. Owing to the locality traversed, artificial values for these, due to competition, seldom had to be considered. Distance was evaluated at \$6 to \$35 per ft., depending on amount saved and expected traffic; curvature at \$48 to \$80 (or more) per degree; and rise and fall at \$36 to \$700 per ft. on long maximum grades requiring the application of brakes in descending.

Throughout the 1800 miles between Moncton and Winnipeg the geographical characteristics, and consequently the engineering problems, varied greatly. The short rout across the broken topography of New Brunswick necessitated long stretches of maximum grade and development for distance, culminating on the slopes of the divide between the Miramichi and St. John Rivers. Even with a short pusher grade of 1.1% eventually adopted here, cost of construction was very heavy. This included a tunnel and 3918 ft. of viaduct, 193 ft. high, over the Little Salmon River. A pusher grade was also required to negotiate the summit between the St. Lawrence and Bay of Fundy waters, near the extreme northern corner of Maine. In southern Quebec, the line parallels the St. Lawrence River, 20 miles inland, before swinging north to where the substructure for the new Quebec Bridge is rapidly nearing completion. Just beyond, another great viaduct, 3000 ft. long and over 160 ft. high, was required to span the gulch of Cap Rouge. Three of the piers for this was sunk by pneumatic caisson, one to a depth of 55 ft. below high water.

LOCATION AND ROUTE NORTH OF THE ST. LAWRENCE.

Perhaps the most difficult problem confronting the locating engineers, on the whole eastern division, was to find a path through the forbidding range of hills loosely called the Laurentian Mountains, which forms the northern watershed of the St. Lawrence River. Some 80 miles west of Quebec city this range is abruptly cleft, enabling the St. Maurice River to carry south the accumulated drainage of 15,000 sq. miles. Three alternatives were proposed: 1, to develop a line up one of the more easterly streams until sufficient altitude should be attained to cross over into the St. Maurice valley and follow this to its upper waters; 2, to enter this valley at its lower end, cross it, and attempt to reach the hinterland by way of the Mattawin or Riviere aux Rats, two of its main tributaries from the west, or 3, to proceed further up the St. Lawrence, and pierce the Laurentian at some more westerly point, avoiding the precipitous cliffs of the St. Maurice.

All of these routes were explored. The third, apart from other objections, proved too long. The second and most direct was reported against on account of the excessive slope in the lower waters of the valleys explored, the difficulty of developing distance within their narrow confines, and the great cost of bridging

the lower St. Maurice. The approved route followed up the rivers Batiscan and Brochet, until a pass was reached overlooking the hamlet of La Tuque, at the head of navigation on the St. Maurice, where the latter turns from south-east to south. The descent was effected by fitting a two-mile horseshoe curve into a recession of the hillside.

Beyond La Tuque, the waters of the St. Maurice come down 80 miles from the old Hudson's Bay post at Weymontachene, dropping 700 ft. in a series of cataracts and turbulent rapids. Its course is fairly direct, except for a long detour to the north around the 16 miles of air line between the mouth of the Vermillion and CooCoo Cache. Four miles above La Tuque, the main river is bridged by six 140-ft. trusses, on concrete piers and the precipitous side hill is followed to Vermillion. Here, after repeated efforts, a circuitous route through the long granite ridge was located in CooCoo Cache, and the St. Maurice again followed to Weymontachene.

From Weymontachene to the Gatineau River, the obvious route appeared to be via the Ribbon River, but a 10-mile saving in distance was effected across from its mouth to its upper basin. However, this involved two semi-loops, a 100,000 yd. summit cut and several others of slightly less magnitude. The first preliminary west of the Ribbon struck far to the north, via Haircutting Lake, avoiding the Gatineau valley altogether. Later the east branch of this was crossed and the sinuous line between interlacing waters of the St. Maurice and Gatineau roughly followed to where it intersects the height of land, 50 miles beyond.

Innumerable lakes and creek expansions, separated by irregular ridges of sand and boulders, covered with jack-pine, here constitute the outstanding features of the topography. So intricately interwoven are these, that the country had to be criss-crossed with lines for a width of 20 miles before a satisfactory alignment could be obtained, with a profile showing only moderately heavy work. Similar conditions prevailed for a further distance of 25 miles to the Atik River, which was followed to its junction with the Megiskan, a branch of the great Nottaway. This region was the most inaccessible and least known on the whole line, and will be the last to be completed.

While the St. Maurice valley was being explored from the Quebec end, engineers sent north from Ottawa, North Bay and western points, had made the unexpected discovery that the country beyond the height of land presented far fewer difficulties than that draining into the St. Lawrence. Accordingly, late in 1905 the route south of Lake Abitibi was abandoned.

The actual height of land is crossed three times in northern Quebec, and twice in northern Ontario, with elevations above mean tidewater of 1500, 1070, 1075, 1120 and 1260, respectively. At all of these points except the most westerly, the work is light. From the Megiskan River to Lake Nipigon, occurs a vast spruce-covered plain, of which the soil is a deep agricultural clay, interspersed with a few sand ridges and isolated outcrops of rock, and covered in many places by from 1 to 10 ft. of muskeg. That part east of Lake Abitibi (a shallow and muddy expansion of the Abitibi River, 400 sq. miles in extent) is intersected by the sluggish waters at the sources of the Nottaway and Harricanaw Rivers. The western portion, on the other hand, is drained by swift flowing branches of the Moose and Albany Rivers, so numerous as to require a bridge on an average every sixth mile, not counting arch culverts up to 30 ft. span. These show on the profile as deep gulches, separated (except for an occasional long shallow cut) by mile after

mile of surface line within a few feet of subgrade.

The alignment throughout this section is exceptionally direct. For 250 miles westerly from Lake Abitibi, the length of preliminary location exceeded the air line by less than 4%; it contained only six curves of 3° and none over 3°. The first G.T.P.R. reconnaissance, run in 1903, between the Kenogami and Missinabi Rivers, was a straight line 115 miles long. On final location some of the very long tangents were broken up to obtain more favorable river crossings, but several stretches of 16 to 18 miles were retained.

North of Lake Nipigon, granite ridges alternate with flat stretches of muskeg and clay. These latter occur with decreasing frequency as the line crosses the height of land for the last time to enter the rock-ribbed and unproductive wilderness which forms the barrier separating the farm lands of eastern Canada from the prairies. With the exception of a short tract of indifferent agricultural soil, between Lost Lake and the Wabigoon River, the country is barren and desolate, much of it having been denuded even of its original growth of stunted spruce.

An enormous number of irregular bodies of water lie scattered over its surface, many of them with shores deeply indented, and buttressed by rugged cliffs. In the vicinity of Onamakawash Lake, along Canyon Lake, and on both sides of the Winnipeg River, the rock cuts were exceptionally heavy. Embankments of even larger size had also to be made of rock borrow and train-hauled material. Corresponding conditions prevail along the line of the C.P.R., and repeated surveys showed that no improvement could be effected by adopting a still more northerly route. The last 50 miles into Winnipeg is, for the most part, through settled prairie country. By crossing and keeping south of the C.P.R., the worst portion of the deep Julius muskeg, which required years to fill, was avoided.

CONSTRUCTION WORK.

Actual construction began in the spring of 1906, contracts having been signed for the building of 150 miles from Quebec west, and 245 miles from Winnipeg east. The latter portion was to a connection with the branch to Fort William (then under construction by the G.T.P.R.); thus giving a line from the wheat district to Lake Superior. From time to time additional sections were let, until by October, 1908, the whole line was under contract. Supplies for constructing the most easterly 850 miles were distributed from various points on the Intercolonial, Canadian Northern C.P.R. and other railways. The extreme western end was also easily accessible by steamer and short winter road from various points on the C.P.R. as far east as Dinorwic. The central portion was opened up east and west from La Tuque, the Timiskaming and Northern Ontario Ry., Lake Nipigon, and the Thunder Bay branch of the G.T. Pacific Ry.

Steel on the Quebec and Lake St. John branch was laid into La Tuque early in 1907. About the same time the T. & N. O. Ry. ran its first train into McDougall's Chutes at the head of navigation on the Black River, a tributary of the Abitibi. From here, two main transport routes were established. One extended upstream into Abitibi Lake. The other followed down the Black and Abitibi Rivers, to where the new line crossed the latter, beyond which a monorail tramway was constructed 8 miles across country to the Frederickhouse River. The tramway was operated by a platform truck having shafts attached to a pole at right angles to the rail. The horse thus walked alongside the car and rail, the car being guided on the rail by double-flanged wheels. A service of steamers and gasoline boats was established on each route, short stretches of light-rail tramway be-

ing built around the worst rapids. Push roads were also cut to provide winter communication. Later, when the T. & N. O. Ry. had extended its line 40 miles to a junction with the National Transcontinental Ry. (where the town of Cochrane now stands), the steel was laid east and west over the new grade, these routes were abandoned.

Meanwhile the G.T. Pacific Ry. had finished its branch from Fort William to Sioux Lookout, with a spur into Sturgeon Lake. This extended the field of operations, and gave impetus to that part required to connect Winnipeg with the Great Lakes. In the summer of 1908, a narrow gauge railway, 18 miles long, was constructed around the rapids of the Nipigon River, and before navigation closed that year, a considerable quantity of supplies had been distributed along the north shore of Lake Nipigon by steamers built for the purpose. In the following year an attempt was made to establish a similar transport route from Jackfish over the height of land, into Long Lake, and thence down the Kenogami River. This failed, owing to the inability to secure reasonable grades up the steep ascent from Lake Superior, except at prohibitive cost.

It was accordingly decided that the 350 miles between Cochrane and Lake Nipigon should be covered from either end. By Dec. 1910, 40 miles at the west end of this was graded and track laid for over 100 miles at the Cochrane end. Two months later a winter tote road was completed across the remaining distance, and sufficient supplies and outfit to grade all but a few cuts were distributed in log warehouses erected at intervals of about 20 miles.

GRADING.

As most of the work was of the lightest description, chiefly side casting, the construction plant consisted almost entirely of shovels and wheelbarrows, with a few tons of light rails, some car wheels and a load or two of explosives for loosening frozen clay, and breaking up boulders. This light work was practically finished by Oct., 1911, and up to the end of Feb., 1912, 20% of the balance of the excavation had been completed.

In the heavy rock districts work, of course, proceeded much more slowly. The usual methods of blasting were employed: 1, block holing, loading with dynamite and firing with time fuse, in the smaller cuts; 2, heavy springing, loading partly with black powder and discharging with battery in the larger cuts, or where it was desired to break up and waste several thousand cubic yards at once; 3, tunnel blasting, or "coyoting." For this latter work, the station man was usual paid per lineal foot for shafts and tunnels. In loading these, the high explosives were sometimes left in the case, but the blast was usually more effective if the cartridges were removed from the boxes. Frequently 6000 cu. yd. or more of rock were broken up by one of these blasts. Where the expense of bringing in cars and track was excessive, the shattered rock or muck was removed by stone boat on pole track, the poles being well iced in winter, or lubricated with black oil in summer.

Deep clay cuts in the Abitibi region were excavated with less expense in winter, as in summer horses could only travel in the greasy blue gumbo after the cuts (and often the fills as well) had been corduroyed. But in the winter, so long as the work progressed steadily, even in the coldest weather, the cut did not get time to freeze deeply in a single night, and the frozen top could be undermined or broken down with a few sticks of dynamite. A slight additional expense was incurred in winter by shovelling snow away from the base of the dump.

Much of the grading in New Brunswick and Quebec was performed with steam shovels having dippers of ½ yd. to 2½ yd. capacity. These were hauled

into the work in winter with their necessary complement of dinky engines, cars and track. Some of the smaller machines were similarly used in northern Ontario. Scrapers, both wheel and slush, were employed on the prairie section, and elsewhere generally for light sandy work, a few being sent in across Lake Nipigon. An elevating grader was tried in the Abitibi country, but was soon discarded, as the horses mired in the sticky clay.

SLIDES.

Slides were numerous throughout the clay belt. These occurred, to some extent, in the sides of cuts, which frequently required a slope of 1 on 2 or even flatter. Much more serious, however, were those which took place under deep fills and behind concrete abutments. At Brule Creek and the Okikodasik and South Rivers, heavy concrete structures on poles were moved bodily out of place, but the shifting from original position was not sufficient to prevent the erection of the steel superstructure after movement had stopped. In some instances it appeared probable that pressure behind the concrete had deflected the piles laterally through the yielding clay; in others, that the slip had occurred on an inclined plane below the level of the foundations.

At the little Mistongo, a long 6-ft concrete arch was built on pile foundation, and the deep gully bridged by a light trestle, from which material excavated in an adjoining cut was dumped. Some of this, in wet weather, simply flowed away in a river of mud. After several slides had occurred, which broke up and buried the culvert, sweeping three or four trestles in succession down the slope, the fill was completed in winter, a large square box culvert of heavy timber being built to replace the arch culvert. With the freshet, the embankment again settled, and a small lake formed on the upstream side, from the middle of which protruded one end of the timber culvert, standing upright. Continuous filling at length brought the embankment up to grade, the water being at first pumped and siphoned over the top, and later carried of through a reinforced concrete pipe built permanently through the bank and having a long extension at the downstream end.

BRIDGES AND CULVERTS.

On completion of the main surveys, small parties were sent over the line with instructions to take soundings where any openings were to be left. A light boring machine was used, by which casing pipe screwed together in sections was forced down through the river bed, and the core broken up with the drill, and removed by means of a rope attached to a short tube with ball valve. At the Manuan River, this machine was set on the ice, and the casing driven by an improvised pile driver, consisting of a section of green birch for hammer, working between leads and operated by transport dogs. When the ice went out the machine was transferred to a raft, and the dogs harnessed to the spokes of a windlass. By this contrivance, pipes were driven through 50 ft. of hard compacted sand.

The treacherous soil of the clay belt was the cause of a great deal of trouble in securing stable foundations, especially when attempting to excavate in mid-stream. A coffer-dam for the main pier of the Abitibi bridge, consisting of 4 ft. of puddle, between an outer row of 12-in. ordinary sheet piling, and an inner row of Wakefield sheet piling, 18 in. wide, failed to prove watertight. Eventually a continuous lining of steel sheet piles was driven around the inside and left in the work. The cofferdam was then partly unwatered, and material squeezed up by the foundation piles excavated with an orange-peel bucket to slightly below the river bed. Concrete for this pier was laid in mid-winter, much of it under

water, being prevented from freezing by the injection of steam. Fig. 4 and 5 show work at this pier. A cofferdam of sand bags at the Mattagami was used, with indifferent success.

When possible, long spans were used to avoid foundations in midstream where clay was encountered in the river bed. For shore foundation pits, round logs were generally used to prevent caving in, as sawn lumber was expensive or unprocurable where such pits were dug ahead of the steel. Trestles of unsquared timber were erected at most of the openings where a bridge or culvert was required. They were constructed of the largest timber in the vicinity, irrespective of variety, even cottonwood being used. For the longer stringers, however, British Columbia fir was imported. These trestles were of the most temporary character, and in a few cases failed to withstand the impact of outgoing ice during the spring freshets. They served, however, to push the track ahead, so that steel and cement could be brought in for the permanent structures.

Concrete was almost universally employed for substructures. This was partly owing to the absence of a good quarrying stone, but more largely to the scarcity of skilled stone cutters and masons.

There will be about 240 steel bridges and viaducts, or a total length of 11 miles, and aggregating 61,000 tons. Of this amount, 52,000 tons have been erected or are under construction, leaving about 9,000 tons to be let. The greater part of this will be erected in 1912 and the balance in 1913. The maximum single span is 300 ft., and the Winnipeg River bridge, is an example of these 300 ft. truss spans. Steel viaducts are built with 40 ft. towers and 60 ft. intermediate spans. The viaduct over the Mistongo River (Abitibi region), is typical of these structures. All bridges are designed according to Dominion government specifications; engine loading, class "heavy," weight 180 tons, 49,400 lb. on each pair of drivers. Plate girder spans, both through and deck, are used up to a length of 100 ft. Bridge lettings are generally given early in the year and cover the required erection for the same year, depending on the concrete being completed and track reaching the bridge site. Upon these conditions the time of completion depends. For transportation, construction rates are given bridge companies over lines under construction, on a ton-mile basis. Bridge companies are furnished with drawings and weights of steel, so all can bid under the same conditions. All steel contracts are for a pound price erected, and a unit price for timber in floor.

TRACK AND TRACKLAYING.

The track is laid with 80 lb. rails of Am. Soc. C.E. section, 33 ft. long, with four bolt angle-bar joints. There are 3,000 ties per mile, 18 ties per rail on

in the summer, but when this melted, a lot of repairing and shimming was required to render the line safe for material and surfacing trains.

Throughout Jan., 1912, tracklaying was continued west of the Nagagami River at the rate of one-third mile per day, with the thermometer often 40° below zero, and seldom above 5° below. Under favorable conditions, two miles of track a day was often laid for short periods, but temporary interruptions usually brought the average down below one mile a day.

TELEGRAPH.

The telegraph line is being built at the same time as the railway. It provides for an ultimate capacity of 12 wires, although only two wires are now being erected.

PROGRESS AND DELAYS.

It was hoped the entire railway would be completed in six years. Progress, however, on that portion to which access could be had only from either end, was continually interrupted by delay in getting out some large cut, failure of a temporary structure, development of sink holes, or other unforeseen cause. Throughout part of northern Ontario and Quebec, no supplies could be moved except in winter, by reason of the extensive prevalence of clay and muskegs, over which horses could not travel. In other localities, such as those served by Lakes Nipigon, Sturgeon and, to a less extent, Abitibi, contractors were dependent for transport on the season of open navigation. Frequently it was essential to have supplies conveyed part way by steamer and part by winter road.

Failure to foresee and make provision for what should be required months, or even a year ahead, meant serious loss. Uncertainty regarding the duration of the seasons had to be allowed for also. In 1907 there was a 2 ft. depth of snow in the Kenogami district on June 1, and the ice in Lake Nipigon did not break up until June 16; whereas on another occasion snow had disappeared from long stretches of the tote roads (running east from Cochrane and Matheson) before the end of March. Navigation could not generally be relied on after about Oct. 20 on many of the waterways traversed. Toward the close of one of the busiest seasons on Lake Nipigon, both steamboats operating on this route went aground within a fortnight of each other, in consequence of which large quantities of essential supplies were not delivered until late in the winter. During the excessively dry summers of 1909 and 1910, disastrous forest fires swept over the country. These did enormous damage along the line north of the height of land, burning up contractors' camps, warehouses and plant, and putting a stop to the work in many localities.

Scarcity of labor, and time lost in replacing men who quit, was an ever pres-

ward from Moncton, except for a short distance in southern Quebec, and the yet unbridged St. Lawrence.

Another stretch of track extends east and west of Cochrane, covering 330 miles of the clay belt. This leaves a gap of 150 miles in northern Quebec and another of 240 miles in northern Ontario. Across the former, contractors were putting in supplies last winter, but except for the most easterly 10 miles, which is partly constructed, no grading has yet been done. Throughout the latter, however, only a small amount of excavation and some temporary trestles remain to be completed, on which work is being rushed, so as not to delay the "pioneers" of the tracklaying gangs working from either end. These are expected to meet not later than the end of the present year, giving through connection by way of the T. & N. O. Ry. between the cities of eastern Canada and the wheat fields of the West.

Across New Brunswick, east and west of Quebec city, for about 100 miles out of Cochrane, and between Winnipeg and Superior Junction, train filling, surfacing and ballasting are finished steel bridges are in place; water tanks, stations and section houses built, or under construction; telegraph line strung, and the line practically ready for operation. Division yards are located at an average of 120 miles apart, and the grading and the work on engine houses and other necessary structures for these are well advanced, at all except three of the yards. Sidings are provided about seven miles apart, with a water tank at every third siding.

While the whole country west of the settled part of Quebec was a wilderness six years ago, thriving towns have since grown up at La Tuque, Cochrane, Hearst and Graham. All of these are actual or prospective junction points with other railways and all in the midst of vast pulp-producing forests. La Tuque has the enormous undeveloped water powers of the St. Maurice River behind it, and Cochrane and Hearst are destined to be the market towns for the future farms of the clay belt.

PROGRESS REPORTS ON CONSTRUCTION.

In order to keep check on the rate of progress of the work D. MacPherson, the Assistant to the Chairman introduced percentage forms of reports, being modifications and extensions of somewhat similar forms in use on the C.P.R. The form shown in fig. 3 is returned monthly to the Assistant to the Chairman by the division engineers, through the district engineers, and it is then graphically plotted on a diagram, a portion of which is shown in fig. 4. This shows not only the percentage done during the month on grading, ballasting, and all other items of construction, but also shows the percentage done to date under each of these headings and the

THE COMMISSIONERS OF THE TRANSCONTINENTAL RAILWAY.

Contract No.	District.	Contractor.				
Percentage Report of Work Done, Month Ending			191.....			
Division No. from Mile. to Mile.						
Class of work.	Percentage done in month.	Percentage done to date.	Cost of work done during month	Cost of work done to date.	Approximate estimate of total cost of work.	Brief description of work done.
Grading						
Tracklaying						

Fig. 3. Headings of Monthly Progress Report.

tangents and 20 on curves. By far the greater part of the ties cut for the line are of jack-pine; tamarack, hemlock, cedar and spruce are used in lesser quantities. Both single and double boom "pioneer cars" were used in tracklaying work. Tracklaying was sometimes carried on throughout the winter, the snow being in some cases shovelled or ploughed off the grade, or simply tramped down sufficiently not to impede the "tie-buckers." Finally snow packed about the ties was found to make a much firmer and more even skeleton track than that laid

ent cause of delay. By far the greater part of the grading was sublet to "station men," who frequently "jumped" if they found themselves going behind with their work. Prices, however, were high, and in most cases, covered the extra cost of pushing the work in the face of unfavorable conditions.

The undertaking has now progressed to such a point that it is reasonably certain trains will be running across the whole eastern division sometime in 1914. The track is already laid 355 miles eastward from Winnipeg and 750 miles west-

percentage done of the whole work in each main contract. This form of report has been found invaluable as an aid in answering requests for information from the government and for compiling the annual reports.

The form of progress report on construction is a sheet 14 in. wide and 17 in. high, divided into seven vertical columns, with headings as follows: 1, class of work; 2, percentage done in month; 3, percentage done to date; 4, cost of work done during month; 5, cost of work done to date; 6, approximate estimate of total

cost of work; 7, brief description of work done. The itemized classes of work in the first column are as follows: 1, grading; 2, tracklaying; 3, ballasting; 4, trestles, culverts and small waterways; 5, permanent bridge substructures; 6, tunnels; 7, fencing; 8, water service; 9, telegraph line; 10, sundry; 11, important individual pieces of work included in the above items, but for which detail percentages are desirable; 12, engine houses, 13, buildings, (stations, section houses, tool houses, trainmen's houses, freight sheds, store houses, ice houses, coaling plants, cinder hoists); 14, advances and deductions; 15, extra work orders.

The percentages are of the total am-

water. The distance from Winnipeg to Quebec via C.P.R. to Fort William, and lake, canal and St. Lawrence River to Quebec is 1,771 miles, involving five transshipments of wheat. The distance on the National Transcontinental Ry. will be 1,351 miles, and, as the maximum east-bound grade is 0.04%, compensated for curvature, a Mallet articulated compound is capable of hauling, on this grade, a gross load behind the tender of 4,290 tons. Assuming the tare 33½% of gross load, the net paying load would be 2,860 tons, equal to 95,333 bush. of wheat, in one train. Assuming the earnings of such trains to be \$4.40 a train mile, or exactly double the earnings of the C.P.R.

Cape Breton Coal, Iron and Railway Company, Ltd.

This company offered recently for subscription in London, Eng., £300,000 sterling 6% first mortgage gold bonds at £98 per £100 bond with a bonus of one share of \$100 for each bond. The prospectus shows that the authorized bond issue is as follows:— 6% 1st mortgage gold bonds, £410,900; 5% income bonds (of which \$921,000 are issued) \$2,000,000. The capital is \$5,000,000, of which 40,000 shares of \$100 each are issued, or agreed to be issued, as fully paid.

The company was incorporated in

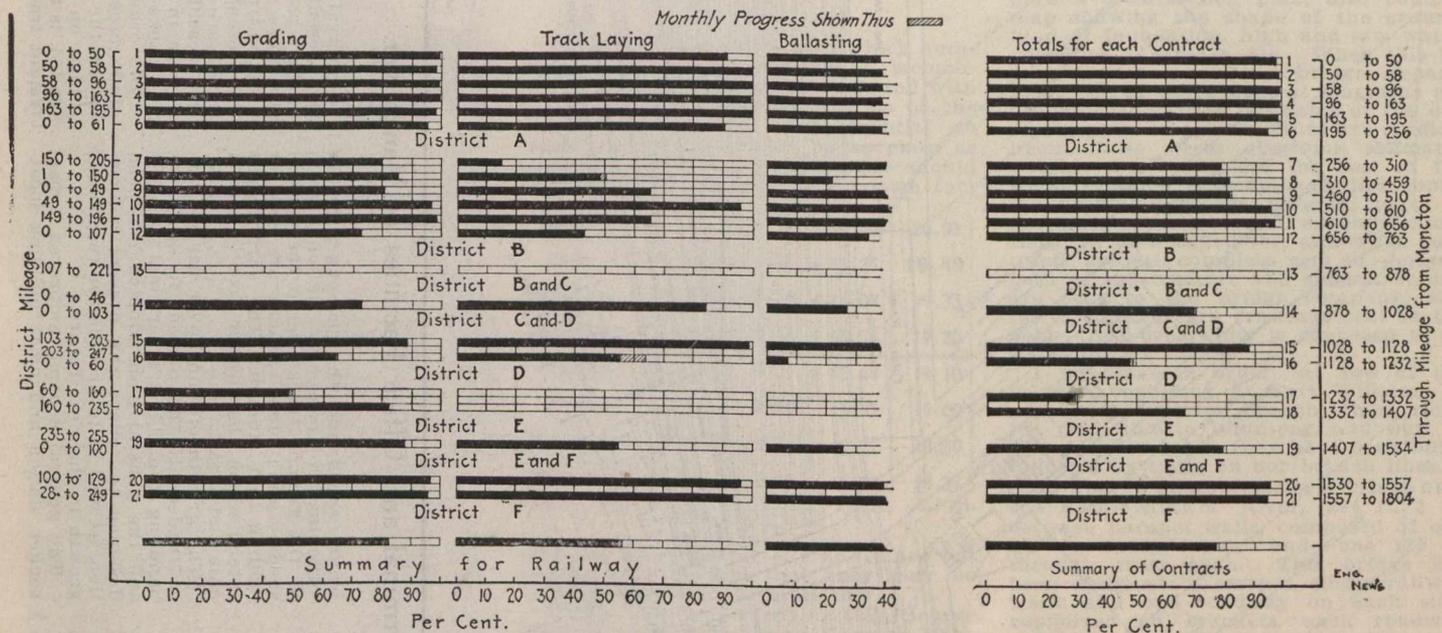


Fig. 4. Portion of Progress Diagram, National Transcontinental Railway.

(The cut shows only the first three and the last of the several classes of work on the entire diagram.)

ount of work done on the division (including individual works shown in detail, if any), and they represent the percentage of money value of work done. For tracklaying, ballasting, fencing and telegraph line, the percentage columns must be filled in on this basis, and also the total number of miles completed must be given in the last column (brief description).

The engineering organization consists of a Chief Engineer, G. Grant; assistant Chief Engineer; Bridge Engineer, R. F. Uniacke; district engineers (each in charge of a district 250 to 400 miles long) division engineers (in charge of 40 to 50 miles), resident engineers (in charge of 10 to 15 miles). The Chairman of the National Transcontinental Railway Commission is R. W. Leonard.

FREIGHT TRANSPORTATION FACILITIES AND ADVANTAGES.

The originally estimated distance of 1,900 miles between Moncton and Winnipeg has been reduced gradually by repeated revisions of location at various points to a distance of 1,804.8 miles. This distance is 261 miles less than the shortest distance over any other combined railways between Moncton and Winnipeg. The distance between Winnipeg and Quebec will be 1,351 miles, which is 223 miles shorter than the C.P.R., and the grades are so much more favorable that engines of equal capacity should haul nearly twice the load on the new line that they can on the latter.

Mr. MacPherson points out that transportation of grain by water has always been much cheaper than by rail, but the latter has been slowly and surely cheapening until the present time, when the easy gradients and tremendously powerful locomotives of modern lines will make a combination on land difficult to excel (or peradventure to equal) on

freight train miles for 1908, the cost per bushel over the 1,351 miles between Winnipeg and Quebec is bound to be 4.25c. The lowest rate that has been in force from Fort William to Montreal, via the lake, canal and St. Lawrence River, a distance of 1,216 miles, is believed to have been 4c. per bush. in 1908. This rate for 1,216 miles would be equivalent to 4.44c. for 1,351 miles, so that, at \$4.40 per train mile, the engines above referred to could haul grain on the National Transcontinental Ry. eastbound from Winnipeg to Quebec for 0.19c. per bush. cheaper than the cheapest existing water route could haul it the same distance, and 10.86c. per bush cheaper than the present combined rail and water rates between the two points in question; in brief, at about 25% of the present rail and water rate. It would appear, therefore, that the days of the absolute supremacy of water transportation are in danger of at least a partial eclipse.

The foregoing, reproduced from Engineering News, was compiled mainly from information furnished by D. MacPherson, M. Can. Soc. C.E., Assistant to the Chairman N.T.R. Commission, which included a detailed statement, prepared at Mr. MacPherson's instance, by Karl Weatherbee, one of the assistant district engineers.

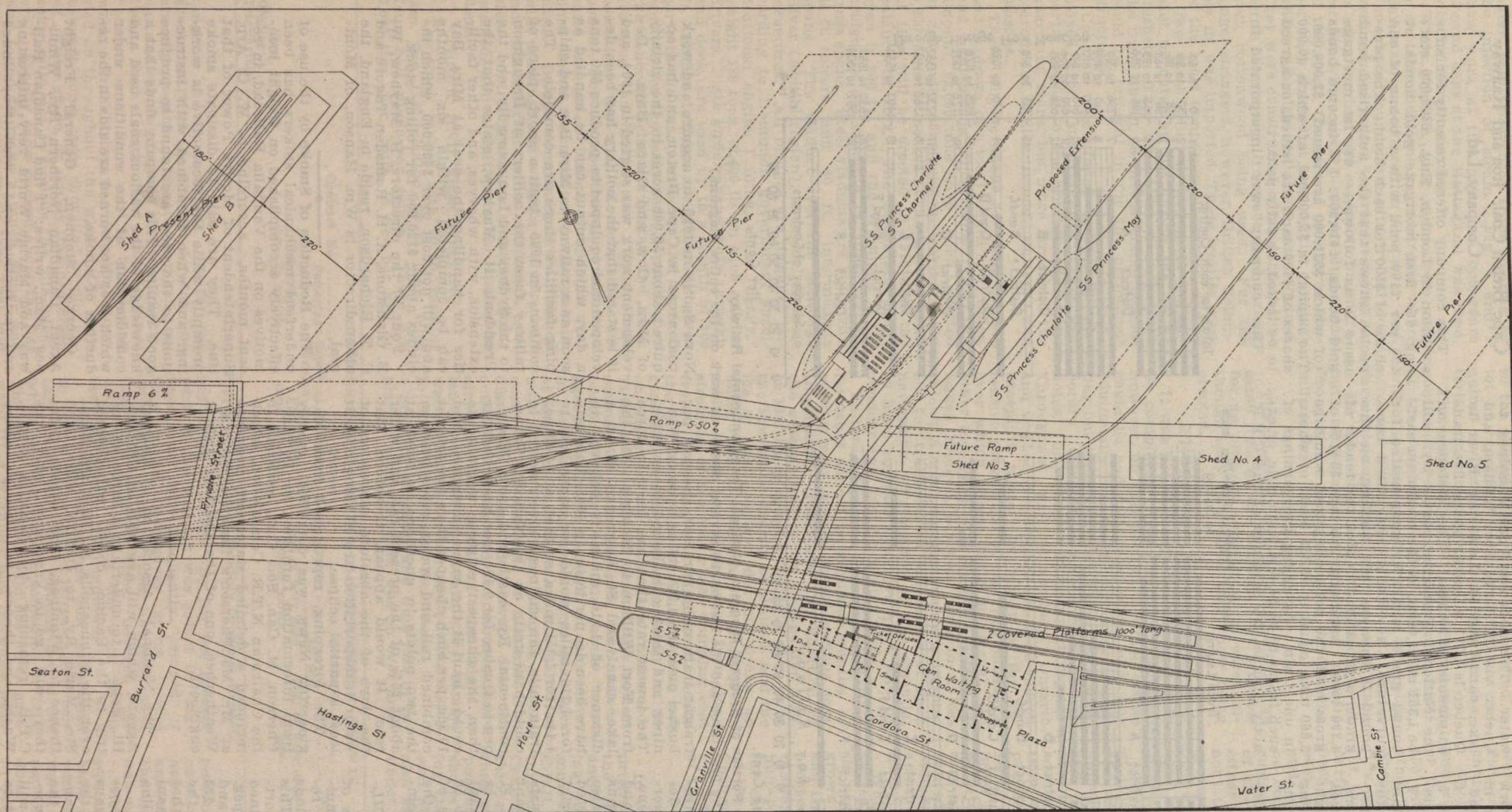
The National Association of Railway Agents, which will assemble at Chicago, Ill., Sept. 7, to undertake a three weeks' trip to the Pacific coast, will proceed over the Minneapolis, St. Paul and Sault Ste. Marie Ry., to Duluth, Minn., and thence to Winnipeg, from which point they will go to Vancouver over the C.P.R., returning by boat to Seattle, Wash., and thence to Chicago, where they will disperse.

Nova Scotia in 1895, to acquire and work coal areas in Cape Breton, and has acquired about 50,000 acres in the vicinity of Mira, Cow, and Glace Bays. Development work was started in 1904, and it is stated that the colliery has been developed and equipped to produce 500 tons a day, which output can be handled as soon as a railway to Mira Bay and shipping facilities there are complete. The company in 1905 built a short piece of railway from the colliery at Broughton to the Sydney and Louisburg Ry. and the President, H. Mayhew, states that the extension, with wharves, and other facilities for handling the coal at Mira Bay can be completed within six months and will not cost over \$400,000, which includes about \$120,000 for rolling stock.

Four of the directors, H. Mayhew, W. B. Gladstone, A. H. Ramsden-Tagore and C. T. Richardson, reside in England, the other director is Wm. Hanson, of Montreal.

The Reduction of Smoke by the use of underfeed mechanical stokers has been effectively accomplished on freight locomotives on the Vandalia Railroad, in recent months, according to W. C. Arp, Superintendent of Motive Power of that line. They are said to dissipate smoke promptly while the locomotive is working, and when combined with instructions to the crew are found to produce good results. This company finds that a knowledge of the various coals used and consideration of the conditions under which they are burned are aids in the reduction of smoke.

George Stephen, General Freight Agent, Canadian Northern Ry., Winnipeg, Man., writes: "I find Canadian Railway and Marine World very interesting and instructive and wish it continued success."



Canadian Pacific Railway Passenger Terminal and Office Facilities at Vancouver.

The last issue of Canadian Railway and Marine World contained a description of the improvements which have been started on the C.P.R. passenger terminal at Vancouver, B.C. The late date at which the official information reached this office rendered it impossible to have an engraving made in time for that issue so that the description alone could be published. The plan is given on this page and so that it may be thoroughly understood a portion of the description is repeated below:—

The present passenger station, which is located at the foot of Granville St., near the shore line of Burrard Inlet, was

built about 14 years ago, and except for minor alterations, is unchanged from its original plan. The general waiting room and ticket offices are at the street level, and the baggage room is on the track level, which is about 30 feet below the street.

Along the water front across the local freight yard tracks are located the steamship wharves. There are two large sheds on a jetty pier of recent construction used by the C.P.R. trans Pacific steamship lines; also five sheds adjoining the longitudinal wharves used by the C.P.R. Victoria, Seattle, Alaska and other steamship lines. Between the

wharf sheds and the passenger tracks adjoining the passenger station certain of the freight tracks serve the several sheds, and other tracks are used for drilling and storage. The yard tracks extend along the harbor front about a mile and a half.

The growth of Vancouver has rendered inadequate the present facilities for handling the C.P.R.'s terminal business and the general plan adopted has been designed to relieve the present congestion, as well as to provide for reasonable growth in the near future.

The general scheme embraces a passenger station and office building locat-

ed on available land immediately east of the present passenger station. There will be four passenger tracks, with provision for more when required, separated by wide platforms, between the station and the present freight yard. The passenger tracks are to be raised about 5 ft. above the present track level to reduce the difference in level between the street and the tracks to about 25 ft.

In order to avoid an inconvenient grade crossing and delays to traffic between the city and steamship wharf a bridge on the line of Granville St. extended, is to pass over the passenger and freight tracks to the steamship pier and

connect directly with passenger accommodations on the pier. An incline is also to be built leading from the west side of this bridge to the wharf, giving access to the lower deck of the pier and freight sheds and the water front. Another viaduct over the tracks is to be built on the line of Burrard St. extended northerly, with an incline giving access to the present trans Pacific pier and other portions of the water front.

The main entrance of the passenger station will be on Cordova St. with the main waiting room located centrally in the station on the street level. Ticket offices serving the several classes of railway and steamship passengers will be located at one end of the waiting room, and the baggage checking room, luncheon and dining room, parcel room, women's waiting room, men's smoking room, news booth, information booth and other facilities will be all placed immediately adjoining the main waiting room.

On the lower floors of the station will be the baggage rooms, express company's space, immigrants' rooms, supply rooms, and other station facilities not directly used by passengers. Stairways and lifts will connect the two levels of the station and also afford communication with the office floor above. A separate foot bridge will be carried over the passenger tracks directly connected with the waiting room at one end and with stairways leading to the track level giving access to platforms without crossing tracks at grade. The track platforms will be 1,000 ft. long, and will be covered with shelter sheds of the umbrella type. The platform adjoining the station will be used only for baggage express and supplies.

Above the public rooms of the station building the space will be devoted to the company's offices. The interior arrangement of the office space will be adapted for a unit system of sub-division; that is, each panel will have heating and lighting facilities so that partitions may be placed or removed at will in order to provide for changes in arrangement of office accommodations which may be desired from time to time.

The proposed steamship station on the pier will be a two level building, the upper floor being devoted to the passenger business and offices and the lower floor to freight, baggage and express. There will be double level gangways on the west side of the pier, which will be used for the Victoria and Seattle service, the lower gangway being used for freight and the upper for passengers; these gangways to be supported on floating pontoons to maintain the landing at a constant level with respect to the boats. On the passenger or upper level of the pier will be waiting rooms, ticket offices, baggage checking room, customs office and other conveniences. Separate

at Vancouver are unusual as compared with other large terminals on account of the absence of suburban business. The aggregate number of trains is not large, but they are long and frequently are run in several sections and contain a number of classes of traffic.

The designs for the terminal have been prepared by Westinghouse, Church, Kerr and Co., in co-operation with C.P.R. officials, and the construction of the station and facilities is being carried out by the same organization.

Improved Design of Numbers for Headlights, Etc., on the C.P.R.

Owing to the rapidity with which numbers on locomotive headlights, locomotives, cars, etc., have to be read, and with all kinds of varying lights, it is of the utmost importance, and essential to safety, that they should be as plain as possible, and that all similarities should be got rid of. It is a well known fact

Ibsen	.....		f 9 58	16 40	20.03
Lang	.....	FN	s 9 43	16.25	19 49
Milestone	.....	WMI	s 9 25	16 08	19.33
Corinne	.....	NI	f 9 13	f 15.55	19.20
Wilcox	.....	CO	s 9 01	s 15 44	19 10
Diana	.....		8 50	15 33	19 00
Rouleau	.....	..WOA	s 8.38	s 15 22	18.50
Pitman	.....		f 8.25	15.08	18.37

Section of Working Time Table, C.P.R. Western Lines.

that the usual figures 3, 6 and 8 are not very distinctive and that they may be easily mistaken for one another.

With a view to remedying this, George Bury, Vice President and General Manager, Western Lines, C.P.R., has designed a series of letters which are certainly a great improvement on the ordinary ones and which it would be very difficult to mistake, as they appear to remove all possibility of error, the long loops in the 3's and 6's having been got rid of, while the difference between 5 and 6 has been made more marked.

The accompanying drawing shows the letters Mr. Bury has designed, which are being used on locomotive headlights and in working time tables on the Western Lines. A facsimile is also given of a section of a working time table, so that the figures may be compared with the ordinary ones.

It is probable that the new figures will also be used for locomotive cabs and tenders and for cars, and they may be adopted for the whole C.P.R. system.

Steel Bridges on the Grand Trunk Pacific Railway.

By J. G. Le Grand, Bridge Engineer, G.T.P.R.

Our bridges are designed in accordance with the specifications of the Department of Railways and Canals, to carry a live load to correspond to class "heavy" of the said specifications, viz., a moving load composed of two 180 ton compound engines followed by a train estimated at 4,750 lbs. per lineal foot of track.

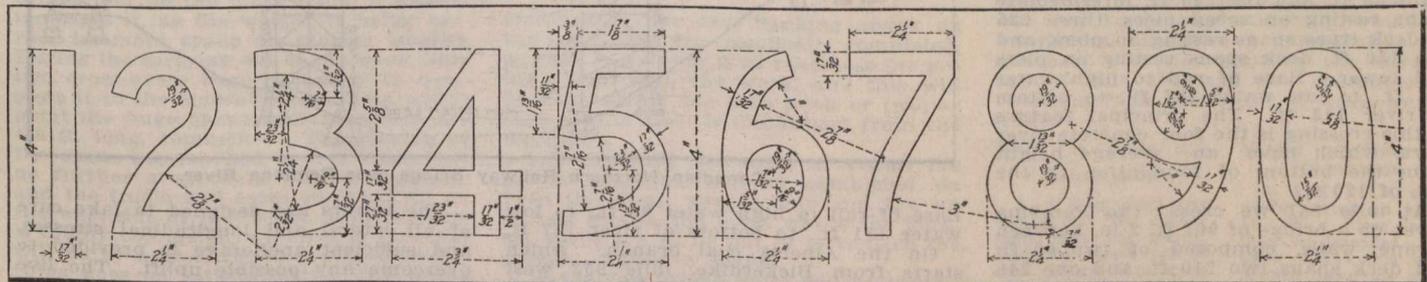
The story of a bridge can be summarized as follows:—Study of the crossing at site by the field engineers, who prepare a cross-section plan, also contour map showing the shape of the ground, kind of foundation, high and low water, velocities of stream, etc. When this information reaches the bridge department one or more general diagrams are prepared and stress diagrams of the different parts of the structure are studied. From these stress diagrams estimated weights are made and the cost of the whole crossing is computed; then comes the designing of the different parts of the substructure and superstructure. Bids are then called for, and when contracts are let complete sets of designs, both of substructure and superstructure, are sent to the bridge company, and set of substructure drawings sent to the field—then everything is supposed to go smoothly.

I will take in order a few of the bridges, beginning at Fort William, on our Lake Superior branch, then along the main line to Winnipeg, and west of Winnipeg as far as they have been built, followed by those on our branch lines.

At Fort William we have a bridge over the Kaministikwia River, 394 ft. 3 in. between parapet walls, composed of one 258 ft. swing span and one 125 ft. through truss span. This bridge has been designed to carry a single railway track and one roadway on each side, supported on brackets, each roadway capable of carrying an electric track. The distance from base of rail to water line is 33 ft., to the bottom of river 56 ft., and to rock line 95 ft. The principal feature of this bridge is that the centre pier has been carried down to rock line through a steel cofferdam 38 ft. in diameter and 63 ft. deep. This, I understand, sets a record for foundation made through open cofferdam under water. The pier between the swing span and the fixed span is composed of two twin cylinders 15 ft. in diameter, resting on two steel cofferdams 18 ft. in diameter, filled with concrete, and 65 ft. deep.

The next steel bridge on the Lake Superior branch, at the crossing of the Dog River, is 254 ft. long, composed of two 125 ft. deck spans and temporary wooden trestle on each end. Base of rail to high water is 39 ft., to low water 45 ft., and to river bottom 51 ft.

We next cross the Winnipeg River at



Locomotive Headlight Numbers used on C.P.R. Western Lines.

rooms will be provided for outgoing and incoming passengers. Two tracks will be placed on the surface of the pier within the shed, and one track on the outside of the building for the direct handling of freight between cars and steamers.

The essence of the general design has been to secure easy lines of communication between the railway trains, steamers and the city. The traffic conditions

The Huntsville, Lake of Bays and Lake Simcoe Navigation Co. is having an engine for one of its vessels compounded at the Polson Iron Works, Toronto.

The Dominion Government s.s. La Canadienne, which broke through the lock gates of the Welland canal at Port Colborne, June 20, was docked at Port Dalhousie for the repairing of two holes which were punched in her hull.

Minaki with a bridge about 410 ft. long, composed of one 300 ft. through span and one 100 ft. deck girder span. Base of rail to high water is 29 ft., to low water 33 ft., to river bottom 79 ft., which means about 50 ft. of water at high water.

Next we have a bridge over the Assiniboine River at Winnipeg, 468 ft. 8 in. between parapet walls, composed of one

44 ft. through girder span, four 80 ft. deck spans, and one 90 ft. lift span trunnion type. This bridge is designed for a double track. Base of rail to high water 15 ft., to low water 43 ft., to bottom of river 56 ft., and to rock 63 ft.

Our first steel bridge west of Winnipeg, on the main line, at mile 45, over the Assiniboine River, is 437 ft. 2 in. inside of parapet walls, composed of one 250 ft. through truss span and one 88 ft. through plate girder span at each end. Base of rail to high water 13 ft., to low water 22 ft., and to river bottom 34 ft.

We also cross the Assiniboine River at mile 203. This crossing is 255 ft. in-

On the same mile we cross the McLeod River with a bridge of 1,066 ft. 11 in. between parapet walls, composed of two 70 ft. end deck spans, four 210 ft. deck truss spans, two 40 ft. tower spans resting on two steel towers, one river span 80 ft. high and abutments. Base of rail to high water 107 ft., to low water 118 ft., to bottom of river about 122 ft.

At mile 930 we cross the valley of Prairie Creek with a bridge 802 ft. 2 in. between parapet walls, composed of two 70 ft. end deck spans, three 70 ft. and nine 50 ft. intermediate deck spans resting on six towers, one bent and two abutments. Base of rail to high water

river at miles 24.5 and 35.5 with similar spans. At mile 34 we again cross this river with a 66-ft. through plate girder span. Base of rail to high water 8 ft., to low water 13 ft., to bottom of river 15 ft.

On our main line from Prince Rupert east we have one bridge crossing the Zanardi Rapids at mile 8, 658 ft. 4 in. between parapet walls, composed of three 55-ft. through plate girder spans, two 125-ft. and one 225-ft. through truss spans. Base of rail to high water which is the highest tide, 7 ft. 6 in.; to low water 32 ft. 6 in., to bottom of river 43 ft. 6 in.

Outside of the above bridges, which are now complete, we have under construction or study about 40 more, one of the most important, now actually under construction, being at mile 164, Prince Rupert east, over the Skeena River.

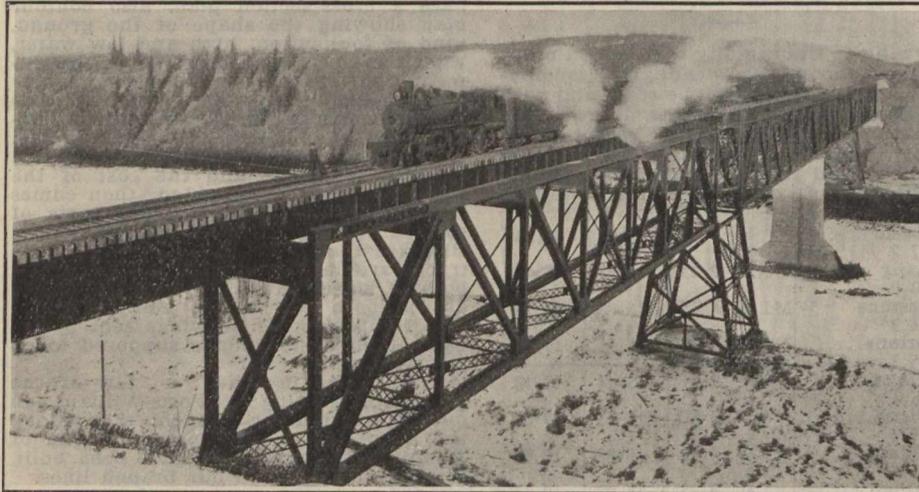
The foregoing paper was read before the Western Canada Railway Club recently.

The Canadian Northern Railway Bridge Over the Pembina River, Alta.

The route selected for the extension of the C.N.R. westward from Edmonton, Alta., towards the Yellowhead Pass, involves the construction of a couple of rather heavy bridges over the Pembina and McLeod Rivers, as these streams have eroded their channels far below the general level of the country. At the Pembina River the banks rise steeply from the water's edge without the usual river flats intervening between the channel and the terraced benches so often seen in deep river valleys; the absence of river flats at the Pembina River thus reducing the length necessary to be bridged.

The total length of steel work is 780 ft. 8 ins., the approach at the east end being 28 bents of the C.N.R. standard framed timber trestle 68 ft. in height. The river span is 216 ft. long, supported on steel towers on concrete pedestals, the span of these towers being 60 ft. The east and west flanking spans are respectively 162 and 135 ft. long, and the western approach is of viaduct construction.

The three truss spans are of the Pratt type, with rivetted connections, the panel spacing being uniformly 27 ft., the trusses are spaced 17½ ft., c. to c., and the depth of trusses is 36 ft. from centre to centre of chords. The floor beams rest on the top of the upper chord with bracket connections to chord at ends of floor beams.



Grand Trunk Pacific Ry. Bridge over McLeod River, 914 miles West of Winnipeg.

side of parapet walls, and is composed of one 250 ft. through truss span. Base of rail to high water 8 ft., to low water 20 ft., to river bottom 30 ft.

At mile 468 we cross the South Saskatchewan River near Saskatoon with a bridge of 1,501 ft. inside of parapet walls, composed of one 175 ft. through truss span, five 225 ft. deck truss spans, one 125 ft. deck truss span, and one 50 ft. deck span. Base of rail to high water 52 ft., to low water 71 ft., to river bottom 75 ft.

At mile 675 we cross the big Battle River valley with a steel viaduct of 2,772 ft., and wooden trestle of 2,600 ft. The steel structure is composed of fifty-one 50 ft. deck spans, one 70 ft. deck span, and one 150 ft. deck truss span, resting on 26 steel towers and two abutments. Base of rail to high water 157 ft., to low water 184 ft., to bottom of river 190 ft.

At mile 786 we cross the North Saskatchewan River at Clover Bar, about nine miles east of Edmonton, on a bridge 1,655 ft. 5 in. inside of parapet walls, composed of two 50 ft. end deck spans, eight 50 ft. and four 40 ft. intermediate spans resting on seven piers, three 225 ft. deck truss spans resting on piers, and two 150 ft. deck spans resting on piers and tower. Base of rail to high water 106 ft., to low water 137 ft., to bottom of river 143 ft. The principal feature of this crossing is the four concrete river piers, which have an average height from the bottom of foundation to the top, of 120 ft.

At mile 861 we cross the Pembina River on a bridge of 902 ft. 2 in. between parapet walls, composed of two 60 ft. end deck spans, two 210 ft. and one 240 ft. deck truss spans, and two 60 ft. tower spans, all resting on two towers and masonry. Base of rail to high water 137 ft., to low water 208 ft., to bottom of river 224 ft.

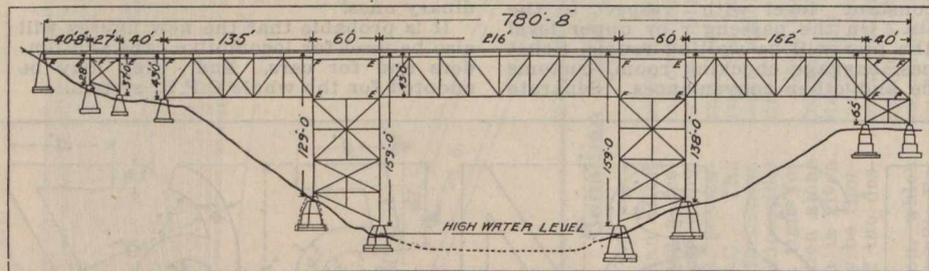
At mile 914 we cross the Wolf Creek with a bridge 652 ft. 2 in. between parapet walls, composed of two 60 ft. end deck spans, two 40 ft. tower spans, and three 150 ft. deck truss spans, resting on two steel towers and masonry. Base of rail to high water 116 ft., to low water 125 ft., to bottom of river 130 ft.

93 ft., to low water 94 ft., to bottom of river 98 ft.

At mile 1,014 we cross the Athabasca River with a bridge of 668 ft. 8 in. between parapet walls, composed of three 225 ft. through truss spans. Base of rail to high water 13 ft., to low water 16 ft., to bottom of river 33 ft.

At mile 1,016 we cross the Snaring river with a bridge of 459 ft. 2 in. between parapet walls, composed of two 225 ft. through truss spans. Base of rail to high water 8 ft., to low water 14 ft., to bottom of river 18 ft.

On the Tofield-Calgary branch at mile 84 we cross the Red Deer River valley with a steel bridge of 770 ft. and two approaches of temporary trestle, making a total length of 1,493 ft. The steel part is composed of four 50 ft. deck spans, two 180 ft. and one 210 ft. deck truss spans, resting on four steel towers.



Canadian Northern Railway Bridge over Pembina River.

Base of rail to high water 96 ft., to low water 111 ft., to bottom of river 117 ft.

On the Alberta coal branch, which starts from Bickerdike, mile 932 west of Winnipeg, we cross the McLeod River at mile 6 with a bridge of 304 ft. of steel, with timber approach at each end. The steel part is composed of two 150-ft. deck truss spans, resting on masonry. Base of rail to high water 49 ft., to low water 62 ft., to river bottom 65 ft.

On the same branch we cross the Embarras River at mile 22 with an 80-ft. deck girder. Base of rail to high water 22 ft., to low water 28 ft., to bottom of river 30 ft. We also cross the same

The towers are designed to take care of all lateral and longitudinal stresses, and sufficient anchorage is provided to overcome any possible uplift. The live load for which the structure is designed is Class 1 of the Dominion Government specifications.

We are indebted to W. L. Mackenzie, Bridge Engineer, for the foregoing information.

The Timagami Steamboat and Hotel Co.'s hotel Lady Evelyn was burnt, July 4. The loss, which is estimated at \$30,000, is partly covered by insurance.

The Rebuilding of the C.P.R. Bridge Over the St. Lawrence River at Lachine.

An illustrated article on the rebuilding of the C.P.R. bridge over the St. Lawrence, at Lachine, Que., prepared by a member of Canadian Railway and Marine World's staff, who visited the work, was published in the February issue. The following information has been supplied officially recently:—

It was early in 1910 that the management came to the conclusion that the time had arrived to rebuild the bridge, so as to provide for a second track to handle the enormous increase in traffic over this important approach to Montreal from New York and other U.S. points, and contracts were let.

On July 12, 1910, the first operation was made on the enlargement of the old piers to carry the new girders before any of the new steel could be swung. This in itself was a huge job, and the contractors undertook to complete the first 11 piers during the first season. This was not accomplished, but the 11 piers were completed to a point above the water and all the work on them was completed by Nov. 8, 1911, leaving only pier 13 on the up-stream side to be finished when the cantilever is taken out, but this will not be started probably until next year, as until the last two stages are completed, which is part of the work now under way, this cannot be done, owing to the cantilever tracks of the bridge being in use.

The work on the superstructure was commenced March 15, 1911, when the placing of the two 80 ft. deck plates was undertaken, and ever since the work has been hurried forward with all speed. The bridge, when completed, will contain steel spans as follows: Six 80 ft. long, sixteen 120 ft., four 270 ft., two 122 ft., eight 240 ft., four 270, and four 480 ft., making the total length of the bridge in spans, 3,138 ft. The bridge was cut down, so to speak, from four 240's to eight 120's as far as pier seven. The piers on which the girders are resting consist of open casement to pier seven, counting from the island side, and from eight to 15 inclusive, the pneumatic casing was used. Eleven spans were erected from the main line, on the down stream track, out to pier seven, and then a cross over enabled the traffic to reach the new steel and the work of bridging was continued without the traffic being in the slightest degree interrupted, beyond that caution was used by trains in crossing the bridge, every train travelling at slow speed.

The changing or reducing of the spans to smaller ones, and the device used for putting them into place, resulted in the saving of thousands of dollars. The introduction of the smaller spans has no tendency to reduce the strength of the bridge, but on the other hand, it greatly increases it, as the weight is being carried by more spans on shorter lengths. During the carrying out of the work, only two cross-overs were necessary to complete it to the eleventh pier, from which point the huge channel spans, which are 480 ft. long, commence. The placing of the spans has reached such a point that no further cross-overs will be required, and the traffic will cross on the steel on the west side of the bridge until the east is totally completed, which it is expected will be by next autumn, provided everything goes on satisfactorily. The whole of the bridge as far as the eleventh pier, or the swinging of the huge channel spans are concerned, is finished, with the exception of a small length of new steel to replace the old, and the progress has been well maintained throughout with a gang of nearly 100 men.

Work has now commenced in connection with the placing of the two 408 ft. spans, which will fully complete the west side of the bridge. The spans are being erected at the Dominion Bridge Co.'s

yards, which are in close proximity to the bridge connected by a spur line. As soon as this is finished, the spans will be re-erected on the finished deck-plate portion of the bridge on the Caughnawaga side of the river, where space sufficient in length has been left for the purpose. This done, one end will be attached to a huge derrick which has been specially erected for the purpose of steadying and assisting in putting the end into place, while the other end will be floated on a huge scow in the river below, and in this way the spans will be floated into position. It is expected that the work which has to be done before the bridge is finally completed for second track service, will occupy at least another twelve months. The work of floating in the four huge spans will occupy almost as much time as the rest of the bridge work has done. These through channel spans are not of the cantilever type, but the strength of the bridge will be below, and when the work is finished, the bridge will constitute one of the finest pieces of engineering work on this



Derrick erected to assist the Floating in of the 408 ft. spans, C.P.R. Lachine Bridge.

continent. The two flanking spans on the south side are practically completed, so that everything is in readiness for going ahead with the work, and this will be done within the next week or two, as soon as the steel is discharged from the workshop.

It is expected that early in August the second tracking will be completed on both the down stream side and the up stream side to the point where the longest spans are to be put in to replace the present cantilever spans.

In the new bridge there will be 28,072,252 lbs. of steel. The 80 ft. lengths run 110,000 lbs., the 120's 226,000, the 240's 960,000 lbs., the 270's 1,324,138 lbs., and the 408's 2,600,000 lbs. Starting from the island side, the bridge widens out at the seventh pier, from 16 ft. from centre to centre of trusses, to 20 ft. at the eleventh pier, and continues from that point to the end.

The work being done in the vicinity of the Lachine bridge is of a very extensive character, and not only includes the en-

largement or second tracking of the structure across the St. Lawrence, but three other bridges approaching the main bridge, are to be second tracked, while the bridge across the Lachine canal will, in the near future, have to undergo the same enlargement. This is a heavy swing bridge, but the appropriation has not yet been made, and several matters are to be settled before the work can be started. Still, with the complete second tracking of the approach from the Montreal main line to the Lachine bridge, the second tracking of the canal bridge must inevitably follow. New spans have been inserted in the bridge that crosses the G.T.R. at Rockfield, and the filling up of the sidings for the double tracks approaching on either side is being continued. At the Highlands extensive works are also being carried out.

The C.P.R. is carrying out these works at a cost of about \$3,000,000, in pursuance of its policy to build a second track over the whole of its main transcontinental line, and it is anticipated that before many years, this will have been completed from St. John, N.B., to Vancouver, B.C. Owing to the great difficulty in securing the requisite number of men in various parts of the country, the company is somewhat handicapped in pushing forward the huge work of double tracking.

First Aid to the Injured on the Canadian Pacific Railway.

By S. A. Gidlow, General Secretary, St. John Ambulance Association, C.P.R.

On first thoughts, the reader may consider the subject either too dry, or something entirely out of his line, therefore, I will commence by stating that if he will have a little patience he will find it not so dry after all, and, no matter what his occupation, it does concern him very materially. One of the first questions usually asked is, "What is First Aid?" and I think the best way to answer this question is to state what its objects are:

To instil into the public mind a few simple, practicable lessons showing how best to render instant attention to persons suffering accident or sudden sickness, pending the arrival of skilled medical assistance.

To teach people what not to do, so that there may be no likelihood of the bystander causing aggravation to injury, or loss of life through improper first aid treatment.

In case of emergency, such as bleeding, accidental poisoning, choking or drowning, a life may not be sacrificed by want of a little intelligent first aid knowledge on the part of the bystander.

To attempt to explain in detail the various kind of accidents in which first aid has been rendered successfully, would be wearisome, therefore a comparative list has been compiled showing the advantage of first aid, and the consequences resulting from the want of such knowledge:

WANT OF FIRST AID KNOWLEDGE.	VALUE OF FIRST AID KNOWLEDGE.
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1. A little child was sitting at the dinner table with the family. With its mouth full of food, it got into a fit of temper over something its brother was having served to him, the food became lodged in the windpipe, and, notwithstanding the slapping of its back, it went black in the face, throwing its arms wildly about; the father rushed out of the house to fetch a doctor, who lived but a short distance away, but on his arrival life was extinct.

1. A little child, whilst eating an apple, bit off a piece larger than he intended. By some means this piece slipped down his windpipe, and became lodged. The child became black in the face; the mother rushed to a neighbor who happened to know first aid. Upon her arrival, the child, being found unconscious, she immediately used first aid knowledge as instructed, with the result the doctor stated, the child was none the worse for its accident.

2. A girl playing around the table accidentally pulled the table cloth and upset a pot of hot tea over her chest. One of the company present frantically pulled the child's clothes off, undoubtedly with good intentions, but the result was the skin was torn off the chest, necessitating her detention for three months in the hospital, where her life was despaired of for some time. In after life, when she became a mother, she was unable to suckle her offspring, in consequence of those injuries preventing the proper development of the breast.

3. Two cyclists were riding along a greasy road, when one had a side slip, throwing him beneath the wheels of a heavy van, which passed over one of his thighs, completely smashing the bone; the broken ends of the bone severing the main artery. His friend sent a messenger to the nearest doctor, about 30 yards away, and stood by his friend, seeing his life's blood ebbing away. Upon the arrival of the medical man life was pronounced extinct.

4. A man with a weakness of the lungs, whilst stooping down broke a blood-vessel, the blood gushed out in great quantities. His colleagues picked him up and carried him to the nearest doctor, but he had not proceeded many yards when he died in their arms.

2. A little child was sitting in a baby chair in front of the fire, when the mother, going to the fire for some purpose, accidentally caught the handle of a saucepan of boiling water, and tipped it over both feet and legs of the child. A first aid who happened to be present, treated the injuries as instructed. After a few days in bed and a little convalescence, the doctor discharged the child none the worse for its misadventure.

3. Father and son were driving in an automobile, and while attempting to make a short turn the back part of the machine struck a telegraph post with great force, pitching both occupants into the roadway. The father sustained a compound fracture—that is, a fracture where the bone has been driven through the skin—in addition to this the main artery was severed. The son, who had a knowledge of first aid, applied the proper treatment, stopped the bleeding, and conveyed him to the hospital, where he was complimented upon saving his father's life.

4. A lady was knocked down by a passing vehicle. The wheel passed over her chest, breaking several ribs, and the broken ends penetrated the lungs. Blood gushed out of her mouth. A first aider, happening to be on the scene, treated her under first aid rules; sent for a doctor, who ordered her removal to hospital by ambulance, where she ultimately recovered.

Let us take another form of comparison to show the value of this knowledge. Some little time back, a man was knocked down by a street car, causing a simple fracture of the thigh bone, that is to say, the bone only was broken, and none of the parts adjacent thereto, such as the tissues or arteries were injured. The bystanders, with the idea of getting the poor fellow out of the way of passing traffic, lifted him to a perpendicular position, with the weight of his body on the broken leg, thereby causing the broken bone to become further displaced, and to pierce the femoral, or main artery of the thigh. As a result of this well meant but ignorant action on the part of the public, the man died from loss of blood before the services of a medical man could be obtained. Had the driver or conductor of the street car in question, been instructed in the principles of first aid, and made use of such knowledge, the poor fellow's life could easily have been saved, and the company they were serving thereby saved heavy claims for damages.

The case of possible deaths from drowning demands special attention. Such may occur from the upsetting of a boat, a careless step by the river side, on the dock or harbor quay. In many of these there may be willing hands to save, but few possess sufficient knowledge to quickly restore animation and consciousness. Ignorant and careless handling of the supposed victim by drowning has often unwittingly completed the work of suffocation by immersion, and one can

realize what this means in this country, where an average of 700 drowning accidents occur every year.

First aid is a branch of work entirely different from that of the surgeon. It is special, and differs from the special training which every student receives. The medical student is taught to use all the best and most approved methods, while the first aid student is taught to use whatever is nearest to hand in the most scientific way possible. He must make a bandage out of a necktie or a handkerchief. He must improvise a tourniquet from a belt or brace; for splints he must utilize a stick, a rifle, an umbrella or folded newspapers, and construct a stretcher out of a couple of broomhandles and coats.

The officials of the C.P.R. centre of the St. John Ambulance Association have for some time past realized the value of this movement to their employes and to themselves, as is seen from the fact that they are now organizing first aid classes amongst all classes of employes throughout the railway system, so that no matter where an accident may happen, there you will find an ambulance man able and



S. A. Gidlow,
General Organizing Secretary, St. John Ambulance
Association, C.P.R.

willing to render instant attention to persons suffering from accident or sudden sickness. The cost of instruction and the books and first aid material necessary, are furnished by the management free of charge. A lecturer is provided, who gives one lecture a week to the men until the full course of five lectures has been given. The syllabus of instruction is as follows:

FIRST LECTURE.—Preliminary remarks, objects of instruction, etc. A brief description of the human skeleton, bones, joints, and the muscular system. Signs, symptoms and treatment of fractures, dislocations, sprains and strains. The triangular bandage and its application.

SECOND LECTURE.—The heart and blood vessels. The circulation of the blood. The general direction of the main arteries, indicating the points where the circulation may be arrested by digital pressure or by the application of the tourniquet or by other means. The difference between arterial, venous and capillary bleeding, and the various extemporary means of arresting it. The triangular bandage and its application.

THIRD LECTURE.—A brief description of

the nervous system. First aid to persons suffering from shock or collapse after injury, injury to the brain, collapse from drink, epilepsy, fainting, hysteria, sunstroke, electric shock, effects of lightning, and convulsions in children. First aid in cases of frost-bite, burns, or scalds, injury by vitriol throwing, wounds, bites of animals, stings of insects. What to do when the dress catches fire. The triangular bandage and its application.

FOURTH LECTURE.—A brief description of the organs and mechanism of respiration. The immediate treatment of the apparently drowned, or otherwise suffocated, artificial respiration; treatment for choking. First aid to those poisoned. The immediate first aid treatment of injuries to the internal organs, and of those suffering from internal hemorrhage. Foreign bodies in the eye, ear and nose.

FIFTH LECTURE, (FOR MALES ONLY).—Improvised method of lifting and carrying the sick or injured. Methods of lifting and carrying the sick or injured on stretchers. The conveyance of such by rail or in vehicles.

FIFTH LECTURE, (FOR FEMALES ONLY).—Preparation for reception of accident cases. Means of lifting and carrying. Preparations of bed. Removing the clothes. Preparations for surgeon.

As soon as ever the lectures are finished, the men are taken in hand by one of the company's ambulance instructors, whose duty it is to teach the practical work, such as the proper application of bandages and splints, to various parts of body and lifting and carrying the injured on stretchers, etc. The reader may not think the placing of a man on a stretcher of much importance, but it is really a very important part of the work, as a great deal of damage may be done in placing a man on a stretcher.

No man is allowed to give instruction in the practical work before he is fully qualified, and before any such man is fully qualified to act as instructor, he must hold the certificate, voucher, and medallion of the St. John Ambulance Association, and these honors can only be obtained after three years constant application to first aid work, during which time he must attend three courses of lectures, and undergo three examinations in first aid, each examination more exacting than the previous one, before he obtains the medallion, or full qualifying badge of the Association. Before the instructor allows his class to go up for examination, the members of the class are expected to answer a series of test questions, and to do the practical work in connection with them. Below are given a few of each grades of questions, which the first aid student is expected to answer:

FIRST TEST.—What is first aid to the injured. What are signs? What are symptoms? What results of injuries must receive the first attention? What steps must be taken beyond the actual treatment of injury? How would you remove clothing when necessary? What must the first aid student not do? What is elementary anatomy? What is elementary physiology? Etc. etc. etc.

SECOND TEST.—What organs are concerned in the circulation of the blood? Trace the circulation of the blood through the organs and lungs. How many kinds of hemorrhage are there? In what way should arterial hemorrhage be controlled? What is a tourniquet? Describe the various main arteries? What is a fracture? State the general signs and symptoms that may be present in cases of fracture. What apparatus may be necessary for the treatment of fracture? How may splints and bandages be improvised? Give the general rules for the treatment of fractures, etc.

THIRD TEST.—State the general treatment for burns and scalds. What steps should be taken when a woman's dress takes fire? State the signs, symptoms and treatment for frost bite. State the

treatment for injuries to joints. How would you remove foreign bodies from the eye, ear and nose? State the treatment for wounds of the abdomen? What is the difference for treatment of injuries to the stomach, and of injuries to the liver, spleen, and intestines? Etc.

subject will be selected for him, and will thus have to study all. Notwithstanding, every candidate will have the same chance. There is a fixed minimum of total marks for all the subjects selected, together with a fixed minimum of total marks for each subject, so that by this

fort to bring its value home to the people. All who will help to do so will perform thereby, not only an act of charity, but will be forwarding a movement of great national importance.

I would insist that every railway official should take at least one course of lectures, for in scarcely any walk of life is there so great a need of intelligent assistance on the spot, as in the various ramifications of railway life. All are liable to accident, therefore, all must be depending to a more or less extent on these first aid principles.

No sane person desires, should he unfortunately suffer serious accident, to have the injury aggravated or his life sacrificed by the well meant but ignorant attention of bystanders, or for the want of a little intelligent first aid knowledge, the learning of which would only take a few hours of a person's lifetime.

CANADIAN PACIFIC RAILWAY COMPANY.

Office of Superintendent Angus Loco. Shops, Montreal.....190..

SUBJECT
Ambulance man's report in connection with accident at the Angus Locomotive Shops.
Name of person injured
Description of injury
How accident was treated
Material used
Signature
Ambulance man.
Supt. Loco. Shops.

Note—The above is to be filled in by the Ambulance man who renders first aid and sent to the office of the Supt. of Angus Loco. Shops as soon as possible after the accident.

The C.P.R. classes in Montreal include some 500 men. Classes have also been organized at St. John, Carleton, Woodstock, Aroostook Jct., and McAdam Jct., N.B.; Brownville Jct., Me.; Ottawa and Toronto, Fort William and Kenora, Ont.; Winnipeg and Brandon, Man.; Moose Jaw, Sask.; Medicine Hat, Lethbridge and Calgary, Alta.; Cranbrook, Nelson, Eholt, Revelstoke and Vancouver, B.C., and many other points.

The C.P.R. centre of the St. John Ambulance Association has the following officers:—PATRONS:—Lord Strathcona and Mount Royal, Sir Thos. G. Shaughnessy.



C.P.R. men treating a fractured thigh.

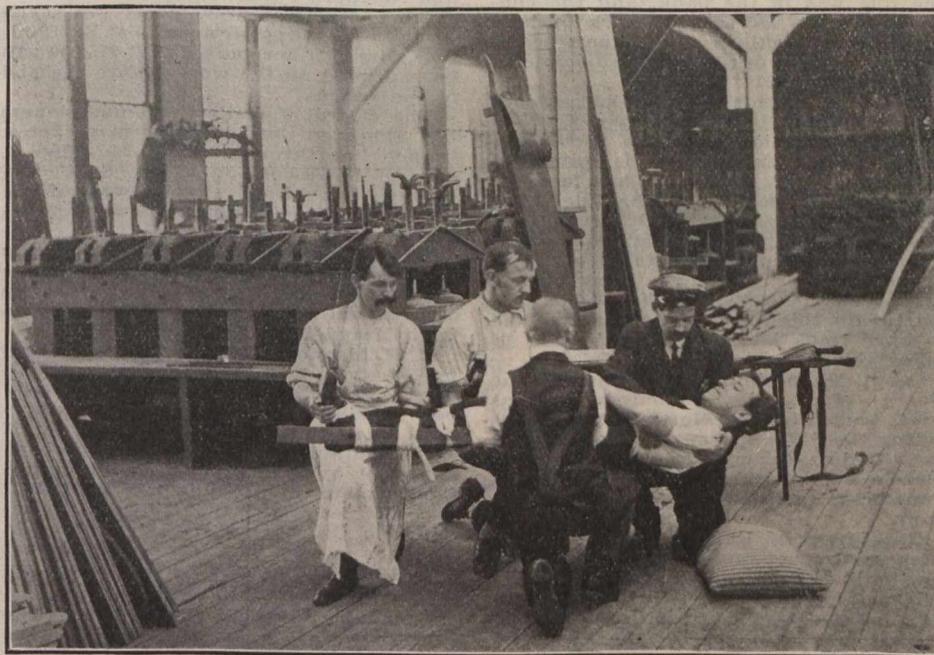
FOURTH TEST.—What are the two symptoms of nerves? Of what is the cerebro-spinal system made up? What is the spinal cord? What are nerves like? Explain the sympathetic system. Explain the respiratory system. What is exciting respiration? What is inducing circulation? State the various forms of insensibility, and their treatment. What are the signs, symptoms and treatment for concussion of the brain? What are the signs, symptoms and treatment for compression of the brain, apoplexy and epilepsy? How would you treat for shock to the system? State the treatment for strangulation, hanging, smothering, or choking. What is the treatment for electric shock, and how would you liberate the subject from live wire? etc., etc., etc.

FIFTH TEST.—Under what heads may poisons be classified? What poisons give rise to convulsions, delirium, failure of respiration, and collapse? What are the signs, symptoms and treatment for poisoning by alcohol, opium, poisonous acids and alkalis? State the best methods for making a person vomit. What would you do with a person apparently drowned? etc.

As soon as the instructor considers the class ready for examination, he makes his report to the proper quarter, and a medical officer is then appointed to examine the class, and all who pass the examination satisfactorily are given the certificate of the St. John Ambulance Association, certifying that they are qualified to render first aid to the injured. After the examination the men are given one hour a month in order to meet together for practice, and are by this means kept up to a proper state of efficiency, also, at stated intervals, the men are inspected by a medical officer appointed by the management, so that the company's officials can see for themselves if their men are up to date, and able to do the work required of them.

The examinations are carried out with the greatest strictness practicable. Definite subjects are laid down, in which candidates are to be examined, and the same fixed number of subjects for each candidate, but arranged in such a manner that no candidate will know which

system every man has to pass a general aggregate of marks, and must also know each subject. Ignorance on an essential point disqualifies the candidate, whatever the total marks gained, or whatever the general knowledge may be. Supposing a candidate does not know how to stop an artery from bleeding, it would not matter how much else he knows, he would be disqualified. The examination



Lifting an injured workman.

is thus made fair, thorough, definite and uniform.

First aid is still a novel idea to the great mass of the working population in Canada; it forms to them, in fact, a new departure in the conduct of life, and, as in the case of all new departures, it requires much time, care, patience and ef-

Sir Wm. Whyte, R. B. Angus. PRESIDENT, D. McNicol. VICE PRESIDENTS, J. W. Leonard, George Bury, H. H. Vaughan; Grant Hall, W. R. Baker, G. P. Girdwood, M.D., A. D. MacTier, C. Murphy, H. A. Beatty, M.D., M.R.C.S., Eng. CHAIRMAN, L. R. Johnson. GENERAL SECRETARY, S. A. Gidlow.

Canadian Northern Railway Construction, Betterments, etc.

James Bay and Eastern Ry.—The Board of Railway Commissioners has approved of location plans for this line in Roberval tp., Que.

Grading on the line from outside Roberval was on July 19, reported to have been practically completed to Chute a l'Ours, about 30 miles, and track laying will be started Aug. 1. J. P. Mullarkey is the contractor. It is said that the line will be extended along the valley of the Ashuapmouchouan River, and through the Chibougamou country, to Nottaway Bay or James Bay.

Montreal Tunnel and Terminal Construction.—The company's plans for the tunnel from the north side of Lagachetiere St. to the new town on the western side of Mount Royal, were approved by the Board of Railway Commissioners, July 11. The question of the overhead viaduct from Lagachetiere St., to the harbor front was left over in order that the Montreal city council might have a further opportunity to study the plans submitted.

Preliminary work in sinking shafts at the city end of the tunnel was started July 13, and it was expected that boring operations would be started by July 30. It is estimated that 1,000,000 cubic yards of material will be excavated from the tunnel, and an additional 500,000 cubic yards from the excavations for the central station.

The Montreal city council gave consideration, July 21, to the company's plans to connect the tunnel up with the station in the east end at Moreau St. The route to some extent parallels the Lachine, Jacques Cartier and Maisonneuve Ry., and in approving it, the council reserved rights as to crossings of all present and future streets. This matter will be dealt with later on.

Montreal-Ottawa-Port Arthur Line.—Prior to leaving Montreal for England, June 26, Sir Wm. Mackenzie is reported to have said that the proceeds of the \$35,000,000 of bonds guaranteed by the Dominion Government for the building of the line was in the bank, and the contractors had 7,000 men at work pushing the different sections of the line to completion. The work would be completed by the end of 1914.

The first section of the line extends from Montreal to Hawkesbury, Ont., 58 miles, construction on which is well advanced and is expected to be completed this year. J. P. Mullarkey has the contract for this section of the line. The line from Hawkesbury to Ottawa has already been completed and is in operation. From a point outside Ottawa to Pembroke, 90 miles, grading is being pushed forward. J. P. Mullarkey being the contractor for this work also. It is expected to have track laid to Fitzroy harbor, 25 miles, this year.

G. A. Mountain, Chief Engineer of the Board of Railway Commissioners, has spent some time in North Bay, investigating the different routes recommended for the line through the town, and to plan a line which will meet the objections made to that surveyed by the company.

The Board of Railway Commissioners has approved of revised location surveys for the line through Badgerow, Field and Gibbons townships, northwest of North Bay. The Board has also approved of revised location plans for the line from mileage 208.3 to 211.47 west of Sudbury Jct.

Steel is reported to have been laid from Port Arthur, easterly to the mouth of the Mackenzie River, where a temporary bridge has been built and across which a temporary track has been laid. The Kennedy Construction Co. is reported to have the contract for the erection of the concrete piers and abutments for the permanent bridge. It is expected

that these will be completed in the spring.

Canadian Northern Ontario Ry.—The Board of Railway Commissioners has authorized the operation of traffic over the line from Toronto to Deseronto, Ont., rescinding previous orders. Work is well advanced on the line to Sydenham, which includes the cut offs on the Bay of Quinte Ry., the contract for which is being carried out by Angus Sinclair. From Sydenham to Ottawa, 90 miles, J. P. Mullarkey, is carrying out the contract for the greater part of the work, Ewen Mackenzie having completed the grading on the 20 miles from mileage 180 to 200. On this 90 miles track is reported to have been laid from Ottawa to the Rideau River, and track is also being laid westerly from Sydenham. Another track laying gang is preparing to start work at Forfar, where the line crosses the Brockville, Westport and Northern Ry.

A route map has been approved by the Minister of Railways for the company's projected line easterly from North Toronto for 7.2 miles.

Sir Wm. Mackenzie is reported as having recently stated that the company's plans included the laying out of large yards and shops at Leaside Jct., and smaller shops on the Rideau River, near Ottawa. The principal shops of the company would be those at Leaside Jct., near Toronto, and at Port Mann, B.C. A new building for the head offices would be erected in Toronto. The union station to be erected at North Toronto by the C.P.R. would be the company's principal station in the city, although a few of the trains might run into the Front St. station.

The Minister of Railways has approved of a route map for the company's proposed line through the counties of Lincoln and Welland, Ont.

Canadian Northern Ry.—The new train shed of the Fort Garry union station at Winnipeg, was opened for traffic June 24. There are six tracks in the shed, which is being used by the C.N.R., the G.T. Pacific Ry., and the Great Northern and Northern Pacific Railways.

Considerable improvements are being made in the company's yards at St. Boniface, Man. It is reported that \$75,000 will be expended on the work before the end of the season.

The Board of Railway Commissioners has approved of location plans for a branch line through tps. 30-34, range 4, west of the second meridian, Sask., and through tps. 24-22, range 1, west of the 5th meridian, and range 29, west of the 4th meridian, Alta.

Work is reported to have been started on a 10-stall roundhouse with a machine shop attached at Radville, Sask. This is a divisional point on the company's line from Maryfield to Lethbridge, Alta.

M. H. MacLeod, General Manager, is reported as stating that the line into Calgary, Alta., will be completed by September. This line is to be continued southerly to Macleod, and the route plans for 12 miles southerly and westerly have been approved by the Minister of Railways. Construction on this line was started at the Macleod end, the Northern Construction Co. having the contract. Mr. MacLeod is also reported as stating that a contract will shortly be let for the remaining mileage into Calgary.

Canadian Northern Pacific Ry.—The supervision of the construction of the company's line from the Yellowhead Pass to the Pacific coast has been divided between the company's Winnipeg and Vancouver offices. T. H. White, who had charge of the final location surveys, and has been Chief Engineer for the C.N.P. Ry., has charge of the construction from the Pacific coast to the Albride summit, while the remaining mileage from Albride summit to the Yellowhead Pass is being supervised from the Winnipeg of-

fices. The construction headquarters of the Northern Construction Co., which has charge of the contract for the line from Kamloops to the Yellowhead Pass for itself and Foley, Welch and Stewart, advised us recently as follows:—McDonald Bros., who have a subcontract for the first 20 miles from Kamloops northeasterly, have practically completed the grading. The next 10 miles was sublet to Boyd and Craig, who have about two months' work yet to do to complete. The next 30 miles has been sublet to Murdoch and Co., who have made good progress during the three months they have been at work. There are about 500 men, including station gangs on this section. The sub-contract for the next 100 miles has been sublet to Twohy Bros. Co., who have two complete steam shovel plants on the ground and are busy taking in supplies, making two complete trips a week. Twohy Bros.' own steamboat goes up the Fraser River as far as mileage 100. The remaining mileage to the Albride summit, it was expected would be sublet at an early date.

Press reports state that contracts have been let for the ten bridges described on pg. 337 of our last issue as follows:—Substructures for seven of the bridges, Armstrong and Morrison, Vancouver, B.C.; substructure for one bridge, John Galt Engineering Co., Winnipeg; substructure for two bridges, C. F. Graff, Seattle, Wash., has the option of a refund at certain prices. The Dominion Bridge Co. has the contract for six of the superstructures, and the Canadian Bridge Co., Walkerville, Ont., the contract for the other four.

Surveys are being made for a branch line from Kamloops through Vernon to Kelowna, at which point a terminal site of 17 acres fronting on Okanagan Lake has been acquired. Press reports state that tenders will shortly be asked for the building of the line.

Press reports state that a contract has been let for the grading at the terminal yards at Port Mann. The contract, it is said, involves the raising of the level of the area by 4 ft., requiring the bringing in of 350,000 cubic yards of material. The yard will have room for 60 miles of track of which 30 miles will, it is said, be laid this year.

The line between Port Mann, and Hope has been completed, and a regular daily freight and passenger service will be put in operation Aug. 1. Press reports state that tenders will shortly be asked for the erection of the stations on this section of the line. Easterly from Hope the line is practically completed to near Rosedale; track has been laid to the Coquihalla River, and ballasting is in progress. The superstructure of the bridge across the Coquihalla River is being built, and it is expected that the grading will be completed as far as Yale, early in September. The boring of the tunnel at Yale is expected to be completed by Dec. 31, and beyond that point the work is well advanced to North Bend.

Sir Donald Mann, Vice President, is reported as having stated in Vancouver, July 6, that nothing would be decided about the company's terminals in that city until the city council had decided as to the disposal of the False Creek property. The location of terminals would determine the route and manner of the entrance of the line. The company would have an entrance independent of other lines.

Canadian North Eastern Ry.—The Minister of Railways for British Columbia, has approved of route map for the extension of the company's line from mileage 13.5 out of Stewart to the junction of the Naas and Blackwater rivers, 91.5 miles; of the route map of a branch line up the north fork of the Naas River, 50 miles; and of a branch starting from the Blackwater River for 95 miles, to the G.T. Pacific Ry. crossing of the Skeena River, 16 miles below Hazelton

**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

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POSTAGE:**

TORONTO AND WEST TORONTO POSTAL DELIVERY,
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LAND AND GREAT BRITAIN, \$1 a year.

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proof is not required.

TORONTO, CANADA, AUGUST, 1912.

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**The Great Northern Railway's Policy
in Canada.**

Carl R. Gray, President, Great Northern Ry., writes Canadian Railway and Marine World, from St. Paul, Minn., under date of July 13 as follows:—

"My attention has just been called to an editorial in your July issue. Will you not do me the justice to print my unqualified denial of the correctness of any portion of the statement which you have quoted, and my additional assurance that I did not say to any one anything which would justify the alleged interview? The dispatch was sent out from Spokane, Wash., before I became officially connected with the Great Northern, and even before any official announcement had been made of my appointment. I had never been in Canada and I had not the slightest knowledge at the time of any of the plans of the Great Northern. Inasmuch as the only Canadian lines which we have in mind are intended to connect up with Vancouver as a port, and as none of them serve a country which could be called specially a grain growing section, the utter absurdity of the statement can be easily appreciated.

"This unauthorized and untrue interview has been very widely quoted, and I have recognized the utter futility of attempting to deny it in every quarter, but in view of the fact that you have accepted it as true and drawn from it certain conclusions (which I must admit on its face were justifiable, but which, in view of the facts, constitute an injustice both to the Great Northern Ry. and to myself), I am sure that it is only necessary to call your attention to the matter to secure equal publicity for my denial."

Had the interview referred to appeared in a daily paper as an ordinary press dispatch, we should not have paid any attention to it, but it was published in Engineering News, of New York, a technical paper with a reputation for accuracy, and we therefore accepted it as authentic. It credited Mr. Gray with stating as follows:—

"Millions of dollars are to be expended this year and next year in extending lines into the virgin territory of Washington and Oregon, and into the province of British Columbia. The plan is to drain the rich grain fields of Western Canada by means of north and south feeders. Contracted work in eastern Washington to the Pacific coast will be rushed to completion, and additional contracts will be awarded soon for extensive development in Northern Washington. Development of subsidiary lines in Oregon will be carried out by J. H. Young, the new President of the Spokane, Portland and Seattle Rd. and other Hill lines. The Northwest is our territory, and we are planning to strengthen our position in all parts of the western country."

We have pleasure in giving Mr. Gray's denial equal publicity. His statement that the only Canadian lines which his company has in contemplation are to connect up with Vancouver as a port is significant. But the fact must not be lost sight of that in addition to the arrangement under which the G.N.R. crosses the International Boundary and reaches Winnipeg over the Canadian Northern Ry. it has also crossed at two other points in Manitoba and has built lines to Portage la Prairie and Brandon, which certainly are draining "the rich grain fields of Western Canada by means of north and south lines."

A glance at the G.N.R.'s map will show that it has eleven other branch lines running northeasterly from its main line towards the International Boundary south of Manitoba and Saskatchewan, some of them being built almost to the boundary. Rightly or wrongly, the impression prevails that it has been the G.N.R.'s intention to extend some or all of these lines into Canada, and had the

reciprocity treaty been ratified, the probability is that some at least of such extensions would have been already made or under way.

**Orders for Construction of Toronto
Union Station and Viaduct.**

The Board of Railway Commissioners passed order 17034, July 18, as follows.— Re consideration of plans of new union station, Toronto, filed by the railway companies: Upon the hearing of the matter at the sittings of the Board in Toronto, May 24, the Grand Trunk and Canadian Pacific Railway Companies and the city of Toronto being represented by counsel at the hearing, and what was alleged, it is ordered that the plan of the said proposed new union station, submitted by the G.T.R. Co., dated Jan. 17, 1912, and filed with the Board as plan A, be approved: the work of constructing the said station to be commenced forthwith and completed not later than Sept. 1, 1914; and that the railway companies be liable to a penalty of \$100 a day for every day they are in default under this order, with leave to move to extend the time, or to be relieved of such penalties, if any, if the facts warrant such application.

THE ORDER FOR THE VIADUCT.

The Board passed the following order 17033, July 18:— Re separation of grades in the city of Toronto, and order 7200, dated June 9, 1909, as amended by orders 13568 and 16019, dated April 25, 1911, and Feb. 22, 1912, respectively, it is ordered that the work ordered to be done under order 7200, as amended by orders 13568 and 16019, be commenced forthwith and completed on or before Sept. 1, 1914; and that the railway companies be liable to a penalty of \$100 a day for every day they shall be in default under this order, with leave to move to extend the time, or to be relieved of such penalties, if any, if the facts warrant such application.

Railway Lands Patented.—Letters patent were issued during May for railway lands in Manitoba, Saskatchewan, Alberta and British Columbia, as follows:—

	Acre.
Canadian Northern Alberta Ry.	15.87
Canadian Northern Ry.	9,897.94
Canadian Pacific Ry.	48.24
Grand Trunk Pacific Ry.	48,946
Qu'Appelle, Long Lake and Saskatchewan Rd. and Steamboat Co.	1,359.62
Total	11,370.61

The C.P.R. and the Canadian Northern Ry. each subscribed \$5,000 to the fund raised to aid those who suffered loss in the recent cyclone disaster at Regina, Sask.

The Brandon, Man., council unanimously passed a resolution, July 16, in favor of laying a double track on Tenth St., from Princess St. to Victoria St., and on July 18, the Mayor stated that he had vetoed the resolution.

The Nelson Electric Ry. Co., notified the city council, July 16, that it could not entertain the council's offer of \$75,000 for the line. The company suggested that a conference be held at which a price might be fixed.

J. A. Boswell, who has retired from the Superintendency of the Eastern Division, Dominion Ex. Co., Montreal, was entertained to dinner at the Montreal Club recently, by his friends and business associates. He was subsequently presented with an illuminated address containing the signatures of the company's chief employes, and a walrus suit case, with a gold watch bracelet for Mrs. Boswell. He was born at Columbus, Ohio, in 1840, and entered the express business in 1861, with the United States Ex. Co., on the Pennsylvania Rd., and served with that company until 1888, when he joined the Dominion Ex. Co.

Mainly About Transportation People.

SIR WM. MACKENZIE sailed from England for Canada, July 24.

LORD STRATHCONA, has contributed \$4,000 to the Y.W.C.A. building fund at Berlin, Ont.

R. BARRY SMITH, chief law clerk, Intercolonial Ry., died at Moncton, N.B., July 16, aged 60.

N. MacDOWELL, of the North Shore Power Ry. and Navigation Co., died at Clarke City, Que., July 14.

SIR DONALD MANN, has given \$1,000 in aid of those who suffered loss in the recent fire at Chicoutimi, Que.

G. M. BOSWORTH, Vice President, C.P.R., has taken a summer cottage at St. Andrews, N.B., for the season.

L. H. McNAMARA, town ticket agent, G.T.R., Walkerton, Ont., has joined the Canadian Ticket Agents' Association.

F. H. PHIPPEN, K.C., General Counsel, Canadian Northern Ry., Toronto, has purchased a 50 acre property at Dixie, near Toronto.

E. N. BENDER, General Purchasing Agent, C.P.R., accompanied by Mrs., and Miss L. Bender, have returned to Montreal, from Great Britain.

MRS. MacTIER, wife of A. D. MacTier, Assistant to the Vice President, C.P.R., Montreal, and family, are spending the summer in Great Britain.

LADY SHAUGHNESSY, and the Misses Shaughnessy are occupying their summer home, Fort Tipperary, St. Andrews, N.B., for the season.

F. L. WANKLYN, M. Can. Soc. C.E., General Executive Assistant, C.P.R., Montreal, arrived in Canada, July 5, from Great Britain with his bride.

A. PRICE, General Superintendent, C.P.R., Calgary, Alta., is building a residence on Prospect Ave., Mount Royal, in that city, at a reported cost of \$20,000.

J. G. SCOTT, ex-General Manager Quebec and Lake St. John Ry., and Mrs. Scott, left Quebec, July 4, for a summer vacation at Carelton, Baie des Chaleurs.

J. J. NICKSON, who carried out the first contract for the C.P.R. Irrigation project at Calgary, Alta., at a cost of about \$2,000,000, died at Vancouver, July 10, aged 64.

MRS. R. S. McCORMICK, wife of the Chief Engineer, Algoma Central and Hudson Bay Ry., died June 16 and was buried at Indianapolis, Ind. She left a baby daughter and son 4½ years old.

SIR WM. WHYTE, G. F. Galt and A. M. Nanton are reported to have been appointed by the Hudson's Bay Co., as a local board at Winnipeg, to supervise its business in Canada.

A. W. SMITHERS, Chairman of the Board, G.T.R., is expected in Montreal, early in August, for the purpose of making his annual inspection of G.T.R. and of the G. T. Pacific Ry.

J. N. HILL, Vice President, Northern Pacific Ry., New York, and son of J. J. Hill, of the Great Northern Ry., has resigned, and it is stated, he will spend a long vacation in Europe.

L. R. JOHNSON, M. Can. Soc., C.E., Superintendent Angus shops district, C.P.R., left Montreal for Europe, July 5 on the company's business and is not expected back for some time.

HON. F. COCHRANE, Minister of Railways and Canals, has been nominated to represent the Dominion Government at the International Road Congress in London, Eng., in June, 1912.

H. L. DRAYTON, K.C., who has been appointed Chief Commissioner, Board of Railway Commissioners, has, preparatory to taking up residence in Ottawa, sold his house in Toronto for about \$20,000.

W. F. PAGE, who entered G.T.R. ser-

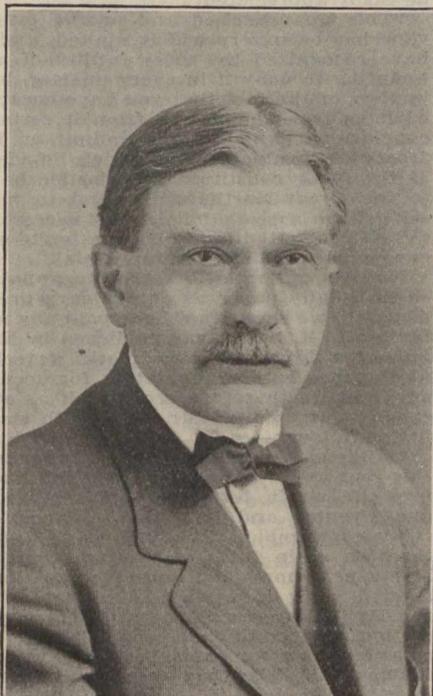
vice in 1852, at Montreal, and who was one of the engine drivers on trains from Montreal westward when traffic was opened in 1855, died at Brockville, Ont., July 7.

The lake near Aldermere, B.C., which has hitherto been known as Chicken Lake, is to be named Kathlyn Lake, in honor of the daughter of W. P. HINTON, General Passenger Agent, Grand Trunk Pacific Ry.

"If there were a competition at the Olympic games for ocean travellers, Canada might well have entered SIR WILLIAM MACKENZIE with a fair expectation of winning first place."—Toronto Mail and Empire.

T. HALL was presented with a silver tea set by the employes of the Michigan Central Rd., building department, St. Thomas, Ont., on his recent promotion to be Assistant General Superintendent of Buildings at Jackson, Mich.

G. STEPHEN, General Freight Agent, Canadian Northern Ry., Winnipeg, was mentioned in Canadian Railway and



J. A. Glassford,
Terminals Manager, Fort Garry Union
Station, Winnipeg.

Marine World for July, as having been born in Montreal, July 5, 1870. The year should have been given as 1876.

H. P. DWIGHT, President, Great North Western Telegraph Co., Toronto, died July 4, aged 84. In our last issue, we gave some details of his illness, with biographical data. Mrs. Dwight, who had been ill for a few days, died July 14, aged 77.

W. B. SMITH, General Manager, Dominion Transport Co., Montreal, who celebrated his 83rd birthday recently, entered the Shedden Forwarding Co.'s service at London, Ont., in 1855, and established the D.T.C. at Montreal on the organization of the C.P.R.

G. McL. BROWN, European Manager, C.P.R., London, Eng., and Mrs. Brown, arrived in Montreal from England July 13. After spending a few days in Montreal, Mrs. Brown went to Hamilton to visit relatives, and Mr. Brown left on a trip to the Pacific coast.

G. H. HAM, head of the C.P.R.'s publicity department, was entertained at dinner in Montreal recently, by the Brit-

ish manufacturers who have been touring Canada and was presented with a gold cigarette case, in appreciation of his services during their trip.

W. P. CHAPMAN, Resident Engineer, Mackenzie, Mann and Co., Toronto, who was married, recently, to Miss Chapman, of Toronto, was presented by the staff, with a cut glass service.

W. H. FLYNN, was presented with an address and a gold watch and chain, by the employes of the mechanical department of the Michigan Central Rd. in Canada, on his recent removal from St. Thomas, Ont., to take up his new duties as Superintendent of Motive Power at Detroit, Mich.

L. GLEASON, travelling expert, Galena-Signal Oil Co., who at one time had his headquarters in Canada, but is now located in Chicago, made his yearly business trip to Newfoundland early in July, and then sailed from St. John's for England for a holiday, intending to return to Chicago early in September.

H. M. KING, Chairman of the London and Dominion Trust Co., London, Eng., returned to Montreal July 19, from Alberta, where he had been in the interests of the Alberta, Peace River and Eastern Ry., which his company is arranging to finance. Mr. King is returning to London, to complete the arrangements.

H. E. FARRELL, who has been appointed Vice President, St. Louis Southwestern Ry. of Texas, in charge of freight traffic, was some years ago, in the service of the Detroit, Grand Haven and Milwaukee Ry., and the Great Western Ry. of Canada, at Detroit, Mich., both of which lines now form part of the G.T.R. system.

C. W. BURPEE, Superintendent, District 1, Atlantic Division, C.P.R., was entertained at a smoking concert at McAdam Jct., N.B., July 10, and presented with two travelling bags and a cheque for \$410, by the officials and employes of the division, on his transfer to Toronto, as Superintendent, District 1, Ontario Division.

C. D. WARREN, of Toronto, and C. E. A. CARR, of New Orleans, La., formerly of Quebec, are President and Vice President respectively of the New Orleans and Western Ry. Co., which has been incorporated at New Orleans, under the Louisiana State laws, with an authorized capital of \$1,500,000 and very extensive powers.

J. H. TELFER, who retired from the position of Weighing Inspector, G.T.R., Toronto, July 1, after 46 years continuous service with the company, was presented with a silver tea service by his fellow officials, recently, the presentation being made at the Canadian Freight Association's annual meeting at Lake Champlain, N.Y.

J. B. INGERSOLL was presented with a gold watch and chain by the staff at the Lake Buntzen generating station, and a club bag by the men of Department B., of the British Columbia Electric Ry. July 13, on his leaving that company's service to take up the duties of his new position with the Kootenai Power and Construction Co., Spokane, Wash.

GEORGE B. WILLIAMS, until recently Car Service Agent, Manitoba Division, C.P.R., has joined the Railroaders' Investment Co., of which Alex. Shields, formerly General Master Mechanic, Canadian Northern Ry. is the President. The company has its head office at Winnipeg, and its operations will extend over the entire Dominion, as agencies are being established in the prominent centres.

J. D. BEATTY, who died at Sarnia, Ont., July 14, aged 74, was connected with steamship interests on the Great Lakes for several years, and was one of the founders of the North West Transportation Co., operating between Sarnia and Duluth, being General Manager until its absorption by the Northern Navigation Co. in 1902. Up to within a few

months of his death, he was President, Sarnia St. Ry. Co.

H. W. MILLS, Manager, Sarnia Street Ry., and Town Ticket Agent, G.T.R., died at Sarnia, Ont., June 6, aged 62. The funeral, under Masonic auspices, was largely attended. Flowers were sent by the Canadian Ticket Agents' Association, of which he was a member for many years, and the Association was represented by its Secretary, E. de la Hooke. This item was written for our last issue, but was left out by an oversight.

R. A. SMITH, of Osler and Hammond, brokers, etc., Toronto, who was killed in an automobile accident July 17, on coming to Canada some 30 years ago from Scotland, entered railway service as a clerk in the old Northern Ry.. At the time of his death he was a director of the Toronto Ferry Co., and of the Victoria Rolling Stock and Realty Co. of Ontario. At one time he was secretary of the Qu'Appelle, Long Lake and Saskatchewan Railroad and Steamboat Co.

HON. F. COCHRANE, Minister of Railways, left Ottawa, June 26, on a trip of inspection of the railways in north western Canada. He arrived in Winnipeg July 3, after having visited North Bay, Sault Ste. Marie and Fort William, Ont., and went on to Vancouver, and thence to Prince Rupert, B.C. He is expected back in Winnipeg early in August, and proposes to begin an inspection of the route of the line under construction to Hudson Bay, Aug. 10, expecting to return to Ottawa, via the Hudson Straits.

MRS. BRYDGES, who died at Winnipeg, July 7, was the widow of the late C. J. Brydges, at one time the most important railway official in Canada. He was appointed Managing Director, Great Western Ry. of Canada in 1853, and was subsequently General Manager of the Grand Trunk Ry. and General Superintendent of Government Railways, respectively. He was one of the commissioners in charge of the building of the Intercolonial Ry., and in 1878 was appointed Land Commissioner, Hudson's Bay Co., at Winnipeg.

B. W. FOLGER, who recently retired as General Manager, Niagara Navigation Co., Toronto, on its being taken over by the Richelieu and Ontario Navigation Co., was presented with a loving cup and travelling bag, and a travelling bag for Mrs. Folger, by the officials and employees of the company. The presentations were made by S. J. Murphy, and A. J. Woodward, formerly Travelling Passenger Agent, and Superintendent Engineer, respectively. It is stated that Mr. Folger will probably leave Toronto for New York in the fall.

C. H. BOOTH, whose appointment as Local Freight Agent, Midland Ry. of Manitoba, Winnipeg, was announced in a recent issue, was born at Banff, Scotland, Feb. 16, 1882, and entered railway service, July 1900, since when he has been, to June, 1902, general clerk, C.P.R., Winnipeg; June 1902 to Aug. 1904, billing clerk, Canadian Northern Ry., Winnipeg; Aug., 1904, to Apr. 1906, chief billing clerk, same road; Apr. 1906 to June 1907, inward rate clerk, same road; June 1907 to May 1908, chief rate clerk, same road; May 1908 to Oct. 1909, accountant, same road; Oct. 1909 to May 15th, 1912, assistant local freight agent, same road.

NICOL KINGSMILL, K.C., who died at Toronto, July 21, was born Sept. 30, 1834, and was the youngest son of the late Col. Kingsmill, who served in the Peninsular war, and was afterward sheriff of Niagara, and later postmaster of Guelph, Ont. Nicol Kingsmill was senior partner of the firm of Kingsmill, Saunders, Torrance and Kingsmill, Canadian solicitors for the Michigan Central Rd., and was a director of the Canada Southern Ry., and subsidiary companies, and also of the Toronto, Hamilton and Buffalo Ry. Rear Admiral C. E. Kingsmill, of the

Canadian Naval Department, is a nephew, and W. B. Kingsmill, of the firm mentioned above, is a son.

D. F. MAXWELL, M. Can. Soc., C.E., whose portrait appears in this issue, has been professionally connected for the last 30 years with various railways and other public works in the Maritime Provinces, as well as with several railways in the New England States. During the past eight years he has been wholly engaged in railway work in New Brunswick, four years of that time having been spent on location and construction on the National Transcontinental Ry., and the balance in charge of surveys for the St. John Valley Railway and the Fredericton and Grand Lake Coal and Ry. Co. He was recently appointed Engineer of Railways for the New Brunswick government.

JAMES MILNE, heretofore Superintendent Canadian Salt Co.'s works at Windsor, Ont., and Consulting Engineer, Sandwich, Windsor and Amherstburg Ry. has been appointed Electrical and Mechanical Engineer for the city of Toronto, at a salary of \$5,000 a year. He was born in Scotland some 45 years ago, and



D. F. Maxwell,
Engineer of Railways for the New Brunswick Government.

has been in Canada for about 20 years. Soon after coming to Canada he was appointed teacher of mechanical and electrical engineering in Toronto Technical School and was subsequently in the service of the Toronto Incandescent Lighting Co., of the Jones Underfeed Stoker Co., and the British Columbia Electric Ry.

W. J. PICKRELL, whose appointment as Master Mechanic, District 1, Ontario Division, C.P.R., West Toronto, Ont., was announced in a recent issue, was born at London, Ont., Sept. 15, 1880, and entered C.P.R. service, Jan. 1, 1899, since when he has been, to July 1, 1901, in the West Toronto shops; July 1, 1901 to Nov. 1, 1904, fireman; Nov. 1, 1904, to July 7, 1905, travelling fireman; July 7, 1905 to Aug. 1, 1907, driver; Aug. 1, 1907 to Apr. 15, 1908, assistant Road Foreman; Apr. 15, 1908 to May 10, 1910, driver; May 10, to Dec. 16, 1910, rule instructor; Dec. 16, 1910, to Apr. 9, 1912, driver; Apr. 9, to May 15, 1912, acting District Master Mechanic, District 3, Ontario Division, West Toronto.

K. J. BURNS, whose appointment as Assistant General Freight Agent, Great

Northern Ry., Vancouver, B. C., was announced in our last issue, was born at Rochester, Eng., Oct. 11, 1878, and arrived in Canada in 1882. He entered railway service June 1893, since when he has been; to Feb. 1898, stenographer, C. P. R., Victoria, B. C.; Feb. to June, 1898, second purser, C. P. R. s. s. Empress of China; June to Oct. 1898, ticket clerk, Great Northern Ry., Victoria, B. C.; Oct. 1898 to May 1900, freight solicitor, same road, Vancouver, B. C.; May 1900 to May 1902, General Agent, same road, Tacoma, Wash.; May 1902 to May 1905, General Agent, same road, Victoria, B. C.; May 1905 to June 1, 1912, General Agent, same road, Vancouver, B. C.

T. McNABB, who resigned his position as Master Mechanic, Alberta Railway and Irrigation Company in May, 1911, was, in view of his long and efficient services, given leave of absence on full pay until the company's lines were taken over recently by the C.P.R. After travelling during the greater part of the past twelve months, Mr. McNabb has retired to his Rockyford ranch in Alberta, which he established in 1902, and looks forward to a life of comparative ease after 49 years continuous railway service with two companies. He is one of the oldest subscribers to this paper, and writes: "Please continue to send me The Railway and Marine World, as I do not wish to get entirely out of touch with the old associations. I congratulate you on the continued improvement in your paper."

E. LAIT, who has been appointed General Yardmaster, Winnipeg Joint Terminals, was born at Toronto, Aug. 23, 1889, and entered railway service, July 9, 1902, since when he has been, to Apr. 3, 1904, car checker, C.P.R., Toronto; Apr. 3, 1904 to Aug. 1, 1905, car checker, Canadian Northern Ry., Winnipeg; Aug. 1, 1905 to Oct. 25, 1907, night terminal clerk, same road; Oct. 25, 1907 to Jan. 9, 1909, freight brakeman, same road; Jan. 15, 1909, to Nov. 16, 1910, switchman, same road; Nov. 18, to Dec. 19, 1910, brakeman; Chicago and North Western Ry., Chicago, Ill.; Dec. 26, 1910, to Sept. 14, 1911, switchman, same road; Sept. 15, to Nov. 18, 1911, night Yardmaster, Canadian Northern Ry., Winnipeg; Nov. 19, 1911, to June 20, 1912, switchman, same road; June 20 to June 28, 1912, Night Yardmaster, Winnipeg Joint Terminals.

H. J. BEEMER, who died in London, Eng., towards the end of June, was born at Honesdale, Pa., in 1848. He commenced his railway career as a foreman for Smith and Ripley, New York, who brought him to Canada. One of his first works as a contractor was the railway bridge at Ottawa, followed by some portions of the Dufferin improvements at Quebec. He was Managing Director, Quebec and Occidental Ry. in 1887, and later built the water works in Quebec city. His most important works after that were the Ottawa and Gatineau Ry., the Pontiac Pacific Jct. Ry., and the Quebec, Montmorency and Charlevoix Ry., and the Montreal and Western Ry. In 1895 he made a contract with the Quebec city council for the construction of an electric railway there. In 1905 he left Canada for the United States and for some time was engaged in mining in Arizona.

A. C. GRAY, M. I. M. E. (Eng.), whose appointment as Superintendent of Motive Power, Reid Newfoundland Co., St. John's Nfld., was announced in our last issue, served a five years apprenticeship with Neilson and Co., now the North British Locomotive Co., Glasgow, Scotland, and entered North British Ry. service there, as a running shed fitter. He was subsequently, Locomotive Foreman, Chief Assistant Locomotive, Carriage and Wagon Superintendent, and General Workshop Superintendent, Southern Brazilian Ry., Rio Grande de Sul, Brazil, and on the sale of the railway, he was retained by the new management as Chief

Mechanical Engineer and Manager of Rolling Stock. Other positions held by him are, Engineer, to report on the Longitudinal Ry., Chili, for the Chilean Government; Chief Consulting Engineer, Hamburg South American Steamship Co.; Honorary Engineer, Customs Department, Rio Grande de Sul, Brazil; Assistant Manager and Chief Engineer, Rasselpur Tea Co., Sylket, India.

J. H. CALLAGHAN, General Storekeeper, C.P.R. Eastern Lines, Montreal, who died recently, was buried at Brownville Jct., Me., July 3, when the funeral was attended by chiefs of the operating department from various points. C. Murphy, General Superintendent of Transportation represented the management, L. R. Johnson, General Superintendent, Angus Shops District, the locomotive and car departments; G. E. Hall, Assistant General Storekeeper, the stores department; H. Ferguson, the purchasing department, and C. Malcolm, the audit department. W. Downie, General Superintendent, Atlantic Division, and H. C. Grout, Superintendent, Montreal, also attended. Mr. Callaghan entered C.P.R. service 26 years ago, as storekeeper during the construction of the road through Maine, being the first resident storekeeper at Brownville Jct. He was afterwards moved to McAdam Jct., N.B., then Farnham, Que., and later to Montreal, where he eventually became General Storekeeper. He was widely known throughout Canada and the U.S.

LACEY R. JOHNSON, M. Can. Soc. C.E., who has been appointed General Superintendent Angus Shops District, C.P.R., Montreal, and whose portrait appears in this issue, was born at Abingdon, Berks, Eng., June 22, 1855, and educated at the Grammar School, there. He entered railway service as an apprentice at the Great Western Ry. works, Swindon, Wilts., June 1, 1870, and was Chief Engineer and Foreman of Mechanics at the Woolwich Arsenal, Jan. 1 to Aug. 1876, and fitter and erector Sept. 1876 to Nov. 1878; Manager, Davis and Sons' engineering works, London and Abingdon, Nov. 1878 to Aug. 1879. In Sept. 1879 he went to India as draughtsman on the Scinde, Punjab and Delhi Ry., and was subsequently foreman of machine and erecting shops there. He left India on account of health, Mar. 1882, and entered G.T.R. service at Montreal as draughtsman, June 1882, and joined the C.P.R., Nov. 2, 1882, since when he has been, to Nov. 1885, General Foreman at Carleton Jct.; Nov. 1885 to May, 1886, Assistant Master Mechanic, Eastern Division, Chapleau, Ont.; May 1886 to Apr. 1901, Master Mechanic, Pacific Division, Vancouver, B.C.; and from the commencement of the trans-Pacific service, his jurisdiction extended over the engineering department of the vessels, during which time he spent three winters in Hong Kong superintending alterations and repairs to the company's vessels; Apr. to Sept. 1901, on the purchase of the Canadian Pacific Navigation Co. by the C.P.R., he was Superintending Engineer, of the combined fleets, which position was severed from the locomotive and car department; Sept. 1, 1901 to July 1, 1912, Assistant Superintendent of Motive Power, C.P.R., Montreal.

Willard Kitchen Co., Ltd., railway contractors, Grand Falls, N.B., writes:—"We think The Railway and Marine World a first-class paper."

The steamboat Columbia, engaged in the coal trade between Oswego, N.Y., and Montreal, was destroyed by fire at Ogdensburg, July 6.

The British steamship Wilhelmina, bound from Quebec to Yarmouth, Eng., ran on the rocks at Peter's River, Nfld., June 30, and became a total wreck.

The name of Dredge No. 4, formerly owned by the Montreal Harbor Commissioners, has been changed by order in council to Manley and Co. No. 1.

Surveying Instruments-

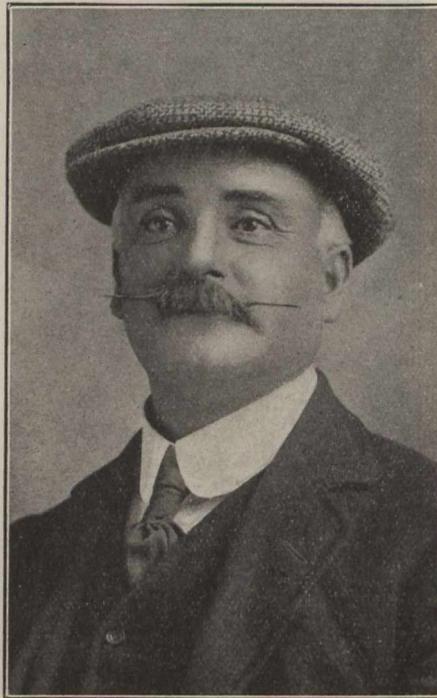
By W. L. Mackenzie, M. Can. Soc. C. E., Bridge Engineer, Canadian Northern Ry.

Following is a summary of an address delivered before the Engineering Society, Manitoba University:—

The best tripod head is that which is strongest to resist torsional stress. The lugs should extend well down between the cheeks; the legs should fit close together when folded, and each should preferably be of one solid piece of wood.

The levelling screws should be of large diameter and easily accessible. They can with advantage be covered with chamois in winter. Personally, I prefer a 4 screw instrument on account of the increased rigidity it offers. For 3 screw instruments wing nuts should be used to clamp the screws when levelled up. Keep the levelling screws and centres clean and free from grit, using a little of the best watch oil for this purpose. In winter it is best to remove all oil.

For all ordinary purposes, including railway work, a circle graduated to minutes is sufficient, and if further accuracy



A. C. Gray,
Superintendent of Motive Power, Reid Newfoundland Co.

is required, it may be obtained by repetition. The compass needle is little used except for checking deflections; a thin, light needle is desirable. The U type of standard is the most rigid; it should be very firmly fastened.

Inverting telescopes are decidedly better than erecting, giving more light, longer focus and better definition. Stadia hairs should be fixed and not adjustable. In examining an instrument, always test the object glass slide. It should be ground to an accurate fit, and if it is found to shake, good work cannot be done. The object glass should be achromatic and free from spherical aberration. The telescope should be tested for power. The sensitiveness of the plate bubbles should not be less than 1-10th inch for one minute of arc.

For a vertical circle a good type is a 60° arc attached to the outside of the standard and a vernier arm attached to the end of the horizontal arms. If a whole vertical circle is used, and it becomes bent, the whole instrument is put out of commission until the circle has been removed and straightened.

Many of the above remarks apply to

levels also. The dumpy, although a little more troublesome to adjust, is much to be preferred to the wye level, which is easier to adjust, but usually needs adjusting oftener. I would refer those requiring further information to Prof. I. O. Baker's comprehensive book on Surveying Instruments.—Manitoba Engineer.

Railway Finance, Meetings, Etc.

Atlantic and Lake Superior Ry.—A meeting of the holders of certificates of participation in the A. and L.S. Ry. Trust Fund was held in Montreal, July 18, to authorize the trustees to be represented and to vote in favor of resolutions submitted at a meeting of shareholders of the Quebec Oriental Ry. (Matapedia section), called for July 18; to authorize the trustees to appoint the first committees of the bondholders in accordance with the respective trust deeds; to make alterations in constitution for the management of the trust fund by authorizing the election of a Vice Chairman, and to enable general meetings to be held in Paris, France; and to appoint an additional member to the committee of management.

Kingston and Pembroke Ry.—After the transaction of the regular business at the annual meeting of shareholders at Kingston, Ont., Aug. 14, a special meeting will be held to consider the expediency of leasing the line to the C.P.R., to approve of the terms, conditions and form of lease; and to decide upon the means to be adopted for raising funds to retire outstanding mortgage debentures; to authorize an issue of bonds and to approve of the terms of mortgage to secure the repayment of any bonds that the directors may be authorized to issue.

Morrissey, Fernie and Michel Ry.—Press reports state that the operations of the Crows Nest Pass Coal Co., for 1911, showed a net loss of \$200,654. The company owns the M.F. and M. Ry., and it is said that the result of the operation of the line for 1911 showed a net loss of \$18,299. The amount of bonds outstanding is \$27,500, against \$37,500, at the end of 1910.

Rutland Rd.—The United States Supreme Court at New York gave a decision July 5, continuing the temporary injunction restraining the New York, New Haven and Hartford Rd. from acquiring the majority stock of the Rutland Rd. from the New York Central and Hudson River Rd. The court is of opinion that the proposed transfer is in violation of the Sherman law.

Temiscouata Ry.—Gross earnings for April, \$21,148; expenses, \$14,381; net earnings, \$6,767.

An Ottawa press dispatch of July 11, states that the Dominion Government has decided to call for tenders, shortly, for the construction of important harbor improvements at Victoria. It is stated that the work will cost over \$1,000,000.

The recent newspaper report that J. T. Davie and Son, Levis, had disposed of their shipbuilding and repair plant, is incorrect. The salvage plant, consisting of the steamboat Lord Strathcona, the schooner G.T.D., with pumps, etc., were sold to the Quebec Salvage and Wrecking Co., Ltd., Montreal, as mentioned in a previous issue.

The Fort William Elevator Co., Ltd., has been incorporated under the Dominion Companies Act, with \$500,000 capital and office in Winnipeg, to carry on a general elevator and grain warehouse business, and in connection therewith to own and operate steam and other vessels, and to conduct a general navigation business. The incorporators are, D. Horne, H. E. Swift, G. H. Yule, W. E. Davidson, M. M. Perdue, Winnipeg.

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.

Board of Railway Commissioners.—H. L. DRAYTON, K.C., heretofore Counsel for the city of Toronto, has been appointed Chief Commissioner, vice J. P. Mabee, deceased.

Canadian Northern Ontario Ry.—R. A. BALDWIN, chief draughtsman, Mackenzie, Mann & Co., Ltd., has also been appointed Resident Engineer Canadian Northern Ontario Ry., Toronto-Niagara line. He is also in charge of the betterments being done on the Bay of Quinte Ry.

C. T. DELAMERE, has been appointed Assistant District Engineer, Port Arthur District, Sudbury-Port Arthur Line, vice A. J. Isbister, promoted to District Engineer, as announced in our last issue. Office, Port Arthur, Ont.

Canadian Northern Ry.—W. PHILLIPS, who was recently appointed European Traffic Manager, with office at London, Eng., has announced the following distribution of territory:—

W. J. CARTMEL, General Passenger Agent, Canadian Northern Steamships, in charge of all business originating in Europe. Office, London, Eng.

F. S. JONES, District Agent, Freight Department, C.N.R., and Freight and Passenger Departments, C.N. Steamships. Office, Glasgow, Scotland.

G. E. COWIE, District Agent, Freight Department, C.N.R., and Freight and Passenger Departments, C.N. Steamships. Office, Liverpool, Eng.

A. T. SHAW, District Agent, Freight Department, C.N.R., and Freight Department, C.N. Steamships. Office, Birmingham, Eng.

A. J. ADAMS, District Agent, Freight Department, C.N.R., and Freight Department, C.N. Steamships. Office, Bristol, Eng.

R. W. ROME, District Freight Agent, C.N.R., and C.N. Steamships. Office, London, Eng.

F. E. BIRCH, District Agent, Passenger Department, C.N. Steamships. Office, Birmingham, Eng.

C. R. SHEPHERD, District Passenger Agent, C.N. Steamships. Office, Bristol, Eng.

Canadian Pacific Ry.—H. C. GROUT, heretofore Superintendent, District 1, Ontario Division, Toronto, has been appointed Superintendent, District 1, Atlantic Division, vice C. W. Burpee, transferred to Toronto. Office, St. John, N.B.

D. L. JONES, heretofore District Master Mechanic, Districts 1 and 2, Atlantic Division, McAdam Jct., N.B., has been appointed acting Master Mechanic, Atlantic Division, during the absence on sick leave, of C. R. Ord. Office, McAdam Jct., N.B.

F. GRANT, heretofore District Master Mechanic, Brownville Jct., Me., has been appointed acting District Master Mechanic, Districts 1 and 2, Atlantic Division, vice D. L. Jones, promoted. Office, McAdam Jct., N.B.

LACEY R. JOHNSON, M. Can. Soc., C.E., heretofore Assistant Superintendent of Motive Power, Angus Shops, has been appointed General Superintendent, Angus Shops District. Office, Montreal.

He will have general charge of the company's property within the Angus shops district, including the construction of new buildings, and the maintenance of those already constructed, the force engaged in the maintenance of tracks and buildings, yard gangs, and engine men, police force and fire protection. He will also have direct charge of the operation of the power and heating plants, and the maintenance of power and heating lines throughout all premises. He will have charge of apprentice instruction, St. John Ambulance Association work, and

such matters as may from time to time be assigned to him.

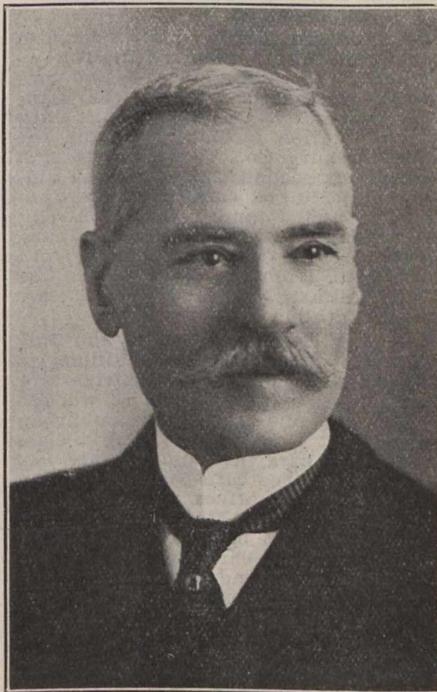
H. OSBORNE, heretofore Superintendent, Locomotive Department, Angus Shops, Montreal, has been appointed Assistant Superintendent of Motive Power, vice L. R. Johnson, transferred to other duties. Office, Montreal.

G. E. HALL, Assistant General Storekeeper, Eastern Lines, Montreal, is carrying out the duties of General Storekeeper, pending the appointment of a successor to the late J. H. Callaghan.

C. W. BURPEE, heretofore Superintendent, District 1, Atlantic Division, St. John, N.B., has been appointed Superintendent, District 1, Ontario Division, vice H. C. Grout, transferred to St. John, Ontario, Toronto.

R. B. RIPLEY, heretofore Engineer in charge of bridge repairs and standardization of grade, Dominion Atlantic Ry., Kentville, N.S., has been appointed Assistant Engineer in charge of grade separation, C.P.R., North Toronto, Ont.

H. B. STEVENS, heretofore Chief Dispatcher, White River, Ont., has been appointed Chief Dispatcher, District 1, Lake



Lacey R. Johnson, M. Can. Soc. C.E., General Superintendent, Angus Shops District, Canadian Pacific Railway.

Superior Division, vice R. T. Moran, transferred. Office, Sudbury, Ont.

T. J. ARMSTRONG, heretofore Roadmaster, Webbwood subdivision, Lake Superior Division, has been appointed Roadmaster, Sudbury subdivision, Lake Superior Division, vice L. B. Copeland, transferred. Office, Sudbury, Ont.

R. SHANKS, Roadmaster, Algoma subdivision, Lake Superior Division, Sault Ste. Marie, Ont., has had his territory extended to include the Webbwood subdivision, T. J. Armstrong having been transferred to the Sudbury subdivision. Office, Sudbury, Ont.

J. H. BOYLE, heretofore Assistant Superintendent, District 4, Eastern Division, Ottawa, has been appointed Superintendent, District 3, Lake Superior Division, vice J. H. Hughes. Office, Schreiber, Ont.

N. E. BROOKS, Division Engineer, Calgary, Alta., has been appointed acting General Superintendent, Alberta Division, during the absence on leave of A. Price. Office, Calgary.

J. ROBERTSON, heretofore Resident Engineer, Cranbrook, B.C., has been ap-

pointed Resident Engineer, Calgary, Alta., vice T. J. Brown, transferred.

W. H. GORDON, heretofore Bridge and Building Master, Medicine Hat, Alta., has been appointed Trainmaster, Red Deer, Alta. This is a new position.

N. E. BROOKS, Division Engineer, Calgary, has been appointed acting General Superintendent, Alberta Division, relieving A. Price, who is on leave of absence.

T. J. BROWN, heretofore Resident Engineer, Calgary, Alta., has been appointed Resident Engineer, Cranbrook, B.C., vice J. Robertson, transferred.

W. E. HAYWARD has been appointed Locomotive Foreman at North Bend, B. C., vice G. H. Tedlock, resigned.

Dominion Atlantic Ry.—G. G. HARE, heretofore Engineer, Kingston and Pembroke Ry., Kingston, Ont., has been appointed Engineer of Bridges, D.A.R. Office, Kentville, N.S.

Esquimalt and Nanaimo Ry.—H. E. BEASLEY, heretofore Superintendent, has been appointed General Superintendent. Office, Victoria, B.C.

J. GOODFELLOW, heretofore Assistant Superintendent, has been appointed Superintendent, vice H. E. Beasley, promoted. Office, Victoria, B.C.

M. S. WHEATLEY, heretofore Mechanical Foreman, has been appointed Master Mechanic. Office, Wellington, B.C.

Fort Garry Union Station, Winnipeg.—E. LAIT, has been appointed General Yardmaster, Winnipeg Joint Terminals, vice G. A. Templeman, resigned to re-enter Canadian Northern Ry. service.

JAS. MOORE has been appointed Car Foreman, Winnipeg Joint Terminals, in charge of car inspectors or other Car Department forces.

W. LAMPORST has been appointed Assistant Yardmaster, Winnipeg Joint Terminals, in charge of engineers and firemen, and such other duties as may be assigned to him by the General Yardmaster.

JAMES TODD has been appointed station master, Winnipeg Joint Terminals, vice J. M. Bannerman, resigned.

Grand Trunk Pacific Ry.—J. P. KIRKPATRICK, heretofore Trainmaster, Districts 31 and 32, Ottawa Division, G.T.R., Ottawa, has been appointed Superintendent, G.T.P.R., with jurisdiction over the Melville-Regina, Regina-Boundary and Regina-Moose Jaw lines, vice W. B. Cronk, resigned. Office, Regina, Sask.

The following agents have been appointed:—Manaki, Ont., J. A. Foran; Waldron, Sask., B. Simmons; Yorkton, Sask., C. W. Hensworth; Lestock, Sask., S. E. Hurley; Bradwell, Sask., H. G. House; Leney, Sask., T. W. Fleming; Stoney Plain, Alta., N. F. Gale.

Grand Trunk Ry.—E. S. COOPER, heretofore Chief Dispatcher, Districts 4 and 5, Eastern Division, Montreal, has been appointed acting Trainmaster, Districts 1 and 2, Eastern Division, vice J. W. Farrell, granted extended leave of absence on account of ill health. Office, Island Pond, Vt.

J. H. JOHNSTON, heretofore Master of Bridges and Buildings, Ottawa Division, Ottawa, has been appointed Master of Bridges and Buildings, Eastern Division, vice A. Finckley, retired on pension after 46 years service. Office, Montreal.

O. MASSE, heretofore Night Chief Dispatcher, has been appointed acting Chief Dispatcher, Districts 4 and 5, Eastern Division, vice E. S. Cooper, promoted. Office, Montreal.

F. B. NIXON has been appointed acting night Chief Dispatcher, Districts 4 and 5, Eastern Division, Montreal, vice O. Masse, promoted.

J. CHISHOLM has been appointed Master of Bridges and Buildings, Ottawa Division, vice J. H. Johnston, transferred. Office, Ottawa.

J. S. McADAM, heretofore Chief Dispatcher, Ottawa Division, Ottawa, has

been appointed Trainmaster, Districts 31 and 32, Ottawa Division, vice J. P. Kirkpatrick, transferred to G.T.P.R. service. Office, Ottawa.

H. C. WHITE, heretofore dispatcher, has been appointed Chief Dispatcher, Ottawa Division, vice J. S. McAdam, promoted. Office, Ottawa.

G. A. HARRISON, heretofore telegraph operator, is reported to have been appointed Travelling Passenger Agent for Thousands Islands, vice E. A. Dornan, deceased. Office, Gananoque, Ont.

G. GORDON, heretofore Car Distributor, Toronto Terminals, has been appointed Passenger Yardmaster, Toronto Union Station.

JOHN BOYD has been appointed Weighing Inspector, Toronto, vice J. H. Telfer, retired after 46 years continuous service with the company.

The following agents have been appointed:— St. Laurent, Que., H. Valade; Brockville, Ont. (pass.), W. E. Allan, acting; Winona, Ont., W. E. Cusson; Sarnia, Ont., (freight), and Point Edward, Ont., G. Dench; Sebringville, Ont., J. W. Manning; Greenfield, Ont., J. Shane; Kinbrun, Ont., W. Hardy; Barrys Bay, Ont., G. A. Thurston; Ravenworth, Ont., N. G. Reynolds.

Great Northern Ry.—L. C. GILMAN, Assistant to the President, has had his office moved from St. Paul, Minn., to Seattle, Wash.

A. WHITNALL has been appointed City Passenger Agent, Vancouver, B.C.

Kingston and Pembroke Ry.—J. A. IRVINE, heretofore in the Construction Department, C.P.R., Montreal, has been appointed Engineer, K & P. Ry., vice G. G. Hare, who has entered Dominion Atlantic Ry. service. Office, Kingston, Ont.

Michigan Central Rd.—B. F. AIKENS has been appointed Purchasing Agent, vice J. F. Farrell, resigned to enter other service. Office, Detroit, Mich.

Northern Pacific Ry.—W. P. CLOUGH, director and member of the executive committee, has been appointed Vice President, vice J. N. Hill, resigned on account of ill health. Office, New York.

Prince Edward Island Ry.—G. A. HUGHES, heretofore train dispatcher, has been appointed Chief Dispatcher. Office, Charlottetown, P.E.I.

Rutland Rd.—F. T. GRANT, heretofore Assistant General Passenger Agent, Boston and Maine Rd., Boston, Mass., has been appointed General Passenger Agent, Rutland Rd., Rutland, Vt., vice C. HARTIGAN, appointed Assistant General Passenger Agent, Lake Shore and Michigan Southern Ry., Chicago, Ill.

Toronto, Hamilton and Buffalo Ry.—F. F. BACKUS, heretofore General Freight and Passenger Agent, has been appointed Traffic Manager. Office, Hamilton, Ont.

J. C. MARTIN, heretofore Assistant General Freight and Passenger Agent, has been appointed General Freight and Passenger Agent.

Canadian Freight Association, Eastern Lines.

At the midsummer meeting of this association, Eastern Lines, at Bluff Point, N.Y., July 10 to 12, the resignation of T. Marshall, Chairman, on his appointment as Manager of the Traffic Department of the Toronto Board of Trade was accepted.

W. R. MacInnes, Freight Traffic Manager, C.P.R., Montreal, on behalf of the association, presented him with a silver tea service as a token of esteem and in appreciation of his services to the association as secretary and chairman.

A. E. Rosevear, Assistant General Freight Agent, G.T.R., Montreal, has been appointed acting chairman, Canadian Freight Association, Eastern Lines, pending the appointment of a successor to Mr. Marshall.

Railway Rolling Stock Notes.

The Intercolonial Ry. has received one postal car from the Nova Scotia Car Works, Halifax.

The G.T.Pacific Ry. has received 73 ballast cars, nos. 392747 to 392819, from the Canadian Car and Foundry Co., Montreal, and 41 flat cars, nos. 361601 to 361641, from the American Car and Foundry Co.

The Canadian Northern Ry. has ordered four Pacific type superheater passenger locomotives, from the Montreal Locomotive Works. They will have cylinders 23 ins. diar., by 28 ins., stroke, driving wheels 69 ins. diar., and will be of a total weight in working order, of 213,000 lbs.

The C.P.R., between June 17 and July 17, ordered the following rolling stock:— five freight refrigerator cars, nine stock cars, nine vans, two wooden flat cars, and one G1 locomotive, from its Angus shops, Montreal; 11 snow ploughs, from the Canadian Car and Foundry Co., Montreal; 1,000 steel frame box cars, from the American Car and Foundry Co.; 25 ten wheel locomotives from the Montreal Locomotive Works, and 25 ten wheel locomotives from the American Locomotive Co., Schenectady, N.Y.

The Canadian Northern Ry., between June 15 and July 15, received the following additions to rolling stock:— two consolidation locomotives, from the Canadian Locomotive Co., Kingston, Ont.; two consolidation locomotives, from the Canada Foundry Co., Toronto; two first class cars, six second class cars, one dining car and 250 box cars, from the Canadian Car and Foundry Co., Montreal; three baggage cars and 150 box cars, from the Crossen Car Co., Cobourg, Ont.; 100 box cars, from the Nova Scotia Car Works, Halifax, N.S., and 47 flat cars from the Rathbun Co.

The C.P.R., between June 17 and July 17, received the following additions to rolling stock:— 100 freight refrigerator cars, 221 stock cars, 42 vans, 62 wooden box cars, one pile driver, five suburban cars, one first class car, eight first class and smoking cars, five dining cars, six sleeping cars, three cafe-parlor cars, and 12 switching locomotives, type U3, from its Angus shops, Montreal; 22 steel frame box cars, 30 ballast cars, 239 coal cars, and 107 flat cars, from the Canadian Car and Foundry Co., Montreal; 67 stone cars from the Nova Scotia Car Works, Halifax; three Rodger ballast ploughs from F. H. Hopkins and Co., Montreal; 19 D10 locomotives, from the Montreal Locomotive Works, and one wrecking crane from the U.S.

Following are chief details of the four ten wheel locomotives, which the Canadian Northern Ry. is having built by the American Locomotive Co., Schenectady, N.Y.:

Weight on drivers, in working order	149,000 lbs.
Weight of engine total	198,500 lbs.
Weight of tender, in working order	134,000 lbs.
Cylinders, diar. and stroke	21 by 28 ins.
Valve gear, type	Walschaert
Driving wheels, diar.	63 ins.
Wheel base, driving	14 ft. 10 ins.
Wheel base, total engine	26 ft. 1 in.
Wheel base, engine and tender	55 ft. 0 3/4 in.
Boiler, type	Wagon top
Boiler, pressure	200 lbs.
Boiler, tubes, no. and diar.	239—2 ins.
Boiler, flues, no. and diar.	24—5 ins.
Heating surface, firebox	180 sq. ft.
Heating surface, tubes	2229 sq. ft.
Heating surface, total	2409 sq. ft.
Superheating surface	408 sq. ft.
Grate area	49 sq. ft.
Capacity, water	5000 imp. gals.
Capacity, coal	12 tons
Superheater	Vaughan-Horsley

Following are the chief details of the 41 Pacific type locomotives, equipped with superheaters of top header double loop type and sectional brick arch, which the G.T.R. is having built by the Montreal Locomotive Works, as mentioned in our last issue:—

Cylinders, diar. and stroke	23 by 28 ins.
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Driving wheels, diar. and stroke	for 31—69 ins. for 10—73 ins.
Boiler, outside diar., first course	70 1/2 ins.
Firebox, length and width	86 7/8 by 75 1/2 ins.
Tubes, no. and diar.	181—2 ins.
Flues, no. and diar.	24—5 3/8 ins.
Tubes and flues, length	20 ft. 7 ins.
Grate area	50.6 sq. ft.
Wheel base, driving	13 ft. 4 ins.
Wheel base, engine	33 ft. 2 ins.
Wheel base, engine and tender	62 ft. 3 1/2 ins.
Weight on leading truck	40,000 lbs.
Weight on drivers	145,000 lbs.
Weight on trailing truck	38,000 lbs.
Weight, total engine	223,000 lbs.
Weight of tender	144,600 lbs.
Capacity, water	8,000 U.S. gals.
Capacity, coal	10 tons.

Following are chief details of the four ten wheel locomotives, which the Canadian Northern Ry. is having built by the Montreal Locomotive Works:—

Weight on drivers	112,500 lbs.
Weight on truck	41,500 lbs.
Weight of engine, total	154,000 lbs.
Weight of tender	123,400 lbs.
Wheel base, driving	13 ft. 6 ins.
Wheel base, total engine	23 ft. 10 ins.
Wheel base, engine and tender	52 ft. 8 ins.
Tractive power, maximum	24,300 lbs.
Factor of adhesion	4.63
Cylinders, diar. and stroke	20 by 24 ins.
Valves, type and gear	Walschaert
Valves, diar. and travel	12 and 5 1/2 ins.
Driving wheels, diar.	57 ins.
Driving journals	8 1/2 by 10 ins.
Truck, type	Four wheel with swing bolster
Truck journals	5 1/2 by 10 ins.
Truck wheels	30 ins.
Boiler, type	Extended wagon top, radial stay
Boiler, outside diar. front end	58 1/2 ins.
Boiler, outside diar. largest course	65 ins.
Boiler, height over crown, front	27 1/2 ins.
Boiler pressure	170 lbs.
Firebox, length and width	102 7/8 by 41 1/4 ins.
Tubes, no. and diar.	133—2 ins.
Tubes, length	13 ft. 2 1/2 ins.
Flues, no. and diar.	18—5 3/8 ins.
Heating surface, tubes	1241 sq. ft.
Heating surface, firebox	141 sq. ft.
Heating surface, total	1382 sq. ft.
Superheating surface	279.6 sq. ft.
Grate area	29.2 sq. ft.
Tender wheels, diar.	33 ins.
Tender journals	5 1/2 by 10 ins.
Tender wheel base	17 ft. 10 ins.
Tender truck, type	Four wheel pedestal
Tank, type	Water bottom
Capacity, water	5,000 imp. gals.
Capacity, coal	10 tons

J. W. Jordan, Yardmaster, C.P.R., Winnipeg, is being charged with theft from C.P.R. warehouses and cars.

The Great Western Ry. of England has been conducting a series of tests of an electric automatic train control and cab signalling system. On July 5, a test was made over a prepared track, two locomotives being started toward each other, the drivers leaving the cabs before a high speed had been attained. When the locomotives came on the same block, the warning whistles blew, steam was automatically shut off, brakes applied, and they came to a stop, without collision.

NOTICE TO CONTRACTORS.

Tenders will be received by the undersigned for the construction of that portion of the Canadian Northern Pacific Railway on Vancouver Island, known as Division D, extending from Mileage 100, west of Cowichan Lake, to a point on the Alberni canal, a distance of approximately forty miles.

Tenders to include clearing, grubbing, grading, bridges, trestles, culverts, masonry and fencing.

Plans, profiles, specifications and forms of contract may be seen and forms of tender obtained at the offices of Mackenzie, Mann and Co., Ltd., Pemberton Block, Victoria, B.C.

Total work to be completed within one year from the date of the signing of the contract.

Tenders to be received at the offices of Mackenzie, Mann and Co., Ltd., Room No. 713, Metropolitan Building, 837 Hastings Street West, Vancouver, B.C., not later than 12-0 noon on the 10th day of August, 1912, and to be enclosed in sealed envelopes marked "Tender for Construction."

The lowest or any tender not necessarily accepted.

MACKENZIE, MANN & CO., LTD.

Canadian Northern Railway Revision at Rainy Lake, Ont.

By W. L. Mackenzie M. Can. Soc. C.E., Bridge Engineer, C.N.R.

The C.N.R. main line from Port Arthur to Winnipeg crosses Rainy Lake at the Narrows near Fort Frances, Ont., on a pile trestle upwards of two miles long. The present structure was completed in 1900, and has served to carry the large traffic up to the present. In constructing the trestle it was necessary to use piles as long as 80 ft., as the lake bottom was rather soft clay. Very little difficulty has been experienced in maintaining the pile trestle, but it was

satisfactory than winter work, as many as 28 soundings to rock bottom being secured in one day. Many of the soundings taken extended to 90 ft. below the surface of the water, the water sometimes being 40 ft. deep, with 50 ft. of clay underneath. The clay varied from a soft ooze to a compact clay in which the sounding rod would only penetrate an eighth of an inch with a 4 ft. drop of the hammer.

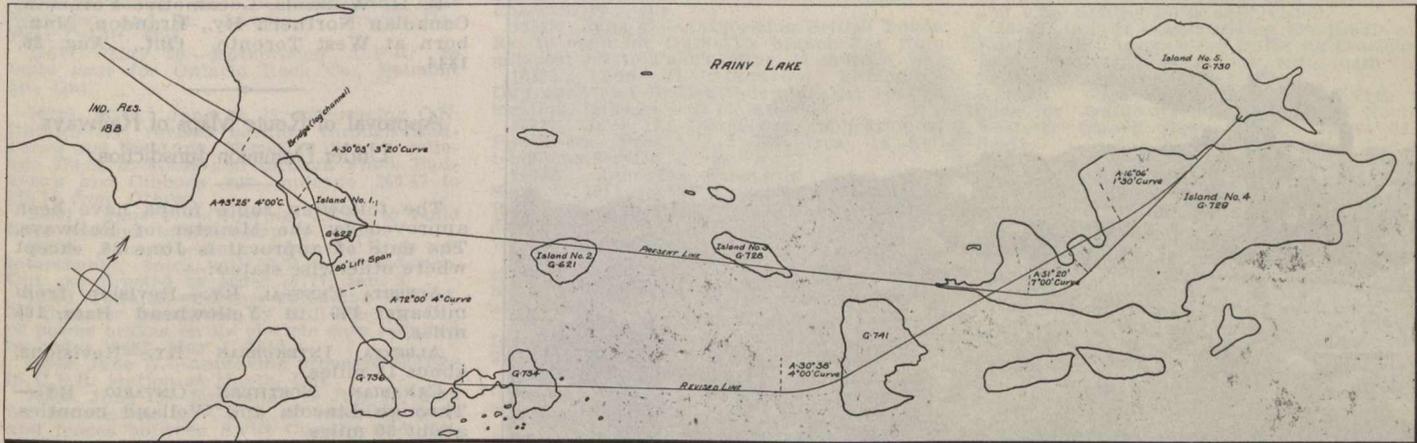
Following the taking of the soundings, a contour map of the lake bottom was made and a location for the new line was selected, giving much smaller quantities of fill as compared with any other line. The new line is 15,814 ft. long, 800,000 cu. yds. rock are required for a

The accompanying plan shows the relative positions of the present and revised lines. The profile illustrates the hugeness of the work. The illustrations from photographs on pg. 408, show the barges and girders in use.

Approximate Quantities for Timber Bridges on the Canadian Northern Railway.

By A. J. Taunton.

These figures refer to bridges on the C.N.R., and must be modified to suit other structures. For pile trestles the piles may be estimated directly from the profile, the deck and caps running at about 2,700 f.b.m. per opening of 14 ft. 9

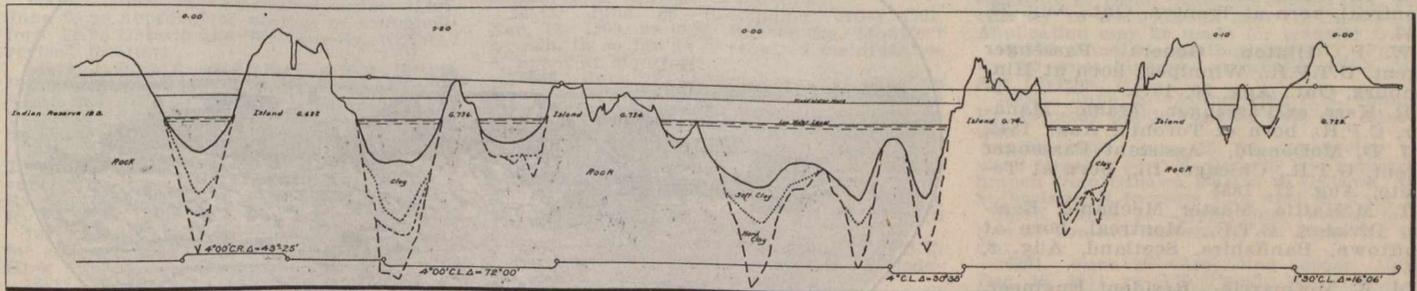


Canadian Northern Railway Rainy Lake Revision. Plan.

necessary to take continual precautions to guard against trouble. When the lake froze over in the fall, the water was usually higher than later on in the winter, and as the water gradually fell it was necessary to keep the ice cut away from the piles to avoid settlement from the weight of ice. In the spring there was always the possibility of a strong north wind driving the ice against the trestle. However, the latter caused little trouble and any slight damage from this cause was immediately repaired. The increase in traffic during the last few years made it apparent that the trestle must soon be replaced. It was not possible to make an embankment on the present line and keep the line open for traffic at the same time, besides the depth to rock on the pre-

double track embankment, about 95% of this being obtained from an adjacent island. Contractors are using drills operated by compressed air, the power being obtained from the hydro-electric development recently completed at Fort Frances. Steam shovels are employed for loading the rock into cars, and switching locomotives are used between the borrow pit and fill. The contractor has devised an unusual arrangement for building the fills. To obviate the necessity for a trestle, he placed two plate girders 140 ft. long across a supporting barge 32 ft. by 112 ft. by 6 ft. deep, the inner end of these girders being supported by a cross girder 80 ft. long, the ends of the cross girder being in turn supported by two smaller barges 12 ft. by 24 ft. by 5 ft. deep. The two long gird-

in., and a small allowance for dump plank and bracing depending on the height being made. Allow for lengths of pile in ordinary soil 15 ft. more than the height from the ground to cut-off. The iron will be about 60 lbs. per m. The piling on frame trestles is also obtained from the profile. The f.b.m. timber may be approximately obtained by multiplying the area of the opening between end bents, the ground, and the base of rail by a factor K, the value of which may vary from 11 to 13½. For long low trestles K may be as high as 13½, and for short deep ones the low limit (11) will be reached. The ratios of the area of the toe slopes at the ends to the whole area, and the timber in the deck to the total quantity, will considerably influence the value of K. Good guessing on the part



Canadian Northern Railway Rainy Lake Revision. Profile.

sent line was such that the embankment quantities would have been excessive.

In order to choose a new location it was necessary to take soundings to rock over a large area adjacent to the present line. This work was started during the winter with only fair success, owing to the difficulty experienced in handling the sounding rods, as they became quickly coated with ice. The work was continued during the summer, using a barge 22 ft. wide by 34 ft. long, on which was erected a small pile driver with a 75 lb. hammer operated by hand. The sounding was done through a well in the centre of the scow, using extra heavy 1½ in. steel pipe in 10 ft. lengths for sounding rods. This proved much more

ers are spaced 30 ft. c. to c., and are connected by floor beams on which track stringers are placed to carry cars as they came from the borrow pit. The cars are dumped in the space between the barges, the outer end of the long girders serving as a tail track for empties.

This arrangement has proved entirely satisfactory, and the work has progressed without interruption, the embankment being now about 75% completed.

On making comparison between excavation and embankment quantities it is found that the embankment is almost entirely displacing the clay in the bed of the lake.

of the estimator is necessary; this, combined with experience and judgment, should give very fair approximate results. The iron will be 57 to 60 lbs. per m.

The following figures are for Howe trusses, exclusive of falsework:

Span in feet.	Equivalent Loading.	D.G.S.	f.b.m.	lbs.
60	Class III		33,000	13,000
60	" Heavy		42,000	28,000
80	" III		56,000	40,000
120	" II			58,000

From the Transactions of the Engineering Society, Manitoba University, in The Manitoba Engineer.

The Ottawa Car Co. is going to build a new and larger plant at Britannia, a suburb of Ottawa.

Birthdays of Transportation Men in August.

Many happy returns of the day to:—

W. E. Bishop, General Agent, Niagara Navigation Co., Hamilton, Ont., born at Brantford, Ont., Aug. 10, 1863.

J. F. Chapman, Manager, Thousand Islands Ry., and Oshawa Ry., Gananoque, Ont., born at Frankford, Hastings Co., Ont., Aug. 25, 1863.

A. E. H. Chesley, General Accountant, Dominion Atlantic Ry., Kentville, N.S., born near Annapolis Royal, N.S., Aug. 27, 1877.

C. H. N. Connell, Engineer Mainten-

C.P.R., St. Louis, Mo., born at Edinburgh, Scotland, Aug. 3, 1857.

J. F. Richardson, Superintendent Telegraphs, British Columbia Division C.P.R., Vancouver, born at Granby, Que., Aug. 23, 1861.

W. G. Ross, President, Quebec Railway, Light and Power Co., born at Montreal, Aug. 6, 1873.

W. Le B. Ross, Local Treasurer, G.T. Pacific Ry., Winnipeg, born at Ottawa, Ont., Aug. 9, 1868.

Major Salt, Car Foreman, C.P.R., Toronto, born at Lichfield, Eng., Aug. 12, 1859.

F. C. Salter, European Traffic Mana-

W. F. Taylor General Storekeeper, Intercolonial Ry., Moncton, N.B., born at Hillsboro, N.B., Aug. 20, 1855.

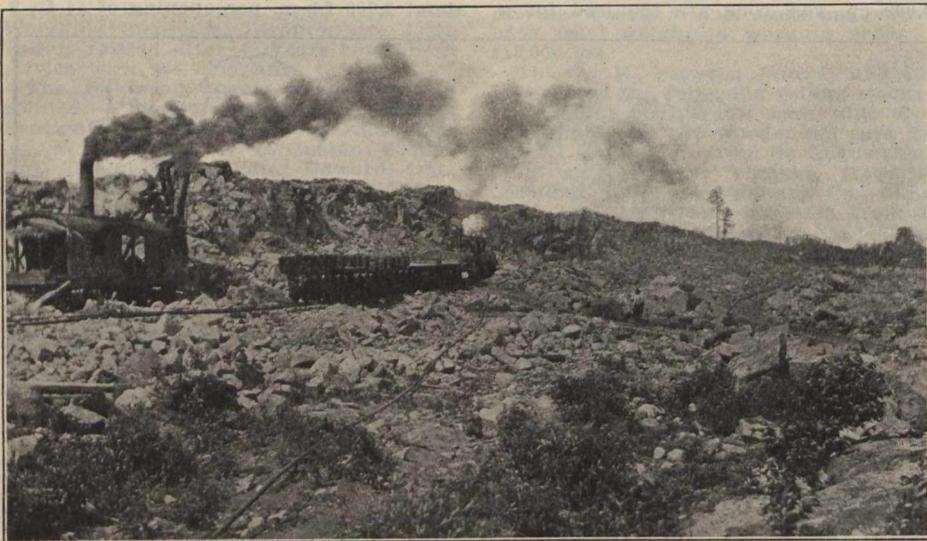
R. L. Thompson, ex-District Passenger Agent, C.P.R., Toronto, born at Montreal, Aug. 17, 1873.

F. J. Thomson, Marine Superintendent, Canadian Northern Steamships, Ltd., Montreal, born in Cheshire, Eng., Aug. 20, 1876.

F. E. Warren, Division Car Foreman, Ontario Division, C.P.R., West Toronto, Ont., born at Chelsea, Que., Aug. 29, 1872.

W. B. Way, Assistant Superintendent District 3, Eastern Division, C.P.R., Montreal, born at Bowmanville, Ont., Aug. 22, 1867.

E. H. Williams, Locomotive Foreman, Canadian Northern Ry., Brandon, Man., born at West Toronto, Ont., Aug. 26, 1844.



Canadian Northern Railway Rainy Lake Revision. Main Borrow Pit.

ance of Way, Canadian Northern Quebec and Quebec and Lake St. John Rys., Quebec, born at Woodstock, N.B., Aug. 26, 1876.

F. Barlow Cumberland, ex-Vice President, Niagara Navigation Co., Port Hope, Ont., born at Portsmouth, Eng., Aug. 5, 1846.

E. L. Desjardins, Assistant Superintendent, Montreal and Ste. Flavie District, Intercolonial Ry., Riviere du Loup, Que., born at St. Jean Port Joli, Que., Aug. 1, 1859.

F. L. Ellingwood, Superintendent Building Construction, C.P.R., Montreal, born at Eastport, Me., Aug. 6, 1863.

G. H. Ham, head office staff, C.P.R., Montreal, born at Trenton, Ont., Aug. 23, 1847.

W. P. Hinton, General Passenger Agent, G.T.P.R., Winnipeg, born at Hintonburg, Ont., Aug. 30, 1871.

R. Kerr, ex-Passenger Traffic Manager, C.P.R., born at Toronto, Aug., 1845.

J. D. McDonald, Assistant Passenger Agent, G.T.R., Chicago, Ill., born at Toronto, Aug. 27, 1855.

T. McHattie, Master Mechanic, Eastern Division, G.T.R., Montreal, born at Dufftown, Banffshire, Scotland, Aug. 8, 1854.

M. K. McQuarrie, Resident Engineer, District 1, British Columbia Division, C.P.R., Revelstoke, born at Sault Ste. Marie, Ont., Aug. 17, 1884.

J. A. Marsh, Trainmaster, British Columbia Electric Ry., New Westminster, B.C., born at Dresden, Ont., Aug. 16, 1876.

W. J. Meakin, Locomotive Foreman, C.P.R., Castor, Alta., born at Toronto, Aug. 22, 1869.

C. Montgomery, Master Mechanic, Pere Marquette Rd., St. Thomas, Ont., born near London, Ont., Aug. 29, 1860.

W. E. Mullins, General Manager, Costa Rica Division, United Fruit Co, San Jose, Costa Rica, born at Stratford, Ont., Aug. 13, 1870.

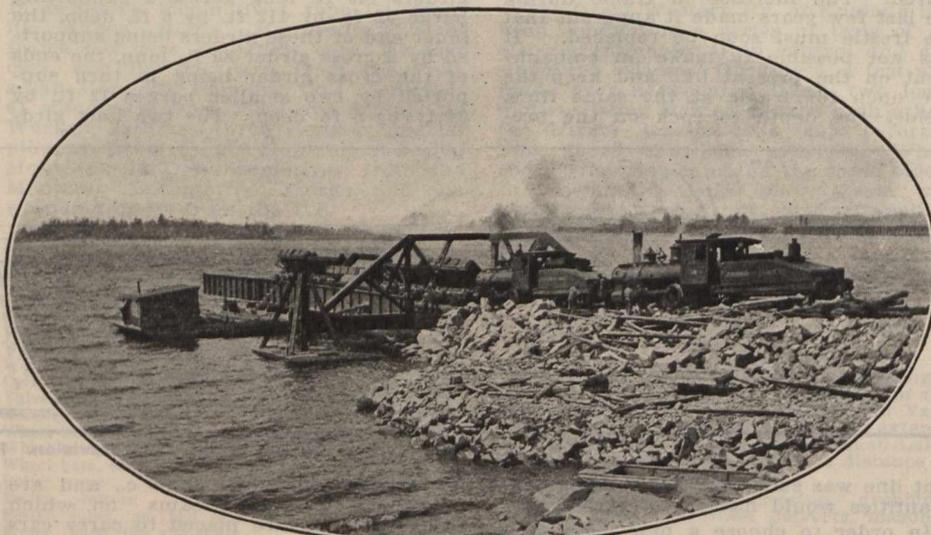
F. H. Phippen, K.C., General Counsel, C.N.R., Toronto, born at Belleville, Ont., Aug. 26, 1862.

W. M. Porteous, Freight Agent,

ger, G.T.R., and Canadian Ex. Co., London, Eng., born at Sarnia, Ont., Aug. 31, 1863.

W. H. Sample, Master Mechanic, Ottawa Division, G.T.R., Ottawa, born at Altona, N.Y., Aug. 2, 1864.

C. R. Scoles, General Manager, Quebec Oriental Ry., New Carlisle, Que., born at Grantham, Lincoln, Eng., Aug. 27, 1856.



Canadian Northern Railway Rainy Lake Revision, Barges and Girders in use.

S. A. Simpson, Superintendent, Sleeping, Dining and Parlor Cars and News Service, Saskatchewan Division, C.P.R., Moose Jaw, born at Toronto, Aug. 22, 1880.

W. Stitt, General Passenger Agent, C.P.R., Eastern Lines, Montreal, born in Kirkcudbrightshire, Scotland, Aug. 3, 1855.

J. F. Sweeting, Industrial Agent, Natural Resources Department, C.P.R., Calgary, Alta., born at Worthing, Eng., Aug. 20, 1872.

Approval of Route Maps of Railways Under Dominion Jurisdiction

The following route maps have been approved by the Minister of Railways. The date of approval is June 26, except where otherwise stated:—

ALBERTA CENTRAL RY.—Revision from mileage 140 to Yellowhead Pass, 165 miles.

ALBERTA INTERURBAN RY.—Revisions, about 18 miles.

CANADIAN NORTHERN ONTARIO RY.—Through Lincoln and Welland counties, about 30 miles.

From North Toronto, eastward, 7.2 miles.

CANADIAN NORTHERN RY.—Revision from Calgary, Alta., southerly and westerly, about 12 miles.

CANADIAN PACIFIC RY.—From Laggan to Lake Louise, Alta., 3.55 miles. (June 18).

From Estevan, Sask., westerly, 96.5 miles.

Revision of Touchwood Hills branch, 48.8 miles.

From Sedgewick southerly, 23.6 miles.

GRAND TRUNK PACIFIC RY.—Revisions between Calgary and Coutts, Alta., about 45 miles.

Revision of Cutknife branch, about 11 miles.

MONTREAL AND SOUTHERN COUNTIES RY. (Electric).—From Ranelagh station to Laprairie, Que., about 12 miles.

NIAGARA, ST. CATHARINES AND TORONTO RY. (Electric).—From St. Catharines to Niagara-on-the-Lake, Ont., about 14 miles.

From Port Dalhousie to Beamsville, Ont., 12 miles.

NIPISSING CENTRAL RY. (Electric).—From Haileybury to New Liskeard, Ont., about 5½ miles.

Orders by the Board of Railway Commissioners.

Beginning with June, 1904, we have 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 hearings 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.

16544. May 15.—Approving location of Windsor, Essex and Lake Shore Rapid Ry., siding, freight shed and station at Essex, Ont.

16545, 16546. May 18.—Authorizing G.T.R. to build siding for Bechtels, Ltd., near Waterloo, and St. Lawrence Starch Co., Port Credit, Ont.

16547. May 20.—Authorizing C.P.R. to build spur for Ontario Rock Co., Belmont tp., Ont.

16799, 16800. June 19, 17.—Approving C.N. Ontario Ry. revised location through Badgerow and Field tps., Nipissing district, mileage 374.53 to 378.96 and through Field, Badgerow and Gibbons tps., mileage 260.47 to 265.92 from Ottawa.

16801. June 17.—Ordering C.P.R. to build farm crossing in Salaberry tp., Que.

16802. June 19.—Authorizing C.P.R. to use interchange track with G.T.R. at Goderich, Ont., as directed by order 15777, Jan. 8.

16803. June 18.—Further extending to Sept. 30, time for installation by Hull Electric Co. of power brakes on its electric cars required by order 10462, May 3, 1910.

16804. June 17.—Approving proposed change in C.P.R. station at Meath, Ont.

16805. June 18.—Extending to July 15, time for installation by C.P.R. of crossing signs and fences between Swift Current and Neville, Sask., ordered by order 15865, Feb. 1.

16806. June 19.—Approving location of C.P.R. branch from near Laggan station to near its hotel at Lake Louise, B.C.

16807. June 19.—Authorizing G.T. Pacific Ry. to build spur for Great Northern Tannery Co., Edmonton, Alta.

16808. June 19.—Amending order 16589, May 20, re G.T. Pacific Ry. location through Fort William, Ont.

16809. June 19.—Ordering that crossing of G.T. Pacific Ry. by C.P.R. at the dock at Vancouver, B.C., be protected by gates, watchman to be appointed by C.P.R. and paid by the G.T.P.R.

16810. June 18.—Further extending to Sept. 30, time for completion of overhead bridge by G.T.R. at Rockfield, Que.

16811. June 17.—Ordering that G.T.R. crossing at Bronson Ave., Ottawa, be protected by overhead structure, 20% to be paid from railway grade crossing fund, half remainder by city and half by G.T.R.

16812. June 19.—Approving plan and chart of interlocking plant to be installed by G.T.R. at bridges over St. Lawrence river and Soulanges canal.

16813. June 22.—Amending order 16695, June 7, re approval of portion of Campbellford, Lake Ontario and Western Ry. (C.P.R.) revised location.

16814. June 6.—Ordering G.T.R. within three months to install two sets of gates at King St., and one set at Sherbrooke St., Peterboro, Ont., day and night watchmen to be employed.

16815. June 20.—Amending order 16668, June 1, re crossing at Burrard Inlet, B.C. by substituting Vancouver, Victoria and Eastern Ry. for Vancouver, Westminster and Yukon Ry.

16816. June 11.—Extending to July 15, time for completion of certain work by C.P.R. at King St. crossing, Walkerton, Ont.

16817. June 19.—Authorizing C.N. Ontario Ry. to cross with its Ottawa-Capreol line, Dufresne Road, Ferris tp., Ontario.

16818. June 22.—Authorizing Canadian Northern Ry. to cross public road with its Alask Southeastern line, Saskatchewan.

16819. June 19.—Approving C. N. Ontario Ry. revised location through unsurveyed territory in Algoma District, mileage 208.3 to 211.47 from Sudbury Jct.

16820. June 20.—Authorizing G.T.R. to extend passing track and re-align main line over county line road, Brant tp., Ont.

16821. April 12.—Relieving C.P.R. from erecting fences on certain portions of its Fort William, Ignace and Kenora subdivisions.

16822. June 24.—Authorizing G.T. Pacific Ry. to open for traffic its line between Hinton, mileage 978, and Fitzhugh, mileage 1028, A. Ita.; speed limited to 20 miles an hour.

16823. June 20.—Ordering that city of Montreal be subject to fine of \$25 a day after

June 24, that it is in default of commencing work re Park Ave. subway, required by order 16504, May 13, and \$25 a day after Dec. 15 that it is in default of completing same.

16824. June 20.—Extending pending sanction of Governor-in-council of agreements, time for operation of Midland Ry. trains over Canadian Northern Ry. to Winnipeg Terminals, as defined in order 16550, May 20.

16825. June 20.—Extending to Oct. 1, time for completion by C.N.R. of spur into Hudson Bay reserve, Edmonton, Alta.

16826. June 18.—Authorizing C.P.R. to build its Moosejaw northwesterly branch across 34 highways in Saskatchewan.

16827. June 22.—Authorizing C.P.R. to use bridge 69.3 on its Boundary subdivision, B.C.

16828. June 22.—Approving James Bay and Eastern Ry., (C.N.R.) revised location in Roberval tp., Que.

16829. June 20.—Authorizing British Yukon Ry. to open for traffic its branch line from milepost 160 to Pueblo Mine, 13 miles.

16830. June 21.—Approving Edmonton, Dunvegan and British Columbia Ry. revised location, mileage 4 to 14, Alberta.

16831. June 17.—Dismissing application of Publishers Press, Ltd., Montreal, re Bell telephone service.

16832. June 20.—Amending order 14738, Sept. 9, 1911 re C.P.R. subway at Saranac Rd., York tp., Ont., by substituting plan dated Feb. 17, 1912; 20% to be paid from railway grade crossing fund.

16833. June 24.—Approving location of portion of C.P.R. Moose Jaw Southwesterly branch from mileage 37.85 to 64.47, Sask., and authorizing crossing of 22 highways.

16834. June 21.—Authorizing C.P.R. to build four spurs across Symes and Gunns roads, Toronto.

16835. June 24.—Extending to Aug. 31, time for completion of C.P.R. spur for Hanson and VanWinkle Co., Toronto.

16836. June 24.—Relieving C.P.R. from erecting fences on its Lac du Bonnet subdivision.

16837. June 18.—Authorizing C.P.R. to take certain city lands in Toronto, in connection with enlargement of freight terminals, etc.

16838. June 20.—Authorizing railways to dispense with night watchman at C.N. Ontario Ry. and C.P.R. crossing near Ottawa.

16839. June 21.—Authorizing C.P.R. to build extension to siding for Taylor Milling and Elevator Co., Lethbridge, Alta.

16840. June 21.—Authorizing C.P.R. to close highway near mileage 48, Edmonton branch, Alta.

16841. June 22.—Authorizing C.P.R. to build spur for Lethbridge Brewing and Malting Co. and Young Bros., at Macleod, Alta.

16842. June 25.—Approving C.P.R. plan of track elevation at North Toronto, Ont., plan of subway structures for Yonge St. and Avenue Rd. to be filed for approval.

16843. June 17.—Dismissing application of Quebec Rifle Association re C.N.R. stopping trains at Point aux Trembles Range, Montreal.

16844. June 20.—Authorizing C.N. Quebec Ry. to cross C.P.R. with its St. Eustache-St. Jerome line, near St. Augustine.

16845. June 20.—Rescinding order 6301, Feb. 15, 1909, re C.N. Quebec Ry. Montfort branch, in so far as it requires maintenance of agent at Montfort.

16846. June 25.—Approving plans showing track elevation of joint section of C.P.R. and C.N. Ontario Ry. from Summerhill Ave. to Dovercourt Rd., Toronto, except approaches to subways at Yonge St., and Avenue Rd., which must be level; Christie St. subway to be full width of street.

16847. June 19.—Amending order 16498, May 10, re location of G.T. Pacific Branch Lines Co.'s station at Bashaw, Alta.

16848. June 18.—Approving location of G.T. Pacific Branch Lines Co.'s station at Dodsland, Alta.

16849. June 21.—Authorizing G.T. Pacific Branch Lines Co. to build seven spurs in Regina, Sask.

16850, 16851. June 17, 22.—Defining express delivery and collection limits for Shawinigan Falls and Fraserville or Riviere du Loup, Que.

16852. June 24.—Authorizing Toronto, Hamilton and Buffalo Ry. to build spur for Barton Lumber and Supply Co., Hamilton, Ont.

16853. June 11.—Dismissing application of city of Ottawa for removal of G.T.R. tracks from Preston street.

16854. June 21.—Ordering G.T.R. within 90 days to install electric bell at Brock St., Uxbridge, Ont., 20% to be paid from railway grade crossing fund.

16855, 16856. June 21.—Ordering Michigan Central Rd. within 60 days to install electric bells at Hornby St. and East St., Springfield, Ont., 20% to be paid from railway grade crossing fund.

16857. June 11.—Authorizing G.T.R. to build

spur for Export Lumber Co., crossing Preston St., Ottawa, Ont.

16858. June 24.—Defining express delivery and collection limits for Three Rivers, Que.

16859. June 24.—Approving G.T.R. plans for new station at Richmond, Que.,

16860. June 2.—Approving C.P.R. plan of employees' passageway from Arlington St. bridge, Winnipeg.

16861. June 25.—Authorizing Canadian Northern Ry. to cross with its Alask Southeastern line 20 highways in Saskatchewan.

16862. June 24.—Ordering C.P.R. from May 1 to Oct. 1, to stop its mail trains at Lesage, Que., on flag.

16863, 16864. June 25, 24.—Authorizing C.P.R. to rebuild six bridges on its Manitoba, Ontario, Atlantic and Eastern Divisions.

16865. June 24.—Authorizing C.N. Ontario Ry. to cross Carp River, Fitzroy tp.

16866, 16867. June 25.—Authorizing C.P.R. to build bridges 104.9 Moose Jaw subdivision, and 0.55, Smiths Falls subdivision.

16868. June 25.—Authorizing Esquimalt and Naniamo Ry. to open for traffic its Cowichan Lake branch from junction with main line to Cowichan Lake, 18 2-3 miles.

16869. June 25.—Authorizing C.P.R. to open for traffic its Swift Current Northwesterly branch from mileage 33 to 34.8, Sask.

16870. June 25.—Approving location of Campbellford, Lake Ontario and Western Ry. (C.P.R.) from mileage 106.17 from Glen Tay to mileage 121 and rescinding order 16669, May 30, which approved from mileage 106.7 to 123.

16871. June 26.—Relieving C.P.R. from further protection of crossing at mileage 84½ near Plaisance station, Que.

16872. June 26.—Authorizing Georgian Bay and Seaboard Ry. (C.P.R.) to open for traffic its line from Coldwater, mileage 12 to Bethany, mileage 88.2.

16873, 16874. June 26.—Relieving C.P.R. from erecting fences on its Boundary, Nankup and Slocan, Lardo, Okanagan, Shuswap, Mountain and Arrow Lake subdivisions, B.C.

16875. June 25.—Authorizing C.P.R. to build spur for Alberta Clay Products Co., at Dunmore, Alta.

16876, 16877. June 25.—Authorizing C.P.R. to build ballast pit spur across highway near Elcan, Alta., and its Pheasant Hills branch across highway at mileage 17.3, McAuley subdivision.

16878. June 25.—Relieving C.P.R. from further protecting crossing at mileage 90.5 from Schwitzer Jct., Man.

16879. June 26.—Approving location of C.P.R. station at North Transcona, Man.

16880. June 26.—Extending to July 31, time for installing aeralis by G.T.R. on Union Stock Yards branch, Toronto.

16881, 16882. June 26.—Authorizing G.T.R. to build spurs for Dominion Cannery, Ltd., near Forest station, and for N. J. and W. G. Smart, near Collingwood, Ont.

16883. June 25.—Approving changes in G.T.R. side track and stockpen, Pricerville, Que.

16884. June 26.—Authorizing G.T.R. to build spur for Benson and Bray, Midland, Ont.

16885. June 26.—Dismissing application of residents of Druid, Alta., to compel G.T. Pacific Ry. to erect station near C.P.R. station. Application may be made for transfer track.

16886. June 24.—Authorizing G.T. Pacific Ry. to cross highway at mileage 176.9 Casiar District, B.C.

16887. June 26.—Authorizing C.N. Ontario Ry. to cross public road at Cote St. Michel, Que.

16888, 16889, June 25, 26.—Approving revised location of C.N. Ontario Ry. industrial branch from Oshawa station to Oshawa, and authorizing it to cross side road in Mara tp.

16890. June 26.—Approving revised location of Toronto Eastern Ry. in Pickering tp., Ont.

16891. June 25.—Amending order 15727, Dec. 19, 1911, re G.T. Pacific Ry. station at Hazleton, B.C., reserving leave to company to apply for approval of site giving adequate facilities.

16892. June 27.—Amending order 16790, June 10, re change in C.P.R. tracks and alteration of bridges on Mountain, Aqueduct, and Guy Sts. Montreal, by substituting city of Montreal for Montreal Tramways Co., in line 8 of operative part.

16893. June 26.—Ordering Dominion Atlantic Ry. to show cause within 10 days why it should not furnish adequate facilities for housing and repairing its engines and cars at Kentville, N.S., under penalty of \$25 a day.

16894. June 26.—Authorizing county of Compton municipality, Que., to build highway crossing over Maine Central Rd.

16895. June 25.—Authorizing J. B. Damp-house, Stony Point, Ont., to build farm crossing over G.T.R.

16896. June 24.—Defining express delivery and collection limits for Montreal.

16897. June 26.—Approving revised location of G.T.R. track in Cobourg, Ont., on

lands of W. J. Crossen and J. G. Field's estate.

16898. June 27.—Authorizing C.P.R. to build spur for N.K. Fairbank, Co., Lasalle, Que.

16899. June 28.—Authorizing South Ontario Pacific Ry. (C.P.R.) to open for traffic its line from Guelph Jet., to Hamilton, mileage 0 to 16.3.

16900. June 27.—General order re matter of indicating changes in freight, passenger and express tariffs. This is given in full on another page.

16901. June 28.—Authorizing G.T.R. to build spur for Congregation of Grey Nuns, St. Laurent parish, Que.

16902. June 27.—Approving proposed change in G.T.R. siding track on Charles St., Berlin, Ont.

16903. June 27.—Authorizing G.T.R. to build spur for A. E. Rogerson, Toronto.

16904. June 26.—Authorizing C.N. Ontario Ry. to build across public road in Ross tp.

16905. June 28.—Approving Canadian Northern Branch Lines Co. location through tps. 30-34, r. 4, w. 2 m., Sask.

16906. June 28.—Approving revised location of Kettle Valley Ry. from station 0 to 53+07.6, west of Penticton, B.C.

16907. June 27.—Approving clearances of Canada Malting Co.'s grain unloading shed on C.P.R. and Great Northern Ry. at Winnipeg.

16908. June 26.—Authorizing Vancouver, Victoria and Eastern Ry. to build highway crossing for B.C. government at Ashnola siding, B.C.

16909. June 26.—Authorizing Esquimalt and Nanaimo Ry. to build highway crossing between 2nd and 3rd Sts., Duncans, B.C., at expense of city.

16910. June 28.—Authorizing city of Hamilton, Ont., to build subway under G.T.R. at Birch Ave., near Sherman Inlet.

16911, 16912, June 28.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.) to cross eight highways between mileage 130.78 and 144.00, Hope tp., approving location from mileage 94 to 97 and authorizing it to take G.T.R. lands.

16913. June 27.—Authorizing Alberta Ry. and Irrigation Co. (C.P.R.) to cross 39 highways and approving location of Stirling branch from mileage 0 to 37.14, Alta.

16914. June 28.—Rescinding order 3049, May 2, 1907, re C.P.R. bridges over Assiniboine river, at St. James and Headlingly, Man.; bridges to be opened for navigation on four hours notice to District Superintendent.

16915. June 28.—Authorizing C.P.R. to use six bridges on its Sault subdivision and Timiskaming branch, Lake Superior Division.

16916. June 27.—Amending order 16686, June 7, re spur for F. H. Wiley, Winnipeg.

16917. June 28.—Authorizing C.P.R. to build spur for E. Steel, west Hawkesbury, tp., Ont.

16918. June 27.—Authorizing C.P.R. to open for traffic its second track from Moose Jaw mileage 0.6 to Caron, mileage 16.2, Sask.

16919. June 28.—Authorizing C.P.R. to build spur for Canada Lumber Co., Weston, Ont.

16920, 16921. June 26.—Authorizing Georgian Bay and Seaboard Ry. (C.P.R.) and G.T.R. to operate over crossing at mileage 50.5, from Port McNeill; and G.B. & S.R. (C.P.R.), and James Bay Ry. (C.N.R.), over crossing at Brechin, Ont., on account of interlocker being completed.

16922. June 28.—Temporarily approving G. T. Pacific Ry. C.R.C. 10, Standard Freight Mileage Tariff to supersede C.R.C. 7.

16923. July 2.—Authorizing Algoma Central and Hudson Bay Ry. to open for traffic its line between mileage 85 and 93, north of Sault Ste. Marie, Ont.

16924. July 2.—Authorizing Canadian Copper Co., and Algoma Eastern Ry. to operate over crossing in McKim, tp., half-interlocker being completed.

16925. July 2.—Authorizing C.N. Pacific Ry. and C.P.R. to operate over crossing on C.P.R. Mission Branch, B.C., interlocker being completed.

16926. July 2.—Approving Canadian Northern Ry. location through tps. 24-22, r. 1, w. 5 m., and r. 29, w. 4 m., Alta., mileage 0 to 13.21.

16927. June 29.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.), to cross four highways and divert highways between mileage 165.46 and 165.96, Ont.

16928. July 2.—Authorizing C.P.R. to build additional track across Queen St. Port Moody, B.C.

16929. July 2.—Authorizing C.P.R. to build its Moose Jaw southwesterly branch across highway at mileage 29.75.

16930. June 29.—Authorizing G.T. Pacific Ry. to build spur to Union Stock Yards, St. Boniface, Man., crossing of Canadian Northern Ry. to be protected by interlocker.

16931. July 5.—Extending to Aug. 1, time for putting into effect order 16479, May 10, re classification of gramophones, etc.

16932. July 4.—Authorizing C.P.R. to open for traffic its Moosejaw Southwesterly

branch, from mileage 27.4 to 35; trains limited to 15 miles an hour.

16933 to 16935. June 29.—Authorizing Edmonton, Dunvegan and British Columbia Ry. to cross five highways in Alberta; and approving its revised location through tp 55, r. 25, w. 4 m., and authorizing it to cross highway between secs. 33 and 34.

16936. June 28.—Ordering G.T.R. to instal improved type of electric bell at two crossings in Corinth, Ont., 20% to be paid from railway grade crossing fund.

16937. June 29.—Approving Kettle Valley Ry. location, from Penticton to Coldwater, B.C., (sec. A).

16938. July 6.—Approving Alberta Interurban Ry. location through sec. 13, tp. 24, r. 1, w. 5 m., mileage 1.25 to 2.28, Calgary, Alta.

16939. July 4.—Ordering that Vancouver, Fraser Valley and Southern Ry. (B.C.E.R.), be subject to penalty of \$25 a day after July 10, it shall be in default of requirements of order 16225, Apr. 3, re filing tariffs.

16940, 16941. June 29, July 2.—Authorizing C.N. Ontario Ry. to cross two public roads in Westmeath tp.,

16942. June 29.—Amending order 16653, May 31, re building of subway under G.T.R. at Sherman Inlet, by City of Hamilton, Ont.

16943. June 27.—Approving changes in G.T.R. bridges over public road in Tay, tp., Ont.

16944, 16945. July 3.—Authorizing G.T.R. to build spurs for Meaford Brick Co., con 1, St. Vincent tp., Ont., and Alabastine Hardmortar Co., Toronto.

16946, 16947. July 5.—Approving G.T.R. plans for bridges 189 and 77 on its Northern and Ottawa Divisions; and three and two bridges on its 12th and 15th districts.

16948, 16949. June 29.—Authorizing Campbellford, Lake Ontario and Western Ry. (C.P.R.), to build across two highways in Newcastle, and Hope tp., Ont.

16950, 16951, July 5, 4.—Authorizing C.P.R. to rebuild two bridges on its Wingham and Emerson subdivisions, and to build two bridges on Campbellford, Lake Ontario and Western Ry., mileage 180.57 and 0.91, Ont.

16952 to 16954. July 4, June 6, 3.—Extending to July 31, time for completion of electric bells by C.P.R. at Coldwater Jct., Ont., as required by order 15950, Feb. 8; to Aug. 31 for building spur at Wolverton, Ont., required by order 16287, Apr. 11; and to Dec. 31, for completion of spur at Emerson, Man., required by order 13302, Mar. 23, 1911.

16955. May 31.—Relieving C.P.R. from erecting fences on portions of its Eastern and Lake Superior Divisions.

16956 to 16960. July 5.—Authorizing C.P.R. to build spurs for Canada Cement Co., under lease to Revelstoke Saw Mill Co., Calgary Jct. Alta.; O. Lemire, St. Henri de Mascouche parish, Que.; G. Pigott & Co., York tp. Ont.; Ogilvie Flour Mills Co., Medicine Hat, Alta., and G. P. Sherwood & Co., Montreal.

16961. July 4.—Authorizing C.P.R. to expropriate land for Windsor St. terminals, Montreal.

16962. July 3.—Ordering G.T.R. to build farm crossing for E. N. Richards and G. H. Bennet, Windsor, Ont., on farm lot 102, con 1, Sandwich East tp., Ont.

16963. July 5.—Relieving G.T.R. from further protecting crossing just east of milepost 8, near Transcona, Man.

16964. July 10.—Extending to Jan. 1, 1913, time for completion of spur by Esquimalt and Nanaimo Ry., authorized by order 15626, Dec. 14, 1911.

16965. July 5.—Relieving C.P.R. from further protecting crossing just west of mileage 123, Portal subdivision, Sask.

Samuel Price, K.C., of St. Thomas, Ont. is reported to have been appointed to revise and consolidate the Dominion Railway Act.

The National Steel Car Co., Ltd., has been incorporated under the Dominion Companies Act with an authorized capital of \$6,000,000, consisting of \$3,000,000 of 7% cumulative preferred shares and \$3,000,000 ordinary shares. It is stated that the present issue of \$1,500,000 preference shares and \$2,000,000 of ordinary shares have been subscribed. The head office will be in Montreal, and the works at Hamilton, Ont., the directors being Sir John Gibson, W. Southam, and J. J. Scott, of Hamilton; Sir Henry M. Pellatt, Toronto; W. G. Ross, C. H. Cahan, M. Davis, and B. Magor, Montreal; W. B. Parsons, W. K. Brice, and M. H. Coggeshall, New York City. The company will be under the management of Basil Magor, at one time in the service of the Dominion Car and Foundry Co., of Montreal, and latterly connected with the Magor Car Co., of Passaic, N.J.

Canadian Northern Railway's Perpetual Consolidated Debenture Stock Issue.

The C.N.R. Co. issued a prospectus in London, Eng., recently of £1,438,356 (\$7,000,000) 4% perpetual consolidated debenture stock at 95.

The trust deed provides that the total amount of debenture stock shall not exceed £2,000 a mile of line operated, and an amount not exceeding the cost price of securities of independent corporations deposited with the trustees. The debenture stock is secured by a general charge upon the undertaking, property and assets (other than land and money subsidies) of the company, subject to £1,180,600 of bonds primarily charged on the Ontario Division (287 miles), and to charges created, or to be created, not exceeding \$10,000 a mile of line (other than the above mentioned 287 miles of line in Ontario) or \$15,000 per mile if guaranteed by the Dominion Parliament, or any of the provinces, and is a specific first mortgage upon certain securities deposited with the trustees.

The proceeds of the present issue are required in anticipation of a great increase in business on the opening of the through transcontinental service, for the initial acquisition, construction or extension and equipment by the Canadian Northern System Terminals Ltd., of certain terminal and hotel facilities at important central points on the system including Quebec, Montreal, Ottawa, Toronto, Hamilton, Sudbury, Port Arthur, Winnipeg, Brandon, Regina, and Calgary. These terminal and hotel properties are, or as acquired will be, vested in the C. N. System Terminals, Ltd., but will be used by the C.N.R. under permanent lease or agreement. The C. N. System Terminals, Ltd., has created first mortgage securities to the extent of \$7,000,000, which it has sold to the C.N.R. Co., and which have been deposited with the trustees for the debenture stock. The present issue of debenture stock is being made against these securities. It is expected that through trains will be running from Quebec to Vancouver early in the spring of 1914.

The C.N.R. is operating 4,100 miles, which include 644 miles of leased lines. In addition, about 500 miles of new branch lines have been completed and will shortly be opened for traffic, and over 500 miles more are under construction, a large proportion of which will be completed this year.

The Quebec Bridge Construction.

The principal work in progress on the site of the bridge across the St. Lawrence River near Quebec, is the sinking of the caisson for the south main pier. The dimensions of the caisson are 55 by 180 ft. by 40 ft. in height. It has been sunk to a depth of 21 ft. under ordinary high-water, and 4 ft. in the river bed under ordinary low water. It is expected that the caisson will have to be sunk to a depth of about 70 ft. before an absolutely safe foundation for the pier will have been reached. Three hundred men have been employed in three shifts under a five pound air pressure in the caisson, but as the depth increases, the number of men employed will be increased, and the period of working in the caisson will be shortened. There are in addition, about 300 men employed outside the caisson. It is expected that the caisson will be sunk to a proper depth and the pier erected by the fall. The masonry work on the other piers is being progressed with and it is expected to have everything completed by the fall, for the erection of the superstructure. The contractors for the substructure are M. P. and J. T. Davis, Quebec. (Sept., 1911, p. 831.)

RAILWAY DEVELOPMENT.

Projected Lines, Surveys, Construction, Betterments, Etc.

Alberta Interurban Ry.—The Board of Railway Commissioners has approved of location plans for the line from mileage 1.25 to 2.28 in Calgary, Alta. An arrangement has been made whereby the company's Carbon line will enter Calgary over the G.T. Pacific Ry. tracks, to the station ground at the R.N.W.M.P. barracks, and thence proceed over the city's electric railway tracks to the market place. This arrangement, so far as the city is concerned, was approved by the city council, July 8. A site for shops has been leased by the city at a nominal rental, the work of reclamation to be done by the company.

The Minister of Railways has approved revised route map for the company's projected Carbon line.

Alberta, Peace River and Eastern Ry.—Application is being made to the Minister of Railways for approval of the route map of this projected line from Milk River, Alta., to Peace River and on to Fort Churchill, Hudson Bay. The application was opposed June 26, by other companies, and the Minister stated that he would investigate the matter during his trip to the West. (July, pg. 339.)

Algoma Central and Hudson Bay Ry.—Track laying was completed July 3, on the extension to the C.P.R. transcontinental line, the steel laying gangs connecting the last rails at mileage 109.75 north of Sault Ste. Marie, Ont. The point of connection is at Franz, 23 miles west of Missanable station on the C.P.R. From this point the line is under construction to Hearst, on the National Transcontinental Ry. We are officially advised that ballasting on the extension is being proceeded with between mileage 93 and 195 at Franz, three steam shovels being at work. It is expected to have the section from Hawk Jct. and Franz, mileage 164.25 and mileage 195, completed ready to turn over to the operating department early in August. This will enable the operation of a regular train service between Michipicoten and the C.P.R.. It is expected that the ballasting on the line from mileage 93 to Hawk Lake Jct., will be completed by the end of October.

The work at the company's terminals at Sault Ste. Marie is, we are advised, proceeding satisfactorily. The station which is estimated to cost \$100,000 and the yards and shop, which are estimated to cost \$300,000, are well advanced, and their completion is looked for by winter. The company's steam shovel has been used on the yard excavation work, and it is intended to move it out to a ballast pit, in order to get out material for adding considerable ballast on the line between mileage 20 and 68, in order to bring it into first class shape. R. S. McCormick, Sault Ste. Marie, Ont., is Chief Engineer.

The Board of Railway Commissioners has authorized the opening for traffic of the extension from mileage 85 to 93 north of Sault Ste. Marie. On July 5, President Drummond, of the Lake Superior Corporation, owning the line, and other officers made a trip of inspection over the entire line to Franz and subsequently went over the extension under construction to Hearst. (June, pg. 299.)

Algoma Eastern Ry.—Grading on the extension of the line from the end of the present operated line at Crean Hill, Ont., to the terminal site on Goat Island, directly across the channel from Little Current, Manitoulin Island, has been completed, and 28.5 miles of track have been laid. The total distance from Crean Hill to Goat Island is 62 miles. Track laying has been delayed owing to lack of steel, but deliveries have now been made at Espanola and the work resumed. It is expected to have the 7.5 miles east to Crean Hill, and the six miles from Es-

panola to West River laid about Aug. 1. At this point track laying will be suspended for about a month, pending the erection of a combined timber and steel plate girder bridge. It is expected to complete tracklaying to the terminal yard site on Goat Island, as well as the ballasting from Crean Hill about the end of October.

Work on the terminal site at Little Current, and the construction of a bridge across the channel will be proceeded with this summer. There has been some delay in reference to the bridge on account of the requirements of the Public Works Department in regard to the width of the opening. This has now been adjusted and it is intended to put in a swing draw span on a centre pier in the channel, giving 150 ft. clear opening on each side. The balance of the structure, which will be about 600 ft. long, will consist of deck plate girders on concrete piers with end wing abutments. R. S. McCormick, Sault Ste. Marie, Ont., is Chief Engineer. (May, pg. 238.)

Atlantic, Quebec and Western Ry.—We were officially advised, July 5, that the whole of the line to Gaspe Basin, Que., had been completed and that it was expected to open it for traffic before the end of July. (July, pg. 339.)

Bruce Mines and Algoma Ry.—We have been officially advised that arrangements are being made for the company's financing, and that until these are completed nothing can be said as to the plans for future construction. (May, pg. 238.)

Central Ry. of Canada.—We are officially advised that the contractors have got well started on the first section of this line, and expect to have the grading completed early in September. This section extends from McAlpine, on the C.P.R., to Lemieux, Ont., 25 miles. The general contractors, C. J. Willis and Sons, London, Eng., and Montreal, have sublet several short lengths of grading to farmers in the district. F. S. Williamson, Montreal, is Chief Engineer. (July, pg. 339.)

Chicago, Milwaukee and St. Paul Ry.—Chicago, Milwaukee and Puget Sound Ry.—The latter line, which is an extension of, and controlled by, the first named was opened for traffic to Bellingham, Wash., July 11.

E. W. McKenna, Vice President, C.M., and St. P. Ry., is quoted as stating in reference to the reports referred to in our last issue, that the company had no intention whatever of entering Winnipeg, or invading Canadian territory, for some time to come, if at all. The company had not secured options for any right of way, nor had any surveys for such a line been completed.

Surveys are being made for a line from the C.M. and P.S. Ry. through Kalispell, Stillwell and the Tobacco valley, to Roosville, Mont., or Phillips Pass, to which point, the C.P.R. is reported to have made surveys for a line from Elko, B.C. (July, pg. 339, and June, pg. 299.)

Cumberland Ry. and Coal Co.—The Dominion Coal Co., which owns this line, is said to want to build a line from Springhill to Wallace, N.S., on Northumberland Strait, where it is proposed to establish a shipping point for its collieries. Hitherto the company has shipped its coal to Parrsboro, on the Bay of Fundy. J. H. Plummer, President, D.C. Co., had an interview with the Minister of Railways recently with a view of obtaining a subsidy for construction. Another report says that the line will be built as an Intercolonial Ry. branch. (June, pg. 21.)

Dominion Atlantic Ry.—A contract has been entered into between the company and the Dominion Government under the act granting aid to certain railways for

the building of an extension of the company's line in Canning, N.S., to the government wharf there, one mile, (June, pg. 299.)

Edmonton, Dunvegan and British Columbia Ry.—The Board of Railway Commissioners has approved of location plans for the line from mileage 4 to 14, Alta.

Work is reported to have been started on laying out the terminals at Edmonton. A connection has been made with the G.T. Pacific Ry. yards, and several sidings laid, in order to provide for the handling of construction material. (July, pg. 339.)

Essex Terminal Ry.—The Board of Railway Commissioners has authorized the opening for traffic of the extension of the line through Windsor, Sandwich tp., and Sandwich, Ont. (Jan., pg. 22.)

Fredericton and Grand Lake Coal and Ry. Co.—We are officially advised that the profile plans show a line following the east bank of the St. John River from Gibson, N.B., for about seven miles, through an open, well-cultivated district: thence to the Little River, about the 20th mile, is through a wooded country, which has been lumbered over for many years; and from the Little River to within two miles of Minto, the line will pass through a well farmed district. Near Minto, where connection is made with the New Brunswick Coal and Ry. Co., is the coal area, which is to be tapped. The maximum gradient is 1% compensated for curvature and the maximum curvature is six degrees. The substructures of the bridges over the Nashwaak River, Noonan Creek, Burpee Mill stream and Little River are all of concrete. All culvert openings under embankments sufficiently high are to be concrete arch culverts, varying from 4 ft. to 10 ft. openings, and the smaller culverts are to be of corrugated galvanized iron pipe. H. W. D. Armstrong, Fredericton, N.B., is Chief Engineer. (July, pg. 339.)

We have been officially advised, that the projected branch line to Marysville, was being located.

A contract has been entered into between the company and the Dominion Government under the act granting aid to certain railways for the building of a line from the Intercolonial Ry. at Gibson, to Minto, with a branch line to Marysville, a total length of 35 miles.

Glengarry and Stormont Ry.—Press reports state that engineers have started making a survey for a line from near St. Polycarpe, southerly and westerly through Glengarry county to Cornwall, Ont. C. L. Harvey, C.E., is a provisional director of the company. (June, pg. 300.)

The survey party is in charge of H. S. Dickson, with M. J. McLennan as assistant, and is working between Cornwall and Williamstown. (June, pg. 300.)

Hudson Bay and Pacific Ry.—An order of the High Court of Justice, London Eng., has been granted directing the winding up of the H.B. and P. Ry. Development Co., which was started for the purpose of financing the construction of the line. A meeting of creditors is to be held in London, Eng., Aug. 7.

Intercolonial Ry.—Tenders are under consideration for the erection of a brick and stone passenger station at St. Flavie, Que.; a 10-stall locomotive house and annex with brick chimney, etc., at Point Tupper, N.S., and for the erection of an extension to pier 7, Richmond, N.S.

An Ottawa press dispatch says: "The government has decided to promote the shipment of coal from the Springhill, N.S., mines to the upper provinces by the construction of a spur line of the I.R.C. from Springhill to Wallace. The harbor at Wallace will be dredged and docks constructed for the handling of the coal. Financial provision for this will be made at the next session of Parliament." Another report says the line will be built by the Cumberland Ry. and Coal Co. (See under that heading.)

Joliette and Lake Manuan Colonization Ry.—A contract has been entered into between the company and the Dominion Government under the act granting aid to certain railways for the building of a line from Joliette, to or near Lake Manuan, Que., 60 miles. (June, pg. 284, and May, pg. 230.)

Kettle Valley Lines.—The Board of Railway Commissioners has approved location plans of the extension of the line from Penticton to Coldwater, B.C., plan of a 250 ft. deck span over Trout Creek near Penticton, and revised location plans of the line from mileage 0 to 53.07 west of Penticton.

An arrangement is reported to have been completed under which the K.V. Ry. and the C.P.R. are to have joint terminals in Grand Forks, B.C. The city council has granted a free right of way for additional trackage, and exemption from taxation for 10 years, and the companies undertake an initial expenditure of \$200,000. The necessary bylaw to authorize the council to enter into the agreement is to be voted on at an early date. (July, pg. 339.)

London, Lake Erie and Tillsonburg Ry.—Press reports state that J. H. Teall, Tillsonburg, Ont., who controls this charter, has sold out all his interests, together with the property he has acquired at Port Burwell in connection with it, to the G.T.R.

Michigan Central Rd.—A contract is reported to have been let to G. A. Ponsford, St. Thomas, for the erection of an engine dispatching house 100 by 50 ft., and an oilhouse 40 by 50 ft. at St. Thomas, Ont. (June, pg. 301.)

Minneapolis, St. Louis and Canadian Rd.—A company with this title is reported to have been incorporated at Minneapolis, Minn., July 15 to build a line from Watertown, S.D., to the Canadian boundary. Watertown is a central point on the Minneapolis and St. Louis Rd., between St. Louis, Minn., and Le Beau, S.D. N. Erb, of the M. and St. L. Rd., is actively promoting the new company. (Jan., pg. 22.)

Minneapolis, St. Paul and Sault Ste. Marie Ry.—The Central Terminal Co., a subsidiary organization, has finally secured possession of properties bounded by Twelfth Place, West 15th St., South Canal St., and South Clinton St., Chicago, Ill., as a site for its terminals. The new terminals are estimated to cost \$5,000,000. The work of demolishing the buildings has been in progress for some time, and will now have been completed, as the arbitration proceedings in connection with none of the properties have been closed. (June, pg. 301.)

Montreal Central Terminal Co.—A special meeting of shareholders is to be held in Montreal, Aug. 9, to elect directors, increase the capital stock, authorize an issue of bonds, and the making of traffic agreements with all railway companies requiring terminal facilities in or about Montreal. F. E. Came, 44 Beaver Hall Hill, is secretary. (May, pg. 239.)

North Ry.—We are officially advised that J. T. E. Lavoie is in charge of the party in making a preliminary survey for the line from the mouth of the Nottaway River on Hudson Bay, to Lake Matagami, Que.

The organization of the company is reported to be about completed and the financial arrangements well forward. Surveys are reported completed for 120 miles north from the crossing of the National Transcontinental Ry., in addition to the surveys from Montreal to that point, and it is said that it is expected to start construction next spring. (July, pg. 339.)

Northern Territorial Ry.—An office has been opened in Edmonton, Alta., by H. G. N. Neville, who is stated to be the Chief Engineer for this railway, and an unconfirmed press report states that in the very near future 40 survey parties are to

be put in the field, and in all some 300 men will be engaged on preliminary survey of the line from Edmonton to Hudson Bay. The report goes on to say:—"Next season grading of the road to the northeast and the laying of steel will be carried on, and in two years time, according to plans of the company, the line will be complete and in operation from Edmonton to Lake Athabasca. The company will then proceed with the construction of the line easterly to the north shore of Lake Wellaston in Saskatchewan and thence to Fort Churchill or Port Nelson, named as alternative ports under a federal charter. From Edmonton a cut off is to be constructed at a later date, giving connection with Hudson Bay by a still shorter route. From Lake Athabasca the road will run westerly north of the Peace River block, from Hudson Bay terminal. The railway will run steamships to a British port." (May, pg. 239.)

Northern New Brunswick and Seaboard Ry.—We are officially advised that of the mileage subsidized last session of the Dominion Parliament, 16.7 miles, from the Drummond mines at Austin Brook, to the Intercolonial Ry., near Bathurst, N.B., have been built, and that surveys have been completed for the remaining 9.3 miles, to deep water in Bathurst Harbor. This latter mileage, we are advised, will not be built for some time. (May, pg. 239.)

Pacific and Hudson Bay Ry.—We have been officially advised that the company has not yet been formally organized. It has power to build a line from the Pacific coast to Hudson Bay, about 1,500 miles, the first section being from Bella Coola, B.C., to Dunvegan, Alta. Three survey parties are in the field, and it is hoped to have the route on the first 700 miles surveyed by the end of the summer. The route map for the line from Kimisquit, near Bella Coola, to Natalkus Lake, B.C., about 110 miles, has been approved by the Minister of Railways, but application will shortly be made for the approval of a revised route. It is expected that the organization of the company will shortly be completed and arrangements made for starting construction early in 1915. H. D. Verschoyle, General Manager, Port of Bella Coola, Ltd., Vancouver, B.C., is interested. (June, pg. 301.)

Pacific Great Eastern Ry.—D'Arcy Tate, Vice President and General Counsel, is reported to have stated on his return to Victoria, B.C., from England, recently, that arrangements had been completed for a first issue of \$5,000,000 of the company's bonds, guaranteed by the province of British Columbia, and that it was expected construction would be started near the head of Howe Sound at an early date. P. Welch, Vice President, is quoted as stating, July 4, that it was expected to break ground at some point between North Vancouver and Howe Sound, within a month, and to crowd the work so as to have the line ready for traffic within two years. J. Callaghan, Vancouver, is Chief Engineer. (July, pg. 339.)

Quebec and Saguenay Ry.—It is expected, we are officially advised, to have the section of the line under construction completed to subgrade about Aug. 31. It is intended to start tracklaying simultaneously, from Cap Tourmente and from Ste. Irene, Que. The latter is about six miles from Point au Pic, near Murray Bay., and is more convenient for the landing of rails. About ten miles west of Ste. Irene the company has opened a ballast pit, from which ballast will be used for the eastern division from Baie St. Paul to La Chute, above Murray Bay. If the fall weather is favorable, it is expected to have the first lift of ballast completed so that the line will be opened for traffic in December.

The question of the proposed extension to Chicoutimi, we are advised, is for the present in abeyance. A. H. N. Bruce, Quebec, is Chief Engineer.

Representatives of the European financiers associated with Sir Rodolphe Forget, in the construction of this line, were in Montreal, July 7. Sir Rodolphe advocates the extension of the line to Cape St. Charles, and the establishment there of a port for trans-Atlantic passenger steamers. (July, pg. 340.)

Quebec Eastern Ry.—We are officially advised that surveys for this projected line from the southern approach to the Quebec Bridge, to Sherbrooke, Que., have been completed, and that it is expected to start construction in the near future. A. H. N. Bruce, Quebec, is Chief Engineer. (June, pg. 301.)

Reid Newfoundland Ry.—At its recent session the Newfoundland Legislature authorized the government to raise a further amount of \$1,000,000 in order to complete the branch lines authorized to be built in 1910, for which purpose \$4,000,000 have already been expended. (May, pg. 240.)

The Southampton Ry. Co. has entered into a contract with the Dominion Government under the act granting aid to certain railways for the building of a line from Millville, on the C.P.R., St. John-Edmundston line, to the St. John River, near the Pokiok bridge, N.B. (June, pg. 302.)

Timiskaming and Northern Ontario Ry.—The T. and N.O. Commission is reported to have arranged with Jas. McMillan to make a survey of the country in the vicinity of Moose River, on Hudson Bay, with a view of locating a railway terminal there, and of developing a port for deep sea traffic. (July, pg. 340.)

White Pass and Yukon Route.—The Board of Railway Commissioners has authorized the British Yukon Ry. to open for traffic its branch from mile post 106 to Pueblo Mine, Yukon, 13 miles. (Aug. 1911, pg. 7571.)

President Dickeson is reported to have stated, prior to leaving Dawson, Yukon, July 15, that the company had an engineer locating an extension of the line from White Horse to Yuyon Crossing, 120 miles. Such a line would tap the Tantalus coal fields.

Retirement of J. J. Hill.—In a letter addressed to the stockholders of the Great Northern Ry., (U.S.A.), July 6, J. J. Hill says: "With my resignation today of the chairmanship of the board ends my active official participation in conduct of the G.N.R. The work begun nearly 40 years ago has been substantially accomplished: though its results have been extended far beyond the foresight of anyone at that time. The property whose fortunes I have directed for so many years has become an organic growth. Its future will be shaped more by the forces that govern development of the natural resources of the country than by individual initiative. I will remain a member of the executive committee, and any service it may need from me will always be at its command. But it seems wise to begin the process of adjustment to other hands at this time, when all the outlook is fair and every change may be weighed with deliberation in the light of what is for the best interest of the property."

The American Association of Railway Accounting Officers' annual convention was held at Quebec, June 26 to 28. During the meetings, the members were at various times the guests of the Quebec Ry. Light and Power Co., C.P.R., Quebec and Lake St. John Ry., Intercolonial Ry. and the Richelieu and Ontario Navigation Co. The officers for the current year are: President, M. P. Beauvelt, I.C.R., Chicago, Ill.; Vice Presidents, C. M. Beuling, Pennsylvania Rd., Philadelphia, Pa., and C. B. Segar, Union Pacific Rd., New York. J. Leslie, Assistant Comptroller, C.P.R., Montreal, was elected on the executive committee.

Grand Trunk Pacific Railway Construction.

Collingwood Schreiber, Dominion Government Consulting Engineer, started from Winnipeg, July 15, on his annual trip of inspection over the completed line of the G.T.P.R. and of the section of the main line, and the branch lines under construction. He went by rail to the end of track, and then proceeded along the right of way from Tete Jaune Cache by whatever mode of transport offered, to Van Arsdol, where the train service is available to Prince Rupert.

E. J. Chamberlin, President, returned to Montreal, July 15, after a trip to Winnipeg and some other points in the West. He said that while there was a shortage of labor the work through to the coast was being pushed forward. It was, however, questionable whether the line could be finished earlier than the end of 1914.

M. Donaldson, Vice President and General Manager, in an interview July 9, said the Mountain Division had been completed to the Fraser River, beyond Tete Jaune Cache, and supplies and material were being sent ahead by steamboats. This would greatly expedite construction, as heretofore all supplies for work had to be taken in over the tote road.

The Board of Railway Commissioners has authorized the opening of the line for traffic from Hinton, mileage 978 to Fitzhugh, mileage 1028. Beyond this point the contractors are operating construction trains, as far as Tete Jaune Cache, at mileage 1097.

From the western end of the line track has been laid to the Skeena River, the bridge across which was expected to be completed July 30. This bridge has a total length of 943 ft. 10 ins. between parapet walls, and consists of three 70 ft. deck plate girder spans, and three 240 ft. deck truss spans, resting on masonry. The base of rail is 112 ft. above high water level, 140 ft. above low water level, and 163 ft. to bottom of river. The main feature of the bridge is the two river piers which, owing to the depth of the water, had to be built with pneumatic caissons. These caissons were 41 by 89 ft., divided longitudinally into two working chambers. They were sunk to a depth of 177 ft. from base of rail, which gives a height for the concrete piers from foundations to seat of bridge of about 134 ft. Owing to the rapidity and depth of water at that place the 240 ft. truss span over the channel was erected without falsework.

From the eastern bank of the river, construction gangs are at work towards Fort George. The heaviest portion of the work is at Burns Lake, but it is not expected that this will be taken in hand until Jan., 1913, as it will not be possible to get the steam shovels and other plant in until track is laid.

At the terminals at Prince Rupert, Foley, Welch and Stewart have taken over the excavation contract let to Rich and Harris, and have sublet part of the work to A. McDougal and A. Rankin.

G.T.P.R. BRANCH LINES.

The Premier of Saskatchewan is reported to have informed President Chamberlin that the Provincial Government is prepared to make provision for the guaranteeing of bonds to provide adequate terminal accommodations for the company's lines at Saskatoon, Moose Jaw, and Swift Current, as well as for the completion of the terminals at Regina. Mr. Chamberlin is reported to have informed the Premier, June 27, that plans were being prepared to have the work at these places gone on with at once.

The question of the route by which the company's branch from Regina will enter Moose Jaw, Sask., is said to have been settled. The route, it is said, will be through the coulee north of the city, and the Crescent site selected by the Can-

adian Northern Ry. will be utilized as a joint station.

H. E. Bissell has been securing a right of way for the company's branch line from Yonge, into Prince Albert, Sask., and he is quoted as stating that tracks will be laid by the end of the year.

The Minister of Railways has approved a revised route map for about 11 miles of the Cutknife branch.

Location surveys are being made for the branch from Watrous to Swift Current, and press reports state that construction will be started at an early date.

We are officially advised that, while surveys have been made for a line from Watrous to Swift Current, Alta., the final location has not been settled, and no decision has been reached as to when construction will be started.

Track laying is being proceeded with on the branch from Biggar to Swalwell, where connection will be made with the branch from Tofield. This latter branch has been in operation for some time to Red Deer, mileage 83.5, and the Board of Railway Commissioners has authorized the running of trains from Red Deer to Trochu, at mileage 121.4. Track is reported to have been laid to Three Hills, about 10 miles north of Swalwell. It is further reported that grading will be completed into Calgary early in Aug., and that track will be laid by the end of the year.

The Minister of Railways has approved route map for the branch from Calgary to Coutts, Alta., of 46 miles. A Lethbridge dispatch, July 17, states that the contract for building this line has been let to J. D. McArthur, Winnipeg.

Track is reported to have been laid on the Albert coal branch, to 33 miles from Bickerdike, Alta., and it is expected to complete the remaining 25 miles this year. (July, pg. 341.)

National Transcontinental Railway Construction.

The Dominion Premier, prior to sailing for England, recently said the Dominion Government fully appreciated the importance of the port of Quebec and the necessity of pushing forward the development of the harbor, and the construction of the terminals for the N.T.R. to a completion as soon as possible.

The contractors for the building of a line, and the laying out of terminals at Cap Rouge, in connection with the Quebec Bridge, M. P. and J. T. Davis, have made considerable progress with their work, and it is expected that it will be sufficiently advanced to permit the operation of trains early in Sept.

Daily papers of July 9, contained an interview with M. J. O'Brien, railway contractor, of Renfrew, Ont., which reported him as stating that at points east of Cochrane, Ont., the contractors were altering the 0.4% gradient, called for by the contracts to something steeper, and telegrams from Cochrane stated that R. W. Leonard, Commissioner, N.T.R., had decided to increase the gradients from 0.4% westward and 0.6% eastward to 0.8% and in some cases to 1%, with the object of saving upon construction. The Department of Railways gave out an official denial of the report July 15, and the G.T. Pacific Construction Co., which is building one of the sections where the alteration was said to be going on, has also denied the report.

It was reported, July 10, that track had been laid to 156 miles east of Cochrane, and to 206 miles west of Cochrane. Grading is practically completed through to Superior Jct., and it is expected that the building of the bridges and the track-laying will be completed on the line easterly from Winnipeg to Cochrane, by the end of the year.

A station building, roundhouse, etc., has been completed at Hearst, at which

point the Algoma Central and Hudson Bay Ry. will cross on its way to Hudson Bay.

We are officially advised that contracts for the construction of station and other buildings, referred to on pg. 291 of our June issue, have been let as follows: P. Cauchon, Quebec; Thetford Contracting Co., Black Lake, Que.; Moncton Construction Co., Moncton, N.B.; G. Goodwin, Ottawa. The contract for the equipment of mechanical coaling plants at Moncton, Napadogan, Edmundston, N.B.; Grant, Colvert and Armstrong, Ont., has been let to Williams and Wilson, Ltd., Montreal.

An extensive forest fire, June 28, near Superior Jct., is reported to have caused damages to the amount of about \$100,000 to the ties and bridges on the line easterly. Five trestle bridges and thousands of ties waiting shipment are said to have been burned. (July, pg. 341.)

The Will of the Late James Osborne.

The will of the late James Osborne, General Superintendent, British Columbia Division, C.P.R., who died at Vancouver a short time ago, was probated at Toronto, July 16. It disposes of an estate of \$37,897.48. A Ross Osborne, the eldest son, receives the silver tea service presented by Winnipeg wholesale merchants when Mr. Osborne left there for St. John, N.B., some years ago. The balance of the estate is to be administered for the benefit of the widow and children until the youngest child is 21 years of age, when it is to be divided among Mrs. Osborne, the two sons and four daughters in equal shares of \$5,199.64 each. If Mrs. Osborne remarries she is to receive the income of only one half her share.

Following are extracts from the will:—"My desire is to preserve the family tie; that is that all members thereof shall be thoroughly loyal one to the other; that they shall be sober-minded, teetotalers, virtuous, good and truthful, all working together for the good of the family and mankind; that each member of the family shall treat the others like ladies and gentlemen, be kindly affectioned one to another, and be good and generous to their stepmother. I desire that a family home be maintained so long as there is necessity for it, and that the children be loyal to each other and to their stepmother. I should like my eldest son to take his place as the head of the family, and retain it by good conduct and attention to business and to the family, and to him I bequeath the silver tea service presented to me by the wholesale merchants of Winnipeg." It is also requested that the silver service be handed down from eldest son to eldest son, each having his name engraved on the tea kettle, so that it may remain in the family as a remembrance of the original recipient.

Development of the Railway Systems of the World.—The length of the railway lines at the end of 1909 (the latest figures available) are as follows: Europe, 329,691 kilometers; America, 513,824 kilometers; Asia, 99,436 kilometers; Africa, 33,481 kilometers; Australia, 30,316 kilometers, or a total of 1,006,748. The average cost of construction per kilometer of line is \$76,718 for Europe, and \$41,785 in other parts of the world. On this basis the European railways at the end of 1909 would have cost \$25,293,000,000, while the railways in other parts of the globe would have cost \$28,829,100,000.

W. F. Joly and J. P. Heffernan were each fined \$25 and costs, at Winnipeg recently, on a charge of conspiracy to obtain a situation from the C.P.R. by fraud. The former applied for a position of switchman, and being defective in sight and hearing, got the latter to personate him before the medical board when called on for examination.

Great Northern Railway Lines in Canada.

Speaking recently in Victoria, the British Columbia Premier said with reference to the rumors of G.N.R. developments in the province, that he had been informed by L. W. Hill, that the company had decided to proceed with its construction work, and that it is intended to complete the Vancouver, Victoria and Eastern Ry., to extend its lines on Vancouver Island, and to do other work in the province. It was not possible to state definitely what all the plans included, but he was informed that it is intended to let contracts for extensive construction at an early date, and that no time will be lost in going ahead with the work.

Vancouver, Victoria and Eastern Ry. and Navigation Co.—The question of the route of the line through the Hope Mountains, which is a matter of controversy with the Kettle Valley Lines, is in process of solution. An inspection of the route in dispute was made July 26, and following days by J. H. Kennedy, Chief Engineer, V.V. and E.R. and N. Co. A McCulloch, Chief Engineer, K.V.L., and A. J. Kerr, representing the Board of Railway Commissioners. The route in dispute extends from Hope to the Coquihalla summit, 35.5 miles and the cost of construction is placed by Mr. Kennedy at \$3,500,000. It is suggested that the two companies join in the building of a double track route between these points. The matter is to be considered by the Board of Railway Commissioners at its present Western sittings.

The Chief Engineer of the G.N.R. made an inspection recently of the construction in progress, and in an interview stated that ballasting was in progress between Princeton and Coalmount, and that it is expected to have track laid to Tulameen by the fall. Grading is in progress beyond Tulameen.

Vancouver to New Westminster.—Press reports state that it has been arranged to build a second track on the line from Vancouver to New Westminster, B.C., and that the work will be done by the company's own staff.

Victoria and Sidney Ry.—Application is being made under the provisions of the Navigable Waters Protection Act, 1906, for approval of the plan and site of a proposed car barge landing at Sidney, B.C. (July, pg. 361.)

Dominion Government Railway to Hudson Bay.

We are officially advised that the contract for the second section of the Dominion railway to Hudson Bay, which it is about to let, will extend from Thicket Portage, the end of the section now under construction, to Split Lake, 68 miles. The work on this section is considered to be the heaviest on the route. The grading will average about 35,000 cubic yards a mile. The maximum gradient is 0.4% each way, but there is a considerable amount of curvature, mostly of two and three degrees, and there are two or three points where curves of four degrees are required. The principal bridge structure is over the Nelson River at Manitou rapids, where the river is confined to a channel about 408 ft. wide. The engineers have not sounded the channel, but from the known discharge of the river and its estimated velocity at this point, the depth must exceed 100 ft. It is probable that the bridge will be a single through truss span of about 480 ft. Outside of this there will only be a few girder spans on the section.

J. Armstrong, Chief Engineer, in an interview, is reported to have stated that he had recently completed an inspection of the work in progress on the line. The steel superstructure of the bridge across

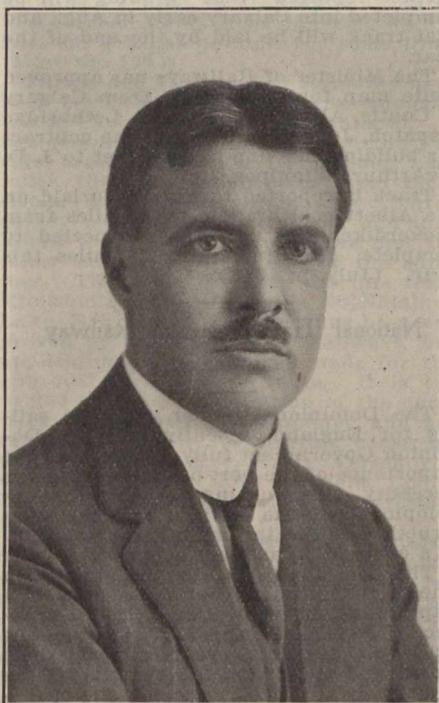
the Saskatchewan River at Le Pas is well advanced, and the bridge will be completed by the end of the year. The bridge, in addition to carrying a railway track, will have a 12 ft. roadway on each side. The grading on the line, which was subtlet by J. D. McArthur to McMillan Bros., is well advanced.

Engineer Moffatt, who has been making surveys at Port Nelson, with a view of determining its possibilities, from a railway point of view, as the terminus of the line, since March, returned to Le Pas, via Norway House, July 17.

The question of the terminal on Hudson Bay will be looked into by the Minister of Railways, who has arranged to start out on an inspection trip from Le Pas, Aug. 10, visiting both Port Nelson and Fort Churchill. (July, pg. 361.)

Appointment of Chief Railway Commissioner.

Henry Lumley Drayton, K.C., heretofore Counsel for the city of Toronto, has been appointed Chief Commissioner of the Board of Railway Commissioners for



H. L. Drayton, K.C.,
Chief Commissioner, Board of Railway Commissioners.

Canada, vice James Pitt Mabee, deceased. He was born at Kingston, Ont., Apr. 27, 1869, was educated in England and Canada, and commenced his legal career in 1886, as law student in Toronto. He was admitted to the Ontario bar in 1891 and commenced practice. He was appointed Assistant Solicitor for the city of Toronto in 1893, and resigned in Sept. 1900, to engage in private practice. On Jan. 29, 1904, he was appointed Crown Attorney for the county of York, Ont., and resigned in Nov. 1909 to resume private practice. He was appointed a K.C. Jan. 20, 1908, and on Apr. 25, 1910, was appointed counsel for the city of Toronto.

On the adoption by the city of Toronto, of the Ontario Government hydro-electric system, he was also appointed a member of the commission formed to manage affairs connected with it.

He is a member of the Engineers' Club of Toronto, the Toronto Club, Toronto Hunt Club, Ontario Jockey Club, Rosedale Golf Club, Glen Major Fishing Club and Toronto Racquet Club.

Unconfirmed press reports state that the Chief Commissioner's salary is to be increased to \$15,000 a year, as soon as the matter can be brought before Parliament. In 1908, legislation was passed providing for a reorganization of the Board, so as to consist of six members, a Chief Commissioner with a salary of \$10,000 a year, an Assistant Chief Commissioner at \$9,000, a Deputy Chief Commissioner and three other members at \$8,000 a year each.

Grand Trunk Railway Betterments, Construction, Etc.

E. J. Chamberlin, President, H. G. Kelley, Vice President, and W. G. Brownlee, General Transportation Manager, completed an inspection of the G.T.R. lines, July 15. In passing through Toronto, July 13, the President said a general policy of improvement of the company's terminal facilities between Toronto and Chicago, would be started at once. It was impossible to state what would be done, but the improvements would be made as fast as possible. He had nothing to say as to the Toronto union station plans, as the company had not received any definite notification of the C.P.R.'s intentions. The present plans might be utilized or not, if the C.P.R. did not cooperate, but it was improbable that anything would be done until the definite order had been received from the Board of Railway Commissioners.

Richmond, Que.—Plans have been filed with the town council of Richmond, Que. for a new station building, the estimated cost of which is \$20,000.

St Lambert and Turcot Yards.—Vice President Dalrymple advised the Transportation Bureau of the Montreal Board of Trade, July 4, that plans have been prepared for laying out additional trackage, and carrying out other improvements at the yards at St. Lambert and Turcot. The intention is to handle all through freight at these yards, so as to permit the Montreal yards to handle local freight only.

Brockville Roundhouse.—We are officially advised that there is no foundation for the press report that the roundhouse and shops at present located at Brockville, Ont., are to be removed to Prescott, Ont.

Cobourg, Ont.—The Board of Railway Commissioners has approved plans for new tracks for the G.T.R. in Cobourg, Ont., on lands of W. J. Crossen, and of the Field estate.

Brantford, Ont.—The Board of Railway Commissioners has authorized the company to extend its passing track and re-align its main line over the county line road in Brant tp., Ont.

Galt-Berlin-Elmira Branch.—Residents of the district served by this branch line have petitioned the company to operate it by electricity in order that a better service be given. (July, pg. 343.)

Boulianne and Jalbert, Ltd., has been incorporated under the Dominion Companies Act, with \$50,000 capital, and office at Chicoutimi, Que., to carry on a general contracting business, for the construction of railways, wharves, etc. The incorporators are, T. and H. Jalbert, Chicoutimi; T. and J. Boulianne, Chambord; and R. Lindsay, Roberval, Que.

The F. H. McGuigan Co., Ltd., has been incorporated under the Quebec Companies Act, with \$100,000 capital, and office at Montreal, to carry on a general contracting business for the construction of public and private works of all kinds, including railways, tramways, tunnels, harbors, docks, dredges, telegraph and power plants, etc. The incorporators are, F. H. McGuigan Jr., A. G. B. Claxton, T. R. Kerr, D. Laughlin, and A. S. Hawnes, Montreal.

Traffic Orders by the Board of Railway Commissioners.

The dates given for orders are those on which the hearings took place, and not those on which the orders were issued:—

Classification of Gramophones and Records.

16705. June 5.—Order 16479, May 10, 1912, directing that in the Canadian Freight Classification, gramophones, graphophones, phonographs and records be transferred from their present positions to the Musical Instruments List, and that they be also included in the second class rating applicable to Musical Instruments. all kinds, not otherwise specified, carloads, minimum 12,000 lbs., is to be put into effect by the railway companies not later than July 15, 1912.

Indicating Changes in Tariffs

16900. June 27.—Re indicating changes in freight, passenger and express tariffs: It appearing to the Board that comparison of freight, passenger, and express schedules with those which they supersede or amend, should be facilitated; and in pursuance of the powers conferred by sec. 322 of the Railway Act; and upon the report and recommendation of the Chief Traffic Officer, it is ordered that all freight, passenger and express tariffs, and supplements thereto, applying between points in Canada, or from any point in Canada, to a foreign country, filed with the Board on or after Sept. 1, 1912, shall, except as hereinafter provided, indicate advances thereby made in existing tolls by the symbol "A" (capital), and reductions by the symbol "R" (capital), with the necessary explanatory note, in the following manner, namely:

1. Schedules which show the rates opposite the stations. The proper symbol to be shown against each rate, or each rule or regulation, changed.

2. Schedules in which the rates appear in a table separated from the station list—(a) Unless the station groupings have been varied relatively to their rates, the proper symbol to be shown in the rate table in the manner prescribed in sec. 1. (b) If the station groupings have been varied relatively to their rates, the proper symbol, or symbols, to be shown against the reference on the station page to the rate table, and against each rule or regulation changed.

Provided that if any rates or matter be necessarily so closely printed as to leave insufficient space for the symbols, or if the latter be otherwise unsuitable, and in such cases only, increases shall be printed in full-faced type, and reductions in italics. And it is further ordered that the requirements that the title page, or front cover, of all tariffs and supplements bear, at the top, the word (or words) "Advance," "Reduction," "Re-issue," or "New Rates," as the case may be, is not hereby abrogated.

Eye and Ear Tests for Railway Employees.

The Assistant Chief Commissioner, Board of Railway Commissioners, D'Arcy Scott, gave the following judgment, June 28:—

On November 9, 1910, the Board issued order 12225, which, among other things, required that certain employes on train and engine service should undergo an eye and ear test before a competent examiner. The railway companies do not interpret those provisions of the order in the same manner, and a question has arisen as to whether the examination of the seeing and hearing of employes should take place indoors or out in the open, under conditions as they would get them in actual employment on the railway.

The matter was discussed at length before the Board on Oct. 3, 1911, and judg-

ment was reserved. Representatives of different companies had submitted a majority and a minority report in connection with the matter, and the Board has had the benefit of a very carefully prepared report from its Chief Operating Officer. A majority of the railway companies desire to have an indoor test only, both for those seeking employment in the railway service for the first time, and those already in the employ of the company who must pass a satisfactory test in order to retain their positions, or be promoted.

The minority report of the railway companies, which is practically endorsed by the employes' representatives, recommends the indoor test under certain conditions. Undoubtedly, the indoor test is more convenient for the railway officials, and more accurate than the outdoor test, and in some respects a more definite standard of seeing and hearing can be established by it. The outdoor, or field test, is a difficult one to submit a man to on all occasions, owing to the changeable conditions of the weather, atmosphere, etc.—but under favorable circumstances it is, I think, by far the more satisfactory test, especially for a man who has had experience in railway service. I think, therefore, that we might lay down the following general principles to govern in this matter:

1. No person shall be employed in railway service until he has passed the indoor test satisfactorily.

2. Any employe going up for a periodical examination or an examination for promotion, shall be examined by the indoor test; and in case he fails to pass the indoor test satisfactorily he shall be given an outdoor test, according to the uniform rules submitted herewith; and in such case the latter shall be taken as the governing test; and, during the outdoor examination, the candidate shall be permitted to wear glasses, as provided for in the said rules, if he wishes to do so.

For the purposes of this memorandum, promotion means going from fireman to engineer, or from trainman to conductor; but it does not mean a change from freight service to passenger service without a change of rank, such as a freight engineer being made a passenger engineer, or a freight conductor being made a passenger conductor.

As to the wearing of glasses while on duty, I think any employe who requires to use glasses should be encouraged to do so, but he should be required always to carry a duplicate pair with him lest an accident may happen to those he is wearing.

There are a number of details respecting the method and character of both the indoor and outdoor tests to which the Chief Operating Officer has given careful consideration. He has submitted a code of rules on standards of visual acuity, which is attached hereto, and which he recommends for the approval of the Board as uniform rules governing the determination of visual acuity, color perception, and hearing of employes on steam railways. I think the Board should adopt these rules as its standard.

This judgment was concurred in by Commissioners Mills and McLean. The order had not been issued up to July 23.

Tests on the Grand Trunk Railway.

We are officially advised that the Board's decision will make very little difference on the G.T.R., as that company's tests for prospective employes have always been very rigid and all trainmen, yardmen, engineers, and firemen are required to go through an eye and ear test every three months of their service. The indoor tests consist of holding a set of cards with letters of different sizes at a distance of 30 ft. from the candidate; a glass being placed over one eye while the other is being tested. There is also a small card with small letters which is held at a distance of 30 ins. Each employe must be able to distinguish

all letters. After this reading test, comes a color test, which consists of telling different shades of yarn. In this a box containing 67 shades and 7 shades of each color is used and an employe must be able to distinguish between them. In the hearing test one ear is plugged and a clerk recites a phrase which must be repeated correctly by the employe who is 30 ft. away.

Canadian Northern Railway Earnings, Etc.

Gross earnings, working expenses, net profits, increases or decreases, compared with those for 1910-11, from July 1, 1911:—

Earnings.	Expenses.	Net Earnings.	Net Increase
July \$1,475,900	\$1,114,800	\$361,600	\$13,400
Aug. 1,420,600	1,105,900	314,700	51,700
Sept. 1,576,400	1,157,000	419,400	33,200
Oct. 2,028,900	1,348,500	680,400	99,900
Nov. 2,001,500	1,336,300	665,200	106,300
Dec. 1,331,400	1,327,600	503,800	144,000
Jan. 1,223,100	1,004,400	223,706	122,000
Feb. 1,203,400	965,800	237,600	101,800
Mar. 1,572,700	1,145,900	426,800	72,000
Apr. 1,608,100	1,205,000	403,100	42,000
May 1,822,100	1,364,000	458,100	54,900

\$17,769,100 \$13,074,700 \$4,694,400 \$846,800

Inc. \$4,035,200 \$ 3,188,400 \$846,800

Approximate earnings for June, \$1,769,500, against \$1,465,300 for June, 1911.

Mileage in operation 3,851, against 3,354, same period, 1911.

Canadian Pacific Railway Earnings, Etc.

Gross earnings, working expenses, net profits, increases or decreases, compared with those for 1910-11, from July 1, 1911:—

Earnings.	Expenses.	Net Profits.	Increases
July \$ 9,661,818.14	\$5,958,789.81	\$3,703,028.33	\$218,408.74
Aug. 10,421,904.42	6,346,333.41	4,075,571.01	383,598.68
Sept. 10,049,084.97	6,131,638.17	3,917,446.80	5,847.16
Oct. 11,207,991.99	6,526,887.24	4,681,104.75	175,944.23
Nov. 10,570,694.80	6,558,328.31	3,987,366.46	250,244.23
Dec. 10,654,871.67	6,549,141.41	4,105,730.26	819,196.37
Jan. 7,328,781.81	6,245,324.11	1,082,857.70	426,739.83
Feb. 8,931,907.20	6,548,040.53	2,383,866.67	239,159.16
Mar. 10,519,328.76	6,8 0,317.65	2,718,401.11	561,834.57
Apr. 11,301,349.46	7,185,597.67	4,115,751.79	958,777.18
May 11,360,420.81	7,679,905.88	3,680,515.23	736,480.47

\$112,008,144.03 \$72,556,503.89 \$39,451,640.14 \$5,776,480.62

Inc. \$17,319,986.18 \$11,543,505.56 \$5,776,480.62

Approximate earnings for June, \$10,848,000, against \$9,040,000 for June, 1911.

Commencing with July 1, the mileage in operation, was increased to 11,117.

Grand Trunk Railway Earnings, Etc.

Following are the earnings of the G.T.R., C.A.R., G. T. Western Ry., and D.G.H. and M. Ry., for May, as compared with those for May, 1911:—

GRAND TRUNK RAILWAY.		
	1912.	1911.
Earnings	\$3,366,300	\$3,060,000
Expenses	2,359,300	2,041,000
Net earnings	\$1,007,000	\$1,019,000

CANADA ATLANTIC RAILWAY.		
	1912.	1911.
Earnings	\$ 202,100	\$ 185,650
Expenses	204,400	177,400
Net earnings	\$ 2,300	\$ 8,250

GRAND TRUNK WESTERN RAILWAY.		
	1912.	1911.
Earnings	\$ 557,400	\$ 528,300
Expenses	441,300	485,200
Net earnings	\$ 116,100	\$ 43,100

DETROIT, GRAND HAVEN AND MILWAUKEE RY.		
	1912.	1911.
Earnings	\$ 177,500	\$ 168,000
Expenses	173,600	160,000
Net earnings	\$ 3,900	\$ 8,000

Approximate earnings for June, \$4,653,475, against \$4,437,438 for June, 1911.

TRAFFIC RECEIPTS OF THE SYSTEM.

Aggregate from Jan. 1, to June 30:—			
	1912.	1911.	Increase.
G. T. R.	\$18,605,299	\$17,333,392	\$1,271,907
C. A. R.	1,046,129	999,631	46,498
G.T.W.R.	3,202,444	3,197,363	5,081
D.G.H. & M.R. ...	1,017,878	1,006,049	11,829
Totals	\$23,871,750	\$22,536,435	\$1,335,315

Canadian Pacific Railway Construction, Betterments, Etc.

Windsor St. Station, Montreal.—The interior and other work on the enlarged Windsor St. station and office building had been so far completed that the members of the staffs began to take possession of their new quarters, June 17. It is expected that the transfer of the various departments will be completed by November.

The entire ground floor of the station will be occupied by shops, and offices have been reserved for the Bank of Montreal. The main entrance at the corner of Windsor and St. Antoine streets, consists of a vestibule 40 ft. square, while the general waiting room is 58 by 132 ft. Off this is a ladies' waiting room, a nursery, and smoking room, all with lavatory accommodation. The refreshment room, and dining room are conveniently situated and special provision is made for the immigrant traffic.

Campbellford, Lake Ontario and Western Ry.—The Board of Railway Commissioners has approved location plans for the line from mileage 94 to 97, and from mileage 106.17 to mileage 121 from Glen Tay, Ont.

A bylaw has been passed by the taxpayers of Trenton, Ont., granting a free site for a roundhouse and station, with a nominal assessment for ten years, the company agreeing to make Trenton a divisional point.

The contractors are pushing construction as fast as possible. Malvern is the centre of the construction work at the east end of the line, and other centres are at Trenton, working easterly, and Bayside, working westerly. Deeks and Hinds, the general contractors, have their headquarters at Agincourt.

Agincourt to Toronto.—In connection with the building of the new Lake Shore line, J. W. Leonard, Assistant to Vice President, is quoted as stating that it had been decided to build a second track on the present line easterly from Yonge St. through Leaside, Donlands, and Wexford, to near Agincourt, where the Campbellford, Lake Ontario and Western Ry. joins the main line. The contract for the substructures of the new bridges to carry the double track across the main Don, the west Don, the Belt Line ravine, and the reservoir ravine would be let at once, so that the steel work could be put up in the spring.

Georgian Bay and Seaboard Ry.—A regular freight and passenger service was inaugurated on this line July 2, the Board of Railway Commissioners having authorized the opening for traffic of the 7 miles from Coldwater to Bethany, Ont. The trains run through to Port McNicoll, to and from which point the company's upper lake steamers sail five days in the week, for Port Arthur and Fort William.

North Toronto Improvements.—J. W. Leonard, Assistant to the Vice President, in an interview in Toronto, July 16 is quoted as saying, that the plans for the new union station at North Toronto with the Canadian Northern Ry. had been approved, and that work would be begun within a month. The building would be sufficiently large to accommodate satisfactorily the two railways which are to use it. Its size and appointments would be in keeping with the rapid growth of the city, and worthy of the Toronto of the future. He said definitely that the company would not build a hotel in Toronto, as has frequently been rumored.

The Board of Railway Commissioners has approved plans for the track elevation at North Toronto, and has ordered that plans be filed for the subways at Yonge St. and Avenue Road. The Board has also approved plans for the elevation of the C.P.R. and the Canadian Northern Ry. from Summerhill Ave. to Dovercourt Road, with some alterations.

Toronto Freight Yards.—The tearing down of the old government house and

the other buildings on the King-Wellington St. site is practically completed, and it is expected that the new freight sheds on the site will be under construction early in August.

In connection with the laying out of the yard an extensive piece of work is being carried out along the Front St. embankment, east of Bathurst St. A retaining wall is being built, in such a way that 25,000 cubic yards of the present bank can be cut away, to form a lead starting from under the Bathurst St. bridge, up to the yards. It is expected that this part of the work will be completed by the end of August.

South Ontario Pacific Ry.—The first section of this railway, viz., from Guelph Jct. to Hamilton, Ont., 16.3 miles, was opened for traffic July 1.

Sudbury-Port Arthur Second Track.—The second track work between Sudbury and Port Arthur, to which reference was made on pg. 349 of our last issue, is being carried out under the supervision of B. C. Huffman, for the Dominion Construction Co., which has the contract. His headquarters are at Sudbury.

In an interview in Toronto, July 16, J. W. Leonard, Assistant to the Vice President, is quoted as stating that the 60 miles of work already let would be completed this season.

Spur Lines at Fort William, Ont.—The Board of Railway Commissioners has directed the company to build a spur line along Neebing Ave., for the benefit of the industrial plants being established along the Kaministikwia River.

North Transcona Freight Yards.—Press reports state that contracts for \$2,000,000 of work have been let in connection with the laying out of the new freight yards at North Transcona, Man.

Portage la Prairie to Brandon Second Track.—The Board of Railway Commissioners has authorized the opening for traffic of the second track from Melbourne to Carberry, Man., six miles.

Estevan Westerly.—A route map for a line from Estevan, Sask., westerly for 96.5 miles has been approved by the Minister of Railways.

Pasqua-Caron Second Track.—The Board of Railway Commissioners has authorized the opening for traffic of the second track from Moose Jaw to Caron, Sask., 16.2 miles.

Touchwood Hills Branch.—The Minister of Railways has approved of a route map for a revision of the Touchwood Hills branch, for 48.8 miles.

Moose Jaw Southwesterly.—The Board of Railway Commissioners has authorized the opening for traffic of this branch from mileage 27.4 to 35, and has approved of location plans for its extension from mileage 37.85 to 64.47. The plans for this branch show that it will connect up with the line now under construction from Swift Current, southeasterly.

Moose Jaw Northwesterly.—The bridge across the Saskatchewan River, a little north of Outlook, which was described on pg. 215, of our issue of Mar., 1910, is expected to be completed early in November. This will connect up Moose Jaw by means of the branch already completed, with the Portage la Prairie-Wetaskiwin line at Macklin.

Swift Current, Northwesterly.—The Board of Railway Commissioners has authorized the opening for traffic of this branch from mileage 33 to 34.8, a point beyond Cobri, Sask.

Weyburn-Lethbridge Line.—The Board of Railway Commissioners has approved of location plans presented by the Alberta Ry. and Irrigation Co., which is building the western end of the line, for the route from Stirling, Alta., easterly for 37.14 miles. The contractor for the

grading of the first 25 miles, has the work well in hand, and the bridge building gang started work at Stirling, July 8.

Sedgewick Southerly.—A route map for a line of 23.6 miles from Sedgewick, Alta., southerly, has been approved by the Minister of Railways.

Suffield Southwesterly.—Grading is in progress south of the Bow River, on the section of the line from Kipp towards the mileage under construction from Suffield, Alta.

Alberta Central Ry.—The Minister of Railways has approved of route maps for this line from mileage 140 to the Yellowhead pass, Alta., 165 miles.

Calgary to Vancouver Second Track.—We are officially advised that five engineering parties are in the field preparing plans and estimates for the building of a second track between Calgary, Alta., and Vancouver, B.C., 812 miles. The location surveys have not yet been sufficiently far advanced to state definitely what changes in alignment, etc., will be made. F. F. Busted, is Engineer in charge of grade revision and double tracking, Calgary west, with office at Kamloops, B.C. Press reports state that one of the results of surveys made, show that by the construction of a five mile tunnel through the Selkirk range, starting at Bear Creek and terminating below Glacier, a gradient of less than 1% against western traffic can be obtained, and that by a division at Notch Hill, just east of Kamloops, the 1% gradient could be obtained from Calgary to Vancouver.

Kaslo and Slocan Ry.—Some temporary work has been done on the existing narrow gauge line in order to permit the operation of trains for construction purposes, and to enable the present mineral traffic to be got out, pending the complete reconstruction of the line.

Trail to Metalline, B.C.—Press reports state that a survey has been made for a line from Trail, B.C., to Metalline, on the International boundary, where connection can be made with a branch line of the Idaho and Washington Northern Rd. The last spike of this line was driven, June 24.

Grand Forks, B.C.—An agreement has been reached between the city council, the C.P.R. and the Kettle Valley Lines, whereby the two railways will lay out union terminals in the city. The city gives a free site and exemption from taxation for ten years. The companies will make an initial expenditure of \$200,000 on buildings.

Grain Elevators at Vancouver, B.C.—George Bury, Vice President, informed the Vancouver Board of Trade recently that the company would have a grain elevator ready at its deep water terminals by the end of 1914. He would be prepared towards the fall to give the Board fuller information as to this, and the company's other plans for handling the business at Vancouver. (July, pg. 344.)

Sliding of Railway Fills built on ground which is underlain by limestone strata are prevented on parts of the St. Louis and Southwestern Ry. by breaking up the surface of the rock with dynamite, according to J. P. Warren, Assistant Roadmaster, at Tyler, Tex. Fills on ground of this character had been found to give trouble due to the seepage of water through the overlying ground to the surface of the rock, causing slipping at that point.

The third annual sports of the C.P.R. European staff, were held at Acton, Eng., June 29.

A London, Eng., cable states that Herr Van Kramer, in conjunction with Herr Van Kapp, has invented an apparatus by which a signalman is enabled to stop a train at a distance of 20 miles by merely pressing a button in his cabin.

The Death of Cecil B. Smith.

Cecil Brunswick Smith, M. E., M. Can. Soc. C.E., one of the most active and prominent engineers of Canada, died at his home in Toronto, on July 1. Two weeks before, he had been engaged in his customary professional activities on the Pacific coast. At that time he consulted a specialist in California, who warned him that he was suffering from an internal cancer and had not long to live. He returned to his home in Toronto, to close up his affairs as soon as possible. Until the specialist's examination, Mr. Smith had no knowledge of his serious malady.

He was born at Winona, near Hamilton, Ont., 48 years ago. He was educated at the Collegiate Institute at Hamilton and the School of Applied Science of McGill University, Montreal, Que., where he graduated in civil engineering in 1884, when but 19 years of age. For his high standing in scholarship he was awarded the Governor General's Gold Medal for that year.

Following his graduation he was Resident Engineer on construction of the Nipissing and Pacific Junction Ry., now part of the Grand Trunk Ry., and later of the St. Catharines and Niagara Central Ry. From 1887 to 1888 he was Resident Engineer on the construction of C.P.R. between Woodstock and Windsor, Ont.; and for a year was Locating Engineer of the Toronto, Hamilton and Buffalo Ry.

After two years in the United States, spent as division engineer and chief assistant engineer of railways constructed in North and South Carolina, Virginia and Maryland, he returned to Canada to become Assistant Professor of Civil Engineering at McGill University, a position he continued to hold for five years, until 1898. During this period he made a special study of the characteristics of Portland cement and was the author of several papers dealing with this subject. He also wrote a text book on railway engineering.

In 1898 he was appointed locating engineer of the C.P.R. on the line between Toronto and Sudbury, Ont. The following three years he served as Assistant City Engineer of Toronto. In 1901 he was appointed Resident Engineer on construction for the Canadian Niagara Power Co., and between 1901 and 1905 built the present plant of that company at Niagara Falls, Ont. At the close of this work he became Chief Engineer of the first Hydro-Electric Commission of Ontario and organized the very complete water power surveys which were conducted in 1906 and 1907. The reports of this work have formed the basis of all water power developments in the Province since.

During the same period he also served as Chairman and Consulting Engineer for the Timiskaming and Northern Ontario Ry. Commission. In 1907 he retired from both commissions and established the firm of Smith, Kerry & Chace, consulting engineers, etc., of Toronto. As senior member of this firm he had the supervision of planning and constructing some of the largest hydro-electric power plants in the Northwest, among them the 60,000 h.p. development on the Winnipeg River, near Winnipeg, Man.; the 19,000 h.p. plant for the Calgary Power Co., on the Bow River in Alberta; the 24,000 h.p. development of the Mount Hood Ry. & Power Co., near Portland, Ore., and the 15,000 h.p. plant on the Snake River in Idaho for the Crane Falls Power and Irrigation Co. He served these enterprises not only in an engineering capacity, but largely directed their organization and financing. In this connection he served as president, manager or vice president of several of these large development companies.

He was ever active in promoting the welfare of his profession and was a mem-

ber of the Institution of Civil Engineers of Great Britain, of the Canadian Society of Civil Engineers, of which he was a member of the Council and a past Vice President; the American Society of Civil Engineers, the Engineers' Club of Toronto and the Oregon Society of Civil Engineers.

He was one of the busiest of men, and his early death may perhaps be attributed in some degree to the pressure under which he worked, taking him back and forth across the continent many times in the course of a year. It was a well considered plan of his to retire to a strictly consulting practice as soon as the last of the great works which he had under way was completed; but apparently he had miscalculated his strength and was denied the termination for his career, which he had so earnestly desired.

He is survived by a widow and two sons.

The Section Foreman Problem.

By P. J. M. Woslyng, Roadmaster, C.P.R., Lethbridge, Alta.

I would advise the following measures to improve the situation facing us regarding the scarcity of good section foremen:—

1. Give the section men a fair and square deal. Let them understand that they are just as important as any other class of railway employes and show them that it is recognized that their service is important.

2. Pay all regular laborers the highest local laborers' wages, so that they will be encouraged to remain and work steady on the track.

3. The foreman should show his men how to do different kinds of work, and explain whenever convenient why it should be done in such a way. When a laborer is far enough advanced, give him a show to do different kinds of track work under the foreman's supervision, and if he does wrong, the foreman should be prompt to rectify him. Before he gets any promotion, move him to some section, in a yard, or extra gang, where some heavy work is going on under a good practical foreman; and let him work long enough to get familiar with heavier work than he would be able to practice on an ordinary section.

4. When the roadmaster calls a meeting of his foremen to discuss track work, the men that are nearest in line for promotion should, if possible, be present and be encouraged to take an active part.—
Railway Age Gazette.

Canadian Car Service Bureau.—At the annual meeting in Montreal July 11, representatives of the Canadian Pacific, Central Vermont, Grand Trunk, Quebec Central and Toronto, Hamilton and Buffalo Railways were re-elected members of the executive board. M. Magiff, Superintendent Telegraphs and Car Accountant, Central Vermont Ry., was re-elected Chairman. The Manager is J. E. Duval.

Brockville Roundhouse.—We are officially advised that there is no foundation for the press report referred to in our last issue, stating that work was about to be started on an addition to the roundhouse at Brockville, Ont.

L. J. Papineau has been appointed Supervising Engineer of the power development works in course of construction by the Dominion Public Works Department, on the St. Lawrence river, in the vicinity of Montreal.

L. D. Oakley has been appointed Line Auditor, Western Lines, Dominion Express Co., for the inspection of offices west of, and including, Port Arthur, with office at Winnipeg; J. Richardson, Line Auditor, Eastern Lines, continuing the inspection of offices east of Port Arthur, Ont., with office at Toronto.

Grand Trunk Terminal Warehouse Co., Ltd.

A company with this title has been incorporated under the Dominion Companies Act, with a capitalization of \$10,000,000 (1st mortgage, 30 year sinking fund bonds), of which \$5,000,000 are issued, and \$6,500,000 are issued. The bonds which \$5,500,000 are issued. The bonds have been offered to the public at 95 with a bonus of 50% of common stock.

In view of the appreciable benefit to be derived by the railway companies from the establishment of the proposed warehouses, the organization of the G.T.T. Warehouse Co., has been carried through with the co-operation of the Grand Trunk and G.T. Pacific Railways, and the Warehouse Company has secured an operating contract with these railways, extending over 30 years. The railway companies undertake to provide sites for the establishment of the company's warehouses at various points, at nominal rentals, during the first period of the leases, and for the balance of their term at extremely low rentals.

The ultimate policy of the company is to provide warehouses at all the important commercial distributing centres in Canada, such plants to be situated upon, or accessible to, the lines of the G.T. and G.T. Pacific Railways, and their subsidiary companies. Plans have been prepared for the acquisition of property and the construction of warehouses at Montreal, which will give the company available warehouse space of 465,000 sq. ft. A warehouse will also be immediately established at Toronto; construction will be begun in the various other cities so soon as the question of location, capacity and other details finally decided upon. The warehouses will be of the most modern fireproof construction, and the most up to date labor saving devices will be installed. Cold storage facilities will also be installed at certain points.

As before stated, it is proposed to provide at Montreal warehouse buildings which will have a total rentable space of 465,000 sq. ft. This figure is arrived at after making conservative allowance for that portion of the total space which will be occupied by elevators, posts, passageways, heating, etc.

The income which the company will derive from the rental of this space for warehousing and storage purposes is estimated at 60c. per sq. ft. per annum, thus giving annual gross receipts of . . . \$279,999.00
From this is deducted the total expenses of operating the warehouses, including taxes, heating, labor, office and other general expenses, which will not be in excess of 15c. per sq. ft. of rented space or 69,750.00

Leaving an annual net revenue of \$209,250.00

It is estimated that for the construction of the Montreal buildings, and the purchases of the land, bonds will require to be issued to the amount of . . . \$1,500,000.00

With the issue of a total \$5,000,000 of bonds, and the construction of additional warehouses at Toronto and other Western points, the net revenue of the company would be proportionately increased, and based on the above estimate would be 697,500.00

Deduct:—
Interest on \$5,000,000 bonds \$ 300,000.00
1% sinking fund 50,000.00
\$350,000.00

Leaving a total amount applicable on the common stock of \$347,500.00
Or at the rate of over 6% per annum.

The directors are W. Wainwright, J. E. Dalrymple and R. S. Logan, three of the G.T.R. Vice Presidents; J. N. Green-shields, President, Quebec Savings and Trust Co., and G. Bird, General Manager, International Bank.

Electric Railway Department

The Halifax Electric Tramway Co. and its Employees.

The employes of the Halifax Electric Tramway Co., after a series of meetings, recently forwarded to the company a schedule of wages, etc., which they desired the company to adopt, and a list of alleged grievances for adjustment.

The proposed wage schedule called for the rates to be as follows: First year, 21c. an hour; second year, 23c.; third year, and over, 25c.; snow work, 30c.; and awaiting orders, at regular car time; Sunday work and overtime, time and a half; for instructing new men, one day's pay in addition to time taken by instruction; wages to be paid once in seven days; uniforms, men to pay half cost for the first year, company to provide them free thereafter, suit once a year, overcoat every second year. For the shed men, the rates asked were as follows: Motor and truck repair men, first year, 21c.; second year, 23c.; third year, 25c.; armature winders, first year, 21c.; second year, 23c.; third year, 25c.; car cleaners, 21c. an hour; snow work, 30c. an hour.

The rates hitherto paid motormen and conductors were first year, 18½c.; second year, 19½c.; third year, 20c.; fourth year, 21½c.; fifth year, 21c.; sweeper time, 22c. an hour. The men paid half cost of uniforms up to five years, after which the company provided them free.

The company agreed to pay the following rates, beginning July 1: First year, 20c.; second year, 21c.; third year and up, 23c.; sweeper work, 25c.; Sunday work, full week-day time, and to provide uniforms free after three years service, the men to pay half cost up to three years.

The extra pay would amount to about \$5,500 a year, which follows an advance of about \$6,000 made in November last.

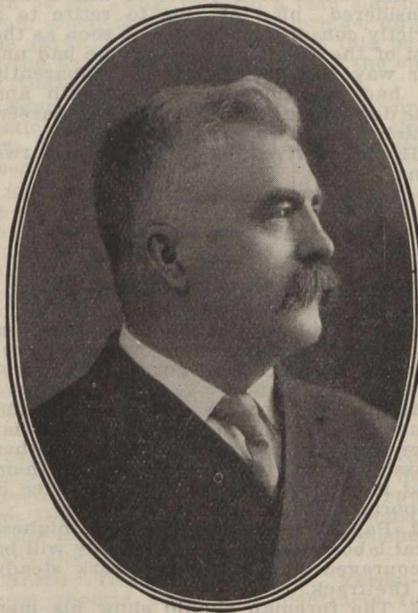
This does not appear to have been satisfactory to the men, as at a meeting on July 12, they decided to apply for the appointment of a conciliation board, under the provisions of the Industrial Trades Disputes Act, and named J. T. Joy, President, Trades and Labor Council, as their representative.

The General Managership of the Montreal Tramways Co.

James E. Hutcheson, heretofore Superintendent and Purchasing Agent, Ottawa Electric Ry. has been appointed General Manager, Montreal Tramways Co., to succeed Duncan McDonald, who has resigned in order to attend to his many important personal interests.

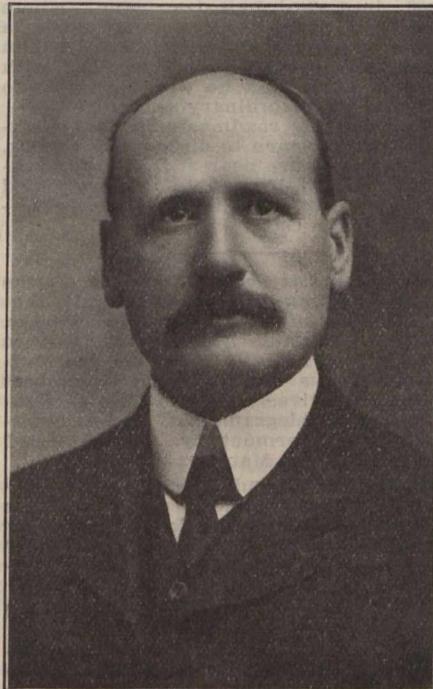
Mr. McDonald has opened an office at 526 Transportation Building, Montreal, and the various interests with which he is connected will be managed from there. Among these are the Montreal Tunnel Co., the Prepayment Car Sales Co., of which he is President, and which controls the pay-as-you-enter car, of which he is one of the patentees, and also the pay-within car. He is also a director of the Dominion Park Co., Montreal, of which he was one of the principal founders. He was born at St. Thomas de Montmagny, Que., June 17, 1859, and removed to Montreal in 1875. He entered Montreal St. Ry. service in 1881, as a driver, in order to acquire a thorough knowledge of street railway work from its very commencement. He was soon changed to conductor, and after about a year in that capacity, was appointed roadmaster. In 1886 he severed his connection with the company, and engaged in other business. Anticipating the progress that the trolley system would make, he went to St. Paul

and Minneapolis, Minn., in 1889, and secured a practical knowledge of electric railways. He returned to Montreal in 1892, and re-entered Montreal St. Ry. service as inspector, and in 1894 was appointed Superintendent of Transportation, which position he held until 1898,



Duncan McDonald.

when he resigned to become General Manager, Parisian Tramway Co., with headquarters in Paris, France, in which position he organized the Parisian system to a high degree of efficiency. In 1903 he returned to Montreal, having been offered the position of Manager, Montreal St.



James E. Hutcheson.

Ry., which position he held to Nov. 1910, when he was appointed General Manager, and on the recent reorganization of the company, under the name of the Montreal Tramways Co., he was appointed General Manager of the new company. He is a director of the Automobile Club

of Canada, a member of the Civil Engineers' Society of France, a member of the Institute of Electrical Engineers, Eng., and has been connected with the Canadian Street Railway Association since its inception, having been President for two years, 1909-1910 and 1910-1911, and is still a member of the executive committee.

J. E. Hutcheson was born at Brockville, Ont., Sept. 15, 1858, and entered railway service in 1874, in the G.T.R. mechanical department, afterwards serving in that company's ticket, freight and telegraph departments. In 1884 he was appointed a dispatcher, C.P.R., at Ottawa, in 1886 Chief Dispatcher and in 1888 Trainmaster, which position he held to 1891, when he took charge of the Ottawa Electric Ry. Co.'s operation. He has taken an active part in the Canadian Street Railway Association's work since its inception, having served continuously as a member of the executive committee, and also having been Vice President, and for the year 1908-09, President. He was, for several years, a member of the 43rd. Regiment, retiring with the rank of Major, in 1910, on his return from England, where he acted as Adjutant in charge of the Canadian team at Bisley.

The Toronto Railway and its Employees.

As the result of negotiations between the company and its employes, an agreement was signed, July 3, outlining the terms of employment to June 16, 1915, the terms offered by the company being accepted by the men, as a compromise. There is to be an increase of 2½c. an hour, all round, and 4c. an hour extra will be paid for Sunday work. Shedmen are to receive a half holiday on Saturdays. The first year men are required to pay full cost of the first uniform. The men will pay half the cost of the second, and further uniforms will be provided free by the company.

The old rate of wages was, for first year men, 21c.; second year, 23c.; third year, and up, 25c for motormen and conductors; for shed men, foremen, 25c; assistants, 22c.; car washers, 21c.; motor and truck repair men, 21c.; second year, 23c.; third year 25c.

It is stated that the increase in wages will absorb about \$130,000 a year.

Montreal Tramways Mutual Benefit Association.

The report for the year ended Apr. 30, shows that during the year there were 1,173 members disabled through sickness and injury; 626 visits made by doctors; 7,587 consultations; 5,811 prescriptions issued; \$10,274.10 paid for sickness and injury, \$1,725.95 for medicine; \$354.50 for pensions; \$296.31 for withdrawals and \$12,533.35 for death and burial insurance. There were 29 deaths during the year. An act amending the association's charter was passed, changing the name from the Montreal Street Railway Mutual Benefit Association. The annual picnic resulted in a profit of \$8,149.20. The management committee reported a special Christmas donation to the funds of \$4,000 from the company, making the total contributions received from the company, \$18,915.61, which, added to the fees and dues from the members, \$15,812, and the proceeds of the picnic, interest, etc., \$12,926.49, makes the total revenue for the year, \$47,654.10. The expenses being \$34,939.32, there is a surplus of \$12,714.78.

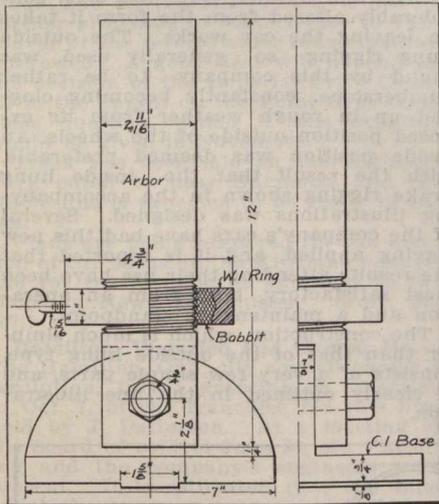
Sale of Dominion Power and Transmission Co. Not Carried Out.

The proposed sale of the Dominion Power and Transmission Co.'s properties, in and around Hamilton, Ont., including the Hamilton St. Ry. and four radial electric railways to Sir Wm. Mackenzie and his associates, which was referred to in Canadian Railway and Marine World for July, has not been carried out, and parties on both sides of the transaction say that the negotiations are off.

Commutator Slotting Jig at Halifax Electric Tramway Company's Shops.

At the Halifax Electric Tramway Co.'s shops, D. B. Logan, Foreman Machinist, a method of slotting the armature coil wire lead slot in the commutator segments, has been devised. A lathe is employed for the purpose in conjunction with the jig shown in the accompanying illustration.

The jig is bolted on the tool post of the lathe carriage. Over the vertical arbor, the dismantled commutator is slipped, the diameter of the arbor corresponding to that of the commutator bore. A milling cutter saw, on a mill-



Jig for Carrying Commutator while Slotting in the Lathe.

ing arbor held in the lathe spindle, is made to revolve at a high velocity, cutting the slots in the commutator, which is fed up to the cutter by the tool carriage.

The construction of the carrying jig is interesting. To the vertical flange of the cast iron base, which is made to fit the tool post stand, there is attached an arbor, the lower end of which is slotted to fit over this flange, a $\frac{3}{4}$ in. bolt holding the two together. This construction allows for the arbor being inclined from the perpendicular when in service, as will be explained further on. On this arbor there is a wrought iron ring or collar, adjustable within limits along the arbor, on which the mounted commutator rests. The method of attaching the ring to the arbor, in order that it might be adjustable, is rather unique. Were the ring itself threaded, the arbor would of necessity have to be threaded from its lower end up to the section now required; that is, the carrying bolt section would be threaded. To obviate such a design, the unusual construction followed became necessary. The ring, set true with the arbor, was blocked up from its lower surface, and the annular recess thus formed between the ring and the arbor thread poured with molten babbitt. This formed a perfect internal thread in the supporting ring, allowing the necessary lengthwise adjustment on

the arbor without threading the arbor from the bottom up to that point.

The jig in operation is mounted on the tool post stand, with its swing adjustment in a plane at right angles to the lathe centre line. The arbor, swung over at an angle towards the centre line, carries the commutator dismantled from its carrying shaft. It is set in such an angle and position that when it is moved across against the cutter by the carriage cross screw, the cutter strikes the corner that is to be slotted for the entry of the coil connecting wires. The commutator is set by hand in the positions for slotting each sector independently, and there held during slotting, being then swung over to the next sector.

Electric Railway Notes.

The first pay-as-you-enter cars to be operated in Great Britain, have been put into service at Gateshead, Eng.

G. E. Wadland, heretofore Treasurer, Sarnia St. Ry., has also been appointed Manager and Secretary vice H. W. Mills, deceased.

The Guelph Radial Ry. is reported to be in the market for a snow sweeper, for delivery in time for use during the coming winter.

The Regina Street Ry. has received four single truck, pay-as-you-enter cars, from the Preston Car and Coach Co., Preston, Ont.

The Sarnia St. Ry., Sarnia, Ont., is building a car barn and machine shop of concrete blocks, with gravel roof. The cost is reported as about \$12,000.

Superintendent Mickle of the Kingston, Portsmouth and Cataract Ry., Kingston, Ont., recently announced that cars would be run on Sundays only in very warm weather.

The Dominion Power and Transmission Co. has received three suburban cars, for its radial lines out of Hamilton, Ont., from the Preston Car and Coach Co., Preston, Ont.

The Moose Jaw Electric Ry. has put a Sunday car service in operation on its lines in Moose Jaw, Sask., following the recent vote of the citizens granting the right to do so.

One fatal, and one non-fatal accident were reported during May, in connection with the operation of electric railways in Canada. The death was due to a car motor falling on a man.

F. D. Powers, heretofore freight traffic expert for the Vancouver board of trade, has been appointed Freight Traffic Agent, British Columbia Electric Ry., with office at New Westminster.

The Quebec Court of Appeal has dismissed the appeal of the Montreal Street Ry. against the decision of the Recorder's Court fining the company \$25 for carrying freight on its lines in the city.

The Calgary Municipal Ry. has received one double truck sprinkler, one scenic car, and one single truck car, completing an order of 12, from the Preston Car and Coach Co., Preston, Ont.

Members of the street railway committee of the St. Thomas, Ont., city council, visited various cities in the U.S. recently, for the purpose of inspecting types of street cars, and their method of operation, with a view to a betterment of the municipal street railway system. It is stated that the pay-as-you-enter cars are favored, and quotations are being received.

J. B. Ingersoll, who has been engaged for some time past as electrical engineer on the British Columbia Electric Ry. Vancouver, B.C., is reported to have left that company's service to become manager of the Kootenai Power and Construction Co., which is building a 40,000 h.p. hydro-electric plant at Kootenai

Falls, Montana, with a transmission line of 170 miles.

It has been decided to appeal against the decision in the action of Kerley, against the London and Lake Erie Ry. and Transportation Co. to recover penalties for the operation of cars on Sundays between London and Port Stanley, the full text of which was given in our last issue, pg. 365. Pending the hearing of the appeal, Sunday traffic on the line has been suspended.

As a result of a conference between the Winnipeg board of control and the directors of the Winnipeg Electric Ry., July 5, following a number of previous conferences, it is said that an arrangement has been made relative to all points in dispute between the city and the company, and that an official announcement of the settlement will be made when all the details have been worked out.

The question whether the decision in the action of Kerley against the London and Lake Erie Ry. and Transportation Co., as to the operation of cars on Sunday, affects the Brantford and Hamilton Ry. is being considered by the latter's management. The city clerk of Hamilton has advised the city council that the decision only affects companies whose lines have been built and brought into operation since 1897.

J. D. Burpee, Accountant, Ottawa Electric Ry., has been appointed Superintendent and Purchasing Agent, vice Jas. E. Hutchinson, resigned to enter Montreal Tramways Co.'s service. He was born at Ottawa, Apr. 25, 1876, and commenced railway work in 1891 under H. B. Spencer, Superintendent, District 4, Eastern Division, C.P.R., Ottawa. He entered Ottawa Electric Ry. service in 1893, since when he was, to 1896, stenographer; 1896 to 1898, cashier and paymaster; 1908 to 1912, Accountant, during which time he also acted as assistant to the Superintendent and Secretary.

S. D. Egan, whose appointment as Superintendent, Regina Municipal Ry., Regina, Sask., was mentioned in our last issue, was born at Auckland, New Zealand, Sept. 23, 1866, and received training at the Government School of Engineering, Chatham, Eng., where he qualified class first, as mechanical engineer, land and sea, and gold medallist for general knowledge construction and operation of steam and electric railways. He has had a varied railway experience in Europe, Australia, Egypt, the Sudan, Jamaica and Africa, having served on the Cape to Cairo and Rhodesian railways, both in construction and operation. He has been in Canada about six years, and has served, at various times, on the C.P.R., Mackenzie, Mann and Co., Ontario Government, city of Toronto, and as expert for the Board of Railway Commissioners.

Advantages of Electric Locomotives.—

A recent paper on electric locomotives for the handling of freight in railway yards and in mining, brought out clearly certain advantages over steam locomotives apart from the elimination of fire and smoke and the difference in fuel efficiency of the central station boiler and engine and the (smaller) locomotive boiler and engine. The electric locomotive can be relied upon, as long as the line voltage is maintained, to develop its full power at any time, being independent of the state of a boiler, the skill of a fireman, or the quality of fuel. The track adhesion is better—sometimes as much as 20% better—because the torque of the driving wheels is uniform throughout each revolution, and there is not the same tendency to slip when starting under load as in the steam locomotive. The traction can be increased indefinitely by sanding the rails, since the electric locomotive can draw power indefinitely from the line. No time is lost on the road for coaling, watering, boiler tending, or waiting for steam pressure to rise.

Car Equipment with Reference to Safety Devices.

By A. E. Beck, Claims Agent, British Columbia Electric Railway.

"It must be made difficult for employees to cause accidents or for the public to meet with them," is a good rule for the management of railway corporations to ever have in the mind's eye. It is not just to hold a railway corporation or any person wholly responsible for that which could not be wholly prevented, but there are negligent acts on the part of both the carmen and the public which, although frequently present, are

more numerous than any other class. Street car passengers insist on freedom of entrance and exit and rebel against forcible restriction. If people would not get on or off a car while it is in motion our work would be greatly lessened, but that is just what they will do despite our many efforts to warn them, and in their rashness and haste they are all too frequently assisted by the too impetuous conductor or motorman.

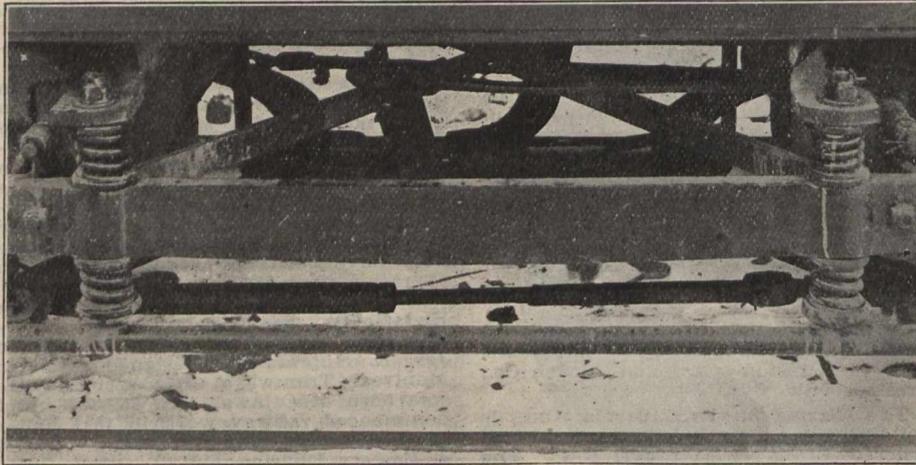
Where the summer car is so much used, both summer and winter on this coast, and where doors, gates and folding steps are not provided, an answer must be given to (one foot on the step and the car started)—"Why did you not

warning was not heard the fact that it had been given would be susceptible of proof by others as to the actual occurrence.

"Was the whistle blown before the accident?" and "Was the door opened before the car came to an actual stop?" are recurrent questions which indicate that we must protect ourselves from ourselves; that we must equip our carmen, both mentally and mechanically, by lectures and actual tests in the proper use of safety devices so as to make it difficult for accidents to occur. But we must not overburden the men who have already "too much to do," as they, as well as the public, chafe under the yoke of restriction.

Our work of protection should include the "higher ups" as well as the men, the principles of the doctrine of public safety being preached constantly to the superintendents.

The foregoing is an abstract of a paper read at the Pacific Claim Agents' Association's convention at Los Angeles, Cal., recently.



Inside Hung Brake Rigging on Hull Electric Co.'s Cars.

Inside Hung Brake Rigging on Hull Electric Company's Cars.

The brake rigging of the Hull Electric Co.'s cars, which operate between Ottawa and Aylmer, Que., has been considerably altered from the form it takes on leaving the car works. The outside hung rigging so generally used, was found by this company to be rather cumbersome, constantly becoming clogged up in rough weather from its exposed position outside of the wheels. An inside position was deemed preferable, with the result that the inside hung brake rigging shown in the accompanying illustrations was designed. Several of the company's cars have had this new rigging applied, and it is reported that the results attending their use have been most satisfactory, both from an operation and a maintenance standpoint.

The construction, which is much simpler than that of the outside hung type, consists of a very few simple parts, and is clearly outlined in the line illustration.

preventable and for which we must find a cure without recommending quack remedies. Success has attended our efforts in the educational field, such as "barn" talks to the men, addresses to school children, warnings to passengers by placards and press notices, etc., but our experience teaches us that some measure of physical restraint is also necessary to protect ourselves and the thoughtless or heedless. Already we have minimized the attacks of our adversary, as is shown by a constantly decreasing casualty list.

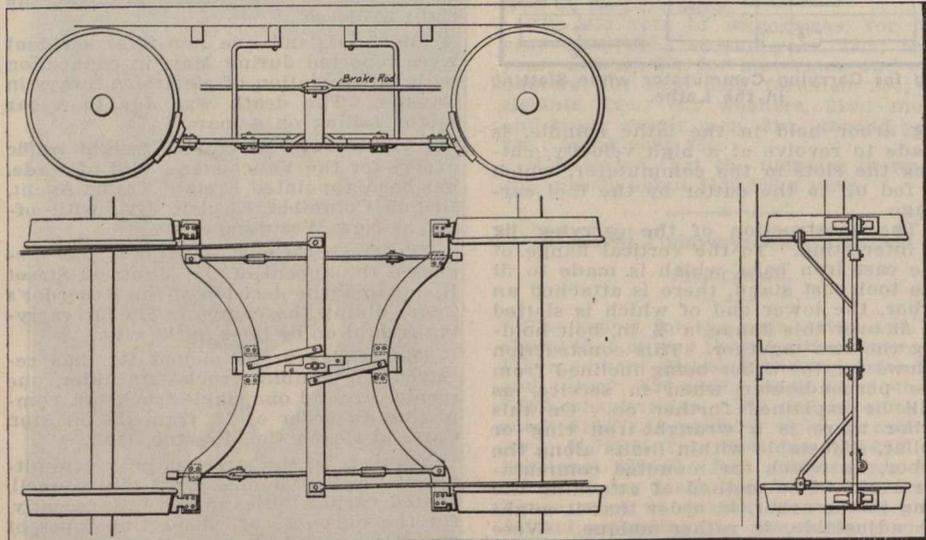
While it is true that public safety must be recognized as of primary importance, it is also true that attention must be paid to certain economics of car building to prevent the car being equipped with safety devices to such an extent as to make both operator and car in danger of being overburdened by a bundle of mechanical absurdities.

Well directed efforts have been made to so construct the car itself that, structurally, it will conduce to public safety, and these attempts have brought forward many types of cars, each having its own champions. Steam railways have almost universally accepted a standard car pattern and perfection in this line appears to have been about reached, but we yet await the perfectly constructed street car. Is the standard street car an impossibility? Will the time never come when the man on the street will be as familiar with the structure and safety equipment of a car in Los Angeles as in New York or elsewhere? The provision of such a standard car would be a very desirable factor, as in its construction could be embodied the results of our concentrated endeavors for the prevention of accidents.

The more serious accidents happen at the front end, where they are most difficult to prevent, the time for action being but a brief moment, and the danger occasioned by a cause beyond the control of the motorman. Here we must endeavor to lessen the severity of the impact and prevent mutilation.

The accidents at the rear end are

tell me the car was about to start?"—and similar queries. The writer suggests the installation of an electric bell, operated by either the motorman or conductor by means of a push button and ringing simultaneously at the front and rear of the car, at the points of entrance and exit. This would serve to warn passengers and also provide for the "proceed" or "stop" signal to the motorman. By this means the motorman could signal the approach of a passing car and



Inside Hung Brake Rigging on Hull Electric Co.'s Cars.

provision is made for warning those waiting to board a car which is already overloaded as well as the person who approaches the car unobserved from side or rear, as is frequently the case, after the "proceed" signal has been given. With such a system of warnings carried out, parties knowingly assuming the risk of accident would be the authors of their own misfortune in case of mishap. Even in the event of the allegation by the injured person that the

Western Canada Power Co.—W. McNeill, Assistant Manager, W.C.P. Co., stated at a public meeting in Burnaby, B.C., July 16, that contingent upon certain negotiations in progress with the Provincial Government, the company would start construction upon the projected electric railway through North Burnaby by the fall. The matter under discussion was as to the cost of the bridge across the Pitt River, and a decision was expected by the end of August.

Electric Railway Projects, Construction, Betterments, Etc.

Berlin and Northern Ry.—The Berlin, Ont., city council has under consideration a proposal to contribute \$6,000 towards the erection of a new bridge across the Grand River at Bloomingdale, on the projected extension of the old Berlin and Bridgeport Electric Ry. from Berlin to Bloomingdale. W. H. Breithaupt, Berlin, Ont., is President. (June, pg. 308.)

Brandon, Man.—Certain of the aldermen desire that no double track lines be built at present, but single lines only, so as to serve a greater area. The routes at present proposed with double track on Tenth St., are under construction, and the city engineer wants a decision to be reached so that he may go on with track-laying and have the lines in operation at the earliest possible date.

The city engineer has been authorized by the city council to order 100 tons of 70 lb. rails, and 500 tons of 60 lb. rails. (July, pg. 367.)

British Columbia Electric Ry.—R. H. Sperling, General Manager, in an interview, July 5, is quoted as stating that the company is quite willing to reopen negotiations with the transportation committee of Greater Vancouver, in respect to its various franchises. The company will not withdraw any of the offers it had made, and on the other hand, it has no further proposals to make either to Vancouver or the several other municipalities interested. A good deal will depend on the decision of the Imperial Privy Council in the appeal on the Point Grey franchise question, which it was expected would be given in November.

Track has been laid on the Highland Park cutoff to near Edmonds, and the whole line is expected to be ready in the fall.

Plans are being prepared for the erection of car barns on the Kitsilano reserve, and for the erection of additions to the shops in New Westminster. (July, pg. 367.)

Hamilton, Waterloo and Guelph Ry.—The Hamilton, Ont., city council passed a resolution, July 2, granting an extension to Oct. 1, of the franchise for this line, held by J. Patterson. At a meeting of the board of control June 30, Mr. Patterson and the company's engineers were present. It is estimated that the lines which the company proposes to build under its charter, which includes a line to Toronto, will cost \$12,000,000, although it is possible this might be reduced to \$9,000,000 through savings on the right of way. It is desired that local interests should subscribe one-third of the capital. The extension of time was given to see what could be done in this direction. The International Bond and Share Co. of New York, is looking after the financing, and the McArthur Construction Co., of New York, made the estimates for construction. A subsequent press report states that the International Bond and Share Co.'s representative who went to England in connection with the project says the required capital cannot be obtained there. (June, pg. 308.)

International Ry. (British Columbia).—Application is being made by the company for a license to store 5,000 ft. of water in the Fraser River above Yale, B.C., for power purposes. The company contemplates building an electric line through the lower mainland connecting New Westminster with Ladner, thence through Delta and Surrey, B.C., to Blaine, and Huntingdon, Wash. H. T. Thrift, Hazlemere, B.C., is Secretary. (May, pg. 251.)

Lake Erie and Northern Ry.—A bylaw to subscribe \$125,000 of debenture stock in the company was approved by Brantford, Ont., ratepayers, June 25. On July 9, the ratepayers of Simcoe and Port Dover approved of bylaws subscribing \$25,000 each to the project, and July 11,

the Galt town council decided to submit a bylaw subscribing for a similar amount. The town of Paris has also a similar bylaw under consideration.

W. P. Kellett, Managing Director, is quoted as stating that tenders will be asked for the construction of the line early in Aug. (July, pg. 367.)

Lethbridge Municipal Ry.—H. Doughty is quoted as saying that nine miles of track had been laid on the municipal electric railway in Lethbridge, Alta., to July 1, and that it was expected to have the tracklaying completed by Aug. 1. Superintendent Reid returned from the United States, July 10, from a trip purchasing machinery, etc., for the line, and it is hoped to have the line in operation by Aug. 31. (June, pg. 310.)

London and Lake Erie Ry. and Transportation Co.—Representatives of the Yarmouth, Malahide, Aylmer and St. Thomas municipalities have agreed to submit bylaws to provide for guaranteeing the company's bonds for \$15,000 a mile for the 10 miles of line between St. Thomas and Aylmer, Ont., on condition that the line will be extended to Port Burwell within three years. Aylmer, however, limits its guarantee at present to \$25,000. (July, pg. 367.)

London St. Ry.—Work is reported to have been started on the new north end line, which it is expected to have in operation by Jan. 1, 1913.

AN ELECTRIC RAILWAY EXPERT'S VIEW.

J. E. Hutcheson, who has been appointed General Manager, Montreal Tramways Co., has been a subscriber to this paper for a number of years, so that his opinion in regard to it is of interest and value. It is clearly expressed in the following letter:—

"I wish to say that I have found The Railway and Marine World the most useful periodical published in the interests of the railway business. The reading matter is live and very interesting, and is so arranged as to make the paper a very valuable advertising medium. Railway officials who cannot find time to read your monthly are missing something. I wish you continued success."

Montreal and Southern Counties Ry.—The Minister of Railways has approved of the route map for the proposed line from Ranelagh to Laprairie, Que., four miles.

Press reports state that location surveys for the line to Granby have been completed and that it is expected construction will be started at an early date.

A contract is reported to have been let to the Canadian Westinghouse Co., for electrical equipment for the new power house, including three 500 kw. rotaries, six-phase, 60 cycle, 900 r.p.m., 600 volts d.c.; one 400 kw. motor generator set, 720 revolutions, generator 600 volts, motor 2300 volts; the necessary transformers, and ten quadruple 50 h.p. motor car equipments, with multiple unit electric pneumatic control for operating cars. (July, pg. 367.)

Montreal Tramways Co.—Press reports state that the directors have practically completed their plans for the improvement and extension of the various lines. The plans are said to include the building of a second track on the Bout de l'Île line, and a number of extensions out of the city, and particularly to the summer resorts along Lake St. Louis. (June, pg. 309.)

Moose Jaw Electric Ry.—Work was started July 1, on the extension to the proposed park. President Dion in notifying the city council of the extension, said: "This is the only extension that has been

decided upon, and if the statements are made that we are building extensions in other directions they are not authorized by us, and are not correct." (July, pg. 368.)

Niagara, St. Catharines and Toronto Ry.—It is expected that the projected line from St. Catharines, Ont., to Niagara on the Lake, about 14 miles, will be gone on with at an early date, and that it may be completed this year. The Minister of Railways has approved of the route map. The line will branch off from the present line at Niagara St., St. Catharines, and proceed along that street to Carlton St., turning north about half way to the projected line of the new Welland canal, and proceeding as far as the Lake Shore road, about a mile inland, which will be followed to Fort Mississauga, and thence to the wharf, at Niagara on the Lake. The plan also shows a spur line along Carlton St. to lock 2, and a branch to the proposed new port at the Lake Ontario entrance of the new Welland canal.

The Minister of Railways has approved of a route map of a line from near Port Dalhousie to Beamsville, Ont., about 12 miles, but it is hardly likely that it will be built this year. The map shows a line branching off from the present line, where it strikes east along the main road into Port Dalhousie, and proceeding in the opposite direction skirting the lake shore to Jordan, thence striking directly across to Beamsville, where connection would be made with the Hamilton, Grimsby and Beamsville Electric Ry.

Niagara, Welland and Lake Erie Ry.—C. J. Laughlin, General Manager, Welland, Ont., is quoted as stating that the company will have a line in operation by the end of the summer along the east side of the canal from Welland to Port Colborne, Ont. (July, pg. 368.)

Nipissing Central Ry.—The Minister of Railways has approved of a route map for the extension of the line from Halleybury to New Liskeard, Ont., 5.5 miles. (June, pg. 359.)

Ottawa, Rideau Lakes and Kingston Ry.—T. R. Clougher, London, Eng., and H. E. Upson, Ottawa, made an inspection of the route of this projected railway from Ottawa to Kingston, Ont., early in July. Mr. Clougher is quoted as stating that with the exception of 20 miles at the Kingston end the line would be an easy one to build and that the company was arranging for the financing of the line, and that he expected construction would be started early in 1913. (June, pg. 309.)

Port Arthur and Fort William Electric Ry.—The utilities committee of the Port Arthur, Ont., city council, had the city engineer's plans for the projected belt line to connect with the main line and the Arthur St. extension in that city, before it, July 5. The committee recommended the council to approve of the same, and to prepare a necessary bylaw for submission. The route recommended was not made public. (July, pg. 368.)

Regina Municipal Ry.—The Regina, Sask., city council has under consideration a proposition from a group of real estate men who offer to build a six mile line to open up new territory, and hand it over to the city. The council has asked the promoters to submit proposals for the operation and maintenance of the line pending the development of the property.

Considerable damage was done to the overhead work, and to the car barns, etc., by the cyclone which struck the city on June 30. (April, pg. 197.)

St. Thomas St. Ry.—The city engineer has been directed by the St. Thomas, Ont., city council to prepare an estimate for extending the city's electric railway from Hemlock St. to Pinafore Park, and for putting the track now laid in the park in a condition for traffic. (July, pg. 368.)

Sarnia St. Ry.—Owing to a fire at the plant of the Sarnia Electric Light Co.,

June 28, the street railway service had to be suspended. The S.S. Ry. secured a generator and a steam engine from the Detroit United Ry., and was able to resume its car service July 10. (April, pg. 197.)

Saskatoon, Sask.—Only one vote was cast recently against the project to build an electric railway in Saskatoon, Sask., as a municipal enterprise. The bylaw authorizes the expenditure of \$500,000 on the line, and the routes to be followed are to be practically the same as those laid out by H. M. E. Evans, under the charter given the Saskatoon Electric Ry. and Power Co., which was abandoned. The financing is being arranged through Stone and Webster, Boston, Mass., the construction being in charge of city engineer Locke, with O. A. McCormick, formerly general foreman of construction on the electric railway at Seattle, Wash. Construction was started July 1, and it is expected to have the first section of the line in operation by Nov. 15. (June, pg. 310.)

Toronto and York Radial Ry.—The order authorizing the diversion of the Metropolitan Division to a private right of way from Farnham Ave. to a new terminal near the C.P.R. tracks, North Toronto, was issued June 26; and the company started clearing part of the site July 1. The city has notified the company of its intention to appeal against the order, and this will be dealt with when the courts resume in September.

The taxpayers voted against a bylaw to permit the double tracking of the line on Yonge St., within North Toronto municipality, and in favor of the bylaw to merge the municipality in the city of Toronto. (July, pg., 368.)

Toronto Eastern Ry.—The Board of Railway Commissioners has approved of revised location plans for the line through Pickering tp. Ont.

This line is under construction from Bowmanville to Toronto, together with a branch line into the town of Oshawa, Ont. The general contractor is Gowan Mackenzie, Toronto, who has sublet the grading to the following: Wm. Yule, Bowmanville; Victoria Construction Co., Toronto; Robert Hill, Oshawa; E. Cook, Oshawa; and C. H. Cook, Whitby. The contract for fencing has been let. (July, pg. 368.)

Toronto Suburban Ry.—The first of the extensions of this line to be placed under construction is that from Weston to Woodbridge, Ont. The location is along private right of way, and the contract is being carried out by Ewen Mackenzie, Toronto. The general contractor's own outfit is working on a section of the line, and the grading on the balance has been sublet to S. O'Connor, Woodbridge, and W. Joplin, Woodbridge. The fencing contract has also been let. About half the grading has been completed, and it is expected to have the work completed early in September.

The line to Guelph is also under construction, the general contract having been let to Ewen Mackenzie, Toronto. This line is being built on a private right of way, and starts from the present Lambton line in the park there. It will cross the Humber River a little south of the C.P.R. bridge. The bridge to be built there will be large enough to be also used by the Canadian Northern Ry. line to Niagara Falls. The location from this point is parallel with Dundas St., partly on the north and partly on the south, through Islington, and Summerville, going down to the C.P.R. tracks just west of Dixie station, and keeping alongside of the C.P.R. as far as Cooksville station, where it turns northerly, and proceeds in nearly a straight line for Meadowville, thence through Churchville, Huttonville and Norval to Georgetown. Thence it parallels the G.T.R. to Acton and runs in a nearly direct line to Guelph, passing through Eden Mills. The exact location

for the entrance into Guelph has not been decided. Surveys are being made for an extension from Guelph to Berlin, and it is intended later on to proceed with the surveys to Stratford, which city has given the Mackenzie, Mann & Co. interests a franchise under the charter of the Stratford Ry. The contract let to Ewen Mackenzie, covers the line to Guelph, and it is expected to have it completed this year. A sub-contract for grading on the eastern portion of the line has been let to W. Maher, West Toronto, and other grading sub contracts are being arranged. E. T. Wilkie, is Chief Engineer.

The Ontario Railway and Municipal Board has ordered the company to reconstruct the line on Bathurst St., and Davenport Road, and to pave between the tracks and for 18 ins. on either side, the work to be done under the supervision of the Board's engineer. (July, pg. 368.)

Winnipeg Electric Ry.—A permit has been granted for the erection of a 14 story building to cost \$500,000, on the corner of Notre Dame and Albert streets, Winnipeg. Pratt and Ross are the architects, and the contract has been let to the Carter, Halls, Adlinger Co., Winnipeg. (June, pg. 310.)

Electric Railway Finance, Meetings, Etc.

British Columbia Electric Ry.—Gross earnings for May, \$491,826; operating expenses \$313,469; net operating earnings \$178,357; renewal funds \$37,935; net earnings \$140,422; approximate income from investments \$25,000; net income \$165,422, against \$398,437 gross earnings; \$260,437 operating expenses; \$138,000 net operating earnings; \$29,770 renewal funds; \$108,230 net earnings; \$20,000 approximate income from investments; \$128,230 net income for May 1911. Aggregate gross earnings for 11 months ended May 31, \$5,251,343; aggregate net earnings including estimated income from investments, \$1,836,830, against \$3,839,170 gross and \$1,464,709 net for same period 1910-11.

Brantford St. Ry.—The National Trust Co. sued the Brantford St. Ry. Co. recently to recover \$125,000 and foreclosure of mortgaged premises in default. In the Trial Court at Toronto, July 18, Judge Kelly gave the following decision:—"On the opening of the trial, it was shown that on June 11, the defendant had paid to plaintiff all arrears of interest, and an undertaking satisfactory to plaintiff was given for payment of plaintiff's costs up to the time of such payment. A breach of the covenants did not entitle plaintiff to possession, or to have a receiver appointed. Their remedy is on the covenants themselves. Action dismissed with costs from the time of payment of the interest on June 11, the plaintiff being entitled to costs to that time."

Calgary Municipal Ry.—Passenger earnings for June, \$54,318.77; miscellaneous earnings, \$589.26; total earnings, \$54,908.03; operating expenses, maintenance, etc., \$32,058.38; net operating earnings, \$22,849.65; contingent fund, interest, etc., \$8,008.73; net profit, \$14,840.92 against \$31,526.35, passenger earnings; \$844.60 miscellaneous earnings; \$32,370.95 total earnings; \$13,742.95, operating expenses, maintenance, etc.; \$18,628 net operating earnings; \$4,334.43, contingent fund, interest, etc.; \$14,293.57, net profit for June 1911. Following are the operating statistics for June, revenue per car mile, 32.660c.; operating expenses per car mile 18.906c.; surplus per car mile 13.754c.; cost of power per car mile 4.570c.; proportion of expenses to revenue 58.3%.

Cape Breton Electric Co.—Gross earnings for May, \$28,577.95; operating expenses and taxes, \$16,192.34; net earnings, \$12,385.61; interest charges, \$4,495.83; balance, \$7,889.78; sinking and improvement funds, \$1,206.66; balance for

reserve, etc., \$6,683.12, against \$27,650.50, gross earnings; \$15,471.54, operating expenses and taxes; \$12,178.96 net earnings; \$4,512.50 interest charges; \$7,666.46 balance; \$1,141.67 sinking and improvement funds; \$6,524.79 balance for reserves, etc., for May, 1911.

Edmonton Radial Ry.—Revenue for April, \$32,158, against \$19,014 for April 1911. The number of passengers carried during April was 782,646, against 452,959 in April 1911.

London St. Ry.—Gross earnings, \$25,755.40; expenses, \$17,752.26; net earnings, \$8,003.14; deductions, \$2,371.25; net income, \$5,631.89, against \$24,501.91 gross earnings; \$16,841.63 expenses; \$7,210.28 net earnings; \$2,375.49 deductions; \$4,834.79 net income, for June 1911. Aggregate gross earnings for six months ended June 30, \$141,809.05; expenses \$101,502.05; net earnings \$40,307; deductions \$14,368.50; net income \$25,938.50, against \$127,801.83 aggregate gross earnings; \$94,193.01 expenses; \$33,608.82 net earnings; \$14,269.34 deductions; \$19,339.48 net income for same period 1911.

Moose Jaw Electric Ry.—The gross revenue for the first six months of operation, Sept. 4, 1911, to Feb. 29, is reported as \$16,205, with an expenditure of \$12,479. A meeting of shareholders was held at Moose Jaw, July 3, when it was decided to increase the capital stock to \$1,000,000.

Nelson St. Ry.—Replying to the offer of the Nelson, B.C., city council, to give par for the stock of the company, payable without interest in twenty annual instalments, the company showed a disposition to accept the price, but asked for 3% on the deferred payments. At a subsequent meeting of the city council, an offer was made of \$7,500 for the property and assets of the company to quote the words of the mayor, "lock, stock and barrel" in presenting the resolution.

Toronto Ry., Toronto and York Radial Ry., Toronto Power Co., and allied companies.—Gross earnings for May, \$693,015; operating expenses, maintenance, etc., \$342,545; net earnings \$350,470, against \$622,197 gross earnings; \$304,378 operating expenses, maintenance, etc.; \$317,819 net earnings, for May 1911. Aggregate gross earnings for five months ended May 31, \$3,315,738; net earnings, \$1,696,457, against \$2,934,018 aggregate gross earnings; \$1,471,281 net earnings, for same period 1911.

The gross receipts of the Toronto Ry. for June, were \$444,598.91 against \$401,185.88 in June 1911. The percentage paid to the city for June, was \$88,919.70.

Winnipeg Electric Ry.—Gross earnings for May, \$298,743; operating expenses, \$162,364; net earnings, \$136,379, against \$295,779 gross earnings; \$149,699 operating expenses; \$146,080 net earnings, for May 1911. Aggregate gross earnings for five months ended May 31, \$1,508,300; net earnings \$690,817, against \$1,576,252 aggregate gross earnings; \$761,488 net earnings, for same period, 1911.

Scenic Railway at Vancouver.—A new plan for the construction of a scenic railway up Grouse Mountain was submitted to the North Vancouver municipal council, July 8. A. Phillip proposes the building of a cable line from the end of the proposed extension of the B.C. Electric Ry. line to Essex St., up the mountain side. The first section of the proposed line would have a gradient of 15% and the second section a gradient of 28%, as against the 50% gradient proposed in the plan of the Grouse Mountain Scenic Ry., which was under consideration early in 1911. As no right of way would have to be acquired, the cost would be light, the preliminary estimate being \$50,000. Power would be obtained from the B.C. Electric Ry. The council appointed a committee to interview the promoters, the B.C. Electric Ry. officials and the district council.

Marine Department

Accident to Gates of Lock 22, Welland Canal, Near Thorold, Ont.

By Emile Low.

One of the most serious accidents in the history of the Welland Canal occurred on June 20, about 3.30 p.m. at Lock 22, near Thorold, Ont., when the Canadian Government survey steamboat, *La Canadienne*, bound up from Lake Ontario to Lake Erie, and just entering the lock, ran into the upper gates and opened them. The subsequent rush of water dismounted both the upper and lower

22.7 ft., depth 10.9 ft. She had just passed out of lock 21, some 800 ft. below, and was entering lock 22. The lower gates of this lock were open, and were within the gate recesses, being held in place by the automatic gate hook. Along the lock walls are concrete snubbing posts; every vessel passing through the lock must have two men to attend to the snubbing line, one end being made fast to the ves-

also were torn from their fastenings and followed the vessel and upper gates into the canal below.

The boys who were drowned by the wave of water, had been playing on the bank of the equalizing basin to the left of the canal just below lock 22. Two out of five, succeeded in saving themselves, but three were carried away.

Of the accompanying illustrations, figs.

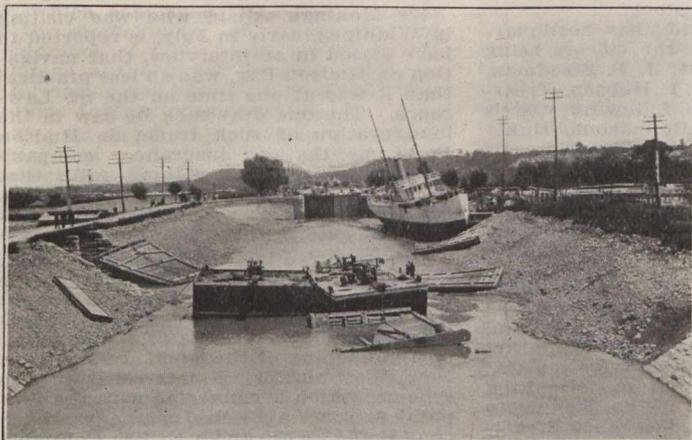


Fig. 1. Looking Down Stream from Lock 22 to Lock 21. *La Canadienne* stranded on Right Bank.

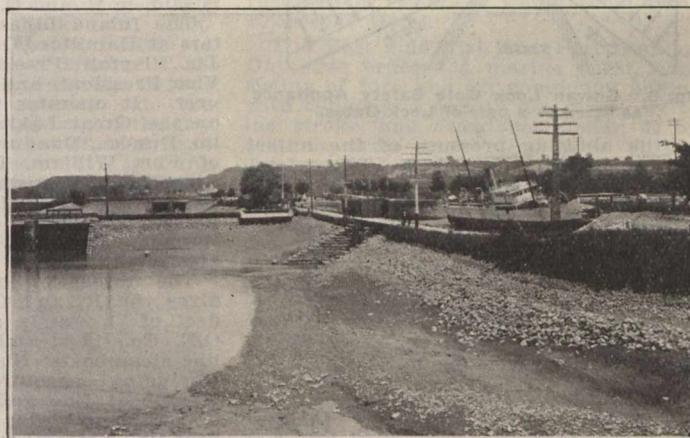


Fig. 2. View from Waste Weir across Equalizing Basin towards Lock 21

gates, wrecked the steamboat and a number of scows in the canal below, and drowned three boys who were near the canal bank.

The numbering of the canal locks begins with no. 1, at Port Dalhousie, on Lake Ontario, and extends southward to Port Colborne, on Lake Erie. The lock at Port Colborne, no. 26, is a guard lock,

sel or to its capstan forward, and the other end to one of the snubbing posts. It seems that at the time of the accident the lower end of the snubbing line was in place around the snubbing post on the lock wall but its other end had not been securely enough fastened to the vessel, so that it did not hold as the vessel moved forward. The result was that the headway of the vessel was not checked

1 to 3, show the appearance of the canal prism just below lock 22 after the accident. The stranded vessel is lying on the right bank; its side was damaged, possibly by striking the bank, and the vessel sank. At the time the photographs were taken, the canal prism had been emptied, as an aid in finding the bodies of the drowned boys and for recovering the displaced lock gates of lock 22. These



Fig. 3. Lower Gates of Lock 22, Replaced.

and lock 25 is at the northern end of the long Lake Erie lever, which ends a short distance south of Thorold. At the latter point the descent to Lake Ontario begins, skirting the escarpment between the two lakes.

La Canadienne was proceeding up through the canal on an inspection trip from Lake Ontario points to Duluth. She is a steel vessel, length 154.3 ft., breadth

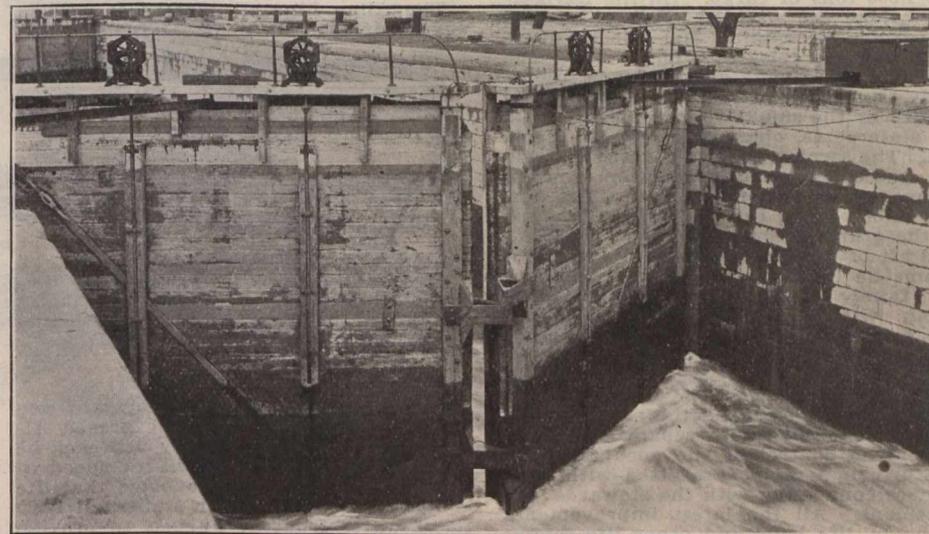


Fig. 6. Gowan Safety Appliance on a Lock Gate.

and she struck the left hand leaf of the upper gate, opening the gate and allowing the water of the upper level to pour into the empty lock chamber.

The in rushing water lifted the upper gates off their sockets and carried them with the vessel into the canal below the lock. At the same time, the holding mechanism of the lower gates, being too weak for the rushing water, these gates

gates are seen lying on the banks in fig. 1, while in fig. 3, the lower gates are shown after they were put back in place, one of the upper gates still lying on the canal bank in the foreground. The sketch plan, fig. 4, exhibits the locality.

A device for minimizing the risk of accident in case of boats striking the lock gates has been installed at lock 24, and is being fitted to lock 21. This is the Gowan

lock gate safety appliance. It is sketched diagrammatically in fig. 5, where its action when a boat strikes one leaf of the gate is represented; fig. 6 shows it applied to a lock gate. The device consists of two large horn castings, one on each gate-leaf, each having the face abutting against the other leaf, shaped to the arc of motion of that leaf. When one leaf is pushed back, the other leaf would, without this device, be forced down stream by the water pressure, and lack-

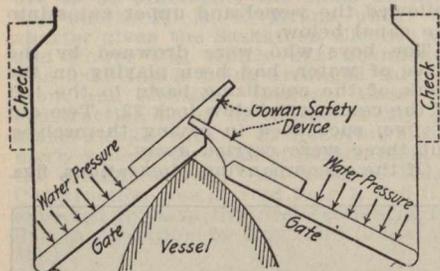


Fig. 5. Gowan Lock Gate Safety Appliance as fitted to a pair of Lock Gates.

ing the abutting pressure of the miter the leaf would be wrecked. The safety device prevents such action in case of small motions, and guides the leaves back to proper miter. It also helps to secure true mitering whenever the gates are closed.—Engineering News.

Canadian Railway and Marine World is indebted to W. H. Sullivan, Superintending Engineer, Welland Canal, for the photographs from which the accompanying illustrations were made.

New Plant Line Steamship for Halifax and Boston Service.

The Canada Atlantic and Plant Steamship Co.'s s.s. *Evangeline* was launched at Govan, Scotland, July 4, the christening being performed by Mrs. H. L. Chipman, wife of the Eastern Manager of the company, Halifax, N.S.

The vessel has 260 state rooms in addition to other cabins, and altogether has accommodation for 700 passengers, and crew of 95. There is also capacity for 1,500 tons of cargo. On the navigating bridge are situated the chart and wheel house, captain's and officers' quarters, wireless telegraph office, etc. The boat, or promenade deck extends practically the length of the vessel, and is occupied by the smoke room, entrance hall, 50 staterooms opening direct on deck, etc. The awning deck is devoted entirely to passenger accommodation, music room and state rooms de luxe. The dining saloon is on the main deck forward of the grand stairway, and is 60 by 45 ft., and aft of the dining saloon are 80 staterooms de luxe. On the lower deck are 20 family staterooms, and a ladies' cabin with 50 berths, and forward are the men's second class cabins and crew's quarters, while the kitchen, etc., are located amidships.

Special attention has been paid to ventilation, and also to heating; each stateroom is equipped with separate radiator under the control of the occupant, and the principal rooms are fitted with telephones connecting with the stewards' department. All the latest improvements in boats, life belts and other life saving appliances are supplied, also complete fire extinguishing plant, Kelvin's sounding machine, and Marconi wireless telegraph.

Her dimensions are, length over all, 364 ft., breadth 46 ft., depth moulded to main deck 33 ft. She is built entirely of steel to Lloyds 100 A1, with double bottom and six water tight compartments, and with ballast tanks carrying 450 tons of water, with specially built bilge keels 200 ft. long to give stability and

steadiness. The machinery consists of twin engines and six boilers, 6,000 h.p., capable of developing a speed of 18 knots. The engines are of the reciprocating four crank cylinder triple expansion type, and the boilers are equipped with forced draught.

The vessel should have been launched in April, but considerable delay occurred owing to strike troubles.

Completion of the Richelieu and Ontario Navigation Co.'s Absorptions.

The absorption of lake lines, which the Richelieu and Ontario Navigation Co. had in view, was completed July 18, when the capital stock of the Inland Lines was transferred to the R. and O. N. Co., payment therefor being made, it is said, in R. and O.N. stock.

The Inland Lines Ltd., has headquarters at Hamilton, Ont., the officers being Jas. Playfair, President; J. P. Steedman, Vice President, and J. I. Hobson, Treasurer. It operates the following vessels on the Great Lakes: *Donnacona*, *Dunelm*, *Dundee*, *Dundurn*, *Emperor*, *Empress of Fort William*, *Empress of Midland*, *Glenellah*, *Neepawah*, *Rosedale*, *Stadacona*, *Strathcona*, *Midland King*, *Midland Prince*, *Midland Queen*, *Wahcondah*, *Winona*. Of these, all but the *Dundurn* are freight vessels.

The absorption of the Inland Lines gives the R. and O.N. Co. a combined fleet of 71 vessels, as follows:— R. and O.N. Co., 13 steamboats and 18 market line steamboats; *Niagara Navigation Co.*, (including acquired from *Hamilton Steamboat Co.*, and *Turbine Steamship Co.*), 8 steamboats; *St. Lawrence Steamboat Co.*, 3 steamboats; *Thousand Islands Steamboat Co.*, 3 steamboats; *Inland Lines, Ltd.*, 17 steamboats.

Atlantic and Pacific Ocean Marine.

The Cunard Steamship Co. has arranged that its vessels on the Canadian route shall make Plymouth one of the English ports of call. The s.s. *Scania*, which arrived at Plymouth from Montreal and Quebec, early in July, was the first vessel on the new schedule.

The Allan Line steamships at present under construction in Great Britain, and

The Dominion Government has called for tenders for the construction of a powerful iron cruiser for the Customs service in the St. Lawrence Gulf. She is to be 185 ft. long, 32 ft. beam, with a draught of 10½ ft., and is to be fitted with 2,000 h.p. engines, and armed with two 26 lb. quick firing guns, in addition to the ram at the bow. She will carry 32 officers and men. She will be constructed with water tight bulkheads.

The C.P.R. s.s. *Empress of China*, which was wrecked on the *Shirahama* reef, off Japan, July 26, 1911, is reported to have been sold to a copper and iron dealer in Yokohama for \$65,500, for breaking up. After the vessel was floated and touched up, at Nagasaki, it was expected that she might have been repaired sufficiently to enable her to be taken to England for complete repairs, but this project had to be abandoned.

Sir Montagu Allan, who was visiting in Winnipeg, early in July, is reported to have stated in an interview, that navigation on Hudson Bay, was no less practical than it was at one time on the *St. Lawrence*. The one drawback he saw in the inauguration of such traffic on Hudson Bay, was that no insurance company would take the risk without rates that would be practically prohibitive, but he considered that it was a place for government enterprise.

It is reported in New Westminster that the *British Columbia Transport Co.* is being organized to operate a freight steamship service between New Westminster and Great Britain, via Panama, on the opening of the canal. E. J. Fader, New Westminster, is interested in the scheme, which is connected with the proposal to form a British company with a capital of £250,000 and a British Columbia charter, for the operation of a steamship service between New Westminster and Victoria, and elsewhere, as mentioned in our last issue.

The Dominion Minister of Marine, in discussing the question of insurance rates on Canadian shipping, in London, Eng., recently, is reported to have said that undoubtedly a very strong sentiment exists in Canada for the establishment of either a Canadian Lloyds, or a Government system of insurance, and that in his opinion, there was unjust discrimination against Canada on the part of Lloyds, which is entirely unwarranted either by the topography of the Atlantic coast or

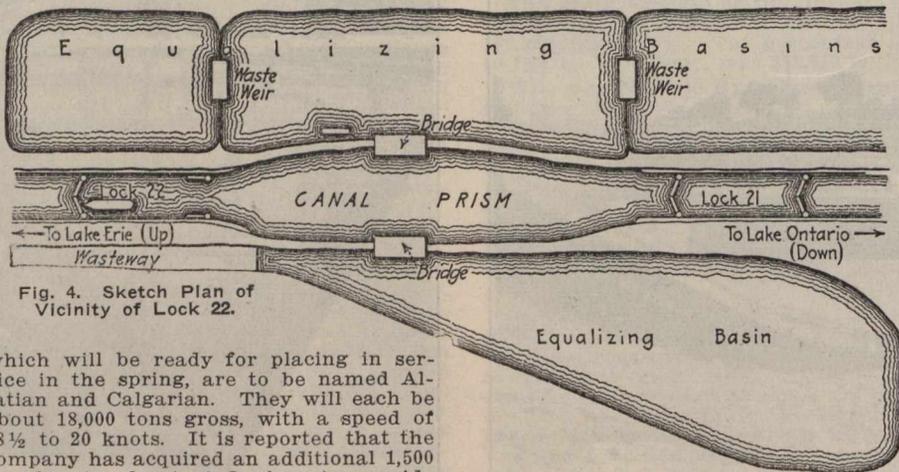


Fig. 4. Sketch Plan of Vicinity of Lock 22.

which will be ready for placing in service in the spring, are to be named *Alsatian* and *Calgarian*. They will each be about 18,000 tons gross, with a speed of 18½ to 20 knots. It is reported that the company has acquired an additional 1,500 ft. of water front at Quebec, to provide extra accommodation for its vessels.

Lord Strathcona, who presided at the Dominion Day dinner in London, Eng., July 1, said that there were three or four questions of paramount importance to the different parts of the Empire, the first was that of communications. He said that there were not yet, steamships of from 22 to 25 knots capacity passing between Canada and British ports, but he still hoped to see the trip done in four and a half days.

by the statistics of wrecks. He believed that it would not be long before one or the other of these policies would be adopted.

Maritime Provinces and Newfoundland.

The Department of Public Works has received tenders for the construction of a sea wall at Windsor, N.S., and a wharf at Boisdale, N.S.

The Department of Public Works received tenders, July 24, for the construction of a breakwater at Seaforth, N.S., and for an extension to the breakwater at Somerville, N.B.

The harbor development construction work at Courtenay Bay, St. John, N.B., was inaugurated, July 11, by the Minister of Finance, who by an electric connection exploded a charge of dynamite, blowing up a portion of a hill which has to be removed.

The final report of the St. John River Commission is expected to be filed by Aug. 15. The whole river has been surveyed, and the report contains estimates of the possible amount of storage both for lumbering and power purposes. S. J. Chapleau represented the Dominion Public Works Department.

An order in council has been passed abrogating an order in council of Apr. 10, which confirmed the bylaws relating to the employment of pilots and the equipment of pilot boats, passed by the pilotage authority of St. John, N.B., as information has been furnished that they require further consideration.

The St. John, N.B., schooner Abana, which was wrecked in West Quoddy Bay, Lubec, Me., Sept. 2, 1911, condemned as a total loss, and sold for the benefit of those concerned, has been rebuilt, and permission has been granted to have her re-registered under her old name, no. 96945, at the port of St. John, as before.

At the recent investigation into the cause of the stranding of the Magdalen Islands Steamship Co.'s s.s. Amelia at Boars Head, in the Bay of Fundy, on June 7, before Capt. W. R. Lugar, Assistant Wreck Commissioner, the captain, W. W. Hersey, was found guilty of negligence, and his certificate was suspended for three months. He was given permission to act as mate of a passenger vessel during that time.

The Dominion Public Works Department has under construction at Polson Iron Works, Toronto, a single screw sea-going tug, with hull of steel throughout. The machinery will consist of main engines, surface condensing type with cylinders 12 and 26 ins. diam., by 18 ins. stroke, supplied with steam at 145 lbs. working pressure, by a boiler of the Scotch return tubular type, 10 ft. diam., by 11 ft. long. She will be equipped with electric light plant, search light, steam steering gear and steam windlass. Her dimensions are, length 80 ft., beam, moulded, 20 ft., depth, moulded, 10 ft.

Province of Quebec Marine.

The Marine Department has decided on the construction of two steel steam tug boats at the Sorel yards, for use in connection with the dredges, now under construction for the St. Lawrence service.

The Quebec Transportation and Forwarding Co., launched a steam tug, named Margaret A. Hackett, from its plant on the St. Charles River, July 16. She is built of white oak, and is 115 ft. long, 24 ft. wide and 10½ ft. deep.

At a meeting of the Quebec Harbor Commission, July 15, it was decided to proceed with the improvements to the Commission's elevator, which is operated under lease by J. Richardson and Sons, Kingston. The improvements include the addition of a marine leg, and the expenditure will be about \$25,000.

During June, permits to pass through the Lachine canal were issued to 1,587 vessels. The quantity of wheat passing through in June, was 3,636,788 bush., oats, 1,644,799 bush.; flax, 124,541 bush.; flour, sacks, 90,677; eggs, cases, 4,545, butter, pkgs., 1,438; cheese, boxes, 50,329; coal, tons, 54,085; coal landed on canal banks, tons, 56,214.

The Montreal Dry Dock and Ship Repairing Co., Ltd., was recently incorporated, with \$50,000 capital, and office at Montreal, to operate the Tate dry dock, on the Lachine canal, of which it has obtained a ten years lease. The officers are, President, J. T. Walsh; Vice President, A. Larocque; Managing Director, T. Hall; Secretary-Treasurer, F. H. Fox.

La Compagnie de Navigation Canada's s.s. Florida was burnt at the Victoria pier, Montreal, July 7, and became, with her cargo, a total loss. She was operated between Montreal and points on the Richelieu River. She was built at St. Thomas de Pierreville, Que., in 1900, and was screw driven by engine of 5 n.h.p. Her dimensions were, length, 100 ft., breadth, 18.7 ft., depth, 5.8 ft.; tonnage, 201 gross, 128 register.

The floating dry dock, which is under construction, for Montreal at Barrow-in-Furness, Eng., was launched July 22, and christened "Duke of Connaught," by Mrs. Hazen, wife of the Dominion Minister of Marine. C. C. Ballantyne, one of the Montreal Harbor Commissioners, was present at the launching. For the reception of the dry dock at Montreal, 30 acres of land have been reclaimed at Maisonneuve, and the permanent basin walls and approach channels have been almost completed. The dock is to have a lifting capacity of 25,000 tons, and is made in three sections, so that three smaller vessels can be docked at the same time.

In response to the Dominion Government's request for proposals for the construction and operation of a dry dock and shipbuilding plant for Quebec, the site for which has been selected at St. Joseph de Levis, it is stated that no proposals, on the plans outlined by the Government, have been received, but that one tender for the construction of the dry dock alone, has been received. The tender is by Sir John Jackson and Sons, Ltd., of England and Montreal for about \$2,500,000, the dock to be handed over to the Government on completion, for operation.

The Ontario and Quebec Navigation Co.'s s.s. Geronia, which sailed from Toronto, July 11, for Quebec, struck a rock in the Lachine Rapids, July 13, and was beached near Heron Island. The passengers were removed by the Verdun-La Tortue ferry steamboat St. Louis, and landed at Montreal. The Geronia was

Ontario and the Great Lakes.

The Canadian Interlake Line has received the steamboat Hamiltonian from the builders, and has placed her in service. She is full Welland canal size.

An Ottawa press dispatch states that a contract has been let to M. J. Hogan, for \$213,000 to extend the pier at Port Colborne, Ont., to provide additional docking facilities.

The lake freighter Toiler, passed through the Welland Canal, July 15, with 101,000 bush. of grain, which is stated to be the largest single cargo to pass through the canal.

It was reported in Montreal, July 16, that the Richelieu and Ontario Navigation Co. was negotiating for the taking over of Round Island, in the St. Lawrence River, where it would rebuild the Frontenac Hotel.

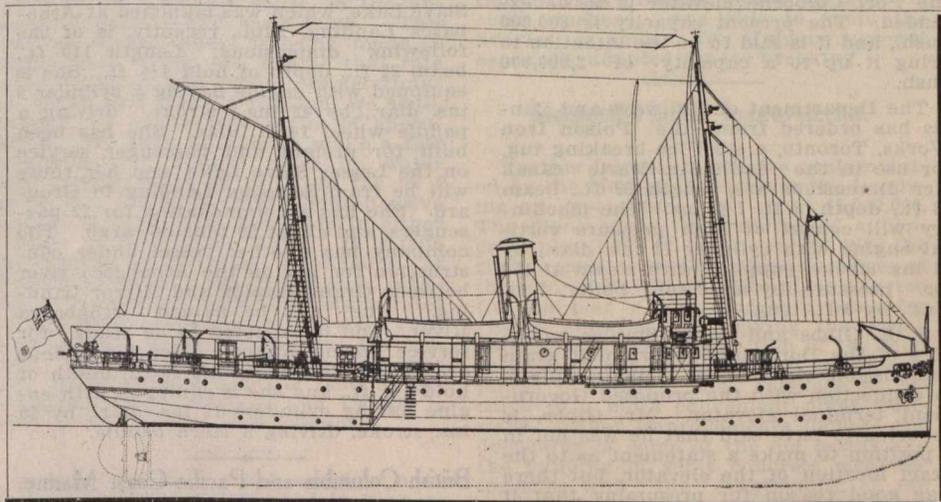
The East Side Fish Co., Port Stanley, Ont., has ordered a marine outfit, consisting of fore and aft compound engine with cylinders 9 and 18 ins. diam., by 14 ins. stroke, and Fitzgibbon boiler, 60 by 108 ins., from the Polson Iron Works, Toronto.

The Calvin Co.'s steamboat India, while entering the Welland Canal at Port Colborne, July 15, collided with the G.T.R. bridge, damaging her steering gear, and moving the pivots of the bridge. The accident is stated to be due to mistaken signals on the vessel.

Hon. F. D. Monk, Minister of Public Works, is stated in a press dispatch to have said at Sault Ste. Marie on July 19, that he had instructed the engineers to start preparing plans for the construction of a new canal and lock there and to go ahead with preparations for commencing work.

The Niagara Navigation Co.'s steamboat Cayuga, which recently broke three of her propeller blades, had three new ones put on, July 16, by the use of the coffer dam arrangement, designed by B. W. Folger, ex-General Manager, and which was fully described and illustrated in our issues of June and July, 1908.

In the article dealing with the absorption of three more steamboat lines by the Richelieu and Ontario Navigation Co., on pages 369 and 370 of our last issue, the name of W. Hanson, director, was given



Dominion Government Hydrographic Steamship for Atlantic Coast. For description, see July, pg. 370.

beached with 3 ft. of water at her bow and about 15 ft. at her stern. The Sincennes-McNaughton Co.'s tugs Rival and Natalie R. were put to work on her with the necessary pumps and outfit, and she was floated, July 16, when she was patched, where a large hole had been ripped in her side, after which she was taken to Montreal for examination and repairs.

as W. Manson; and in the last paragraph of the article, the Inland Lines, Ltd., was referred to as the Inland Navigation Co. The Silver-Islet Navigation Co., Ltd., has been incorporated under the Ontario Companies Act, with \$40,000 capital, and head office at Fort William, to conduct a general navigation and elevator business, etc. F. S. Wiley, R. L. F. Strathy, H. J.

Stephens, Port Arthur; J. J. Wells and P. H. B. Dawson, Fort William, are the provisional directors.

J. E. Russell, contractor, Toronto, has ordered from the Polson Iron Works, Toronto, a steel drill boat, for general use on marine contract work. The dimensions are, length, 80 ft., beam 30 ft., depth 6 ft. The boiler will be of the water tube type with steam at 150 lbs. working pressure. The hull and boiler only are being built by the Polson Iron Works.

The Lake Simcoe Navigation Co. Ltd., has been incorporated under the Ontario Companies Act, with \$40,000 capital, and office at Toronto, to own and operate steam and other vessels, and carry on a general ship owning, navigation and transportation business. The incorporators are, R. J. Law, W. G. Simpson, F. C. L. Jones, I. M. Johnston and F. V. Dalton, Toronto.

The small steamboat, Emma, owned by C. E. Pratt, Parry Sound, and utilized in passenger service between Parry Sound, Depot Harbor and Rose Point, was burnt, July 4. She was built in Collingwood, in 1894, and rebuilt at Parry Sound in 1901. Her dimensions were, length, 89.3 ft., breadth 18 ft., depth 6.6 ft.; tonnage, 146 gross, 94 register. She was equipped with engine of 2 n.h.p., driving a screw.

Work on the preparation of the site for the dry dock, to be built in connection with Polson Iron Works, Toronto, was commenced July 16, when the contractor for the pile driving, J. E. Russell, started operations on the foundations for certain special machinery. W. Newman, Works Manager, stated that it was hoped to have one section completed by the fall, and the entire dock ready for the spring.

The Collingwood steamboat Wasaga, which was burnt, and afterwards sank near Copper Harbor on Lake Superior, in Nov. 1910, has been removed under the authority of the U.S. War Department. It is stated that the removal has disclosed an uncharted rock ledge, 375 ft. north, 49 deg. east from the north east corner of the old Booth wharf, covered by 17 ft. of water, with about 20 ft. all round.

It is reported that the Dominion Government is arranging to acquire a site for an elevator at Port Arthur. The property under negotiation is next to the Canadian Northern Ry. elevator, and has 600 ft. frontage. It is also stated that the Port Colborne elevator is to be extended. The present capacity is 800,000 bush., and it is said to be the intention to bring it up to a capacity of 2,000,000 bush.

The Department of Railways and Canals has ordered from the Polson Iron Works, Toronto, a steel ice breaking tug, for use in the Sault Ste. Marie canal. Her dimensions are, length 55 ft., beam 13 ft., depth, 8 ft. 7½ ins. The machinery will consist of high pressure vertical engine with cylinder 12 ins. diam., by 14 ins. stroke, supplied with steam at 150 lbs. pressure, by a Scotch boiler, 7 ft. diam., by 9 ft. long.

F. E. Gibbs and W. D. Staples, members of the Dominion Government grain commission, visited Fort William, July 5, in connection with the proposed Government terminal elevator. Mr. Gibbs, is reported to have said that he was not in a position to make a statement as to the exact location of the elevator, but there was good reason for presuming that it would be erected on the water lots abutting on lot 19. Tenders for the erection of the elevator are being called for.

The U.S. Lake Survey reports the levels of the Great Lakes in feet above tidewater, for June, as follows: Superior, 602.22; Michigan and Huron, 580.48; Erie, 573.64; Ontario 247.34. As compared with the average June levels for the past 10 years, Superior was 0.18 ft. below; Michigan and Huron 0.53 ft. below; Erie, 0.24

ft. below, and Ontario 0.54 ft. above. It was anticipated that during July, Superior would rise 0.2 ft.; Michigan and Huron 0.1 ft.; and that Erie and Ontario would remain stationary.

The Canadian Interlake Line's freighter, Fordonian, which is expected to be in operation on the great lakes shortly, and which has been built at Glasgow, Scotland, is of full canal size, being 257 ft. long, 42½ ft. beam and 26½ ft. deep. She is equipped with a Carels-Diesel engine of the four cylinder, two cycle type, 1,100 h.p. driving a screw. The cooling water is circulated by a pump driven by a steam engine supplied by a donkey boiler equipped with oil burning apparatus, and which also operates the auxiliary appliances. Fuel will be carried to keep the main engine running for 25 days, and it is stated that the builders have guaranteed the vessel for six months regular service.

An investigation into the causes of the accident in the Welland canal at Port Colborne, when the Dominion Government steamboat La Canadienne, broke through the lock gates, June 20, was held at Port Colborne, July 5, before Capt. Lindsay, acting Wreck Commissioner, with Capt. Milligan and Atkinson, Port Colborne, as assessors. The blame for the accident was found to rest on the captain, Alex. Brown, with extenuating circumstances, owing to the fact that little or no assistance was to be had from the crew, who were ignorant of their duties and careless, and that the master's orders were disregarded in the use of the snubbing rope on entering the first lock. The master's certificate will not be interfered with, considering the inefficient manner in which the crew handled the ropes and performed their duties.

Manitoba, Saskatchewan and Alberta.

A meeting was held in Winnipeg, July 17, of members of the board of trade, the harbor commission, city council, and representatives from North Dakota and Minnesota, in connection with the proposals for the improvement of the Red River. The mayor of Winnipeg, as President of the Red River Association, presided, and resolutions were dealt with, urging both the Dominion and U.S. Governments to support the scheme.

The Hudson's Bay Co.'s steamboat, Slave Lake, which was launched at Athabasca Landing, Alta., recently, is of the following dimensions: Length 110 ft., beam 22 ft., depth of hold 4½ ft. She is equipped with engine having a cylinder 9 ins. diam., by 42 ins. stroke, driving a paddle wheel 14 ft. diam. She has been built for freight and passenger service on the Lesser Slave Lake, and her route will be from Salteaux Landing to Grouard. She has accommodation for 22 passengers, and about 50 tons of cargo. The company has another vessel under construction for use on the Athabasca river between Grand Rapids and Mirror Landing. She will be named Athabasca River, and is expected to be ready for service during August. Her dimensions are, length 135 ft., width 28 ft., depth of hold 3½ ft., and she is equipped with engine having cylinders 12 ins. diam., by 50 ins. stroke, driving a stern paddle.

British Columbia and Pacific Coast Marine.

The Public Works Department is calling for tenders for the construction of an extension to the public wharf at Port Moody. The plans cover the erection of a wharf 40 by 64 ft. and an approach from the present wharf of 1656 by 16 ft.

Arrangements are being made for an immediate start on the harbor improvements at New Westminster, for which the ratepayers have voted \$500,000. It is expected that preliminary work will be

so far advanced by September, that the concrete work can then be proceeded with.

The West Vancouver Ferry Co., Ltd., has been incorporated under the B.C. Companies Act, with \$150,000 capital, and office at Vancouver, to carry on a general ferry business, own and operate steam and other vessels, and to carry into effect an agreement with the municipality of West Vancouver.

T. G. McBride and Co., on July 6, placed in service in the Vancouver harbor, a new steam tug named Moonlight. She was built in Vancouver, and has a displacement of 42 tons. The dimensions are, length 70 ft., beam 16½ ft., draught 7 ft. She made nearly 10 miles an hour on her trial trip.

The work on the G.T. Pacific dry dock at Prince Rupert, which was suspended owing to the death of M. Dow, the contractor, has been re-commenced, by Starrett and Co., of Seattle, Wash., and it is stated that the work will be pushed with all speed. The contractors hope to have it completed well within the contract time.

The Inland Navigation Co.'s s.s. Sol Duc, made her maiden trip on the Seattle-Victoria run, July 4. She was launched at Seattle, Wash., towards the end of June. Her dimensions are, length overall, 205 ft., length between perpendiculars, 195 ft., breadth over guards 34.9 ft., breadth moulded 32 ft., depth of hold 12.8 ft., depth moulded 14.3 ft. She has 51 state rooms with berth accommodation for 163 passengers.

In correcting some misstatements which appeared in some London, Eng., daily papers recently, regarding the harbor at Vancouver, it is stated that the Dominion Government is carrying on dredging operations in the Narrows which, when completed, will form a straight channel 1,250 ft. wide at the narrowest point and 35 ft. deep at low tide. It is also pointed out that there is no extra insurance on vessels entering Vancouver harbor, and that insurance does not cease when any vessel passes English Bay.

A difficulty has arisen at Vancouver regarding the payment of duty on fuel oil imported from the U.S. for the use of steamships, etc. The cargo of one vessel was held up there for four days recently, and the C.P.R. was compelled to enter into a bond for the amount of the duty claimed, to obtain its release. The oil shippers have stated that they will bring in no more fuel oil until a definite arrangement has been arrived at regarding the duty. It is stated that on this account, vessels using oil for fuel will have to take it on at Seattle, Wash.

E. H. Heaps, President, A.B.C. Elevator and Wharf Co., is reported to have stated, at Vancouver, July 12, that if there was no announcement from the Dominion Government shortly, in connection with the construction of a terminal elevator at Vancouver, his company would proceed at once with such an erection, and he hoped to be able to have it so far advanced, that they would be able to handle a part of this year's crop, provided the production was equal to present indications, and some of it was forced to seek outlet by Pacific ports.

An order in council has been passed, declaring Prince Rupert to be a shipping port, and the harbor to be a public harbor. The harbor includes Tuck inlet, Lake Wainwright and Porpoise harbor, with connecting and tributary waters enclosed between the main land and a line drawn north true across Venn passage through the east tangent of Dundas point, a line drawn north and south true through the west tangent of Snider rocks, a line drawn east and west true through the south tangent of Holland island, and a line drawn north 34 degs. east and 35 degs. west true through the east tangent of Leer point.

Comments on the Dominion Canal Statistics and the Freight Rate Question.

A. A. Wright, Managing Director, St. Lawrence and Chicago Steam Navigation Co., Toronto, and ex-President, Dominion Marine Association, writes Canadian Railway and Marine World, as follows:

In your July issue, I notice an article on the Dominion Canal Statistics for 1911, in which you quote statements from the comptroller, J. Lambert Payne, which tend to show that the money expended by the government in canal construction and maintenance is wasteful and that freight can be carried cheaper by rail.

I do not think this was Mr. Payne's intention, but, in case it is, or that his article has been misunderstood, I would point out some important omissions in his calculations. He assumes that the railways are built entirely by private capital. In Canada at least this is not correct, as the usual practice is virtually for the government to build the railway and present it to the nominal owners, either by direct grants of land and money, or else by guarantees of bonds, or usually by both methods, which makes the country assume the entire cost and risk of the success of the road. The railway business is then put on a paying business by charging high rates. In fact, the extreme limit the traffic will bear, putting surplus earnings taken from the public into the road, eventually making the road worth the value of the original cost, plus the common stock issued, which is the promoters' profit, and the premiums to bond holders, before they are forced to reduce the rates by water competition or else by a railway managed by some other group of promoters.

The other mistake he makes is in charging the interest and cost of maintenance of canals against the volume of business which may be at the moment passing through, instead of on approximately the amount of traffic the canals could eventually take care of, because canals must anticipate business. It should be borne in mind also that the traffic passing through the Welland and St. Lawrence canals is now, and always has been seriously reduced by lack of facilities in Montreal to take care of the business, and it is notorious that for years men have been almost driven out of the Montreal trade because they could not get despatch for their vessels in that port. The present Welland and St. Lawrence canals could handle, without any difficulty, many times the volume of traffic which they are now handling, and, even an increase of 100%, which would quickly take place if Montreal furnished necessary facilities, would cut the government contribution for interest, maintenance, etc., from 0.265 per ton to just one half that amount.

Another matter which must not be lost sight of, is the effect of the canal competition on freight rates in general, and probably this can be appreciated just as well by mention of the fact that before the present canals were developed as they are now, freight rates as high as 32c. per bush, or \$10.66 a ton, have been paid on grain from Chicago to Montreal and no one need ask what the rail rate would be now from Chicago to Montreal if the canals had not been improved and were still the vessel rate, instead of \$1.50 a ton as at present.

Further, vessel rates are much higher than they need be, because the railways control most of the terminals, and delays and excessive elevator and other charges are necessarily added to the vessel rate, as it costs practically as much to keep a steamboat lying at a dock as running in the lake.

Contrast \$2 a ton, plus even Mr. Payne's charge of approximately another

\$2 a ton, or \$4 a ton on vessels for 1,245 miles, Fort William to Montreal, all water, with \$1.10 a ton Georgian Bay ports to Toronto on wheat, or \$1.70 a ton on lumber, 95 to 125 miles, or equal to about \$11 to \$16 a ton Fort William to Montreal. These rates show clearly that Mr. Payne's rail rates are competitive rates with water, and the Buffalo-New York route, and are not a fair example of rail rates.

It is needless to multiply examples, but I think I have shown that money intelligently expended on canal and waterway improvements is decidedly in the public interest. I am, however, decidedly in accordance with Mr. Payne's policy of showing what canal and waterway improvement costs, as I think that will have a tendency to discourage wasteful expenditures like the Trent and projected Georgian Bay canal.

The expenditure on lighthouses, etc., is well spent and cannot be charged against the canals, because on the upper lakes freight is carried by water at an average of about 40 cents a ton for an average distance of about 800 miles, or about 0.05 cents a ton mile, or about a tenth of average rail rates, which run about half a cent a ton a mile.

No better answer to the question of the relative cost of moving products by water as against all rail, need be stated than the fact that the railways are amongst the largest vessel owning corporations on the lakes.

A Reply by the Comptroller of Statistics.

A copy of Mr. Wright's foregoing letter was furnished the Comptroller of Railway and Canal Statistics, J. L. Payne, who has written Canadian Railway and Marine World as follows:—

With an earnest desire to avoid anything of a controversial character, it may not be amiss to say that the report to which your correspondent alludes was not in any sense intended to discount the value of our canal system in its relationship to our scheme of transportation facilities as a whole. The matter was dealt with purely from the statistical standpoint, and the figures used had reference to the year 1911. It is not, except in a broad way, the functions of a statistician to debate economic issues. His duty is to supply facts, and, incidentally, to present certain logical deductions. The discussion of the probable freight rate on our inland waters was last year undertaken in an academic spirit, in the absence of definite and basic facts. This year an earnest effort is being made to gather data which will enable that rate to be definitely and accurately determined. When that stage is reached, we shall, happily, be outside the realm of speculation. We shall be able to make a fair comparison of freight rates by water with freight rates by rail. So far as I know, this will be the first comprehensive inquiry of that character made in either Canada or the United States. It is true the Bureau of Railway Economics at Washington issued a report last year, making a comparison between freight rates on the Erie canal and on railways running parallel to that canal, but that report, valuable and helpful as it is, was not based on such a set of facts as the Department of Railways and Canals is getting for the year now current.

During May, three fatal, and four non-fatal accidents were reported in connection with the navigation of Canadian waters. Two of the deaths were due to falls overboard, and one to a fall into the hold.

The Imperial Export and Import Co., Ltd., has been incorporated under the Ontario Companies Act, with \$1,000,000 capital, and office in Toronto, to carry on the business of merchants, forwarders and warehouse men, and to act as agents for marine and other insurance, and as agents for vessels, etc.

Steamship Routes in Northern Waters.

The dream of establishing trade routes in far northern waters has been cherished by navigators for centuries, and has been the incentive of many voyages that are landmarks in the history of exploration.

The partial realization of this dream now seems to be at hand. The long talked of Hudson Bay Railway, to connect with a steamship line via Hudson Bay, Hudson Strait, and the Atlantic to the Old World, is at last assured. If the hopes of its promoters are realized, it will afford for two or three months in the year an outlet for the vast resources of western Canada; above all, improved facilities for moving the Canadian wheat crop to European markets.

An analogous project on the other side of the Atlantic contemplates the establishment of regular steamship service between England and Siberia by way of the Kara Sea and the estuaries and the Yenisei and the Obi Rivers. This plan, proposed by an Englishman, Capt. Webster, has been approved by a Russian government commission. Steamers will run from English ports to a harbor on the southwest coast of Novaya Zemlia. There the cargoes will be transferred to smaller vessels especially built for ice navigation, and thus carried to the Siberian rivers. It is expected that navigation will be limited to two months in the year, which will afford time for three round-trip voyages. The cargoes will include grain, timber, graphite, mica and other minerals.

Finally, the Russian government is making every effort to establish a regular sea route to northeastern Siberia by way of Behring Strait. During the summer of 1911 Rear Admiral Trajan, acting under instructions from the Imperial Ministry of Industry and Commerce, took the steamer Kolyma from Vladivostok to Nijni Kolymsk, at the mouth of the Kolyma River, where a quantity of freight was landed, after which the vessel returned to Vladivostok, the whole journey occupying two months. A little later in the season this feat was duplicated by a United States sailing vessel, equipped with an auxiliary motor. In this case the journey was made from Alaska.

The experience of the Kolyma showed that a light draught vessel, by keeping close inshore, was able to avoid the heavier ice fields. The Kolyma was not especially adapted for ice breaking.

Montreal Harbor Improvements.

Further improvements are contemplated by the Harbor Commissioners, involving an expenditure of about \$2,000,000. The plans cover the building of a concrete pier, 1,200 ft. long, straight into the river opposite the Commission's offices at the foot of McGill St. The place selected for this pier is now used as a basin for vessels entering and leaving the canal, and as, with the construction of the pier, this would not be possible, it is contemplated to remove the entrance to the canal to a more convenient point westward. Other improvements include the deepening of some of the old basins and the building of some concrete wharves, together with the lengthening of the King Edward, Alexandra and Jacques Cartier piers, by 300 ft. each. The new pier at the foot of McGill St. will give accommodation for two additional ocean going vessels.

Work on the increased elevator accommodation is progressing, also on other of the various improvements already in hand.

Plans are in course of preparation for additional permanent sheds and further improved railway facilities are also being discussed.

Canada-West Indies Steamship Service.

The existing contract for a steamship service between Canada and the British West Indies and British Guiana, expires July 1, 1913, and in consequence of the recent report of the commission appointed to enquire into the general service with the West Indies with a view to improvements and extensions, the Dominion Department of Trade and Commerce is inviting tenders for a mail, cargo and passenger service between Canada, the British West Indies and British Guiana, and between Canada and Jamaica. The service for the West Indies and Guiana is intended to be every 10 or 12 days from Canada, to Georgetown, calling each way at St. Kitts, Antigua, Montserrat, Dominica, St. Lucia, St. Vincent, Barbados and Trinidad, with Halifax or St. John, or both, as the Canadian ports. The tenderers are also asked to send proposals for a monthly service from Montreal, during the St. Lawrence navigation season, calling at Quebec each way, and the West Indies ports previously enumerated. Permission will be given for the vessels to call at any British port in the West Indies, and the contractor shall have the option of calling at any of the foreign islands for the sole purpose of discharging any Canadian cargo.

The Jamaica service is intended for vessels of from 1,600 to 3,000 net tons, having a speed of from 10 to 15 knots, sailing from either Halifax or St. John, or both, every 7, 10 or 12 days, calling each way at Bermuda.

In tendering, the following information must be given:—registered gross and net tonnage and passenger accommodation of vessels to be employed, average speed, period of round voyages, the annual subsidy required therefor, and the date on which the contractor will be in a position to supply the service.

Preference will be given, other conditions being equal, to the tenderer providing the most satisfactory conditions as to general accommodation, and also as to cool air chambers, insulation for the protection of fruit, etc.

The vessels to be employed must be of class A1, and be of British register, capable of maintaining a minimum speed of 12 knots when loaded at sea under normal weather conditions. The Minister of Trade and Commerce has power to prescribe the maximum freight and passenger rates, and to provide that no discrimination shall be made against Canadian importers and exporters.

The Largest Vessel Yet Constructed.

The s.s. Imperator, which is being built at Hamburg, Germany, for the Hamburg American Line, and which was launched recently, will exceed the ill-fated Titanic by some 5,000 tons. She is 900 ft. long, beam 96 ft. and molded depth 62 ft. From the keel to the boat deck will be 100 ft., and from the keel to the trucks of the masts will be 246 ft. The three funnels will be oval in section, measuring 18 ft. on the smaller and 29 ft. on the greater axis. The rudder will weigh 90 tons and the diameter of the rudder stock will be 2½ ft.

She will be driven by turbines of 70,000 h.p., which will be developed on four shafts. Her estimated speed is 22½ knots. She will have water tube boilers and will be fitted with U-shaped anti-rolling tanks. This device consists of tanks of large capacity, built on opposite sides of the vessel and connected by an inclosed waterway, through which the water can flow from side to side of the ship as she rolls, its flow being subject to control by valves.

The sub-division of the Imperator below the water line has been carried out under the supervision of the Germanic Lloyd's and the immigration authorities. It consists of a series of intersecting transverse and longitudinal bulkheads. Transversely, the ship is subdivided by 12 bulkheads, which are carried two decks above the water line, with the exception of the collision bulkhead forward, which extends four decks above the same level. These bulkheads are intersected by longitudinal bulkheads, which subdivide the boiler and engine rooms, the under water portion of the ship being divided altogether into 24 separate watertight compartments. There are four boiler-rooms, containing the water-tube boilers. The coal bunkers are placed above the boiler rooms, and along the sides of the ship, in the latter case being known as wing bunkers. The longitudinal bulkheads are placed about 19 or 20 ft. in from the side of the ship, and they extend from bulkhead no. 4, aft to bulkhead no. 8. Astern of the aftermost boiler room is the forward turbine engine room, which is protected against flooding by two wing bulkheads, between which and the sides of the ship are placed the auxiliaries. The after turbine engine room is divided by a central longitudinal bulkhead.

Because of its great size, special interest attaches to the turbine installation. The rotor, or rotating part, contains 50,000 blades, and is capable of developing

over 22,000 h.p. The casing is 18 ft. in diameter and 25 ft. long. The shafting of all four propellers is 1½ ft. in diameter. The turbadium bronze propellers are 16 ft. 8 ins. in diameter. Although the engines are spoken of as being of 70,000 h.p. it is probable that on test they will develop from 80,000 to 85,000 h.p.

The Imperator will probably make her maiden trip to New York in the early summer of 1913.

Canadian Notices to Mariners.

The Department of Marine has issued the following:—

45. June 20. 117. Nova Scotia, Cape Breton Island, east coast, Sydney harbor, south east bar, gas buoy withdrawn, north west bar, conical buoy replaced by gas buoy.

46. June 26. 118. Ontario, Ottawa river, Lake Deschenes, Baskins wharf, change in front range light. 119. Ontario, St. Clair river, Sarnia, wreck of steamer Joliet, wrecking barges withdrawn, light-ship replaced. 120. Ontario, Georgian bay, Meaford, extension to east breakwater, temporary lights, caution. 121. Ontario, Georgian bay, south side, Lock-erie rock, change in position of gas buoy.

47. June 27. 122. British Columbia, Prevost passage, Joan rock, buoy established. 123. Alaska, Yakutat bay entrance, Ocean cape, light established. 124. Alaska, Prince William sound, Hin-chinbrook entrance, Zaikoff point, light established.

48. July 2. 126 Maritime Provinces and Quebec, Canadian list of lights and fog signals, new edition. 127. New Brunswick, Bay of Fundy, Machias Seal island, easterly light permanently discontinued, erratum. 128. Prince Edward Island, south coast, Bedeque bay, change in position of Miscouche fairway gas buoy. 129. Newfoundland, south coast, Placentia bay, Little Burin island, fog alarm established.

49. July 8. 130. Bay of Fundy, Brier island, north west ledge, change in position of gas and whistling buoy. 131. Quebec, Gulf of St. Lawrence, Anticosti island, Bagot bluff, new lighthouse. 132. Ireland, north coast, Rathlin island light, alteration in character.

50. July 11. 133. New Brunswick, Bay of Fundy, east of Deer island, Tinker ledge, spindle erected. 134. New Brunswick, east coast, Northumberland strait, Richibucto harbor entrance, change in position of lights on the south beach and north beach.

51. July 13. 133. British Columbia, Vancouver island, Alberni canal, Somass river, beacons. 136. British Columbia, Seaforth channel, uncharted rock north of Dall patch, change in position of gas and whistling buoy. 137. British Columbia, Observatory inlet, beacon established, buoys established.

52. July 16. 138. Nova Scotia, Bay of Fundy, Lurcher shoal, light ship to be removed from her station temporarily for repairs. 139. Nova Scotia, Cape Breton island, east coast, Scatari island, telephone line.

53. July 17. 140. Quebec, St. Lawrence River, survey steamer at work eastward of Father Point, caution.

54. July 18. 141. New Brunswick, Bay of Fundy, Chignecto channel, buoys in the vicinity of Grindstone island. 142. New Brunswick, Bay of Fundy, Calhoun flats, location and description of buoy.

55. July 18. 143. Ontario, Canadian list of lights and fog signals, new edition. 144. Ontario, Georgian bay, Meaford, extension to east pier, eastern entrance to harbor to be closed, light to be moved to the west end of breakwater.

The name of the steamboat Schwalbe, registered at Lunenburg, N.S., has been changed by order in council, to Northern Messenger.

Sault Ste. Marie Canals Traffic.

The following commerce passed through the Sault Ste. Marie Canals during June, 1912:

ARTICLES	CANADIAN CANAL	U. S. CANAL	TOTAL
Copper	864	10,040	10,904
Grain	4,183,652	1,536,926	5,670,578
Building stone			
Flour	309,562	660,590	970,152
Iron ore	4,836,092	2,542,737	7,378,829
Pig iron			
Lumber	4,331	108,737	110,168
Silver ore			
Wheat	6,850,880	5,332,797	12,183,177
General merchandise	2,584	43,529	46,113
Passengers	2,482	1,850	4,332
Coal, hard	25,800	181,760	207,060
Coal, soft	409,606	1,652,769	2,062,375
Flour			
Grain			
Manufactured iron	31,139	52,865	84,004
Iron ore		2,688	2,688
Salt	21,385	55,280	76,665
General merchandise	101,218	77,234	178,452
Passengers	3,817	1,410	5,227
Summary.			
Vessel passages	1,127	2,277	3,404
Registered tonnage	3,829,513	4,594,108	8,423,621
Freight—Eastbound	5,173,605	3,027,628	8,201,233
—Westbound	570,318	1,975,608	2,545,926
Total freight	5,743,923	5,003,236	10,747,159

Among the Express Companies.

The Canadian Northern Ex. Co. has opened an office at Birch River, Man., and has closed its office at Mafeking, Man.

The Adams Ex. Co. has adopted the system of issuing travellers' cheques, and has made arrangements throughout Canada, the U.S., and Europe, as well as other points, for dealing with them.

F. J. Butler, who has been agent, American Ex. Co., at Quebec, for several years, was entertained at dinner, July 4, by a number of friends on his leaving the city for Boston where he has been transferred on the company closing its offices on the Quebec Central Ry., over which, since it has passed under C.P.R. control, the Dominion Ex. Co., is now operating.

The Board of Railway Commissioners, July 3, refused the application of the city of Ottawa, for the extension of the collection and delivery limits for express companies. D'Arcy Scott, Assistant Chief Commissioner, in dismissing the application said that the Board's expert had already reported on the limits in March last, since when there had been no change of a character to warrant an extension.

Instructions issued by the Board of Railway Commissioners, regarding Sunday deliveries, require that express agents shall receive for carriage by the first train stopping at the consignee's station on Sunday, any shipment of medicines, drugs, instruments or apparatus, which they are assured by a physician, or a dealer in medical supplies, are urgently needed for saving human life, or alleviating human suffering. Such shipments must not be c.o.d.'s, and they must be prepaid and fully addressed, and tendered at the railway station. As house delivery may be impracticable and the agent at the consignee's station may not be required to meet the particular train, the shipper must be advised to telegraph the consignee to be on hand to receive the goods on arrival of the train.

As a result of the recent investigation into express rates, etc., in the C.S., by the Interstate Commerce Commission, a number of changes in regulations and practices, the methods of operation, and general rating have been ordered. Of the 13 companies dealt with, the report states that they are separate legal entities, but that it is interesting to regard the fact that by stock ownership and otherwise, they are so interlaced, intertwined and interlocked, that it is with difficulty that any one of the greater companies can be traced as either wholly independent in its management or the agency of a single railway system. So that while these companies compete with each other for traffic, the express business may be said to be almost a family affair. The new rates may be said to be based on a minimum charge of 21c. a pound, increasing in ratio to the increase of weight and distance, at rates varying from 3-10c. to 12c. a pound, approximately making 12c. the highest rate per pound for the greatest distance within the U.S., exclusive of Alaska. The reductions in general average about 15%.

Express Companies in Canada.

Following are particulars of the three express companies which have their headquarters in Canada:—

Canadian Express Company

This company was organized Feb. 16, 1865, under authority of 27 and 28 Vic., chap. 23. It has an authorized capital stock of 30,000 shares of \$100 each, of which 17,052 have been issued and are outstanding. The cash realized from the sale of these shares is reported at \$865,200. The purchase of the capital stock

of the company by the Grand Trunk Ry. Co. was effected in 1891 by the payment of \$660,000 in cash. The total capital liability at the time was \$1,500,000. Since then the capital stock has been increased to \$1,705,200. The company does not report a rate of dividend. All the stock is held in trust for the G.T.R. Co. by A. W. Smithers, C. M. Hays (since deceased), E. H. Fitzhugh, W. Wainwright, M. M. Reynolds, F. Scott, H. Paton and E. J. Chamberlin. With the exception of Mr. Smithers, these gentlemen are all directors of the company.

The officers are:—President, J. Pullen; Secretary-Treasurer, F. Scott; General Counsel, W. H. Biggar; General Auditor, W. W. Williamson. The headquarters are at Montreal.

The operations of the company are chiefly over the G.T.R., the G.T. Pacific Ry. and the Canadian Government Railway System. It has a total operating mileage of 7,230.

Dominion Express Company.

This company was organized May 23, 1873, under 36 Vic., chap. 113. The capital stock is \$2,000,000, divided into 20,000 shares of \$100 each, all of which is outstanding. Following are the directors:—Sir Thos. G. Shaughnessy, W. S. Stout, R. B. Angus, C. F. Smith and C. R. Hosmer. These directors are trustees of the entire stock of the company for the C.P.R. Co. A dividend on the capital stock, at the rate of 8% per annum was declared on June 30, 1911.

The officers are:—President and General Manager, W. S. Stout; Vice President, C. F. Smith; Secretary, H. C. Oswald; Treasurer, G. A. Newman; General Auditor, W. H. Plant. The head office is in Toronto.

The company carries on business over the lines of the C.P.R. and many connecting roads, and has an operating mileage of 13,709, apart from 14,148 of ocean going mileage.

Canadian Northern Express Company.

This company was organized June 13, 1902, under 2 Edward VII., chap. 49.

The company has an authorized capital stock of \$1,000,000, consisting of 10,000 shares of \$100 each. Of this stock \$300,000 was outstanding on June 30, 1911, on which a dividend was not declared. Mackenzie, Mann and Co., Limited, control the company by right of ownership of 90% of the capital stock. The directors are:—Sir Wm. Mackenzie, Sir Donald D. Mann, A. J. Mackenzie and Z. A. Lash. Headquarters are at Toronto, but the General Superintendent is located at Winnipeg.

The officers are:—President, Sir Wm. Mackenzie; Vice President, Sir Donald D. Mann; Secretary, R. P. Ormsby; Treasurer, L. W. Mitchell; Chief Solicitor, G. G. Ruel; General Counsel, F. H. Phippen; Auditor, J. D. Norton; General Superintendent, W. C. Muir.

The company operates almost entirely over the Canadian Northern Ry., and had a mileage on June 30, 1911, of 4,422.

The other express companies operating in Canada, but which have their head offices in the United States, are:—American Express, United States Express, National Express, Great Northern Express, Wells, Fargo & Co.

Telegraph and Cable Matters.

The Canadian Northern Telegraph Co. has opened an office at Birch River, Man., and has closed its office at Mafeking, Man.

The Grand Trunk Pacific Telegraph Co. has adopted the night lettergram service, which has been in use, for some time, by other companies.

The Western Union Telegraph Co. is stated to be negotiating for a site for a new cable office in Cape Breton, and that it will probably erect a building in Sydney.

The Great North West Telegraph Co. has opened an office at Wyebridge, Ont., has re-opened its offices at Birkendale and Rondville, Ont., and has closed its offices at Bayfield, Rosseau and Yarker, Ont.

The Marconi Wireless Telegraph Co. has opened a new office in the Strand, London, Eng. This has been connected with the Clifden, Ireland, station, by a private wire, in order to facilitate communication with Canada and the U.S.

The Western Union Telegraph Co. has lowered the rates between points in Canada and the U.S. which are comparatively near the border line, from 40c. for ten words to 30c., this reduction also affecting the night lettergram rates between the same points.

A meeting of superintendents of the various divisions of the C.P.R. telegraph system of the western lines, was held in the office of B. S. Jenkins, General Superintendent, C.P.R. Telegraphs, Western Lines, Winnipeg, July 15, for the discussion of proposed extensions and betterments of the service. It is stated that similar conferences will be held annually.

The Dominion Telegraph Co., held its annual meeting at Toronto, July 10. The financial statement for the year shows a credit balance of \$292,993.57. The company's lines are operated under lease by the Great North West Telegraph Co. for 99 years, at an annual rental of \$60,000, this amount being distributed to the shareholders in the form of dividend. The directors were re-elected for the current year.

D. Coons, Superintendent, Alberta Division, C.P.R. Telegraphs, is reported to have stated in Lethbridge, July 2, that telegraph lines were to be extended, at once, to Cardston, making a direct circuit to Calgary. Poles are being distributed along the route, and it is hoped to have the work completed in 30 days after commencing. Agents will be placed at Raymond, Magrath, Spring Coulee, Cardston and other points.

The Judicial Committee of the Privy Council decided, in London, Eng., July 10, that the contract between the Newfoundland Government and the Commercial Cable Co., of Feb. 1909, is valid, and binding on the Government. The contract was entered into by the last Government just before its defeat, and was repudiated by the present Government, which repudiation was upheld by the Newfoundland Supreme Court.

The matter of placing the Great North Western Telegraph Co.'s wires underground at Sparks St., Ottawa, was again before the city board of control, July 11. Some time ago the city agreed to pay the G.N.W. Telegraph Co., which has perpetual wire rights on Sparks St., \$9,000 to have its wires placed underground in conduits, but the city solicitor recently wrote to the board of control to the effect that if the matter were taken to the Board of Railway Commissioners, it was probable that the company would be ordered to place the wires underground at its own expense or to pay rent for the use of the city conduits.

The Quebec Public Utilities Commission applied to the Board of Railway Commissioners, July 15, for an order directing the Great North West Telegraph Co., and the C.P.R. to comply with the Utility Commission's order respecting overhead wiring and precautions against fire. E. W. Beatty, General Solicitor for the C.P.R. questioned the Board's jurisdiction, and Assistant Chief Commissioner Scott announced that a letter had been received from the G.N.W.T. Co. agreeing to carry out the work. Ultimately the C.P.R. also agreed, and the case was recalled, the Board, in the meantime, being doubtful of its jurisdiction in the matter.

G. D. Perry, General Manager, Great North West Telegraph Co., who was in Ottawa recently, is reported to have stat-

ed that the company was in no way obstructing the matter of placing wires under ground, as alleged. The company was prepared to enter into a nagreement with the city in the matter some time ago, and a draft agreement was prepared, but the company was unable to execute it as it had granted certain privileges to the Ottawa Electric Co. If the city and the Electric Co. can come to an arrangement, releasing the G.N.W.T. Co. from its obligation, the company is prepared to commence the underground work at once.

Hints on Telegraph Matters.

By W. J. Camp, Assistant Manager, C.P.R. Telegraphs.

Following are extracts from a paper read at a meeting of the Association of Railway Telegraph Superintendents:—

INSULATORS.

During the period from 1887 to about 1898, the C.P.R. used white porcelain insulators on a portion of the long through wires. These were of German or British manufacture. An elaborate series of tests proved their great superiority over glass from a mechanical standpoint, the average blow necessary to break a porcelain being three times that required to break the glass insulator. It was also discovered that usually a porcelain insulator was only partially destroyed when hit by a stone, and that the wire was not set free and remained fastened to each pole, but the glass insulator was so badly shattered that the wire would be freed, and this frequently resulted in a cross with other wires which remained attached to the pole. This advantage was offset to some extent by the fact that, on account of the porcelain insulator being white, it offered a much better mark and was the one aimed at. The price of the porcelain insulator was increased until it reached about nine cents each laid down in Montreal, and its use by us, therefore, abandoned for some years. The glass insulator with which we were supplied then depreciated in quality, apparently on account of improper annealing, and appeals or complaints to the manufacturers resulted in no improvement; and, as the cost of the porcelain insulator was again very largely reduced, we have purchased nothing but white porcelain for the past three years.

In 1910 we procured porcelain insulators from Canada, the United States, and Germany. One make turned out to have defective insulation properties, and we had a series of tests made comparing the three manufactures and glass. All of the insulators were of the same pattern and dimensions. One dozen insulators of each make, selected at random, were placed on pins in the open air, and frequent readings taken of insulation, humidity, temperature and barometer. During the tests the weather was of nearly every description, from dry cold to sleet, wet snow and rain. These tests proved that in every respect the German and United States insulators had from 5 to 10 times the insulating qualities of the Canadian and glass insulators, the two former giving practically the same results with a slight difference in favor of the German, and the Canadian porcelain and glass almost on a par. Tests of wires after erection show the same differences.

TRANSPOSITIONS.

The first telephone dispatching circuit we installed was transposed every half mile. The selectors were in series, alternating on each wire. The circuit was found to be slightly noisy, and we then transposed it every quarter mile, which cut down the noise for a time, but we found it almost impossible to keep the circuit free from noise while working the selectors in series; and, as we found that most of the failures were due to the contact points of the relay, we

changed from series to main line bridging selector without relay. Since then the circuit has been practically free from noise, and on all subsequent circuits installed the same method has been followed. We now transpose all our dispatching circuits every quarter mile, except where two circuits parallel each for a portion of the way. Over this section one circuit is transposed every quarter mile, and the other every half mile. Looking forward to the time when the telephone will be used for other work, we arrange transpositions on our copper telegraph wires (and sometimes on the iron), every half mile for the first pair, and for the second pair, every mile, or transposed at the quarter, three-quarter, and mile, skipping the half mile.

Our method for transposing when the two wires are on the same arm, is by the use of a curved iron bracket under the arm, and so placed that the wire it carries comes directly under the wooden pin carrying the other wire over the top of the arm. This bracket is specially made for us, but the arrangement is similar to that of the Harvard Co. Where the two wires are on separate arms we place an extra pin on the upper arm half way between two of the regular pins, and skip the pin on the lower arm. By these methods we have largely decreased the liability of crosses in case of broken insulators.

LIGHTNING PROTECTION.

The problem of adequate lightning protection is a most serious one with the C.P.R. on the portion of the line between Lake Superior and the Rocky Mountains on account of the excessive severity of the lightning in this district. I might say that we are between the devil and the deep blue sea. If we use sufficient arresters to take care of the frightful discharges, we most likely will kill the telephone circuit by having so many "traps for bugs." We have been using in the stations where the fone line is looped, four Argus arresters, without fuses, on the four ends of the wires, and two Argus arresters with fuses on the bridge wires to the fones and selector. At stations where the circuit is only legged in we have two Argus arresters, with fuses. At the dispatchers office, besides the Argus arresters, we equipped the first three poles from the office with O'Connell pole arresters. In some sections this protection seems to be adequate, the circuit being worked right through storms, but in the district above mentioned it does not appear to be sufficient, my reports showing that at times the telephone has to be abandoned for an hour or more on account of lightning. There have been some interruptions on account of the pole arresters, and this year we are trying out the branch office and pole arresters to the same extent as the former equipment. Some of our superintendents have asked for pole arresters at every station, but I am afraid that if such were installed they would prove to be an endless source of trouble and annoyance, and that after every severe lightning storm, the circuit would be out of commission until a lineman could be sent over it.

TELEPHONE INSPECTORS.

On the C.P.R. we have one telephone inspector for 250 to 300 miles of circuit, with his headquarters approximately in the centre. Up to the present we have not found it necessary to provide the inspectors with motor cars, but, personally, I believe that every inspector should have a light motor car, particularly in sections where there are comparatively few trains. Our inspectors are supposed to be continually on the move. I consider that an inspector's duty is not so much to remove interruptions, as to prevent them occurring.

TRAIN TELEPHONE SETS.

On every section where we install tele-

phone train dispatching circuits we equip every train with a telephone outfit, without selectors. The wrecking cars are provided with howler receivers, by means of which the dispatcher can call them in on the line if necessary. The connecting pole we use is the invention of J. F. Richardson, Superintendent of Telegraphs, C.P.R. British Columbia Division. It is so arranged that connection can be made with any two wires on the line, no matter whether they are on the same arm or not. We do not install any equipment at outlying sidings, as the train equipment answers every purpose should a train become stalled anywhere. On account of the severity of our climate during a portion of the year, no one could use a telephone at a pole box, and each outfit contains sufficient flexible twin wire to lead the circuit into the baggage car or conductor's caboose.

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 Ohio Brass Co., Mansfield, Ohio, has distributed its new general catalogue 12, which contains a listing of all the company's lines, including catenary materials, 1,500 volt materials, 750 volt overhead material, rail bonds, third rail insulators, O-B high tension insulators and car equipment specialties. The catalogue is bound in cloth and contains 490 pages, which include, besides the listing of the different devices, considerable data relative to construction schemes.

The Canadian Westinghouse Co. has secured a contract from the Shawinigan Water and Power Co., Shawinigan Falls, Que., for one 15,000 k.w. 2 bearing water wheel type, 60 cycle generator, which is said to be the largest water wheel generator to be installed in Canada. This will be the third unit which the Westinghouse Co. will have furnished from its Hamilton shops for the Shawinigan Co.'s new power house, the other two units being of slightly smaller capacity, viz., 14,000 k.w.

J. J. Gartshore, Toronto, who some time ago purchased the rails, etc., of the Opeongo Logging Ry., a line of 14 miles running north from Whitney, Ont., to Lake Opeongo, has disposed of all the rails, etc., except of about three miles, and the whole of the material has been lifted. The rails, which are principally 56 lbs. per yard, have seen considerable service, but are still in good condition. Mr. Gartshore advises that the demand for light rails and contractors' equipment generally has been very active during the past few months, owing to the large railway contracts which have been given out.

"The Use of Highly Superheated Steam in Locomotive Practice," an illustrated 28 page booklet, has recently been distributed by the Locomotive Superheater Co., 30 Church St., New York. In it, the development and present day practice in the use of highly superheated steam are outlined, the valuable feature of the booklet lying in the fact that the information contained is for the most part data obtained from outside sources, and consequently, does not savour strongly of the standard type of catalogue. The different types of superheaters made by the company are described in their application to all types of locomotives, incidentally devoting some space to the matter of applying superheaters to existing locomotives.