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CONTENTS OF THIS NUMBER:

PAGE	PAGE
Am. Society of Mech. Engineers ... 77	Firemen and Electricity ... 80
Armature, speed of ... 75	Industrial Notes ... 89
British Columbia Floods ... 75	Iron, Canadian, test of ... 75
Boat Building ... 76	Kingston School of Mines ... 92
Canadian Association of Stationary Engineers ... 79	Laflamme Prof. ... 70
Cables, Atlantic ... 83	Landslide at St. Alban ... 71-4
Caledonia Iron Works ... 81	Mining Matters ... 9
Dobble & Stuart ... 97	Marine Notes ... 92
Electrical Power of Niagara ... 83	The Patent Review ... 97
Earth Return Currents ... 83	Personal ... 97
Electricity from Garbage ... 83	Railway and Marine News ... 92
Utilizing Waste ... 83	Woodruff Separator ... 91
Electrical Steering Apparatus ... 83	Rust Proof Coating for Iron ... 86
Electrical Exhibition in 1895 ... 75	Street Car Factory ... 80
Electric Flashes ... 84 6	Review of the Metal Trades ... 86
	Road Engineering (No. 2) ... 69

For THE CANADIAN ENGINEER:

ROAD ENGINEERING.

BY W. H. BREITHAUPT, M. AM. SO. C. E.

(Continued from June number.)

Special care is required to provide ample section in culverts for the water which they are to pass. Too small a culvert will bank the water and flood the roadway. On the other hand, if the culvert is too large the cost of construction is unnecessarily increased. The cross section of a culvert depends on the maximum rate of rainfall on, and the condition of the soil of, the watershed, the culvert drains, on the form of the mouth and inclination of the bed of the culvert, on whether it is permissible to bank up the water and discharge under head, etc. Culverts are made of wood, brick, stone and vitrified sewer pipe. Wood is perishable and not to be recommended. Brick or stone should be used where a large opening is required. For a smaller one sewer pipe makes an efficient culvert. If one pipe is inadequate, two laid side by side can be used. The ends of the pipe at the side of the road-bed should rest in masonry retaining walls.

On completion of the grading of the road-bed, it is either simply rolled to a uniformly firm surface, or, what is better, a foundation course is put on. In this connection it may be stated that one of the most necessary tools in road-making is a road-roller. It is almost indispensable, as well for the road-bed as for compacting the surfacing. The characteristic of Telford pave-

ment is a foundation course of large stones. This is, however, by no means an absolute requisite for a good road, as even Telford recognized. Stones 7 or 8 inches deep are set on edge as closely as possible. The interstices are filled with spalls, wedged in, and the whole is then rolled to compact the mass. This compacting is very important, as is also the use of angular stone. Rounded stones cannot be held to place, but will eventually work to the top and destroy the road.

The roads in Central Park, New York, are among the best and most carefully constructed examples of Telford road to be found anywhere. Their cost, however, prohibits their extensive imitation. In Macadam pavement proper the foundation course is omitted. Macadam did not use it, but put 12 or more inches of broken stone directly on the soil, a method now conceded to be wasteful as well as otherwise unsatisfactory.

No vegetable, perishable, or yielding matter of any kind must be allowed to remain on the road-bed. Clay road-beds should be topped with a 10 to 14 in. layer of some material which absorbs little water, such as broken brick, clinker or furnace slag, ashes, or coal dust. This can be made very compact by rolling. Clay, roughly made into small lumps, and burnt like brick, a material used in some places for railway ballast, makes an excellent road foundation. On soils other than clay a 4 in. layer of sand, well rolled in, should be used in the absence of other foundation. Such a sand layer is also beneficial on top of a foundation course. The topping of the road-bed, whatever it may be, should in every case be thoroughly rolled. Before this is done it should be sprinkled, as the material then compacts better.

The width of the wheelway, i.e. of the road proper, on main lines of traffic, should not be under that required to allow two vehicles to pass each other safely, viz., 16 ft. Lesser traveled roads do not require this width. The road should always be made higher at the centre, so as to shed water freely. A rise comparatively small, in view of what was formerly considered necessary, is sufficient. The transverse contour of the surface should be either a section of a circle, or a parabolic curve. The latter is to be preferred on account of its greater convexity at the sides of the road. A straight slope from the centre outward should not be used, as it will wear hollow, and the road will then retain water. For gravel surfacing the rise at the centre of the road should be one-fiftieth of the width, for broken stone one-sixtieth, giving for a road 16 ft. wide 3.8 inches and 3.2 inches respectively, of centre rise.

The proper transverse contour should always be given to the topping of the road-bed, so that the surfacing can be in a uniformly thick layer. For a road-covering or wearing surface good gravel is very serviceable, though not as good as broken stone. The fitness of gravel for roadmaking depends mainly on its binding properties. Two of these are the presence of ferruginous clay, and the sizes and angular shapes of the stones. River gravel, gravel from the sea beach, or

any gravel in which the stones are rounded and smooth, never binds well. In such gravel one-half the stones should be broken and mixed with the other half, one-eighth in bulk, not more, of clay or loam being added as a binding material. Sand, except in very small quantity, is detrimental, as it prevents packing. Pit gravel is apt to contain too much earth. It is well worth while to screen gravel that is to be used for road surfacing. Screens with meshes of one-half and one and one-half inches respectively should be used. Any stone under or over these sizes should be rejected.

A 4-inch layer of the prepared gravel is spread uniformly on the road-bed, then compacted with a roller of at least 2 tons weight, and not under 30 inches in width. Before rolling, the surface is moistened. It is then rolled until no pebble rises or creeps before the roller. With two such layers on a proper road-bed a good road for ordinary traffic should be obtained. Like sized gravel, uniformly mixed, must be used in both layers, otherwise frost and rain, acting with the vibration due to the traffic, will cause the larger pebbles to rise while the smaller ones sink between them, and the road rapidly disintegrates. Gravel roads are at their best during moderately damp, or dry weather. In continued wet weather, the binding material becomes soaked and more or less muddy, while in drouths it is apt to crack, and the pebbles in the gravel thus to become loose.

Broken stone surfacing varies in durability with the quality of the stone used. Hardness, toughness, and qualities enabling it to resist the disintegration caused by the weather, are the desired qualities. These are seldom all found together in the same stone. Trap rock, basalt and syenite are very good. Granite should not be used when containing too much mica. Gneiss slates, mica schists, and any easily crumbling stone are entirely unsuitable. Limestone, though not very hard, binds well and makes a good road covering. One of the prime requisites of a good road covering is that it shall be impervious to water. Limestone fills this requisite as well as any stone. But in limestone, too, there is much difference in quality, and therefore in fitness as a material for road surfacing. Quartzose or siliceous grits, uniformly mixed with about one quarter in bulk of limestone, make a good aggregate. When hard stone only is used a small proportion of binding material, such as road-sweepings, clay, or loam, must be used with it as a binding material.

In breaking stone for road covering, the nearer cubical the pieces can be obtained, the better. Hard stone, such as trap or granite, should not exceed $1\frac{1}{2}$ in. in greatest dimension; limestone should not exceed 2 in. It is not desirable that all the stone should be broken to uniform size; smaller pieces are required to fill the interstices between the larger ones. Hand-broken stone is somewhat better than machine broken, but the latter is cheaper and is now almost universally used where broken stone is required in any larger quantities. Broken stone should not be screened. The smaller stone and detritus are needed for interstices and binding, as already indicated. Great care should be taken to have the mass homogeneously mixed throughout. This must particularly be looked to when it is spread on the road-bed.

A layer of stone 4 or at most 6 in. thick when compacted, resting on a well made road-bed, can be counted on to give a good durable road. Nearly 50 miles of

broken stone road in Bridgeport, Conn., have a covering only 4 in. thick. They are subjected to a large traffic of loads averaging 3 tons, and give entire satisfaction. The failure of roads of such comparatively thin covering is nearly always attributable to deficient foundations. Broken stone surfacing should never rest directly on the soil. A layer of gravel or sand at least, if no other foundation course is used, should always first be rolled into the road-bed.

The stone is hauled on the roadway in broad tired carts, and dumped in heaps, which are then spread with rakes to a uniformly thick layer. The depth of the layer will be reduced by rolling one quarter or more, depending on the kind of stone used. Rolling should be done slowly, commencing at the sides of the road and gradually working to the centre. The stone should be wetted, care being taken not to wet to excess, before rolling. This prevents undue crushing and facilitates binding.

(Concluded in next issue.)

MGR. J. C. K. LAFLAMME, whose lucid and interesting description of the disastrous landslide at St. Alban, Que., appears in this issue, was born in September, 1849, at St. Anselme, in Dorchester county, Que. His mother was a great grand-daughter of a soldier of Montcalm. He entered the Seminary of Quebec in September, 1862; was graduated an A.B. in 1868, and



PROF. LAFLAMME.

ordained priest in 1872. He became a doctor of theology in 1873. He has occupied the chair of natural history at Laval University since 1870, and had charge of the course of Physics from September, 1876, to 1893. He studied in Harvard in 1878, and in Paris in 1881, and in 1888-9. Mgr. Laflamme is a foundation member of the Royal Society of Canada, Section 4, and is also a member of the following learned societies: Geological Society of France (elected 1881); Geological Society of America (1891); French Society of Physics (1892). He became Rector of Laval University in 1893, and Apostolic Prothonotary during the present year. The Quebec Government appointed him delegate to the International Congress of Geology at Washington in 1891. Mgr. Laflamme has worked for many years for the Geological Commission of Canada, and has written several scientific works, amongst which may be mentioned the "Manual of Mineralogy, Geology and Botany," of which two editions were exhausted in a few years; and "Notes on a Course of Electricity for the use of Students" (1893), besides a large number of memoirs in the Transactions of the Royal Society and in various scientific reviews in Canada and France.

For THE CANADIAN ENGINEER.

THE LANDSLIDE OF ST. ALBAN.

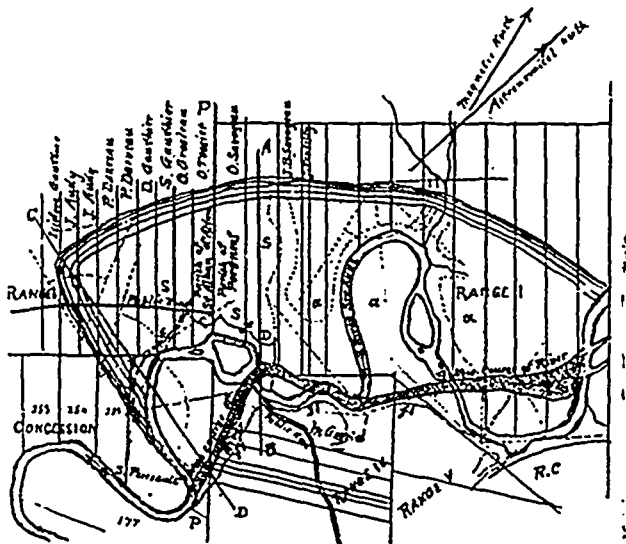
BY REV. DR. J. C. K. LAFLAMME, RECTOR OF LAVAL UNIVERSITY.

On the 27th April last, towards 8 o'clock in the evening, a terrible landslide took place on the north-west bank of the Ste. Anne River, near the line of separation between the parish d'Alton and the Seignory of Portneuf.

Five or six houses disappeared in this overthrow. Eighteen persons were buried with the houses and barns. Four perished, and fourteen others were with difficulty saved on the following morning amidst great dangers. They had passed the whole night on a hillock which had remained dry in the midst of torrents that carried down heaps of sand and clay, mixed with a prodigious number of trunks of trees that had been carried down to the banks and precipitated into the river.

To make known the nature and the probable causes of this cataclysm is the aim of this paper.

For the better understanding of how this catastrophe was produced, it is necessary to know at the beginning the general structure of the country affected, such as it was before the disaster. This will be found on the map presented herewith.



On the south-west of the line PP which separates Portneuf from d'Alton, and which divides the cataclysm into two quite distinct parts, is found a vast sandy terrace S, on the south side of which ran the river. There, this river described the arc of a circle, the convexity of which was turned towards the west. The height of the cliff f on the right bank was about 200 feet, and this cliff was entirely of sand.

On the north-east of the line cited above a deep ravine completely crossed the ground, from the mountain as far as Ste. Anne River: After that, a flatter and more clayey surface could be seen, in which the river had hollowed out numerous wanderings. This part was completely covered with wood. The western half, on the contrary, was cleared, except the overhanging part of the cliff, which was still covered with trees.

The whole of this large surface is now occupied by a depression, bordered on the south-east by the old cliff of the river, and on the north-west by a curved line, leaving at right angles Ste. Anne river opposite the land of M. P. Darveau, and running at first from the east to the west for a distance of about 30 arpents.*

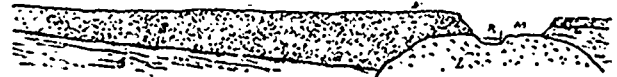
*An arpent is a measure of land equal to about an acre and a third, and in the rural districts of Quebec distances are approximately given by "arpents."

At this point, the line is bent towards the north east, following a direction which forms with the south cliff an acute angle, and is prolonged thus as far as the "Cascades," where it rejoins the river. This line limits the landslide on the north. The southern boundary is the old cliff of the river, f, which has not been affected. The surface overthrown is more than three miles in length, and about 40 arpents wide in the most extended part.

Near the south-west border of the landslide, the ground which has given way is 120 feet lower than the upper level of the terrace of which formerly it formed a part. Further off it reaches 170 feet, and it then rises imperceptibly as far as the north-east extremity. In other respects, all this surface sinks gradually, to such a degree that the river cuts its bed more deeply and the drainage is carried on better. The soil at the same takes a more solid condition.

On the north-west, the surface overthrown is altogether sandy. At the centre, it is a blue, very compact clay, the level of which rises gradually until it attains the surface of the ground. On the east, one only meets with hillocks of sand and clay, with heaps of trees, for the most part still living, thrown pell mell on the ground.

The geological structure is very simple. The two following sections represent it in two different aspects, before and after the landslide. The first (AB on the map) passes by the Gorrie mill; the second, CD, by the ground of M. J. Audy, one of the victims.



Gorrie Section before the slide; S, sandbank; G, soil; surface inclined towards the south-east; L, mass of granite; R, section of bed of river; M, road to Gorrie mill; D, "Horse-back."

As one sees it in the first section, the river, at the Gorrie mill, M, passed through a very narrow granite gorge, before throwing itself with a bound of 105 feet from the height of the granitic cliff into the lower basin. At the bottom of this fall was situated the mill. This mill is now covered over by nearly a hundred feet of clay.



Gorrie Section after the slide. Letters S, G, L, R, M and D have same signification as above given. R, with dot after it, is the former bed of the river, now filled by soil.

On the north-west granitic bank of this pass was placed a narrow band of alluvium, D, about two arpents wide at the base and rising to more than 100 feet. It was this which the people used to call the "Horse-back." This tongue of land soon rejoined the sandy terrace on which were placed the properties that were carried away. It was bordered on the east by a deep ravine, extending as far as the mountain, and followed nearly the direction of AB on the map.

On the south-east the river had for its immediate bank a granitic surface about 200 feet wide, which then hid itself under the cliff of the south bank F. The height of this clayey-sand cliff was about 120 feet. Above this natural barrier, the river flowed gently, describing, in the lower and richly wooded plain, vast wanderings as far as the first fall. The same thing was repeated above this latter.

There was then above the "Horse-back" a great plain, comparatively low, of which the only opening

towards the west was the Gorrie pass. It was by this gully that all the water of the river had necessarily to pass.

It is very probable that a first landslide, comparatively limited, took place above the Gorrie falls at M (see the map), and that *débris* of all sorts, trees, clay, sand, then began to block this gorge.

One sees still, indeed, an inextricable confusion of great tree-trunks, like a forest in miniature, which has accumulated in the old channel to this passage and shut it up completely.

The same conclusion is arrived at, basing oneself on an observation made towards 7 o'clock in the evening by an inhabitant of Ste. Christine (left bank), whose house is half a league from the river, just in front of the Gorrie mill.

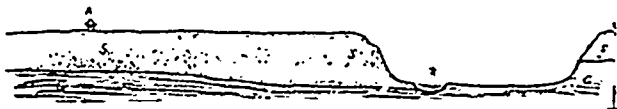
He saw, during about twenty minutes, as it were, powerful jets of vapor thrown on to the tops of the trees near the Gorrie falls. The appearance of those jets was absolutely that of vapor escaping from the funnel of a locomotive in motion. These white puffs were afterwards dispersed in following the course of the river, with great rapidity. At the end of a quarter of an hour they had ceased.

Evidently this was the landslide commencing. The very heavy masses of clay, in falling into the water, caused it to be thrown to a great height, in very attenuated drops, and in the doubtful light of early evening one could take this spray for jets of vapor.

Already at this moment the Gorrie channel was blocked up, and the water, in attacking the more elevated levels, brought about landslides, the materials of which contributed to block more and more the old channel.

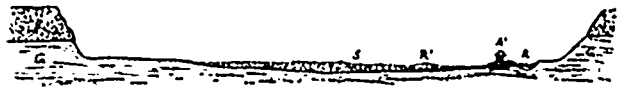
The water, stopped in its course, then accumulated behind the "Horse-back" to a height which surpassed its old level by 100 ft., filling up more or less completely the vast basin where apparently the river flowed to the east of the "Horse-back."

Under the influence of the enormous hydrostatic pressure which resulted from this, this barrier (the Horse-back) was broken in its weakest part, about three arpents from the falls, and the immense mass of water was precipitated into the breach with inconceivable violence. The torrent then began to demolish the base of the sandy terraces *f*, placed on the right bank of the river. It swept their extremities, and the whole mass of these terraces, which only rested on a clayey surface, slipped over towards the south-east and installed itself across the old bed which it had blocked up.



Audy Section before the slide. S, sand bank, G, beds of soil, R, section of river, A, Audy's house.

It was this great movement from the north-west to the south-east which carried away the houses of Gauthier, Audy and Darveau beyond the old channel, and caused them to make a journey of more than 25 arpents (Section CD). They were near the barn, which is seen in photograph No. 3. The next day they were where one sees them in photograph No. 2. Both have now disappeared. The river, in washing away its banks, carried them away.



Audy Section after the slide; S, G & R, near the same as above; R, with a dot at top, represents the former bed of river; A, the portion of the Audy house on the morning after the cataclysm.

Did this gigantic slide take place all at once, or has it required a certain amount of time? On this subject positive data are almost completely wanting. One of the victims affirms that no movement was perceived up to the instant when they had already been taken to their destination. Another says he felt some shocks for about ten minutes, the final shock being of such violence as to force him to go out to find out what was passing. The other unfortunates were so terrified that the observations which they were able to make were necessarily incomplete and confused. Many others than themselves were ignorant until the morning of what had happened. All night they believed that their houses had not budged from their original position the length of the public road. The incessant movements of the ground also, and above all, the invasion of the water pressing them more and more closely, the formidable noises of the torrents which appeared to surround them—all this was for them an impenetrable mystery which rendered them powerless. To explain how their houses, which they knew to be 200 ft. above the river, could be thus surrounded by water, they were reduced to believe in a kind of deluge. They thought the whole parish must have been gulfed, and thanked Divine Providence for sparing them alone.

It was only in the morning that they saw what had come to them, and that they could give an account of the terrible dangers from which they had escaped.

One easily understands that this slide could not show itself with regularity in its whole surface. Some parts descended more quickly than others. Hence the local landslides, the result of which was to give to the portion overthrown the appearance of an agitated sea which had been suddenly congealed. Hence, also, that singular twirling movement which affected most the houses of Audy and Darveau in such a manner that, after the landslip, they had changed their relative position; that on the left was found on the right, and at the same time placed lower down, and they had turned on themselves at an angle of nearly 180°.

Further, the enormous avalanche of water which came from the east covered over, and covered again, more or less, the largest portion of the overthrown surface to such a degree that towards three o'clock in the morning the wrecked unfortunates who had passed the night on an elevated islet which happily remained dry, could see water only on all sides. They believed themselves to be in the middle of a lake, the dirty waters of which, covered over with broken, washed-down trees, were precipitated with the force of a torrent towards the old channel on the south-west.

The rescue of the fourteen wrecked persons was effected on the morning of the 28th April, towards 8 o'clock, by an able rower, young Wilfrid Perron. A rapid current separated them from terra-firma, and the brave rescuer had to make fourteen journeys before succeeding in saving them all. The current was so strong that he could only take one person across at each embarkation. Yet he fell in the water four times during these different voyages. Actions less heroic than that have often been rewarded publicly.

This invasion of the water has then contributed to modify the fallen surface, but to a very limited extent, at least in the central part, for the current there was always feeble. Indeed, one does not find trunks of trees there as much as elsewhere, where it is possible to count them in hundreds and thousands. These trees are nearly always stripped of their bark, which shows the violence of the agent which has carried them down and distributed them all over.

On the south-west limit of the landslide a curious phenomenon took place. At this point a surface of about 60 square arpents seems to have simply sunk down in its place without any lateral displacement



PHOTO No. 3.

(Phot. 3). One still sees at the bottom of the abyss the enclosures of the road and of the fields, standing in a straight line almost exactly with the ends, which remain in place on the height of the cliff. To give an account of this fact it is necessary to suppose that the beds of sand underneath have been raised laterally in such a manner as to permit this falling-in to follow the vertical line exclusively. How was this disappearance of the lower beds accomplished? Probably by a lateral falling away such as took place very often all along the sand slopes. All the part of the landslide placed above the Gorrie mill presents a distinct character. Below, the general surface is flat, almost completely bare of trees; it is like a sea of clay and sand. Above, it is a confusion of hillocks of sand, rarely of clay, covered over with trees, erect on their roots or overturned, an inconceivable medley of mineral and vegetable *débris* thrown pell-mell and at hazard on the ground.

It is very probable that the displacements there have been less pronounced, and that we there have a surface hollowed and cut up by the adventitious weir of which we spoke above. This part of the landslide has only affected a wooded surface, and though the first appearance of it is more tumbled than that of the western part, I believe, nevertheless, that the most important effect, the greatest displacements, have been made in this latter part.

Finally, we have not in this terrible cataclysm any effect of earthquake. It is no longer a question of seeing there either the consequences of a subterranean explosion, or of any convulsive sinking down whatever. We are in the presence of a sliding, pure and simple, of an enormous mass of sand and clay, a sliding down provoked in the beginning by the inundation of the

waters of the river, accidentally obstructed, and facilitated afterwards in a great measure by the infiltration of waters from neighboring lands, making itself a road after years, after centuries, to the level of separation of the beds of sand and of clay. These surface waters are abundant, especially in the spring. One can actually see them still streaming from the north-west side. They glide along on the declivity of clayey surface, and form at the bottom of the abyss a small brook which winds to the base of the clayey bare surface.

The disengagement of mephitic gas which the people observed is a natural effect of the vast overthrow of the earth, seeing that the ground always shuts in these gases in greater or less quantities.

As to the noises which were heard, and the more or less violent shocks which were felt, one learns but little of them in the immediate vicinity of the landslide. The nearest neighbors of the houses which were carried away slept peaceably, without being in any way disturbed. On the left bank nothing was heard.

On the other side, the inhabitants of Portneuf, of Cap-Santi and elsewhere, heard, it appears, some formidable cannon-shots, as it were; they even felt some movements of the earth. These different vibrations had the same cause: the repeated fall of enormous masses of clay in the northern part of the landslide (Phot. 1). These masses, weighing thousands of tons, fell from a height of more than a hundred

feet on to the bottom of the chasm with terrifying noises which made the unhappy persons who passed the night in the midst of the disaster shudder with dismay. It was the solid ground at the bottom, clay, calcareous or granite, which propagated these vibrations, whilst the sandy bed of the neighboring surfaces acted like extinguishers and destroyed them almost immediately.

What does the future reserve for this corner of St. Alban? Ought one to fear the repetition of a cataclysm similar to that which has already caused so much havoc? I think not. For a long time hence there will still be partial landslides which will take place at different points of the abrupt cliff which now limits the scene of the disaster. These landslides will be repeated as long as the slope has not attained the angle of stable equilibrium for the sand and clay. But I do not see any reason to fear a repetition of the misfortune of April 27th.

As to the Ste. Anne River, it is far from having definitely fixed its course; where originally it leaped over several falls, separated by long wanderings, it runs now all in one stroke by an uninterrupted series of rapids going by the side of banks of sand and clay.

On the morning of the 28th April it flowed through three different channels, from the "Horse-back" as far as the lower limit of the landslide. On the next day one of these channels was dry. At the present time, the second, that which the unhappy victims ought to have traversed to save themselves, has equally ceased to exist, and the whole mass of water passes by one channel alone.

These modifications are evidently due to the diminution of the volume of water. But the nature even of the actual banks will bring about other changes in the

course of the river. A torrent of this power does not circulate between perpendicular banks of clay and sand without attacking them and consuming them little by little. It suffices also to-day to throw a glance over these shores to see them continually wasting and disappearing in the current.

The river, then, is changing its course. Its direction will in time be modified, and that on a great scale. New windings will be made; for it is only by them that the current will diminish and the erosive power of the water will cease to be greater than the power of resistance of the clay. The river will thus attain a *régime* of stable equilibrium. Will it recover in these successive displacements some portions of its ancient bed? The thing is quite possible. However, with regard to the Gorrie falls, it is more than probable that it will never be seen again. The river passes now at a level much too low on the north-west to believe that it will remount to the notch of granite from whence it precipitated itself formerly. The general tendency of the water at the present moment seems to be to deviate towards the north-west.

This St. Alban landslide is one of the most terrible geological phenomena which have taken place in our province for many years. I know nothing which can be compared with it, either for the extent of the surface affected, or for the volume of earth which has been swept away by the river. In estimating at 600,000,000 or 700,000,000 cubic feet of earth carried away by the river, one rests quite within the bounds of truth.

At the moment of the cataclysm the river spread a thick, heavy semi-fluid sediment, on which the large trees were carried quite straight, standing up, just as they were carried down to the shores. Masses of dry sand, falling from the elevated parts of the cliffs, bore down on the surface of this



PHOTO. No. 1.

sediment. There they acted like sponges, imbibing from the most fluid part, whilst the most viscous of the clay formed externally an impermeable and very resisting crust, an inch thick, isolating the one from the other, the sand in the centre and the water on the exterior. These heterogeneous agglomerations were carried

down by the water, of which they had nearly the density, and distributed to the different points of the shore. It is there that one sees them still, from St. Alban as far as the stream. At a time when the water has drawn back, these spheroids have been dried by the sun. The exterior crust has been cracked, and finally the mass of



PHOTO. No. 2.

sand has fallen down in such a fashion as to be nothing more than a regular cone, the height of which depends on the dimensions of the clayey mass which has formed it.

The water of the St. Anne River is still absolutely undrinkable. It will have to remain yet a very long time in the same state, seeing the work of erosion which is incessantly going on in the new bed of the river.

I forego from estimating, even approximately, the number of trees which have been broken down, or which are scattered all along the river. All the coves, all the deep waters, are covered with them, without counting the phenomenal number of those which have been swept to the edge of the water and thrown in the stream.

P. W. St. George, city surveyor, of Montreal, who visited the scene of the St. Alban landslide, says: "The accounts given in the newspapers convey no adequate idea of the upheaval. The whole of the sand, which rested on a bed of clay covering the district, has slid right off to a depth of 150 feet, carrying with it all the forest, houses, etc., that were on its surface, and the water has cut a course through a hill 250 feet high. A large tract of country that lay to the north of the river has slid right across the latter, and, coming in contact with the south shore, has caused it to also slide down. A house which was inhabited by Samuel Gauthier, a farmer, his wife, his brother and fifteen-year-old son, has been carried about three-quarters of a mile down the river, and the occupants have never been seen since; they have simply been buried under the mass of

earth that has slid down. The next farm to Gauthier's was tenanted by a man named Prosper Darveau, who, with his wife, was returning from looking after a sick cow in the stable when the slide took place. He said it was about six o'clock in the evening: the night was quite still, but very, very dark,

and there was a drizzling rain, and as he and his wife neared the house he heard a noise like the rumbling of a railway train and saw the house shaking. He immediately rushed in to get hold of his children, ten in number, but when he got the youngsters outside he found that he had only secured eight, whereupon he returned to secure the other two, a girl five years of age and a baby four months old. He brought them downstairs, and after that he remembered nothing, except that he felt himself going through the air at a tremendous speed, and there was the roar of rushing water all round him. When he came to a standstill he struck some matches which he had in his possession in order to determine, if possible, where he was, but the night was so dark that he could see nothing at all. He walked about all night, the water still rushing and roaring around him. When daylight dawned he saw that where his farm had stood the previous day was a big lake, and he and his family had been carried on a section of land, grass, fence and everything, for something like three-quarters of a mile, and landed across the old bed of the river. They were on an island some 50 feet in height, from which they were rescued as previously described. Where formerly was a large tract of forest is now a lake, and the remainder of the country, instead of being a plateau, as formerly, is a mass of broken, undulating sandbanks, 150 feet below what was formerly the level of the land. A waterfall of 108 feet, which was there previous to the catastrophe, no longer exists. This extends for a distance of five miles. The country used to be wooded down to the edge of the river, a stream about 100 feet wide; now the stream is 300 or 400 feet wide, and the whole sides are cut away, leaving nothing but bare, sandy banks on either side. About seven miles below where the slide really took place the river rose 150 feet and carried away immense trees, as well as a bridge that spanned the stream." The river, Mr. St. George says, must have been backed up behind the fall that has now disappeared, and found its way by natural channels to where the slide took place. It must, he says, have taken centuries to undermine the sand so as to cause it to slide off the clay in the immense section it has done.

AN International Electrical Exhibition is to be held in Paris in 1895. It will be opened on July 1st, continuing until Oct. 31st. There will be two sections: an exhibit of electrical accessories, which will be shown in actual operation in the Palais de l' Industrie, and the generating plant in the Palais des Machines; the former at the Champs Elysees, the latter at the Champs de Mars. This should transcend in interest and value the Chicago Fair or any previous exhibition in electricity.

PROF. BOVEY, of McGill University, recently made a test, for the benefit of the visiting American engineers, of a bar of ordinary Montreal iron, 1 inch by $\frac{1}{2}$ inch in thickness. The result was a surprise to the Americans, for previously some of them had not guessed at what Canada could produce in the way of good iron. The testing machine showed that the elastic limit of the bar of iron was reached at a tension of 14,500 lbs., or 29,000 lbs. to the square inch, and that the yielding point was not reached until the tension amounted to 16,500 lbs., or 33,000 lbs. to the square inch. It should be remembered that the iron experimented on was not a piece specially prepared for the process, but a bar picked out from others practically at haphazard.

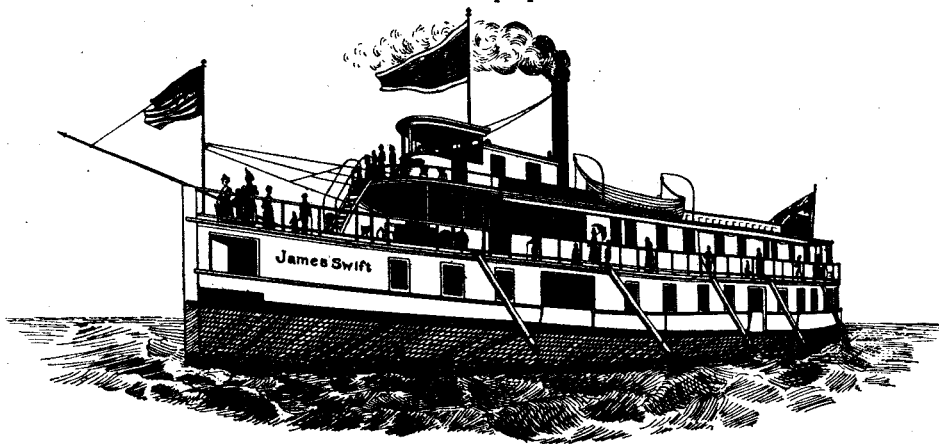
CREOSOTE is a by-product in the manufacture of coke, and as creosoted timber is now being used more largely than heretofore by the railways of Canada and for timbers used in marine works, it is suggested that it should be made in Canada. Large quantities of timber ready creosoted are now imported, Georgia pine being much used in this way. The creosoting of timber will increase with years, and it is worth while for those interested to consider whether works for this could not be profitably started at one of the coking establishments in Nova Scotia, or elsewhere.

APART from the exaggerated newspaper reports, it appears to be only too true that British Columbia has been visited by the greatest flood in its recent history. Several bridges and dykes have been swept away or damaged, and much of the C.P.R. track has been seriously impaired. Besides these things, the farmers, especially in the Fraser Valley, will have to bear the loss of the whole of this season's crop, in addition to the complete ruin in many cases of the homesteads which they have worked so hard to obtain. British Columbia, with its wonderful possibilities, was progressing so well in their development, that this flood will be a cruel blow, and may throw the province back for some time. Still, British Columbians are steadfast, energetic people, and very likely will only take it as a rebuff to be made up for by still harder work. Already, mining men have begun to take this view; some of them think that when the floods shall have subsided, one of the results of the washing of *debris* down the sides of the mountains will be the discovery of new metaliferous deposits hitherto unsuspected. This would indeed be the coming of good out of evil, and we hope, for the sake of this great province, that such may prove to be the case.

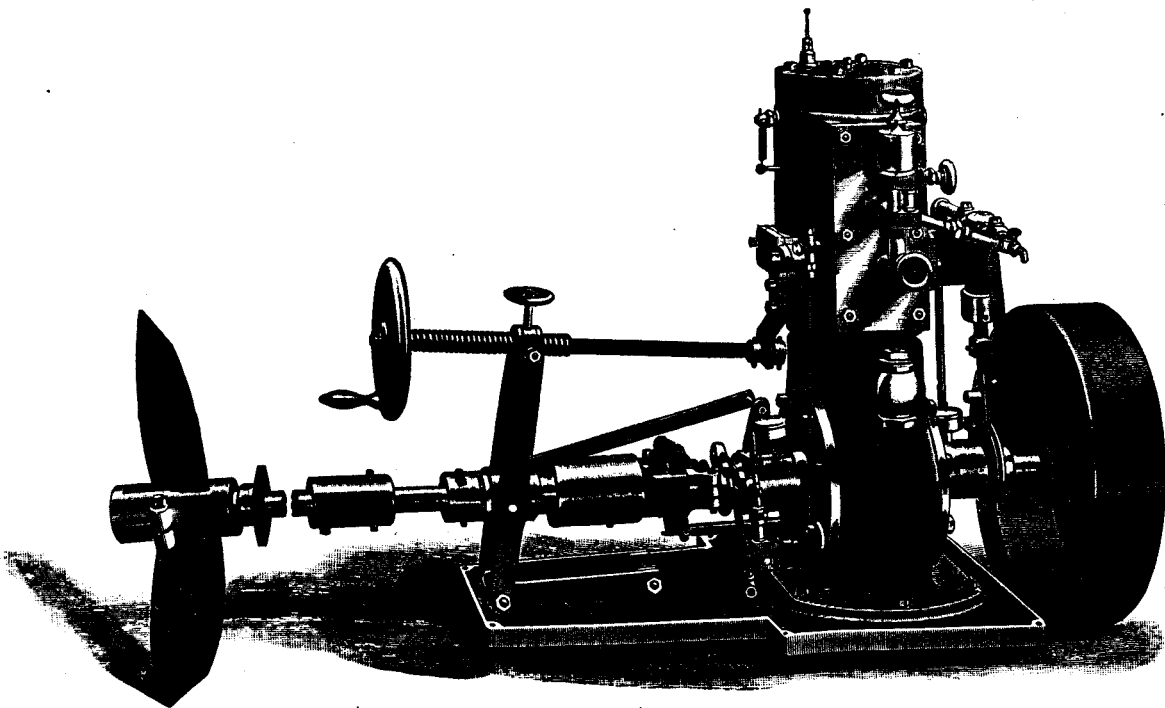
IT is well known that in operating a mechanical device it requires less power to keep the apparatus in motion after it has been started than it does to start it. In the case of a locomotive, for instance, it requires very little steam to keep the machine in motion after it has started, but it requires great power to start it from the condition of rest. Not so with the armature of a dynamo, however; in its mechanical aspect it is altogether different from any other piece of machinery, observes the *Electrical Age*. It is a remarkable fact that the faster the armature is revolved the greater is the power required for maintaining the motion. To run an armature of a 500 h.p. generator at a speed of several hundred revolutions a minute requires a steam engine of great power; but so delicately is it balanced that to turn it by the hand from a state of complete rest is quite easy. The reason for this apparent anomaly is that when the armature is in a state of rest, there is no magnetic field, the existence of which of course depends upon its motion. The faster that the armature is run, the denser will become this magnetic field. The elements of the magnetic field consist of what are ordinarily termed "lines of force," and when we speak of a dense magnetic field, it is another way of saying that there are a great number of "lines of force." One of the peculiar properties of the magnetic "lines of force" is that they tend to arrest motion, and in the case of the dynamo, the tendency always is to stop the armature from revolving. The stronger the magnetic field, therefore, the greater will the tendency be to arrest motion, and hence, in a large dynamo, the power for overcoming this retarding influence must necessarily be very great.

BOAT BUILDING.

The large engraving presented with this article is from a photograph showing the finishing room of R. Davis & Sons' Boat Works, Kingston, Ont. These yachts, finished this year, give one a favorable impression of the style and variety of work turned out by this firm, which has been 27 years in existence, and in this special line is the largest on Lake Ontario. They have a dry dock of their own 180 feet long, with a gate 31 feet wide and a depth of 10 feet on the sill. They build vessels both of iron or wood, and have facilities for turning out anything from a yawl to a large steamer. As a sample of the work which their establishment is capable of turning out, we give herewith an engraving of the steamer "James Swift," which they erected last year, and which has proved herself to be a splendid monument of the firm's skill. The "James Swift," which runs between Kingston and Ottawa, is a vessel of very light draught, though she accommodates 50 first-class passengers. She is lighted by electric light, heated by steam, and the interior work is handsomely finished in white and gold.



R. Davis & Sons have their own machine shops, as well as dry dock, and put in their own engines, which they make in various styles. A very successful engine they make is one operated by gasoline. A view of this engine is given herewith. It is well suited for small yachts. They make compound engines for their larger yachts. These boats are built with the Marshall gear, and a 12 h.-p. engine only weighs 300 lbs.



R. DAVIS & SONS' MARINE GAS ENGINE.

This firm build their yachts with steam-bent ribs, and the construction is planned on moulds, so that the model is followed exactly and can be duplicated with an exactness hitherto unattainable. Each boat is provided with a gear and lifting hooks for lifting the boat out of the water when required.

In a circular recently issued by the firm, they say: "As our improved steam launches have become better known, the demand for them has been great. We endeavor to carry in stock, so far as possible, launches and machinery of all the different sizes, to enable us to fill orders at the shortest notice. In our present quarters we are able to build hulls, boilers, engines and all necessary fit-

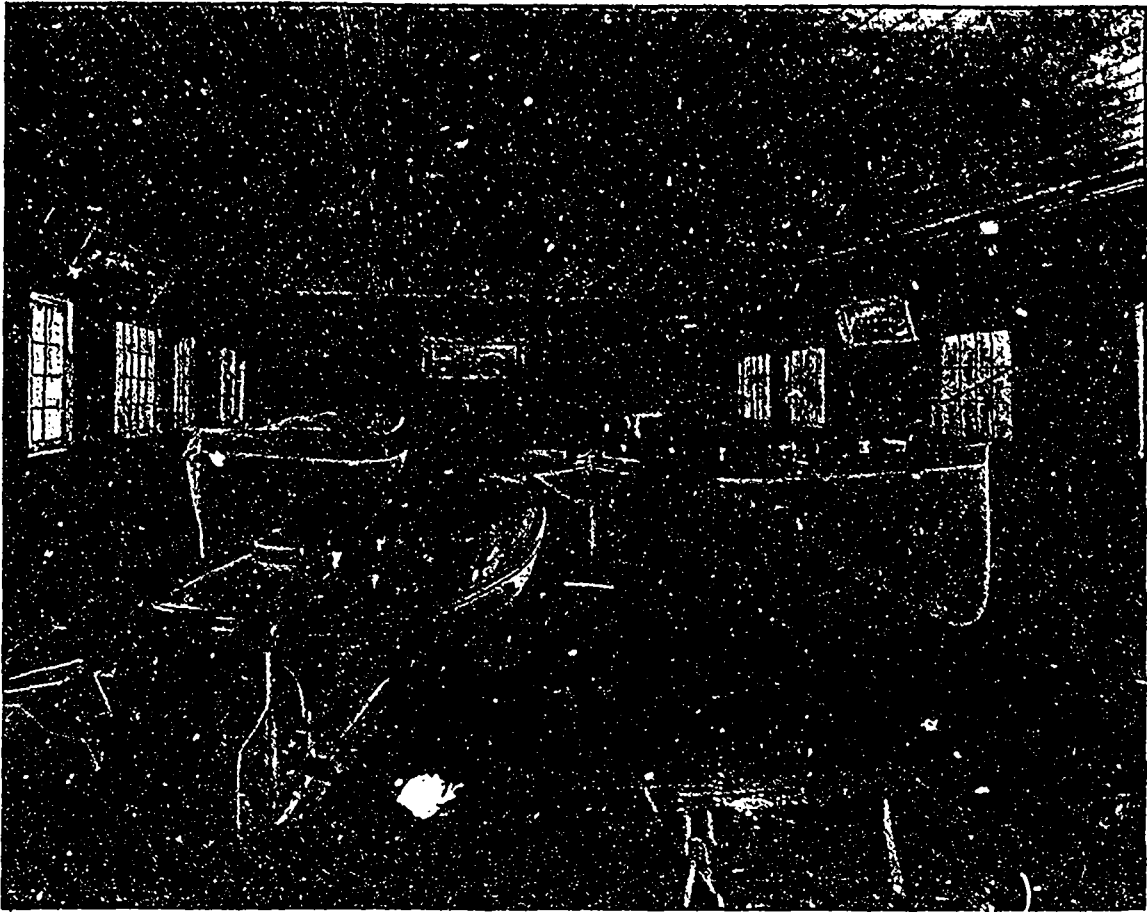
tings with the greatest ease and rapidity, consistent with absolute first-class workmanship. There are very many builders of launches in Canada and elsewhere who do most excellent work; we refer to hulls. It must be evident, however, to all who practically consider the subject that the builder who makes the hull, and also all the machinery, has a great advantage. A complete launch can be built just as cheap, and certainly in a manner far more satisfactory to the customer, when all the work is done in one establishment. This is much better than to procure the hull in one place and the motive power in another, with no one to guarantee final results.

"Experience has amply proved that a launch turned out complete and guaranteed is by far the most satisfactory and economical plan. Notwithstanding the cost of freight and boxing when launches are sent to great distances for customers who are so far away that the item of freight forms a considerable part of the cost of a launch, or for others who for any other cause wish to purchase our motive power alone, we shall be happy to give all assistance possible to accommodate them. In such instances we can furnish a set of lines and full specifications best suited for their purpose, and also a model of the hull, if desired, at reasonable cost

We manufacture launches of the following lengths, standard sizes 18, 22, 28, 33 feet, and as much longer as ordered. Our models combine elegance and speed with highest comfort and seaworthiness. Keels, posts and ribs of our launches are of seasoned white oak; planking of first quality of white pine or white cedar. They are well fastened throughout, and are built to stand the severest tests without necessitating any repairs. We place a galvanized iron tank

in the bow of all our small boats, as we equip for coal oil or gasoline fuel. We put in gas engines or steam boiler, and engine to burn coal, wood or oil at the pleasure of the owner. The use of coal oil for yachts is not as popular as in former years for several reasons."

Last year this firm built a yacht for T. Eaton, the well-known Toronto dry goods merchant, the craft being among the finest on Lake Muskoka, where it is used. They are sending this month a new yacht to Mrs. Worthington, Toronto. This boat is 33 feet long by 7 feet beam, equipped with a compound engine and Yarrow boiler. She will be used on the Muskoka lakes.



FINISHING ROOM, DAVIS & SONS, YACHT BUILDERS, KINGSTON, ONT.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

The twenty-ninth annual convention of the American Society of Mechanical Engineers took place at Montreal on June 5th to 9th inclusive. From the first it was to be seen that the affair would be a pronounced success. The delegates, of whom there were about 250 present, had the chance of hearing some very interesting papers read, and of taking part in the useful discussions which followed. Most of them, while a reasonable part of the time was given up to social entertainment, sight-seeing, alternated with science and engineering. While the engineers had full opportunities given them in which to improve their knowledge on many subjects brought up in the papers, they were also given a royal reception, socially, by the inhabitants of Montreal, and many, no doubt, will be the good impressions of that city's good looks and hospitality carried away by her learned visitors. We will mention the various entertainments proffered, together with the business proceedings as they were set forth for each day. The following acted as a committee for the reception and entertainment of the delegates: P. A. Peterson, C. H. McLeod, F. L. Wanklyn, Edgar McDougall, John Kennedy, E. P. Hannaford, H. T. Bovey, F. R. Redpath, W. Laurie, R. Atkinson, K. Blackwell, T. C. Keefer, G. C. Cunningham, A. Davis, J. Hersey, John Dyer (of the Caledonia Iron Works), Robert Gardner, George Brush, William Kennedy, jr., Prof. Cox, P. W. St. George, J. T. Nicolson (secretary), and Herbert Wallis (chairman).

TUESDAY, 5TH JUNE.

In the afternoon the city of Montreal gave those delegates who had arrived a drive round the Mountain, though the excursion was partially spoiled by the wet weather. Refreshments were served on the Lookout.

The opening session was held in the evening in one of the draughting rooms of McGill College, where there was a large attendance to hear the many addresses of welcome to the convention. The evening was graced by the presence of a fair number of ladies, who appeared to enjoy the reception given them fully as much as their husbands or fathers. Besides the American visitors there were present Herbert Wallis (chairman of the reception committee), Justice Archibald, Mayor Villeneuve, A. Davis, superintendent of the water department; W. Robb, city treasurer; Samuel Finley, Prof. Bovey, Prof. Nicolson, F. L. Wanklyn, P. W. St. George, E. P. Hannaford, Prof. Cox and others.

A letter was read from Mr. Peterson, chief engineer of the

C. P. R., regretting his inability to be present, owing to the floods in British Columbia. He remarked that the reception which the American engineers would meet with in Canada would show them that Canadians did not hate Americans, as Senator Fry, on one occasion, had said. For himself, and on behalf of Canadian engineers, he heartily welcomed the convention.

Herbert Wallis, chairman of the local committee of reception, extended a hearty welcome to the visitors, and congratulated them upon the very interesting character of the papers to be presented at the business sessions. He trusted that the discussions thereon would lead to an interchange of ideas that would advance the cause of mechanical science, and thus be a benefit to the community at large. Especially would the discussions be of widespread interest at the present time, when the commerce of this great continent was to a large extent threatened by the continued existence of the coal miners' strike. That a strike of such proportions, under present conditions of stagnation in all trades and in business generally, and with a plethora of labor, should be possible, showed the power of labor organizations and the extent to which masses of men would subject themselves to the dictates of their recognized leaders. Any proposition which would lead to an increase in the thermal efficiency of steam generators or the economy of prime movers, any feasible plan for the economical substitution of petroleum, or for the utilization of the waste products of the mine, which would make us less lavish in the use of nature's bountiful coal supply, would awaken at this time a special interest worthy of so important a subject.

Mayor Villeneuve read an address in the name of the city, in the course of which he said "I cannot ignore the fact that, one and all, you represent the great industries of the United States, and I am well aware of the importance of your body. The mechanical engineer has been the means of promoting and developing the wealth, natural industries and progress of every country in the universe, and of putting into economical and practical form the disposal of capital with the least possible outlay. You are what may be properly termed the labor savers of the world. I sincerely hope that during your sojourn in Montreal you will give your attention to the industries we possess, and if you fail to learn anything from them, we shall nevertheless reap the benefit of any improvements you may kindly suggest, and which we, as a friendly people, will be sure to appreciate. On behalf of the whole city, I, therefore, tender to you a sincere welcome, and earnestly trust that your present visit will be happy and fruitful and that you will long retain pleasant memories of Montreal."

Prof. Bovey then delivered his address of welcome, remarking first that no doubt the convention would bring about the only form of friction approved by good mechanical engineers, viz., the friction of mind against mind. In the future, all improvements in things mechanical would be on scientific lines. It was clear that the tie which unites the practical workers in the profession with the student and with the teacher was one destined to be drawn closer and closer as the necessity for scientific instruction became a more widely recognized fact, a necessity which had already found strong advocates amongst the members of their and other leading engineering societies. On this account it seems especially fitting that the present convention should hold its meetings in these buildings, devoted as they were to the cause of engineering education. The apparent conflict between the desirability of learning things by theory or practice was by no means confined to engineering. The question of what other subjects besides mathematics should form a basis for an engineering education was too large a subject to enter into at that time. But it would be exceedingly pleasant if he could manage to be a thorough classic, a walking dictionary of modern languages, a storehouse of scientific knowledge, a cultured and honorable gentleman. But alas! art was long and time was fleeting.

John Kennedy then read the following address from the Canadian Society of Civil Engineers:—

The council and members of the Canadian Society of Civil Engineers welcome most heartily the American Society of Mechanical Engineers on this its first visit to Canada. The Canadian society extends this welcome not only on its own behalf, but, in a sense, also, on behalf of all the engineers of Canada. It does so, first, because it is a national society, and, secondly, because it uses the word civil in its original and wider sense, as opposed to military, and the society embraces within its membership engineers in all branches of the profession. While in Canada our comparatively limited population still enables, or perhaps compels, us to concentrate our forces, your numbers, combined with the ever-spreading tendency to specialism in engineering, as in all other professions, enable you to maintain great national societies, representing all the principal departments of engineering. There is, however, no branch of the profession which is not to a greater or less extent connected with the other branches, and particularly with mechanical engineering, of which in America, your distinguished society is the representative. Underlying all departments of engineering there are, however, the same general principles and a common foundation upon which all must build. There is also a community of interest arising from common tastes and from professional pursuits so closely related as to develop amongst engineers the world over a feeling of unity which, although nominally divided, cements them in reality into one great whole. We therefore again warmly welcome you as professional brethren, and also desire to express our high appreciation of the friendliness which has induced you as a society of engineers of another nationality to visit us and hold your annual convention in Canada.

George Hunt next read an address of welcome on behalf of the Canadian Association of Stationary Engineers, as follows:—

We, the humble representatives of Montreal No. 1, Canadian Association of Stationary Engineers, are here in behalf of that body to bid you a hearty welcome to our city. Our feeling is that we are related to you in a certain sense, even closer than the proverbial "42nd cousin," as from the hands of the mechanical engineers a large portion of your labor, skill and inventive genius are handed over to the stationary engineers for economic operation, and to be maintained in that high state of efficiency in which it was received. We welcome you because you are one of the most essential and important bodies in existence. We welcome you because of the vast amount of valuable knowledge that will be disseminated in our midst, knowledge that will be of inestimable value to some of our citizens. We welcome you because this convention will give us still another opportunity of showing our friends from across that imaginary line that, no matter what the tariff may be, you will find our latchstring on the outside and, further, there is no export duty on the friendly greetings which we beg you to accept.

You will, most likely, find that this city is behind the times in some respects, but in others, we have no doubt, you will, ere you leave, say that we are in advance. You will, we are sure, find abundant proof that we are progressive, and intend to progress much faster in the future than we have in the past. Notice our large mills, our waterworks, our street railways, our immense harbor improvements, our grand university, and all in a city that is closed to navigation during nearly half the year.

It is with feelings of pride that we look over the list of professional papers you are about to discuss during the convention, em-

bracing, as they do, some of the profoundest subjects in mechanical engineering, and of the most vital importance to the steam user of to-day. These papers will not fail to leave a lasting impression on the engineers of this city, an impression which no doubt will in time bear fruit in the more economic operation of our several steam plants, with a corresponding increase in profits to the owners, and further than that, we feel that if it could be arranged for you to hold your convention here every year, this city would be benefited to an extent beyond measure. In conclusion, let us again welcome and wish you all enjoyment possible during your stay, and that we may soon see you here again.

Signed on behalf of Montreal No. 1, Canadian Association of Stationary Engineers:

JOHN J. YORK,
GEORGE HUNT,
T. RYAN.

Sir Donald Smith, who entered the Hall at about 9.20, expressed his pleasure in giving the convention a welcome on the part of McGill. He did not regard our neighbors across the border as forty-second cousins, but a good deal nearer than that. In Canada they counted down to the ninety-third. The old saying that blood was thicker than water is more than true, for both we in Canada and our American cousins were a kindred race, and year by year we were coming to think more of each other and to like each other better. Mechanical engineers were men who not only did honor to Canada, but to any country, but he would not refer to them in their presence and hurt their modesty. Sir Donald regretted that the visit had not been made during the session, when they would have received a true student's welcome. He trusted that they would be so well satisfied that they would come to Montreal again, and he concluded with a hearty welcome to all those present.

President Eckley B. Cox, in response to the addresses of welcome extended to them, spoke in high terms of the hospitality which Montreal had already extended to them. He then went on to consider technical education from an engineer's standpoint. Everything should be sacrificed to training the student thoroughly and fundamentally in those branches of Natural Science upon which the engineering profession stood. When that had been done, their special application to civil, mining or mechanical engineering could be given him as far as the time allowed, but to sacrifice the former in order to give him a certain facility in the practical work of the special profession was a waste of time. These things should be learned afterward in actual practice. In other words, when a man received a mechanical engineer's diploma from a first-class technical college, it should, and did, mean only that he had pursued with diligence and profit the branches of Natural Science which the experience of the men who had carefully studied the subject had shown were most useful to those who were to engage in the profession of mechanical engineering. A second point which was of importance was the business training of an engineer. He should have some knowledge of business methods and of bookkeeping; he should understand the importance of knowing the cost of a thing and the causes of such cost and the methods by which it would be determined; he should realize that no expenditure, however valuable the results that might be obtained from it, should be made unless the money for it could be provided without crippling other branches of the business, and he should know that it was not good engineering, that it was not good business, to let a contract at a price which he felt sure was below the actual cost of doing the work, for except in rare cases, one of two results would follow: either the work would be slighted or the contract would be abandoned, either of which might occasion great loss. The engineering student should be taught the absolute necessity of accuracy of observation, accuracy of statement and accuracy of reasoning. Above all he should be taught not to waste. The greatest claim that the engineering profession had upon the respect of the world is that they had persistently and continuously worked to save waste, and to convert those things which are hurtful or useless into sources of wealth. The technical school should strive to produce rather well trained all round men than specialists; to allow nothing to interfere with giving students a thorough training in all those branches which form the ground work of all engineering, and the training in each branch should be so arranged that the student should be equally well grounded in all: that was to say, that no one branch should be carried to a higher point than another, or rather, that no one should be slighted in any way. In other words, that the student should have as much knowledge of each of the branches as is necessary for him to thoroughly utilize his knowledge of the others.

Sir Donald Smith arose on the conclusion of Mr. Cox's speech to congratulate him.

The buildings of the University were then thrown open for the inspection of the visitors.

WEDNESDAY, 6TH JUNE .

The first professional session opened at 10 a.m., in the Draughting Room of the Engineering Building, McGill University. The members, of whom there was a large attendance, were provided in advance with copies of the various papers to be read, in order that they might better be prepared for discussion of the points brought up.

The first proceedings consisted of routine business, and of the nomination of a committee to appoint officers for the coming year. The result of their labors would be made known at a future meeting.

Albert K. Mansfield, of Salem, Ohio, read a paper on the "Theory of Shaft Governors."

Prof. Landsing asked whether experiments had ever been made to ascertain the exact effect upon the spring itself exercised by the action of centrifugal force.

Mr. A. K. Mansfield replied that the ordinary effect was to produce something of a change in its direction.

Prof. D. S. Jacobus stated that the exact time ought to be allowed in which to effect an adjustment of the governor. The adding of an inertia weight, unless it be put in with perfect correctness, was calculated to actually retard the effect of the governor; it will cause it to take longer time to adjust itself. If the load were left on an engine, the loose weight being allowed to move, the governor would have to take hold of the inertia weight and move it away before it could adapt itself to the new adjustment.

Frank Ball said the tendency was to make a distinction between some of the different forms of inertia weights. He thought there was no sufficient reason for this; looked at closely, there was really no distinction.

Prof. Webb said that whether the weight was released either four or six inches, it seemed to him that it would take about the same time to adjust itself.

J. A. Brasher thought the whole power of a governor was not made apparent until the adjustment was completed. It was possible that the inertia weight would sometimes only hinder this adjustment. Centrifugal weights were not always bad; there were several cases in which, when properly managed, they might be of considerable benefit.

Mr. Mansfield remarked that there were great varieties of design in shaft governors. A curious thing was, however, that no matter what the design or combination was, it still seemed always to give the common 2 per cent. variation. No matter how well it might be made, experiments showed that there was still some variation.

The secretary then read Albert F. Hall's (Boston) paper on "Heats, Units and Specifications for Pumping Engines."

There was no discussion.

The secretary here read a letter from Sir William Dawson, the eminent geologist, regretting his inability to be present at the meetings, and inviting the members of the convention to visit the Geological Museum.

The paper by W. H. Bristol, of Hoboken, N.J., was then read, the subject being "A new recording pressure gauge for extremely high ranges of pressures."

G. C. Henning wanted to know whether the tubes described by the author of the paper suffered from any gradual change owing to their mass. He believed the ordinary forms of light tubes did not show such change, but doubted whether heavier tubes would not do so to a considerable extent.

J. F. Holloway stated that in cases of great pressure there was a great need for a steady, constant monitor as to the state of the boiler. Boilers, owing to their hidden-away position in ships, or in basements of great buildings, were often not given as much attention as they deserved. It was very important that the record should be steady and certain—a record that was not absolutely true was worse than none at all. If it failed to be continuously accurate, it failed in the chief purpose it was made for. Another essential was that it should be of such a nature as to be unaffected by any shocks or jars such as were so often to be encountered on steamers, etc. There should be nothing to affect the absolute truthfulness of the reading of the diagram.

F. H. Laforge showed that the spring almost universally weakened, and after a time did not show as much pressure as it ought.

A. A. Cary compared the regular extension spring with a hard drawn brass spring. They soon lost their extension. A steel spring he found to set slightly, but after that it held its tension for a long while. In some gauges, the pressure on the steel spring

caused it to raise the reckoning. He considered Mr. Bristol's invention to be a very good one. If a hard drawn brass spring were turned into a compression spring, it gradually lost its tension, and under strain it usually lost its tension very soon.

(To be continued.)

CANADIAN ASSOCIATION STATIONARY ENGINEERS.

A. E. Edkins, Provincial District Deputy for Ontario, writes THE CANADIAN ENGINEER with regard to the formation of a new lodge at Peterborough, as follows:

I had the pleasure of organizing the new association in Peterborough on June 13th. The new association will be henceforth known as Peterborough No. 14, C.A.S.E. On the evening set apart for organization about fifteen engineers assembled in the Sons of England Hall (where the meetings of No. 14 will in future be held), and as the officers had been elected at a previous meeting, it was decided to initiate them first, the members being asked to adjourn to the ante-room in the meantime. After the officers had been initiated and installed in their proper places, the members were admitted for initiation. The writer remained in the chair by request of Bro. President Potter until the initiation was completed, when President Potter took the chair, and opened the meeting by going through the regular routine of business as prescribed in the constitution. When "Good of the Order" was reached, President Potter called on the writer for a few remarks, during the course of which reference was made to the importance of the educational work of the association, and also to the necessity of every association having and using a blackboard and a question box. President Potter then addressed the members, and in the course of a neat speech took occasion to ask the hearty co-operation of every member in making No. 14 one of the most useful and progressive associations in the Province. Bro. Potter's remarks were well received, and elicited considerable applause. Vice-President Robison, Bros. Duncan, Taylor and Hunt also spoke, each of them averring that it was their intention to work in the interests of the C.A.S.E., and particularly No. 14. It was decided to purchase a blackboard and question box, a committee being appointed for that purpose. President Potter was asked to have the charter framed and hung up by next regular meeting. The members of Peterborough No. 14 will be glad to hear from the secretaries of other branches any time they have any communication to make that will be of interest to them in carrying out the work of the Order. Papers which have been read in other associations will also be thankfully received. Judging from the whole-souled manner in which the Peterborough engineers enter into the work, we may soon expect to see a good, useful and up to date association there. The officers are: President, S. Potter (chief engineer Canadian General Electric Co.); vice-president, C. Robison; treasurer, W. Hunt; conductor, W. Taylor; doorkeeper, J. Morancy; secretary, W. Sharp (engineer Steam Laundry, Charlotte street); trustees, Wm. Wilson, Thos. Duncan, J. T. Sharp. Meet in Sons of England Hall, every 2nd and 4th Wednesday, at 8 p.m.

Toronto No. 1 Can. Asso. of Stat. Engineers has held two successful meetings during the month. Four proposals for membership and two candidates were initiated. On June 22nd the following officers were elected for the ensuing year: Pres., E. J. Philip; vice-pres., J. Fox; rec. sec., T. Eversfield; fin. sec., J. Bain; treas., A. M. Wickens; cond., S. Thompson; doorkeeper, J. Day; trustees, W. Lewis, G. Towler and S. Thompson; delegates to convention, W. Phillips, E. J. Philip, A. M. Wickens, N. Kuhlman; alternatives, G. Towler, T. McLaughlin, L. Thompson, J. Bain.

The annual general convention of the various branches will be held in Toronto on the 3rd, 4th, 5th and 6th of September, and promises to be a most successful affair. Active preparations have already begun. W. G. Blackgove, cor. sec.

On the 28th ult., Montreal No. 1 held a special meeting for the initiation of several new members. At the conclusion of the business part of the evening the members present partook of strawberries and cream and other light refreshments. Cigars were then produced, and a very enjoyable impromptu smoking concert became the order of the evening. Messrs. Hunt, Livingstone, Nadin, Weever, Ryan, Nuttall and others rendered in a very creditable manner several songs and recitations.

On the 15th June, Hamilton No. 2, elected their officers for the year as follows: Joseph Langdon, president; Peter Bailey, vice-president; Wm. Norris, corresponding secretary; A. Nash, financial secretary; Wm. Nash, treasurer; Thomas Carter, conductor; Wm. Stevens, doorkeeper; Peter Stott, Robert Mackie, Andrew Robb, trustees.

FIREMEN AND ELECTRICITY.

In a paper read before the third convention of the Pacific Coast Association of Fire Chiefs, San Francisco, George P. Lowe stated that the features of electricity which are of concern to firemen may be summarized, in general, as follows:

First. Electricity as a fire producer.

Second. Electrical appliances as an interference with the duties of firemen in combating fires.

Third. Electric light and power stations, telephone and telegraph offices and fires therein.

Fourth. Impairment of water mains endangering sources of water supply by electrolysis.

Fifth. Electricity in the fire department service.

Considering these features collectively, there is no reason for doubting the broad assertion that the hazards to life and property from the manifold applications of electricity are over-balanced a hundred fold in the single boon that is conferred in the fire alarm telegraph. If electricity, uncontrolled, has cost millions of dollars and human lives by the score, no mortal can enumerate the billions in property or the thousands of lives that electricity, controlled, has saved through averting wide-spread conflagration. Let us then be magnanimous in judging the characteristics of this marvellous energy, for it is by far a greater friend than foe.

Broadly speaking, every fire caused by electricity may be properly attributed to improper workmanship or to indifferent care, from which arise several potent hazards. Water is as liable to cause fire from improperly constructed electric circuits as it is with quick lime. Every possibility of moisture reaching electric wires or apparatus must, therefore, be provided against, and it is for this reason that rules for safe wiring so often contain such clauses as "located in a dry place," "provided with a water-proof covering," "kept free from moisture," etc. The crowding upon a circuit of a greater current than it should carry, is not so prolific a cause of fires in incandescent lighting circuits as is generally supposed, principally for the reason that through the use of safety devices serious overloading has become an extremely rare occurrence. Moreover, overloaded circuits do not give satisfactory light, which prevents their being frequently placed. Again, in arc lighting the volume of current carried is so slight that the smallest size wire used in electric lighting will safely carry it without material heating. It will appear singular that the arc current, despite this comparatively small heating ability, produces more known fires than any other form of circuit. The cause for this apparent anomaly is that the arc lighting circuits are operated at high electric pressures, which are difficult to restrict; that their insulating covering suffers deterioration from exposure to the weather, and that they are almost universally carried in and out of buildings through or around awnings and cornices. They are, therefore, easily interfered with and their proper maintenance necessitates constant watchfulness. Arc lamps are nothing more and nothing less than open flames, which sometimes throw off glowing sparks of carbon dust, white hot flakes of carbon or red hot globules of molten copper. Treat them accordingly. Keep ignitable material from around and under them and the lamps themselves will be rendered safe from fire.

The crossing of arc, trolley or other aerial wires with telephone or telegraph wires, etc., produces heating in the delicate telephone or telegraph instruments that not only chars them badly, but frequently causes fires. The best cure for this class of fires rests in the use of strong current protectors.

A most serious phase of the electrical problem is the manner in which the erection of the pole lines of the aerial wires interferes with the duties of firemen. It is physical in that the wires present an actual barrier, which must be overcome with force, and it is moral in that the men are naturally fearful of the consequences of handling circuits, the character of which they do not understand. No one need to hesitate to cut telephone, telegraph or other signal wires, for several shocks only startle. No one need expect to be killed electrically if he cuts a trolley wire or a whole set of railway feeder wires. If you stand on a ladder of dry wood that is not metal bound, and it is not raining, and you have no connection with the earth through metal or moisture, you may hack away at the trolley wire with perfect impunity. In fact, the trolley alone is as harmless as the car rail, for the trolley forms one pole of the dynamo and the car rail forms the other. So long as either one is touched alone it is without danger. But should you, by any means, through dampness or metal, become connected with the earth while handling a trolley wire, you would receive a shock that might double you up, or it might be so light that ample consolation would be had in mild profanity. Of this, however, you may feel assured: if you are robust, no shock you may receive from a

trolley circuit will, of itself, kill. I have never known of an instance where the so-called "deadly trolley" has of itself proved deadly.

With arc lighting and alternating current wires, both of which are operated at high pressure, it becomes a matter of great hazard for a layman to cut them, particularly if wet. It is advisable that they should be handled only by an experienced lineman. Such wires are dangerously "hot," not only with each other, but each with the earth.

With reference to fires occurring in electric light and power stations and in telephone and telegraph offices, I beg you to consider most carefully the fact that water is almost, if not quite, as fatal to most forms of electrical apparatus as is fire, and that, therefore, in combating fires in such premises the utmost discretion must be used in throwing water. The necessity for this is all the greater for the reason that the stream of water may take any high electric potential and carry it to the nozzle man with possibly fatal results. A fire that occurred in an electric light station in a large eastern city several months ago entailed a loss of about sixteen thousand dollars, of which amount only a few hundred dollars was lost by the fire itself, and the remainder was due to the wetting of electrical equipment, which caused the current it carried to consume it. The use of a garden hose for five minutes in the main operating room of any large telephone office would entail a loss running into tens of thousands, and telegraph offices, though not equipped with such expensive apparatus, are almost equally sensitive to water. I would strongly advise that water should never be used except as a last resort, and even then, if possible, it should be with the sanction of the station superintendent, who will at least indicate the locations of those wires or apparatus carrying electric pressures that may prove fatal. Above all, fire chiefs should familiarize themselves with such stations as are in their jurisdiction, and should ascertain from those familiar with electricity those portions of the installations that are most costly and most sensitive to both fire and water.

A new feature of concern that will, sooner or later, force itself upon those in your calling, is the possible destruction of water mains and all underground metal work from the use of electric railway circuits having a ground return. The destruction, which is due to the action technically known as electrolysis, consists in the corrosion of water mains which have, perforce, become conductors of the electric railway current. A remedy of the evil may be had in converting the circuit from a "grounded" one into a metallic one, or, to be more plain, to run return wires to the power house, instead of allowing the current to return through the rails, the earth and underground metal work or piping.

A STREET CAR FACTORY.

The new street railway car shops of St. Charles & Pringle, at Belleville, just now present a busy scene. A representative of THE CANADIAN ENGINEER on calling there the other day found sixteen electric cars in various stages of construction, besides other work in the vehicle line. Of these 15 cars were destined for the Montreal street railway, and several of them were near enough to the finishing touches to give one an idea of the high class of work now turned out by this enterprising company. Each car is 27 feet long over all, and has a somewhat more roomy platform than on the average electric cars. They are open cars with reversible seats and a double fixed seat at each end. The end is closed, the framework being embellished with ornamental glass, while the roof is of the "monitor" style with colored lights in the top deck. The interior is finished with bird's-eye maple with cherry mouldings, and the coloring and finishing both inside and out are really artistic, without being too elaborate. Two points of practical improvement are noticeable in these cars—the seat ends are made in a solid piece of malleable iron, giving increased strength without adding to the weight; and the spaces between the seat ends are provided with neatly fitting pull-curtains so that each passenger may shelter himself from rain or sun at his own will. The metal trimmings are of bronze. All are motor cars, very strongly built, and will present a fine appearance. It is expected that the fifteen cars here referred to will be in operation on the Montreal street railway some time this month. Another is a sample car for the Toronto and Scarborough Electric Railway Co., which has some noteworthy features and which will be alluded to again when finished and in operation. The St. Charles and Pringle Co. have about 50 hands employed in their works, and are builders of omnibuses, carriages and wagons. In the building of omnibuses their reputation is unequalled in Canada.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

About three hundred American Civil Engineers paid a visit last month to Toronto, in connection with the convention of the American society, which was being held at Niagara Falls, N.Y. They were received and entertained by the Mayor and citizens, and the Electric Street Car Company placed special cars at their service for a drive round about the city. In the afternoon, the visitors visited the grounds of Sir Casimir Gzowski, where they were entertained to luncheon. A special train conveyed the American engineers back to Niagara Falls, carrying with them lively recollections of the hospitality which had been showered on them. Among the local engineers who took part in entertaining the visitors were: E. H. Keating, Alan Macdougall, John Galt, A. F. Rust, John Williams, W. T. Jennings, H. D. Ellis and C. L. Fellowes.

THE CALEDONIA IRON WORKS.

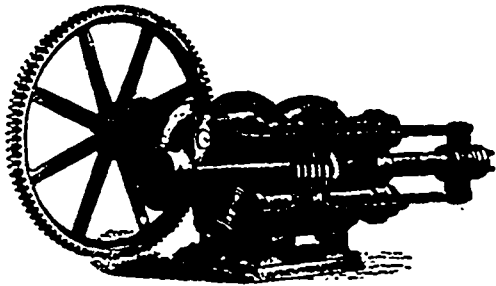
John McDougall, of the Caledonia Iron Works, Montreal, who manufactures at his foundry and machine shops everything in the way of engines, boilers, shaftings, pulleys, etc., is making extensive alterations to accommodate his increasing business. He is building a new boiler shop, which is to have a frontage on William

street of 164 feet, and on Seigneurs street a depth of 64 feet, with a clear height underneath the travellers of 20 feet. This shop will be fitted up with all the latest modern improvements, and will have a capacity for handling boilers up to 25 or 30 tons. There will be a full equipment of travelling cranes and hydraulic rivetting plant, imported from Tweddell & Co., London. It is contemplated, as soon as the boiler-shop is completed, to build a new blacksmith's shop on the site of the present boiler shop. It will be about 65 ft. by 45 ft. in dimension. The portion of the machine shop which was destroyed by fire last July has been entirely rebuilt and furnished with new tubes. The Caledonia Iron Works are at present more than fairly busy. They have a considerable number of orders in hand, among which are the new pumping engines for the Montreal waterworks, with a capacity of 50,000,000 gallons.

The fireman at the east end station of the Royal Electric Co., Montreal, let the water run so low in the boiler that an explosion was the result. The fireman, who was the only one hurt, was thrown a distance of 30 feet, but miraculously escaped without broken bones. The explosion blew one corner of the structure out and shattered a number of windows near by. A piece of the grate bar was driven right through a thick iron pipe of 8 inches diameter, making a hole as clean as if drilled through.

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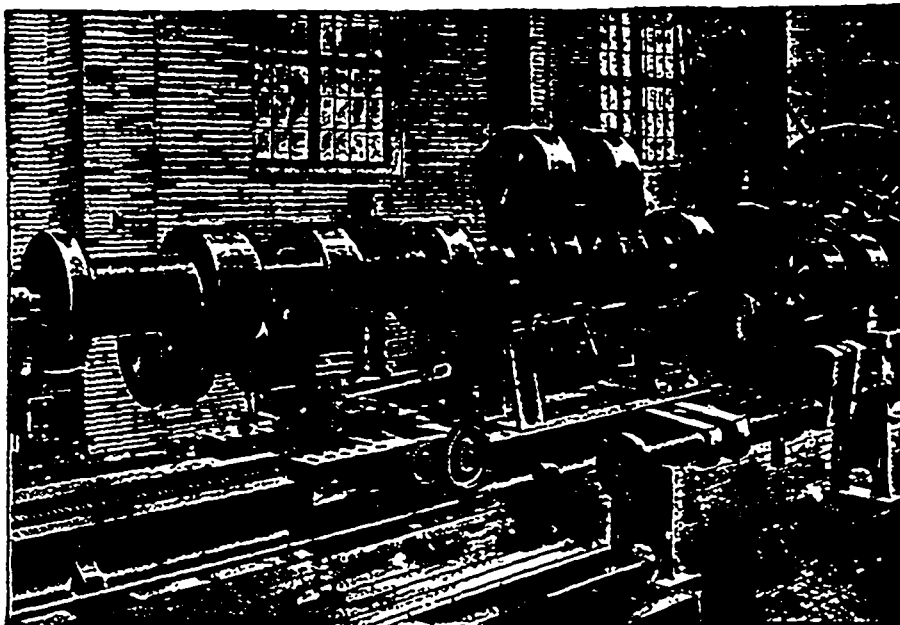
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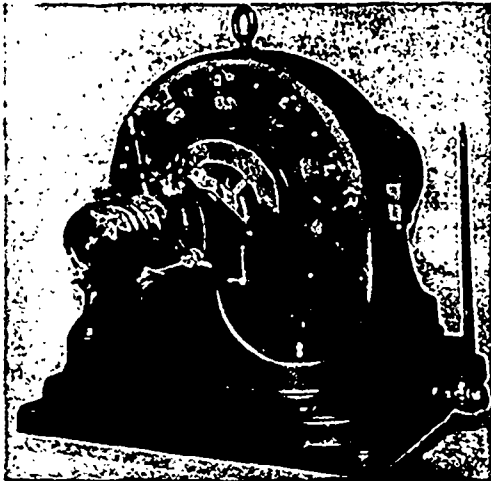
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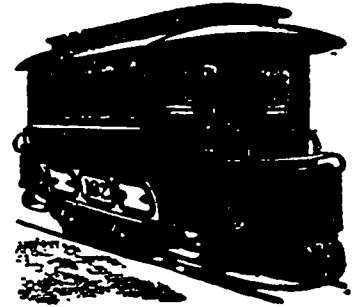
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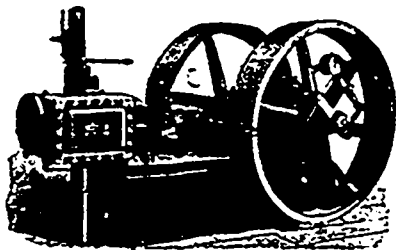


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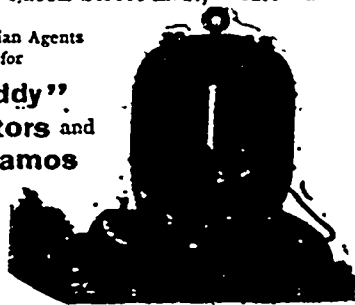
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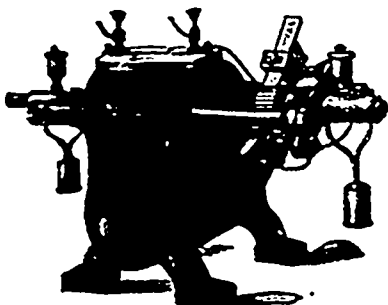
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Electrical Department.

AN exchange states that fifty-five towns and cities in England destroy garbage and refuse by burning, 570 furnaces being used for the purpose, and the combustion is used for generating steam for running the electric lighting plants lighting the towns. Experiments and tests made show that the plan is a success, and that a large saving in municipal expenses resulted. A general adoption of the system is conceded under improved methods in apparatus and necessary accessories.

THERE have been a great many rough estimates as to the distances to which power from Niagara Falls can be conveyed by electricity, but there is a wide diversity in the result. The *Electrical Engineer* tackles the subject and comes to this conclusion: "The broad conclusion to which an inquiry of this nature inevitably leads, is that while under ordinary conditions the commercial limit of electrical transmission of power from water-powers of less than 500 kilowatts can hardly exceed fifty miles, the radius at which it will be profitable with good fortune and management to electrically transmit a water-power aggregating 50,000 kilowatts or more, is, perhaps, to-day, 200 miles, and that it might be commercially advantageous for such a large water-power to undersell large steam-powers at twice this distance with no profit, in order to reduce the general expense upon delivery nearer home."

AT present there are in working order ten Atlantic cables, and two more are to be laid this year. Of these twelve cables, Siemens Bros. have laid or are laying seven. The third cable of the Commercial Cable Co., which is now in course of being laid by Siemens Bros., is 2,301 nautical miles in length, and consists of 495 tons of copper wire, 315 tons of gutta-percha, 575 tons of jute yarn, 3,000 tons of steel wire, 1,675 tons of tar and compound, totalling up to 5,460 tons. The first section is being laid from Waterville, Ireland, out into deep water, and the end will be buoyed. The second section will be laid from Canso, N.S., over the Great Bank of Newfoundland into deep water, and will then be buoyed in the same way. The deep sea portion will be laid last. Another cable is being manufactured by another company for the Anglo-American Company, and is to be 1,850 knots in length. The conductor of this cable will contain more copper to the mile than that of any sub-marine line yet made, and owing to this a very high speed of transmission is expected.

ELECTRICITY is now to be applied to the steering gear of ships. A French contemporary describes a device invented by M. Bersier for operating the rudder of vessels without the "man at the wheel," who has hitherto been deemed as essential as the captain. In this device the standard compass is used and a current from a Ruhmkorff coil is passed from the pivot of the needle to the north pole extremity, whence sparks of 3 millimeters' length pass to one of two semicircular pieces of aluminum insulated from each other, the gap between them being set to the desired sailing direction. When the spark passes to one of these, the current, by means of a relay, starts a motor in one direction, which in turn operates the rudder, while if the spark passes to the other piece, it moves the rudder in the other direction. The apparatus has been in use for two months

on the steamer "Neptune," and it operates very successfully. An additional device is mentioned, in which these sparks pass through a strip of paper, by means of which the record is automatically kept. It is claimed that the errors inseparable from the present method of steering—averaging one to two degrees—will be corrected by the electrical steering system.

USUALLY we have to pay—and pay considerable too—when we want to make use of electricity in any of the thousand and one instances in which that agent is of transcendent value, and this naturally forms the greatest obstacle to its employment for helping in nearly all the undertakings of human life. It will surprise most of our readers, therefore, when they learn that in favored Brooklyn there are a number of places where electricity may be had free of charge, by simply connecting wires between water mains and gas pipes where they enter buildings. Quite an extensive discharge of electricity into the ground is constantly taking place along all the lines of the trolley railways, and these currents find their way to the water pipes and gas pipes. According to a writer in the *New York World*, enough electricity is obtainable in this way to run fans and sewing machines, and as much as one horse-power is easily to be had. It is said, indeed, that in many houses along the trolley lines the gas pipe will give seven amperes and 300 volts, or sufficient to run seven ordinary electric fans, or about seven 16-candle power lights. Some people might be disposed to discourage what may be called a theft of the electric current. This hardly seems fair, however. The loose electricity, so to speak, has been practically thrown away by the railway companies; it is running waste through mother earth. Why should it not be turned to good account by those having the good fortune to reside in places where it has thus become common property?

THE corroding action which the earth-return currents of electric railway systems have on water pipes and gas pipes in the cities is now becoming well known, but the remedy for it is not easy of solution. The metallic underground returns seem to be too complicated, but the *Western Electrician* sees in the double-trolley plan a more effective, though expensive, cure for electrolytic corrosion. It may be worth while to note that while in some cities pipes have been eaten full of holes by the action of the electric current, the city of Montreal has had no trouble from this source. While preparations were being made in that city for the introduction of the trolley system of electric street railways, Mr. Badger, the city electrician, anticipated the difficulty before it was publicly discussed, and had a series of interviews and correspondence with the electrician of the railway company; as a result of which Mr. Badger made suggestions that were carried out in the construction of the roads. It is a property of a mechanically generated electric current that it will seek the easiest road back, without reference to whether it is a direct road. It returns by means of the most ready conductors, though these may be by a zig-zag route. When the rails are not prepared so as to afford a smooth route back for the current, it will seek the next easiest route, which is usually a pipe, especially a pipe

containing water. It seems that when the first line was constructed in Montreal, the ground wires of the track were purposely connected with the water mains, and it was found that in one case the current had literally melted a lead pipe. The city electrician, backed by the city engineer, took the position of holding the company responsible for all damages from such causes. The street railway authorities wisely determined to have their work done as well as possible and as free from risks as they could, and special pains were taken to bond the rail joints and lay the rails so as to make them complete conductors. Aside from the question of damages, it has been found that careful track-laying and bonding has resulted in economy of working, for a waste of current is a waste of steam. The result of this work is that the city of Montreal has no trouble whatever from electrolysis. It may be remarked that the deep laying of pipes is a great safeguard against electrolysis; and even if the tracks had been properly laid the damage would not have been as great as usual in Montreal, for there the water and gas pipes are put down $4\frac{1}{2}$ to 6 feet below the surface, while in many American cities $1\frac{1}{2}$ to 2 ft. is the average depth of pipes. The foregoing bit of history will show, by the way, that it is worth the while of a large city to have a good electrician as well as a good city engineer, when one man cannot be found to combine a knowledge of both subjects. It can easily be seen that a competent electrician watching the interests of a city when new electrical constructions and alterations are going on, can easily save ten times his salary, and prevent a great deal of faulty work and much waste. In view of the necessity for some superintendence of such work, even in moderate sized towns, it will be well for the coming civil engineer to gain at least a fair knowledge of the general principles of electric currents and electric appliances.

Electric Glashes.

WINNIPEG now has an agitation on foot for Sunday street cars.

MR. ELLIS proposes to erect a saw mill, and supply electric light to Vernon, B.C.

A LARGER dynamo is wanted at Toronto for lighting the main pumping station.

THE Niagara Falls, Ont., Electric Light and Power Co. (Ltd.) have increased their capital stock from \$40,000 to \$75,000.

OVER 500 men have been working lately on the extensions to the Niagara Falls Park and River Electric Railway.

THERE is talk of an electric railway between Clinton and Bayfield, Ont. Toronto men are interested.

C. H. STICKLES has been appointed by Nanaimo, B.C., city council to superintend the construction of the electric light works.

PART of the new switchboard of the Bell Telephone Co., Toronto, has been installed.

THE Royal Electric Co.'s new incandescent station, Montreal, built to replace that destroyed by fire recently, will be fireproof.

F. H. SLEEPER & Co. have started an electrical machinery shop in Coaticooke, Que.

THERE is some talk of connecting Eganville, Ont., with Bulger, eight miles away, by telephone.

SOME items on electrical subjects have been crowded out of their proper department this month.

AN English syndicate wants a franchise to furnish power from the Assiniboine River for the electric street lighting of Winnipeg.

A. MATTE, a conductor on the Montreal Street Railway, fell between a motor car and a trailer, receiving some severe wounds.

J. F. GUAY, electrician, Quebec, is placing a fine four-dialed French electric clock in the tower of St. Sauveur Church.

THE Winnipeg Telephone Exchange was damaged by fire a few weeks ago, to the extent of \$5,000.

AN electric railway is proposed to connect Battersea and Kingston.

THE Great Western Electric Manufacturing Co., Chicago, contemplate the establishment of a branch factory at Toronto.

THE Liverpool *Advance* says that the prospects of an electric road from Liverpool to the Milton pulp works are growing brighter every day.

CONSTRUCTION has begun on the telephone line from Lockeport to Liverpool, N.S. Offices will be opened at White Point, Port Matoun, Sable River, Louis Head, and Osborne.

THE Nova Scotia Telephone Co. is replacing its old spruce poles in and near New Glasgow with first-class cedar ones. Their business is growing very rapidly in this district.

W. F. TAYLOR has retired from the Montreal Electric Co., the business of which will be continued by John Shaw and William B. Shaw, the other partners.

THE Bell Telephone Co. are moving into their new building at Ottawa, which is a fine 4-storey structure, well equipped for its special purpose.

ON the 26th July the citizens of Collingwood will vote on a by-law for raising \$10,000 towards extending the electric light system of the town.

A BY-LAW has been introduced in Toronto city council to provide for the assessment of the plant and machinery of the Bell Telephone Co.

GODERICH, Ont., town council is considering the proposition of the Wingham Electric Light Co. to install an incandescent electric lighting plant in the former town.

THE largest chimney ever built in Canada will be that now being erected for the Toronto Street Railway Co.'s engine-house, which is to be 250 ft. high.

CHURCHES are being lit, more and more every day, by electricity. The Montmorency, Que., Electric Power Company alone has contracts to supply three with lights.

THE Reliance Electric Mfg. Co., Waterford, Ont., are thinking of making a move to some other and more central Ontario town.

THE shareholders of the Bell Telephone Co. have been allotted an additional share in every five already held at par value, or \$100 per share.

MR. CUSACK, St. John, N.B., has the contract for putting in poles over the whole route of the street railway. The company have just ordered an engine of 400 horse-power from a Boston firm.

A HALF service of cars on Sunday will be tried in Hamilton for a time, in deference to the wishes of many of the citizens. Only those motormen who volunteer will be employed.

THE Light, Heat & Power Co. of Kingston, Ont., have elected R. T. Walkem, president; L. H. Breck, vice-president, and B. W. Folger, managing director.

THE Mayor of Hamilton has introduced a by-law to the effect that electric railways shall provide enclosed vestibules to protect motormen during the winter months.

THE lowest tender received for installing an incandescent electric system, at Orillia, Ont., was \$9,450, and was sent in by the Canadian General Electric Co.

MRS. T. A. HOGAN was knocked down by a Montreal electric car last month and seriously injured. No blame appears to be attachable to the motorman.

THE North American Telephone Co. (which works in conjunction with the Bell Telephone Co.) will build a branch from Lombardy to Perth, via Oliver's Ferry. They have already reached Lombardy on the line between Ottawa and Kingston.

THE Port Arthur, Ont., council ask for tenders for the lease of the electric railway between there and Fort William, the lessee to have the right to furnish light and power for all municipal and private purposes.

MUNDERLOH & Co., Montreal, now have the sole agency for the Dominion of Canada for the General Electric Company of Berlin, Germany. John A. Burns has been appointed manager of Messrs. Munderloh's electrical and mechanical department.

A NEW system of treating wines by passing currents of electricity through them has been reported on favorably in France. This treatment is found to mellow and preserve healthy wines, and to arrest deterioration in those beginning to give way.

THE Senate Railway Committee has passed the Montreal Island Belt Railway bill, with an amendment to the effect that the compensation clause is to apply equally to Ste. Cunegonde and St. Henri as well as the other municipalities.

GEO. GILLIES' is putting into his bolt works at Gananoque an electric welding machine made by the Gananoque Electric Light Co. The capacity of the machine is about equal to a 2,000 light generator.

Two men at the Montreal Street Railway power-house were injured towards the end of May, by the slipping of a wrench which completed a circuit. One man's hand was burned to the bone, and the other's whiskers were burned off.

HALIFAX, N.S., city council describes the street railway there as an unmitigated nuisance. The track is said to be dangerous, the rails worn out and the cars dilapidated. The company has been notified to rectify this state of things at once.

JAMES WADDELL, superintendent of the P. E. Island Electric Light Co., Charlottetown, has been appointed general manager also. He takes this position in the place of Judge Fitzgerald, who had resigned.

EVA PICHETTE, a two-year old child, ran out into the street in Montreal, just as an electric car was coming down hill. In spite of the efforts of the motorman, she was knocked down and cut to pieces.

THE Montreal Street Railway Co. are contemplating the erection of a large power-house and yard in the centre of the city, probably in the square bounded by St. George, Vallee, Dorchester and Phillip streets.

THE St. John, N.B., Electric Railway Co. have appointed the following board of directors: Sir Wm. Van Horne and Jas. Ross, Montreal; J. J. Tucker, H. P. Timmerman and H. H. McLean, of St. John. Sir Wm. Van Horne is president.

THE Niagara Falls Park and River Railway Co. have purchased for \$10,000 the right to construct an incline railway from the top of the bank at the south-west corner of the Clifton House to the Maid of the Mist Landing.

THE City of Montreal has taken action against the street railway for \$26,354 for clearing away snow from the tracks last winter, three-quarters of the cost of which, they claim, should be borne by the company.

THE Park and Island Railway Co., Montreal, have started work with a large number of men laying rails round the mountain through Cote des Neiges, to a junction with the Montreal street railway. The work is expected to take six weeks.

THE new electric street sprinkler was tested by the Toronto Electric Street Railway Company recently, and worked satisfactorily. The reservoir is built on a car with trolley attachments, and holds 2,800 gallons of water.

COTE ST. ANTOINE council has given permission to the Montreal Street Railway Company to lay tracks on St. Antoine street, provided the street be put afterwards in as good a condition as it was before work was commenced.

J. B. LALIBERTE, J. U. Gregory, B. Leonard, P. B. Dumoulin, J. F. Guay and T. W. Pampalon, of Quebec, are seeking a charter for an electric railway in Quebec under the name of the Compagnie des Travaux Electriques de Quebec.

D. A. STARR, for many years general agent of the Royal Electric Company, and who has been in charge of their outside construction, has been appointed consulting engineer of the Trinidad Electric Light and Power Company, and is now in the West Indies on business for his new firm.

GALT, Ont., is the latest arrival in the area of towns wanting to do their own electric lighting. The chairman of the Fire and Light Committee estimates that the cost of lighting the municipality on this system would amount to \$2,989, which is rather more than the amount paid at present.

S. M. WHEELER, electrician of the Trenton Electric Light Co., has obtained a 30-years' franchise for an electric street railway to run from the town of Trenton to the Grand Trunk station. The proposed road will be 2½ miles long, including a loop line through the town.

J. H. BROWNLEE and W. C. Haywood, of Victoria, propose to build and equip a belt electric street railway, in Nanaimo, about three miles in length; to build a continuous line to Wellington via Northfield, 6 miles in length. The cost of the roads, it is reckoned, will be \$147,000, and it is to be equipped with the most modern appliances, and the scheme includes the purchase of engines and dynamos for lighting Nanaimo, Wellington and Northfield.

It is proposed to extend the Ottawa Electric Street Railway through the grounds of Rideau Hall, to the residence of the Governor-General. The hackmen of the city object, on the ground that to build a railway upon Government property is an infringement on private rights.

THE power-house to be erected by the Sarnia, Ont., Gas and Electric Light Co. will be of red brick on a stone foundation, with stone trimmings and coping, 72 ft. by 34 ft. The chimney will be 70 ft. high, 12 ft. base and 8 ft. in diameter on ground level. The machinery is to be in place by the 1st September.

LA COMPAGNIE MANUFACTURIERE ET ELECTRIQUE DE MONTAGNY, capital stock, \$10,000, is applying for incorporation. It will manufacture, sell, and install electric lights, telephones, etc., and will also manufacture and deal in lumber. The applicants are: N. Bernalchez, A. Belanger, P. A. Choquette, J. C. Lisleis and F. I. Leblanc, all of Montagny, and Alfred Blais, of St. Aubert.

DR. G. S. BINGHAM, on behalf of a syndicate, asks the permission of the Hamilton Board of Works to construct about 600 feet of single track, with a 15-mile trench, on which to test the underground trolley system. The Street Railway Co. has granted the use of rails, motors, ties, etc. By the Harris system, all overhead wires are done away with.

A CORRESPONDENT to the Perth Courier suggests that if the directors of the proposed Perth-Lanark electric railway want the line to pay, they should go on with the line as far as Herron's Mills and past Hopetown. If the company will do this, the writer says he will freely give them enough water-power to run a large factory about a mile beyond Hopetown.

W. E. LOSEE proposes to obtain power for the electric lighting of Victoria, B.C., by placing a dam at the outlet of Lake Sooke. By raising the water 4 feet there would be sufficient, he says, for 640 h p. for 81 days of continued drought. The cost of this he estimates at \$51,000, including the price of a plant sufficient to furnish 225 arc lights of 2,000 c.p. each.

A PROJECT is on foot to build an electric railway from Hazel Hill to Canso, N.S., a distance of three miles. There is considerable traffic between the two points, and it is contended the power at the cable station is sufficient to supply the motive power. There is also some talk of establishing a similar line between the pulp mill at Milton and Liverpool town, a distance of six miles. As in the former case, the power is already furnished.—*Halifax Herald*.

THE following new board of directors have been appointed by the Ottawa Electric Railway Co.: J. W. McRae, G. P. Brophy, T. Ahearn, W. Y. Soper, W. Scott and P. Whelan. The receipts of the company for the past year were \$129,484, and the expenses \$83,324. A dividend of 4 per cent. was declared. During the year 2,797,281 passengers were carried, compared with 2,395,504 for the previous year.

THE coroner's jury in the inquest on the death of young Dionne Pichette, who was run over by a Montreal electric car, stated that in their opinion the company was not rigid enough in the examination which motormen had to pass. They asked the authorities to enforce, as soon as possible, the use of some form of fender, and also asked that motormen should have to obtain certificates of qualification, such as are required by railway employés.

A COMPANY is proposed, under the name of the East River Electric Company, of Pictou county, N.S., to supply Stellarton, New Glasgow, Ferrona and Westville with electric light produced by water power from the west branch of the East River. They propose to build a dam 30 ft. high just below Hopewell, by means of which, according to the reports, 200 horse-power may be developed at the driest season of the year.

THE new electric railway connecting St. Stephen, N.B., with Calais, Me., referred to last month, is to be equipped with 10 cars holding 50 passengers each. The road will be 7 miles long, and the company propose to supply electric light and power also. The officers of the company, which has a paid up capital stock of \$100,000, are as follows: I. C. Libby, Waterville, Me., treasurer; H. A. Goodenough, Brighton, Mass., president; Mr. Curran, Calais, Me., secretary.

THE Gananoque Electric Light & Water Supply Co. recently put in a fine new engine made by John Inglis & Sons, Toronto, and a "Boss" turbine water wheel made by the Wm. Hamilton Manufacturing Co. of Peterboro'. This water wheel has been in use since last December, and, contrary to their fears, they had not the slightest trouble with ice, or any other difficulty with the wheel which has been running constantly since it was put in. This company talk of building an electric railway from Gananoque Junction to the town, a distance of 3½ or 4 miles.

THE Queen Victoria Niagara Falls Park commissioners have accepted the plans of the Canadian Niagara Power Company for the development of the water power of Niagara. Excavation for the tunnel will be commenced this year, and work will commence on the construction of the inlet canal wheel pit at once. The power house will be similar in size to the one on the American side, and will be so constructed as to allow of an extension of 1,200 feet if required. The company expects to be able to furnish power for three 5,000 horse-power turbines within a year.

PROF. CHAS. A. HUSSEY, of New York, has made an improvement in the incandescent lamps, whereby the current may be regulated in the same way as an ordinary gas jet. Three degrees of light are shown—one very low, useful for night time; second one, equal to an ordinary incandescent light, and the third, giving about twice the ordinary light without the use of more electricity. Prof. Hussey and H. S. Woolley are thinking of establishing a factory in Montreal or elsewhere for the manufacture of this patent electric socket.

TORONTO electric street cars will shortly be provided with new guards, on the model of those adopted by the Buffalo Street Railway Co., which have already, it is said, been the means of saving twenty-five or thirty lives. This guard is attached by iron hooks projecting from underneath the front of the trolley, and is about 3 feet 6 inches deep and about 7 feet 6 inches wide. The framework is of iron, padded in front with two-inch rubber hose. Four light pressure springs are attached to the end of the guards, in order to lessen the shock received by any one falling into it. The interior consists of a net formed out of half-inch rope. The whole guard is suspended about three inches from the ground.

ANOTHER sad car fatality was in the case of Mrs. M. Belanger, the mother of several children, who was killed a few days ago in Montreal. She was just returning from a picnic in a buggy, when the horse took fright and backed up on the track. Mrs. Belanger became excited and jumped out just as a car was coming up. She was knocked down and received injuries which resulted in her death a short time afterwards. The motorman came in for a good deal of blame, as from the reports it seems that he was not looking out properly. At the inquest the jury brought in a verdict that the accident had been caused by the inattention of the motorman, though this could not be called criminal. The car was going too fast, and the company ought to have provided a guard. The family of the deceased woman will take action against the company for \$10,000.

RUST-PROOF COATING FOR IRON.

The following is an account by O. de Rochefort-Lucay of the Bertrand processes for putting rustless coatings on iron: If a thin adherent film of another metal is formed on the wrought iron or on the cast iron, and this iron or cast iron heated to 1,000 degrees, is exposed to a current of oxidizing gas, the oxygen penetrates through the film and oxidizes the iron or the cast iron, and magnetic oxide is the result. The formation of magnetic oxide thus obtained continues indefinitely, and the thickness of the coating of oxide increases according to the period of exposure to the oxidizing current, providing the temperature remains at about 1,000 degrees. The film of metal deposited in the first instance disappears in some obscure way, forming oxides which mingle with the magnetic oxide or volatilize, according to the nature of the metal of which they are composed. M. Bertrand had to find the best method for depositing it on the article to be coated, and he has found that bronze, a mixture of copper and tin, gives every satisfaction. For depositing this bronze on the wrought iron and cast iron, M. Bertrand uses electricity or wet baths and sulpho-phenolic acid. The following is the method adopted in the Bertrand manufactory for an oxidation: The article is cleansed (the cleansing is not indispensable), and then dipped a few moments in a bath containing a solution of sulphophenate of copper and tin. The coating of bronze being formed, the article is immediately washed with cold water and dried with sawdust. The article dried is put into a furnace. Oxide forms, and at the end of 15 to 30 minutes, according to the articles, the article is taken out, sufficiently oxidized. The coating produced varies from 1-10 mm. to 1-5 mm. M. Bertrand uses electricity to ascertain if the coating is of sufficient and uniform thickness, and in so doing he makes use of bells. If, in putting the two wires in contact with the oxidized article, the bells ring, the current passes, the oxidation is insufficient; if it remains silent, the oxide formed is of sufficient practical thickness, because it prevents the electric current from passing.

Process of tinning cast iron: M. Bertrand has used sulpho-phenolic acid to obtain tinning on iron. He dissolves salts of theine in a mixture of water and sulpho-phenolic acid at the rate of 1 per cent. of theine salt and 5 per cent. of sulpho-phenolic acid. In this mixture the article, which is previously cleaned, is dipped, and it is at once covered with an adherent coating of tin, and afterwards by means of rotating brushes in wire and cloth the coating of tin is polished, and a result is obtained that is both effective and cheap.

Process for enameling: There are not more than two processes for enameling cast iron. In the first, called hot, the iron, heated to a vivid red, is powdered with a flux powder, boro-silicate of lead, distributed with a sieve, then it is heated, and when the flux fuses, it is powdered afresh with glass, more soluble, forming the glaze of the enamel. This process is dangerous to the operator and even impossible for large articles, nor does it allow decorations. The second process consists of dressing the cast iron by three distinct and successive operations in the furnaces with a kind of pottery. In the Bertrand enameling the article is first coated with magnetic oxide, then dipped in boro-silicates of lead colored by metallic oxides, to which is added a pipe-clay in order to give more body. The article thus covered cold, by dipping or with brushes, is put into the furnace; the enamel adheres and vitrifies at the usual furnace temperature used by enamellers. By putting a coating of colored enamel with a brush on a first coat simply plain, it is possible to make any decorations desired, which may be burnt in at one operation for outdoor vases. These results, due to the first oxidization with magnetic oxide, are remarkable as much for the color as for the tenacity of the enamel and its resistance to rough usage.

REVIEW OF THE METAL TRADES.

MONTREAL, July 1st, 1894.

Hardly anything has been moving in the Scotch pig-iron trade lately, and Summerlee is still quoted at the prices which have ruled for some time. Bar iron is in fair demand at steady prices. Canadian pig-iron remains in about the same position. There has been a decided improvement in England in tin plates, and there is a firmer feeling here in sympathy with this movement. The prices quoted are as follows: Summerlee pig-iron, \$18 75 to 19; Eglinton, \$18; Carnbroe, \$18; Ferrona, \$16.50 to 17; Siemens, No. 1, \$16.50 to 16.75; wrought scrap, No. 1, \$15 to 16; bar iron, \$1.70 to 1.75; galvanized iron, 4½ to 5¼c.; Orford copper, 9½ to 10c.; ingot tin, 17 to 18c.; lead at \$2.60 to 2.75; and spelter at \$4.50 to 4.75; cut nails, \$1.80 to 1.85.

MONTREAL, May, 14th, 1894.

Editor CANADIAN ENGINEER.

SIR,—Your prints of the photographs of the members of the Canadian Society of Civil Engineers attending the last annual meeting, with those of the library and members of council, I find are remarkably well done; and I am sure if the members belonging to our society knew about this May number, they all would be greatly pleased to be able to procure one, not only for the photographs, but for the review itself, which every month goes so well into all the departments of our profession, and which, I am sure, would be of great interest to them. Wishing you every success to your journal.

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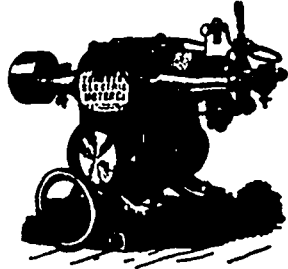
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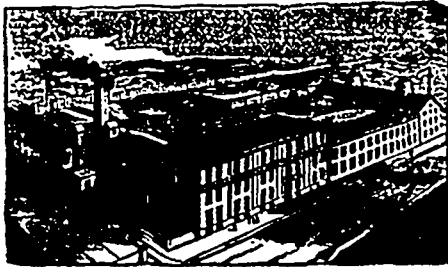


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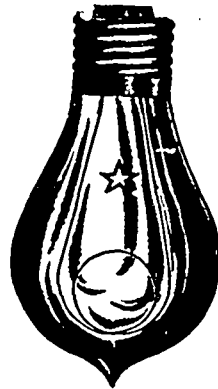
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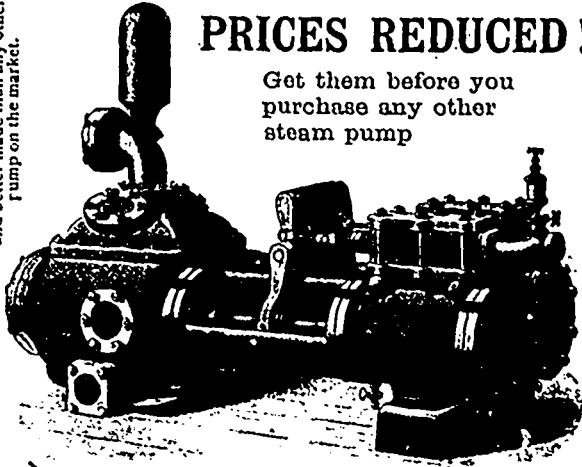
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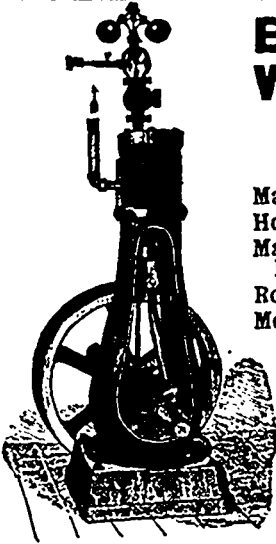
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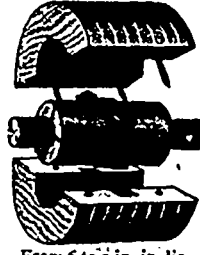
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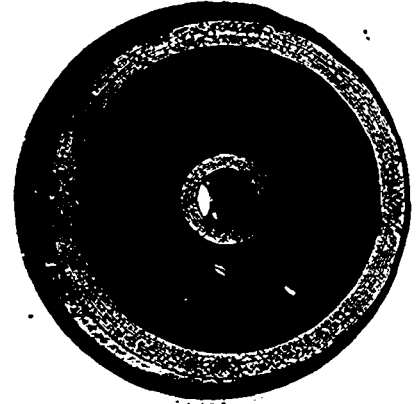
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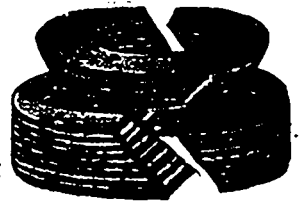
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Industrial Notes.

LONDONDERRY, N.S., rolling mills will soon be re-opened.

A NEW English cathedral is proposed for Ottawa.

THE Ottawa Government is being petitioned to aid in repairing the Marsh Bridge, St. John, N.B.

TUTTLE's planing mill at Moncton, N.B., has been gutted by fire. Loss \$4,000; insurance only \$200.

THE Victoriaville, Que., Furniture Company are applying for incorporation. Capital, \$10,000.

THE Chatham, N.B., pulp mill is shipping sulphite pulp to Great Britain.

SOUTH GRIMSBY, Ont., council have decided to build a bridge over Spring Creek.

W. C. CRAWFORD will build another addition to his handle factory at Tilbury Centre, Ont.

THE Megantic, Que., Pulp Company have a large gang at work on the building of their new mill.

JOHN FARQUHARSON will erect a large biscuit factory on the corner of St. Antoine and Clandeboye streets, Montreal.

THE Provincial Exhibition is to be held at Halifax from September 25th to 28th inclusive.

THE contract for building a water reservoir at Yarmouth, N.S., has been awarded to H. Surette & Co. The price is \$14,460.

J. & T. CONLON's saw mill, on Picnic Island, near Little Current, Ont., has been destroyed by fire. Loss, \$50,000.

THE contract for the re-erection of St. Antoine market, Montreal, has been awarded to A. Chartrand. His estimate was \$8,870.

THE erection of the Berlin and Waterloo, Ont., hospital is to commence at once. The money in hand amounts to \$11,000.

CALGARY, N.W.T., town council has voted \$10,000 in aid of the erection of a general hospital.

WINNIPEG Industrial Exhibition will be held from July 23rd to 28th, inclusive. Prizes aggregating \$15,000 will be offered.

THE Nanaimo, B.C., Gas Co. are erecting a new gasometer. The price will probably be reduced, it being now \$3 per 1,000 ft.

F. B. ATKINSON, contractor, of Levis, Que., has assigned, with liabilities of \$9,798.

ST. JOHN, N.B., is discussing the need for purchasing a new chemical engine.

JOHN STEWART, of New Glasgow, is superintending the construction of an iron bridge at Mira, C.B.

JOHN ASKEW & SON have added a quantity of modern machinery to the roller mills at Leamington, Ont.

A SITE has been selected for the new Free Library building at London, Ont. The building will cost \$14,000.

TWELVE thousand dollars will be spent at Orillia, Ont., in the improvement of the waterworks system.

S. BAIRD has commenced work on the new bridge over the Shiktehawk, near Bristol, N.B.

GEORGE WILCOX, machinist, Brantford, is opening a general repair shop in Berlin, Ont.

RICHARDSON & SONS' lumber mills at Bedford, N.S., have been completely destroyed by fire. Loss \$10,000; insured for \$2,000.

LUKE FESSENDEN's tub factory and stock, at Knowlton, Que., have been destroyed by fire. Loss, \$4,000; not insured.

THE contract for the pumping machinery required in the Point Pelee, Ont., dredging operations has been awarded to Park Bros., founders, Chatham, Ont.

THE Dominion Bridge Co.'s tender for a steel bridge over Mimico Creek at Etobicoke, Ont., has been accepted, and work will commence at once.

MR. BROWN, of the Tilsonburg Iron Works, is preparing to establish a foundry on the site of the old iron works at Tilbury Centre.

PRESCOTT, Ont., council proposes to introduce a by-law to raise \$75,000 for the purpose of putting in sewerage and waterworks systems.

A STRIKE is now under way at the Strait Shore Rolling Mills, at St. John, N.B., caused by a reduction in wages. Both the plate and bar mill men went out at first, but the former returned. Work, however, is at a standstill.

BRANDON, Man., council offers a bonus of \$6,000 to any reliable person who will build at that place a flour mill with a capacity of 300 barrels.

THE Green Glass Blowing Works, Montreal, have closed down for the summer after a very successful season. The employees held a banquet a few nights ago, and spent a pleasant evening.

THE Rankin planing mill, Toronto, which was destroyed some time ago by fire, is to be rebuilt. Exemption from taxes has been granted for ten years.

THE Burns Saw Works, Toronto, have opened a branch factory in Montreal. It is situate in the place occupied formerly by the Montreal Saw Works.

It is urged by the Board of Trade and the Fire Underwriters' Association that Toronto should increase its fire appliances by three more steam fire engines and two chemical engines.

THE Hopewell, N.S., Mfg. Co.'s mill has been equipped with new machinery, and it is now in good working order for turning out wood work of all descriptions.

T. WISTOW, whose earthenware and flower-pot works at London, Ont., were burned down recently, has rebuilt larger works which will be ready for operations very shortly.

ST. JOSEPH'S HOSPITAL authorities, Hamilton, have been granted a permit for the erection of an additional wing, to cost \$10,000.

It has been decided to memorialize the Dominion Government for a grant of \$25,000 in aid of the Dominion Exhibition proposed to be held next year.

THE directors have decided not to hold an industrial exhibition in Montreal this year, owing to the fact that one is to be held in Quebec.

VANDRY & MATTE, plumbers, Quebec, have been awarded the contract for new heating apparatus required in the St. Louis Hotel, Quebec.

H. O. EDY & Co.'s paint, oil and varnish warehouse, Montreal, has been gutted by fire. Loss, \$20,000; insurance, \$12,500. Spontaneous combustion is given as the cause of the fire.

JASPARD ROCHETTE, tanner and currier, Quebec, has decided to invest \$50,000 in the manufacture of leather. About a hundred workmen will be employed.

THOS. FORRESTER, agent for Dick's patent gutta-percha belting, electrical supplies, etc., has moved into new and more commodious premises, 298 St. James street, Montreal.

THE Athelstan foundry and factory at Huntingdon, Que., have been seized by the sheriff on a mortgage warrant, and they will be sold by auction on July 27th.

THE Wilmot, county Waterloo, township council have adopted a committee report recommending the building of three bridges near S. Shantz's.

MONTREAL city council is offered a large "Ronald" fire engine by Quebec, it being found too heavy for the latter city's steep roads.

MESSRS. WEBB, of Holyoke, Mass., have purchased, and are now engaged in repairing the Penobsquis, N.B., paper mill, preparatory to re-starting it.

GUELPH, Ont., opera house will probably be completed about the middle of October. The cost of the building will be about \$35,000.

THE Royal City Planing Mills Co., New Westminster, B.C., are rebuilding the warehouses and shops destroyed by fire a few weeks ago.

D. W. HOEGG & Co.'s Canning Factory, at Fredericton, N.B., has been burned down. Loss, \$10,000. The fire is believed to have been the work of an incendiary.

J. L. SEGUIN & Co.'s flour mill, at Farnham, Que., has been destroyed by fire, together with the most of the machinery. Loss, \$11,000; insurance, \$4,000. Cause of fire, unknown.

JOHN STANLEY, a stationary engineer, of Winnipeg, committed suicide by hanging, owing to his inability to find work. He leaves a wife and children.

THE 17th annual convention of the American Flint Glass Workers' Union will take place in Montreal on July 9th and following fortnight.

IN the case of the Montreal Water and Power Co. versus the Montreal Rolling Mills Co., an action taken on the ground that the latter had used more water than they had contracted for, the Water Co. lost.

A WORKMAN named Theberge, employed at the Jenckes' Machine Works, Sherbrooke, Que., had his leg fractured owing to getting it caught in a belt.

THE B. C. Milling and Feed Co.'s mills, wharves, &c., Westminster, have been purchased by the Brackman & Ker Milling Co., Victoria, who will increase their capacity by the introduction of new machinery.

COATES' foundry at Bradford, Ont., has been burned down, owing to the ignition of a heap of shavings by some sparks from the furnace. Loss \$2,500; no insurance. J. H. Davey's sash and door factory, next door, was also destroyed. Loss \$1,000; uninsured.

GREAT are the inducements being offered by various towns to the Dominion Paper Company for them to build their new mills there. Richmond and Windsor Mills, Que., each offer a bonus of \$25,000, and other places are adopting similar tactics.

AT Edwards' mill at New Edinburgh, Ont., the other day, there was a big sawdust explosion, after which there was seen floating on the surface of the river a great layer of sawdust about 50 feet square and 2 feet thick.

SIMPSON BROS., of Montreal, have started a machine shop at 615 LaGauchetiere street. Their specialty will be the manufacture of "Tip" dies and presses and other machinery for shoe manufacturers.

MR. HUSBAND, C. E., of Coaticook, has completed three plans for a system of drainage for Knowlton, Que. The town council will shortly decide as to which one will be carried out, and at the same time will consider the question of waterworks.

WINDSOR, Ont., gas works have been badly damaged by an explosion and fire. One of the employes, noticing that there was a leak, started to find it with a lighted torch in his hand. The result was that there was an explosion and he was hurt.

WILLIAM FOSTER'S shingle planing mill at Hepworth, Ont., has been burned down. A spark from the furnace probably fell amongst some dry cedar shavings close by. Loss \$2,500; no insurance.

OWING to the boiling over of a kettle of tin in the McClary Manufacturing Works at London, Ont., the place was set on fire. The fire, however, was extinguished before more than a few hundred dollars' worth of damage was done. Loss covered by insurance.

WORK will be commenced almost immediately on the sewer to be built by the Dominion Government through Water Street, Cornwall. The town council will also build main sewers to connect with it.

THE Moncton Gas and Water Co. having refused the city's offer to buy up their plant, the question of valuation and sale has been referred to arbitration. F. W. Holt, C.E., has been appointed arbitrator on behalf of the city.

THE village of Hartland, N.B., is constructing waterworks at a cost of \$3,500. A correspondent says this village needs a pulp mill, a saw mill, a wood-working factory and a canning establishment.

CANADIAN and American capitalists are considering a plan of establishing in Montreal a line of cars to be run by gas. The capital required at the start will be \$2,000,000. The promoters state that by using gas instead of electricity, the cars can be run 50 per cent. cheaper.

THE net earnings of the St. John, N.B., Gas Co. for the past year were \$24,496.83. The board of directorate now consists of Edwin J. Everett, J. M. Robinson, R. B. Emerson, W. Barnhill, James Manchester, G. S. Fisher and James Fleming. George R. Ellis has been re-appointed secretary-treasurer.

A LARGE deputation last month waited on the Government at Ottawa to ask for a bonus of \$250,000 towards the construction of an interprovincial bridge across the river from Ottawa to Hull. The Ontario Government is also being pressed, and Ottawa city has already voted a subsidy of \$150,000.

AT the annual meeting of the St. John River Log Driving Co. the following officers were elected: President, C. F. Woodman; secretary-treasurer, J. F. Gregory; directors, C. F. Woodman, David Keswick, George Barnhill, John A. Morrison, Robt. Connors. The company expects to handle 100,000,000 feet of logs this season.—*Canada Lumberman.*

THE North America Construction Co. (Ltd.), Montreal, are applying for incorporation. Capital stock, \$100,000. Their purpose is to manufacture and deal in materials used in the construction of pavements, roads, building canals, railways, etc. The applicants are N. Connolly, Quebec; Mr. Connolly and J. Swift of Kingston, and J. F. Coleman and R. A. Dickson of Toronto.

THE case of the Gilbert Blasting and Dredging Co. against the Coaticook Cotton Co for \$7,000, being the price of some boilers and engines supplied by the former, has been dismissed, and the plaintiffs have been condemned to refund \$2,000 (which they had received as part payment), on the ground that the boilers, etc., did not comply with the specifications.

W. A. FLEMING, of St. Francois Xavier Street, Montreal, has secured the contract to supply the City of Ottawa with 1,000 feet of Reddaway & Co's "Red Star" rubber hose. The city has formerly been supplied with hose by an Ontario firm; but finding they could get an equally good article for less money, they decided to try the well known Reddaway patent.

IN the case of contractor Neelon against the City of Toronto and architect Lennox, on the ground that defendants had wrongfully dismissed the former from work on the Court House, the result has been again in favor of the defendants. Mr. Neelon had lost his case before, but had now appealed. The amount involved was \$350,000.

THE Board of Works, Toronto, recently appointed a committee to investigate into the quality of various cements. The result of their investigations showed that out of 12 specimens of imported English cement, 5 were no good, 3 medium, and 4 very good. Of nine Canadian samples, 6 were found to be very good, and 3 medium.

THE Gibbs-Franchot-McLaren Company (Ltd.), Buckingham, Que., has been incorporated, with a capital stock of \$50,000. They will manufacture and produce chlorates, acids, alkalies, by a chemical or electrolytic process, and also smelt ores and minerals. The incorporators are David McLaren, Ottawa, Alexander McLaren, Buckingham; S. P. Franchot, Buckingham; Mrs. A. P. Franchot, Buckingham, and W. T. Gibbs, Ottawa.

LETTERS patent of incorporation under the Joint Stock Companies' Act, have now been issued to the "Laurie Engine Co.," Montreal, referred to last month. The capital stock is \$250,000, and the incorporators are: John Laurie, W. H. Laurie, A. A. Ayer, Richard B. Angus, G. Cheney, John Kennedy, J. McKergow, T. E. Lamb, J. T. Gaffney, A. Kingman, T. B. Brown, H. Lawton and Jas. A. Ogilvie, all of Montreal.

FOR some time past the corporation and leading citizens of Hamilton have been agitating for a swing-bridge to replace the old ferry across the Burlington Canal, and a committee is to wait on the Government at Ottawa to urge the claims. It is estimated that the bridge would cost about \$22,000. A later report states that a sum for the purpose of building such a bridge has already been placed in the draft estimates.

THE widow of Auguste Lecompte, who was killed at Montreal some little time ago owing to the earth caving in in a trench where he was laying water pipes for the Dominion Construction Company (who had the contract from the Montreal Water and Power Co.), has been awarded \$2,500 damages against the former company by the court, who decided that the accident was due to the negligence of the foreman in not bracing the ditch.

THE Bell Cigar Company of St. John have put in a plant for the manufacture of German mustard. The plant consists of a crusher, a mustard mill weighing 1,800 lbs., pumps, tanks, etc. The company have the raw mustard, grind it themselves, mix it with English malt vinegar and spices, and put it through the mill. Their bottles are made in New Glasgow, N.S. The capacity is 100 gallons per day.—*St. John Sun.*

A FIRM of Bohemian glass manufacturers are asking the Government at Ottawa for information with a view to the removal of a large factory from Bohemia to Canada. They are thinking of bringing with them about 500 families interested in the industry. The furnaces used in the manufacture of Bohemian glass use wood as fuel, and the sand which is also required is found in great quantities along the valley of the Gatineau. The Ottawa city council will be moved to take some steps in the matter.

THE Burrell-Johnson Iron Co., of Yarmouth, N.S., have been awarded by the town council the contract for supplying two triplex electric power pumping engines, each pump to be of the triplex vertical type, 10½ inches diameter and 12 inch stroke; and two 65-horse power standard motors; together with suitable wrenches, oilers, pressure gauge, starting box and switch, erected ready for connection upon foundations furnished by the town. The equipment is to deliver 1,555,000 gallons in 24 hours from Bain's Pond, or other equivalent source of supply, to the reservoir, or into the town mains, at 120 pounds pressure, and is to be completed and ready for operation by the first day of October next. The price is \$11,500.

MERRICKVILLE, Ont., has decided to purchase a new fire engine. WM. RANKIN, Toronto, whose saw mill was burned down a short time ago, is rebuilding.

A PARK and C. W. BOCH, Toronto, have joined together under the name of the Toronto Emery Wheel Co.

THE Comet Bicycle Manufacturing Co. are about to erect a factory in Toronto, 70 x 100 feet, seven storeys high.

TORONTO City Commissioner Coatsworth says the total horsepower of the city is 16,800.

R. BECKHAM, builder, Montreal, has assigned. Liabilities \$35,607.

GEDÉON GAVEL, building contractor, Montreal, has assigned. Liabilities \$14,000.

M. & L. SAMUEL, BENJAMIN & Co., Toronto, have purchased the stock brands and special rights of the Toronto Cutlery Co.

THE Berlin, Ont., Felt Boot Co. are adding considerable new machinery to their factory.

VERDUN, Que., council has declared in favor of building a dyke along that portion which is about to be annexed to Montreal.

WALLACEBURG, Ont., will give a free site for the proposed new glass factory and will also grant exemption from taxation.

THE Climax Cheese Factory, Tiverton, Ont., has been burned down. Loss, \$5,000; insured for \$1,800.

THE London, Ont., Gas Co. are engaged in laying about fifteen miles of new mains. The cost is reckoned at \$60,000.

A HUNDRED and fifty men are out of employment in Hamilton owing to the closing down of two branches of the Canada Screw Works. The scarcity of coal was the cause.

JOHN FLOOD has begun the work of erecting a new 100 foot chimney at the Insane Asylum, St. John, N.B. New heating electric light apparatus are to be put in.

THE Isaac D. Smead Heating and Ventilating Co., Toledo, is in the hands of a receiver. Liabilities over \$5,000. The company has branches in Canada.

A NEW span of fifty feet is being built on the bridge at Briggs' Corner, Chipman, N.B. Three other spans are said to be in a rotten condition.

MILLER & WOODMAN's saw-mill, at St. John, N.B., is closed down owing to a strike. A reduction of wages was announced, whereupon the men went out.

THE Young & Brother Co., Hamilton, are applying for incorporation. They will manufacture plumbers and steam-fitters' appliances, lamps, etc. Capital stock, \$150,000.

R. RICHARDSON & SON, Bedford, N.S., whose saw-mills were burned down some little time ago, are re-building and have placed orders for a large amount of modern machinery.

THE new Cote St. Antoine (Montreal) school will have a frontage of 147 ft. and a depth of 78 ft. It will be two storeys high, and will have accommodation for about 700 pupils.

THE Citizens' Gas Co., Montreal, has been incorporated. Capital stock, \$62,500. The promoters of the company are F. C. Henshaw, F. E. Nelson, Jas. Taylor, J. T. Hagar and W. Strachan.

LE BLANC & Co., West Pubnico, N.S., have just put in a new engine and boiler and a full outfit of planing machinery at their saw-mill there.

G. C. MOORING, a prominent member of Toronto No. 1, C. A. S. E., and chief engineer of the Methodist Publishing House, has left for England, where he will remain for a few weeks visiting some of the leading engineering establishments.

THE Ontario Engine & Machine Co., Toronto, has obtained incorporation. Capital stock, \$12,000. A. J. Somerville is president, James George vice-president, Charles Smith superintendent, and Alexander Ashenbush secretary.

THE Canada Mineral Wool Co., Toronto, have shipped two carloads of that material to R. Dunsmuir & Sons, Victoria, B. C., who will use it in the construction of their cold storage warehouse there.

THE contract for the repairs of all the bridges on the Bouctouche & Moncton Railway has been awarded to James Barnes, the work to be done under the superintendence of Brewer and Boone. Captain Boone has commenced work. The bridges now passable will be repaired first, while the material for the Bouctouche is coming from Philadelphia. The abutments for this bridge will be of iron. The Cocagne bridge is now passable excepting the two new spans to be built from the wharf to the south shore. The Government is running a ferry during ten hours of the day.—*St. John Sun.*

A DEMAND of assignment has been made upon the firm of Wm. Johnson, Dickson & Co., paint manufacturers, Montreal.

J. H. MUNCH & Co. are starting soap manufacturing at St. Mary's, N. B., in the building formerly occupied by the Fredericton Soap Company.

THE Clappison Pipe and Boiler Covering Co. have opened a factory with the latest improved machinery for manufacturing asbestos, and the well known magnesia sectional steam pipe and boiler coverings.

ARRANGEMENTS are now being made for the speedy construction of pulp and paper mills at Drummondville, Que. Two hundred men will be employed and usage will be made of the water-power of the St. Francis River. The town council has voted a bonus of \$25,000.

THE contract for masonry for the new bridge between St. Stephen, N. B., and Calais has been awarded to Joseph McVey, of St. Stephen, the price being \$10,000, and the work of getting out the stone from Dufferin quarries will begin at once. A Boston firm has the contract for erecting the superstructure.

THE Imperial Writing Machine Co., Montreal, has been incorporated for the purpose of manufacturing typewriting machines and supplies. Capital, \$400,000. The incorporators are C. C. Colby, Stanstead; W. P. Kidder, Boston; C. B. Smyth, Wilmington; G. A. Drummond, Sir Donald Smith, Jas. Ross and H. McLennan, Montreal.

J. R. BOOTH's saw mill at Ottawa, which in some respects was the finest in the world, has been almost completely destroyed by fire. Damage nearly \$200,000, besides what will be lost owing to inability to carry on operations. Insurance about \$100,000. Several hundred men will be thrown out of employment. Two watchmen were on the premises when the fire broke out, but they cannot account for its origin.

MONTREAL water authorities ordered the water to be cut off from Maisonneuve and Cote St. Antoine householders last month owing to non-payment of rates by these municipalities. This was done and citizens of those places suddenly found themselves deprived of that necessity. Maisonneuve, however, later on came to an arrangement with the city, offering a note for \$6,280 due in four months, with interest at 6 per cent. This was accepted and the water was turned on again.

WM. SCLATER, for the past five years managing director of V. M. Sclater & Co., Ltd, Montreal, has resigned that position and has organized a new company under the name of the Sclater Asbestos Manufacturing Co. Mr. Sclater assumes the management of the newly incorporated company, with temporary offices at 196 St. James' street, Montreal, and proposes to devote special attention to the asbestos and manufacturing branches in connection with steamship, railway and engineers' supplies. Mr. Sclater has done much to develop the asbestos business in Canada, and is widely known among the manufacturers of Canada.

THE Chambly Manufacturing Co. ask for tenders for the building of a dam across the Richelieu River, opposite Wilson's Mill, at Chambly, with necessary wing dam and tail race, and the supplying and installation of the turbines required in connection with said dam. Parties tendering for the above will have to guarantee a delivery on the shaft of the largest quantity of horse-power, using as units 500 h.-p. The supplying and installation of electrical machines, poles, wires, transformers, etc., required to transmit say 15,000 h.-p. from Chambly to Montreal, 3,000 whereof for arc lights, 6,000 for motor power, and 6,000 for incandescent lights, with guarantee as to maximum of loss of energy from Chambly to Montreal. Tenders will be received up to August 1st by the secretary of the company, C. D. Gaudet, New York Life Building, Montreal.

A DISCUSSION came up before the Montreal City Council recently as to the inspection of boilers, originating from the boiler explosion which took place some weeks ago at the Royal Electric Company's Works. Boiler Inspector Champagne stated that this boiler had been put in without his knowledge, so that the company had received no certificate from him, thus infringing the by-law. He went on to explain that about twelve years ago, the Boiler Insurance Company received permission from the City Council to insure boilers, on payment to the city of \$2 per year each. After some discussion it was recommended that this arrangement with the Boiler Insurance Co. should be cancelled, and that all boilers in the city be examined every year by the Boiler Inspector, and that the city attorney be asked to take measures to collect whatever money the Boiler Insurance Co. owed the city.

COCKBURN & SONS are preparing to build a saw mill at Cache Bay, Ont.

J. W. HURD has the contract for the new industrial school at Duck Lake, Man.

THE large iron bridge over the Rouge River at Dunbarton, Ont., is reported to be greatly in need of repairs.

It is stated that the Vulcan Iron Works, Winnipeg, will carry on operations as usual, though the company is in liquidation.

THE county of Elgin, Ont., will raise \$15,000 this year for the bridge at Port Stanley and other bridges to be erected in 1894.

DAVID R. BROWN, architect, has been awarded first prize for a design for the new Masonic temple to be erected in Montreal. Tenders will be called immediately.

By the destruction of Hamilton & Co.'s lumber mills at St. John last month about \$50,000 of lumber and machinery were ruined and 60 hands thrown out of work. The mill will be rebuilt.

THE new bridge at Newcastle Creek, N.B., has been completed. When the bridge at Crawford Creek is built a short route will thus be opened to Chipman. It is expected this bridge will soon be undertaken.

THE St. John's, Nfld., *Herald* reports that the tests of the new fire apparatus of that city made under Capt. Nolan, of Montreal, were quite satisfactory. The tests were witnessed by the Governor, the members of the Legislative Council, etc.

IN the case of Wm. McKenzie, of Toronto, against the Winnipeg Gas Co., judgment has been given in favor of Mr. McKenzie, who claimed that he was entitled to \$400,000 of paid-up shares as collateral security for a debt of \$60,000.

IN reporting the discussion of the new plumbing regulations for St. John's, Nfld., the *Herald* of that city says: "The plumbing rules and regulations, which various plumbers opposed, the engineer hopes the council will not be coerced into altering, but will get the opinion of a disinterested engineer like Alan Macdougall, of Toronto."

THE contract for the erection of the court house and jail at Portage la Prairie has been let to T. M. Beamish, of Brandon, whose tender was the lowest sent in and was in amount \$22,544. The highest tender was \$22,700. There were in all seven tenders submitted. Work will be commenced immediately.—*Winnipeg Commercial*.

SAMUEL BICKELL, of Ashburnham (now to be a part of Peterboro'), has put a new outfit of machinery in his cheese-box factory. This machinery is supplied by the Wm. Hamilton Manufacturing Co., manufacturers of mill machinery and turbine wheels. The factory mill turned out 150,000 boxes this season. The *Review* says: "Mr. Bickell speaks in the highest terms of the machinery supplied him by the Wm. Hamilton Co."

THE Consumers' Gas Co., Montreal, are rapidly getting into full operation. There are to be three generating plants with a capacity for one million and a quarter cubic feet per day, two of which are completed with generators and superheaters, and the third will be erected ready for next season. Four large purifiers are being erected, 20 feet square, with deep water-seals, together with the patent centre valve and machinery for working any purifier singly or all four together. One relief holder is completed having a storage capacity of 110,000 cubic feet, and foundations are being laid for a telescopic gas-holder to hold 600,000 cubic feet and having two lifts of 27 feet each, with steel tank 120 feet in diameter. The pipe connections and trunk main are 16 inches in diameter. The process used is the oil-water process, which is now used in many leading American cities with satisfactory and economical results, and is erected by the Economical Gas Apparatus Construction Company, of Toronto.

KINGSTON SCHOOL OF MINES.

The following are the students who passed in the examinations for the degree of Mining Engineer at the Kingston School of Mining:

1st Year—Reginald Instant, Walter Lavell, R. W. Anglin (except in Blowpiping), H. S. Baker (except in Junior English), and L. D. Campbell (except in Blowpiping).

The following have received certificates in the Prospectors Class. F. S. J. Broome, Muskoka Falls; J. Donnelly, jr., R. J. McDowall, E. M. Morgan, and W. H. Stevenson, all of Kingston, and C. J. Rothwell, Arizona.

Railway and Marine News.

THE G. T. R. shops at Stratford, Ont., are to open early this month.

THE Orford Mountain Railway will be extended as far as Richmond, Que.

GUELPH city council offer the G. T. R. a ten years' water contract at 8 cents per 1,000 gallons.

THE work of boring in the Northumberland Straits for the proposed tunnel is going on favorably.

ALMONTE, Ont., has voted in favor of taking \$40,000 stock in the Carp, Almonte & Lanark Railway.

THE G. T. R. shops at Point St. Charles, Montreal, are re-opening this month with 1,400 hands.

A NEW schooner of 385 tons was launched the other day from the yards of J. E. Pettis, Port Greville, N.S.

THE "Arcadia," the third steam tug launched by Alfred Morrell at Collingwood, made her trial trip a few days ago.

ALEX. JEFFERY, Montreal, has the contract for the construction of a pier or breakwater for the St. Lawrence Yacht Club at Dorval, Que.

THE Welland Canal authorities have decided to prosecute the steamer "Robert Holland" for running through the canal at an illegal rate of speed.

THE steamer "Campana" will not be run this year, her owners not finding enough work to keep her running at a profit. She is lying at Toronto.

OWING to the slackness of traffic the "Carmona" has suspended her trips between Toronto and Rochester, and will lie up for the rest of the season.

THE C. P. R. shops in Montreal, Winnipeg, and at Toronto Junction are still closed down, and in the three places several hundred men are out of work.

THE steamer "Bedlington," bound from Halifax to Pictou, whither she was going for a supply of coal, went ashore in a fog on Torbay Ledges last month.

THE International Brotherhood of Locomotive Engineers of the United States and Canada will hold their annual convention in Brockville, August 15 and 16.

THE Irondale and Bancroft Railway will probably be built this year as far as Bancroft. It will perhaps eventually be extended so as to connect with the O. & P. S. Railway.

SIR C. H. TURPER has introduced a resolution in Parliament to the effect that it is expedient to provide a tax on steamships, not to exceed 10 cents per ton of gross tonnage.

A NEW type of boiler, the invention of Mr. Hazlitt, of Kingston, has been put into a steam yacht built by R. Davis & Sons, boat builders, of that city, for a leading citizen.

THE work of putting Negrotown Point, N.B., breakwater into a state of thorough repair, for which the Dominion Government voted \$25,000, is probably to be commenced at once.

THE steamer "Island Queen" has had her engines compounded, the work being carried out by the George Bertram Engine Works, with A. P. Rankin as supervising engineer.

SOME Montreal engineers are becoming interested in the oil regions of Gaspé Basin, and are considering the idea of building a short line through the peninsula, to be called the Gaspé Railway.

THE contract for the erection of a steel bridge over the Soulanges Canal, has been awarded to the Dominion Bridge Co., Lachine. The contract for cement has been given to Hyde & Co., Montreal.

THE contractors are now engaged in cleaning up around the Sault Canal. The masonry is complete, and seven lock gates are on the ground. It is hoped that water may be let in on the 10th of this month.

R. DAVIS & SONS, ship and boat builders, Kingston, have overhauled the steamer "Pelerin," which is now in service for the new Toronto Ferry Co. New boilers were put in and she received a general overhauling.

THE following have been elected officers of the Parry Sound Colonization Railway Co.:—President, J. R. Booth, Ottawa; vice-president, P. Curry, Parry Sound; directors, W. Beattie, J. W. Fitzgerald, Parry Sound; A. W. Campbell, Arnprior; J. McDougall, W. Anderson, G. B. Gune and J. Christie, Ottawa.

LOOMIS & SONS have 300 men employed on the Quebec Central Railway near Lyster, Que., station.

THE Montreal and Chicago Merchants' Shipping Company are reducing their capital stock from \$80,000 to \$40,000.

IT is stated that the G. T. R. will put down 2,000,000 new ties this year. The C. P. R. will have to replace almost all its ties.

E. KENNEDY, superintendent of the Lachine Canal, was last month taken suddenly very ill with heart trouble. We understand he is now improving.

A JOINT stock company is being formed to build and operate a steamboat from New Carlow, Ont., and Palmer Rapids to Barry's Bay, via Combermere.

A NUMBER of Sydney, N.S., capitalists are negotiating for the purchase of the steamer "Gulnare," now the property of the Dominion Coal Co. They would employ her in the coasting trade.

THE Richelieu and Ontario Navigation Co. have completely re-fitted and re-furnished the steamer "Bohemian." She will, in future, every Sunday make a cheap trip from Montreal to Sorel, and intermediate points.

A COMPANY proposes to build a railway ten miles long between Tufts Cove and Windsor Junction, N.S., to pass through the Waverly gold district, provided the Dominion Government will grant a subsidy of \$32,000.

THE Allan line ship, formerly known as the "Polynesian," has been rebuilt and altered, and is now called the "Laurentian." The alteration in internal arrangements is said to have resulted in much greater comfort to passengers.

APPLICATION is being made for the forfeiture of the bonus which was voted by the Provincial Government in aid of the Douglstown Branch Railway. The vote was for a subsidy of \$3,200 per mile, the whole not to exceed \$19,200.

THE work of laying the track of the O. A. & P. S. Railway west of Golden Lake Station, is going ahead rapidly. Materials are being moved in readiness for the building of a station about nineteen miles from Parry Sound.

THE following is the present directorate of the Montreal and Western Railway Company: J. A. Chapleau, H. J. Beemer, Senator Desjardins, Jacques Grenier, F. Brennan, J. D. Rolland, and Dr. Brisson. The line is now leased to and operated by the C.P.R.

THE following board of directorate has been appointed by the Canada Southern Railway Co.: Cornelius and W. K. Vanderbilt, James Tillinghast, Chauncey M. Depew, Chas. F. Cox, Samuel F. Barger, Jos. E. Brown, Edward A. Wickes and Nicol Kingmill.

THE United Counties Railway have just turned out of their own shops at St. Hyacinthe, engine No. 3. She has been thoroughly overhauled, and has also had added to her a new eight-wheel tender, in place of the old small four-wheeled one she formerly had.

THE Gatineau Valley Railway came up last month before the Railway Committee, at Ottawa, and was reported. The Bill gives the company power to build as far as James Bay, and contains a clause permitting the issue of paid-up preference stock to the extent of \$500,000.

CONTRACTS for the construction of the Bangor & Aroostook line have been let as far as Cariboo, and grading is being rapidly completed. The bridge across the Meduxenkeag at Cariboo is practically complete, and tracklaying north of Houlton will commence in a few days.

On the 9th of June, while the Winnipeg express was running through a burning bridge over the Mattawan River, twenty-eight miles west of Fort William, the structure gave way, and the engine and four cars tumbled into the river. The bridge was not a very high one or there would have been more loss of life. As it was, Mrs. Arthur Baker, of Montreal, and Bert. S. Brown, express messenger, of Brockville, were killed, and several others injured. The approach to the bridge was obscured by smoke, but it seems strange that for this reason the train was not brought up before crossing the bridge.

THE New Glasgow Iron Co., says a Halifax contemporary, purpose building three miles of a novel kind of railway from the iron ore mines near Arisaig to a wharf at Arisaig. The rails will be formed out of round poles sixteen feet long and four inches diameter at the top. These poles will not be squared, but placed on the sleepers in their original form and bolted to the sleepers, which will be further apart than the iron rails on an ordinary railway; 1,000 sleepers is the maximum number to the mile. The wheels of the trucks will be double flanged. An engine capable of running at a speed of five miles per hour is being looked for.

THE Detroit, Windsor and Belle Isle Ferry Co.'s new steamship "Pleasure" was launched at Wheeler & Co.'s shipyard at West Bay City, Mich., a week or two ago. The boat is 132 ft. over all, 51 ft. broad over guards, and has accommodation for 3 000 people.

THE Atlantic and Lake Superior Railway Co. have elected the following directors: J. R. Thibaudeau, A. F. Gault, Senator Desjardins, Senator Guevremont, Hy. Hogan, D. Bergin, C. N. Armstrong, Archd. Campbell, and A. R. Chisholm. At a meeting the other day the issue of mortgage bonds and preferential shares was authorized.

MR. ADAMS has made another application to the Dominion Government for a subsidy in aid of an extension of the Canada Eastern Railway Co., so as to make it pass through Nelson, N. B., between Chatbam and Chatham Junction. The proposed branch would be four miles long, and has a provincial subsidy of \$2,500 per mile.

THE schooner "Rose," bound from Labrador to Conception Bay, collided, in a fog off Partridge Point, with an iceberg, and sank instantly, taking with her twelve persons. The rest of the crew saved themselves by jumping without delay on to the iceberg, from which, after many hardships, they were eventually rescued by a passing fishing boat.

A RESOLUTION has been adopted in the Dominion Parliament authorizing a subsidy for the Montreal, Ottawa, and Occidental Railway; for the portion between Quebec and Montreal a bonus not exceeding \$6,000 per mile, nor exceeding in all \$945,000, and for the portion between Montreal and Ottawa a bonus not exceeding \$12,000, nor exceeding in all \$1,440,000.

ON the report of John Galt, C.E., of Toronto, the court has ordered the engineers to proceed with the channel through Ashbridge's Bay. The channel now cut from Toronto Bay into this lagoon has already had a good effect in clearing out stagnant water, and when the eastern gap is widened and the channel cut through, it is thought that Ashbridge's Bay will be quite purified.

THE Dominion Bridge Company, Montreal, are building for the Intercolonial Railway a rivetted through pony-truss span 100 $\frac{3}{4}$ feet centre to centre of bearings, and a clear span of 95 $\frac{1}{4}$ feet. Another firm are building for the company three plate girder spans: One through span 87 feet long and 80 feet clear; one through span 85 $\frac{1}{2}$ feet long and 80 feet clear, and one deck span 54 feet long and 50 feet clear.

THE Pittsburg, Shenandoah & Lake Erie Railway Co. propose building two large steamers to carry coal between Conneaut, O., and Port Dover, Ont. The Dominion Government is asked to vote \$15,000 for dredging the harbor at the latter place, it being at present too shallow. Port Dover people believe that if this project were carried out, Port Dover would become the coal entrepôt for Western Ontario.

THE Richelieu and Ontario steamer "Magnet" was stranded last month, on Split Rock, in the Cascade Rapids. She was, however, successfully removed a day or two later, under the personal supervision of Mr. C. F. Gildersleeve, who proved himself equal to the occasion in a difficult emergency. She was taken to Cantin's dry dock, Montreal, where it was found that she had suffered no great damage.

THE Tiber Steamship Co. (Ltd.) has been incorporated. They will own the steamship "Tiber," at present at Leith, Scotland, and perhaps other vessels, and navigate them between any ports of the world, carrying passengers and cargo. Capital stock \$51,200. The incorporators are Henry Dobell, Montreal; John Delish, of St. Jean d'Orleans; and Chas. Archibald, W. H. Archibald and W. Purves, all of Cape Breton.

AN important judgment has been rendered in the case of Kerr *et al.* versus the Atlantic & North-Western Railway Co. There had been no land of the plaintiffs taken, and consequently no expropriation. Damages to the amount of \$5,500 were granted for interruption of communication with a neighboring street, and \$2,000 on account of the noise and smoke being such close neighbors to the plaintiffs' property.

THERE are at Ottawa now delegations in favor of a terminus for the proposed Huddart fast Atlantic line far east of Halifax. All arguments which favor Halifax as against St. John, favor Terminal City or Louisburg as against Halifax. From Louisburg to Liverpool is nearly 200 marine miles less distance than from Halifax to Liverpool. Here is ten hours more out off the sea journey. If the ten hours is saved at the expense of 277 miles of railway carriage, the argument for Louisburg against Halifax would be somewhat the same as that for Halifax against St. John.—*St. John Sun.*

THE following is the board of directors, this year, for the Bay of Fundy Steamship Co: Jas. Manchester, S. Hayward, W. H. Thorne, H. D. Troop and J. E. Irvine, of St. John; S. W. W. Pickett, of Granville Ferry, N. S., and H. B. Short, of Digby.

DALHOUSIE is suggested by a correspondent to the Montreal *Herald* as the terminus for the proposed fast Atlantic line. He contends that in the Baie des Chaleurs there are no such obstacles to be met with as in the St. Lawrence River, and thus no time would be wasted. It also has good railroad connections, the I. C. R. and the proposed Restigouche-Victoria line connecting the Port of Dalhousie with all parts of the country.

At the annual meeting of the shareholders of the Canada Eastern Railway Co., at Fredericton last month, it was stated that since the company has been under Alex. Gibson's management there had been a large increase in the earnings. The following board of directors were elected: Alex. Gibson, president and manager, Alex. Gibson, jr., E. Byron Winslow, James S. Neill, Charles H. Hatt, James Gibson, Alfred Rowley. George T. Gregory is secretary.

THE Burrell-Johnson Co., Yarmouth, N.S., report a considerable accession of new work during the past month in addition to their usual large run of repair work. They are building a steam plant for a large sailing vessel, and a complete outfit of machinery for a large steam launch. As mentioned elsewhere, they have also the contract for the long-talked-of electrical pumping plant for the town of Yarmouth, and have had to take on a number of extra hands.

THE Dominion line S.S. "Texas" went aground totally wrecked last month off Newfoundland. Many cattle were lost. The value of the ship was about \$130,000, and of her cargo \$188,000. Insured. The "Texas" was 325 feet 5 inches in length, 36 feet broad, and 25 feet deep in the hold. Only two years ago she was thoroughly overhauled, at a cost of \$20,000, electric light and new engines being put in. The current was running about 24 miles an hour at the time of the wreck.

THE R & O. Navigation Co.'s steamer "Montreal," after her overhauling, had a trial trip with the president and directors on board. The old engines not having given satisfaction, new engines were put in, and a fan introduced to assist the draught. On the trial trip her wheels made 29½ revolutions per minute under a boiler pressure of 120 lbs. Her performances are considered highly satisfactory. The machinery was put in by the George Bertram Engine Works, under the superintendence of A. P. Rankin, of the engineering firm of Logan & Rankin, Toronto.

THE annual meeting of the Chignecto Marine Transport Railway Co. was held in London, Eng., last month. It was stated that the time granted for completion of the work had been extended till July of the present year, provided that the work was actually in progress and that the company was possessed of sufficient funds to complete the work. It was decided to endeavor to raise the capital still required (about £300,000) in the short time still remaining, by the issue of prior lien bonds. At a subsequent meeting of bondholders this course was commended, and it was decided, after the necessary capital should be raised, to give the work into the hands of a substantial firm of contractors to be completed for a lump sum, including everything. All the old directors of the company were re-elected.

THE "Montreal Bridge Company" propose to erect a gigantic bridge across the St. Lawrence at Montreal, and want the city council to pay \$40,000 per annum for twenty years as interest on the bonds that would be issued. The proposition is somewhat similar to the "Legge" scheme promulgated some years ago, and is to the effect that the bridge should start from some point in St. Mary's ward (probably a little west of Belle River Park), across Isle Ronde to somewhere on the south side. The southern end of the bridge would be connected with the Montreal & Sorel, the Central Vermont, and G. T. Railways, and the city end with the G.T.R., C.P.R., Atlantic & Lake Superior, Montreal & Park, and Island Railways, and with any other lines which may hereafter be constructed in the vicinity. The main span of the bridge would consist of two cantilevers of 1,110 feet each, with a connecting span of 300 feet where the railways and highways would remain side by side. The distance between the towers of the cantilever would be 1300 feet, and the height above the water for a distance of 800 feet would be 150 feet.

A LOUD explosion occurred at Kingsville, Ont., while a pipe which was supposed to have been tried up to a pressure of 1,200 lbs. was being tested. The pipe was blown into a thousand pieces, but fortunately no one was injured.

Mining Matters.

THE Wentworth mine at Goldenville, N.S., has started work.

THE employees of the Acadia colliery at Westville, N.S., are organizing a relief fund.

OPERATIONS have re-commenced at the nickel mines near Mission City, B.C.

BOAZ & GREENSHIELDS have commenced work at Jeffrey asbestos mine, Que. Capt Thorpe is manager.

THE Finch Mining Co. has commenced operations at the junction of the Thompson and Fraser Rivers.

THE Yale, B.C., Gold Dredging Co. are building a large new dredging machine, to cost \$30,000.

WM. GIBSON, of Boston, has opened a quarry in the black granite district of Bocabec, N.B.

IT is stated that smelting works will before long be established on the western side of St. John, N.B., harbor.

F. H. MASON, the mining expert, Truro, N.S., has returned from a trip to England.

JOHN RICHMOND has discovered a vein of silver four inches thick on an island which he owns in Lake Rosseau, Muskoka.

A NEW ore washer has been erected at the Pictou Charcoal Iron Co.'s works.

A BRICK of gold, weighing 96 oz., has just been taken out from the Ballou mine, Malaga, N.S.

A RICH strike of high-grade ore has been made on the Hillside claim in Jackson basin, near Kaslo.

ASSAYS show \$94 of gold to the ton, from ore taken from the Carscallen property, about eight miles west of Marmora, Ont.

GOLD is reported to have been discovered near Nappan by a number of Amherst people.

THE Cochran Hill, N.S., Mine Co. have just put in a good deal of new machinery.

MR BAUMGARTEN, representing some English capitalists, is inspecting some mining properties in the neighborhood of Kingston, Ont.

THERE is talk of forming a joint stock company for the purpose of prospecting for and developing the anthracite coal beds in the James' Bay region.

A RICH vein of chrome iron has been discovered in D'Israeli Township, near Sherbrooke, Que., and samples are so satisfactory that already American capitalists are making offers for the property.

THE Ontario Government will purchase two diamond drills for use in mining exploration. One will be kept in Toronto, the other at Port Arthur or Rat Portage.

J. E. PETTIS, of Port Greville, has purchased the Taggart farm at Green Hill, which contains a large and good plaster deposit, for \$8,000. A wharf will be built on the property.

THE *Canadian Colliery Guardian* says that the Massachusetts Institute of Technology has sent a party of mining students to study the Waverly gold field and the Sydney coal field.

SOME American capitalists have leased 4,000 acres of land from the Canada Company, just north of Thedford, Ont., and have given a contract to a Petrolia firm to sink wells for petroleum.

WORK has been going ahead at the Russell mine on Calumet Island, and a considerable quantity will be shipped to the States this summer.

THE Drury Nickel Company of Sudbury, Ont., is being wound up. Liabilities \$61,000. Assets, consisting of plant, machinery, nickel, etc., estimated at \$100,000.

IT is intended to construct another long siding at the Joggins Bay mines, so as to increase the shipping facilities to the wharves one of which will be raised.

THE Summer School of Mining in connection with Massachusetts Institute of Technology will hold its session this year at Eastis, Que.

THE stock of asbestos is being depleted in England and the United States, and there is renewed activity in the Quebec asbestos mines.

THE Petrolia *Topic* argues in favor of the Government reducing the flash test of Canadian coal oil from 90° to 85°. This would enable the refiners to extract about half a gallon more high-quality oil from each barrel of crude material.

ABOUT a hundred men are now employed at the Torbrook iron mines, N.S., the superior quality of the ore meeting with increasing appreciation.

THE C.P.R. salt well (No. 2) at Windsor, Ont., is now turning out about 700 barrels per day, the obstruction having been removed.

J. W. Y. SMITH, F. P. Reid and Wm. Hood, of Moncton, are preparing to operate more fully the manganese mine at Hopewell Hill, near Albert, N.B. The ore sells at \$80 per ton.

H. A. BROWN and others have made application for a mile of placer ground, about eight miles from Trout Lake on the South Fork.

A LEAD mine has been discovered on Cedar Creek, near Boundary, B.C., which shows a vein $6\frac{1}{2}$ ft. wide, the ore running 75 per cent. lead and some silver.

J. A. CAMIRAND, an advocate, of Sherbrooke, Que., has discovered a vein of mispickel on his farm, which is said to give richer results than the famous Hungarian mines.

THREE owners of iron ore properties have already applied to the Ontario Bureau of Mines for the use of the new diamond drills which it is proposed to purchase.

THE Dominion Coal Co. will pay this month a dividend of $4\frac{1}{2}$ per cent., being at the rate of 8 per cent. per annum on the preferred stock of the company.

SOME Americans, under the leadership of Mr. Griffin, New York, are preparing to bore for oil in Belliveau's village, Memramcook.

THE Ontario Mica Co., Toronto, have discovered a valuable deposit of sienna on their property near Peterboro'. The vein is reported as 90 feet wide.

JOHN GREENER and a party of prospectors appointed by the Dominion Coal Co., are starting on a tour along the coal crops from Victoria to Port Morien.

A RICH find of gold and copper ore has been made near the town of Parry Sound. It varies in width from one to three feet and is traceable for nearly 4,000 feet.

THE Drummond Colliery, Westville, expects that this season's output will, at least, equal the last. As last season was the best in their history, this looks well for this year.

It is proposed to construct a bridge over the river, to join Minnesota and Ontario, so as to have a road by land from Fort Francis to Rainy Lake City.

A LOAD of baryta has been obtained from McKellar's Island, near Port Arthur, Ont. It will be sent to Duluth, where it will be ground and mixed with white lead.

THE Copper Creek Mining Co. are going to hasten development work on their property at Point Mamainse, Ont. A shaft, which at present is down about 300 feet, will be continued.

ROBT. HALL and John A. McPhee have discovered rich indications of gold in the neighborhood of Sheet Harbor, N.S., and have taken up 100 acres in the Mines' Office. Other parties are now doing likewise.

DEVELOPMENT work on the "Lucky Boy," Slocan district, is progressing. The tunnel now runs about 300 feet. A chute of clear galena ore runs from 15 to 18 inches in width. The other ore averages 150 oz. of silver and 77 per cent. lead.

W. S. HOGG, of Montreal, has been organizing a company for developing a fine gold property about 120 miles from Vancouver, B.C. The capital stock is \$1,000,000, mostly subscribed by eastern capitalists.

MR. MOREHOUSE, of the Hamilton smelting works, says that about 90 per cent. of the ore used in the furnaces will be Canadian. The other 10 per cent. will be American. Lake Superior ore and the combination, it is believed, will have a very good effect.

THE Victoria Gypsum Mining and Manufacturing Co. (Ltd.), Port Bevis, C.B., have resumed work at their quarries. They have engaged the services of Chas. E. Hobart, of Windsor, N.S., as foreman.

THE Kingston and Pembroke Iron Mining Co. have re-elected the following as officers: President, Henry Seibert; vice-president, B. W. Folger; treasurer, J. D. Fowler; secretary, Geo. Osborne; and general manager, W. G. Pollock.

MR. PELOQUIN, of Wahnapiatae, has sold his three-quarter interest in a gold property near Lake Wahnapiatae to J. Riopelle, of Ottawa. This is hoped to be the precursor of several other changes of property in the Sudbury region.

AT Kaslo, recently, a public meeting was held for the purpose of promoting a company to build a smelter in that city. W. O. Clymo, D. C. McGregor, R. F. Green, G. O. Buchanan and J. B. McArthur are interested.

O. D. HOAR, of the Cariboo and Kootenay Mining and Prospecting Co., has taken up a mile and a-half of the Lardeau River adjoining Trout Lake. The company will spend a good deal of money in building a dam and flume, in order to work the river bed.

BRADEN BROS., of the United States Public Sampling Works, Helena, Mont., think of establishing sampling works near Kaslo, B.C. They will also erect ore storage houses, and introduce modern crushers, rolls, elevators, etc.

W. G. MOTLEY, F.R.G.S., of London, Eng., representing the Rajah Mine Co., is making a thorough examination of the ground at Rat Portage, with a view to the resumption of active operations at an early date.

A VAST deposit of gold-bearing quartz, one mile by two in length, is said to have been discovered between Port Arthur and Rat Portage, twenty miles south of the C.P.R. Assays average \$4 in silver and \$8 in gold.

THE Hale mines, Nelson, B.C., district, now employ forty men, and more will probably be in requisition when the expected new machinery is installed. Several applications for leases have been recently made for ground in the vicinity of these mines.

IN the Lincoln mine near Kaslo, B.C., more than seven feet of galena and carbonates are in sight on the upper level. Three hundred feet of tunnel have already been run, and work is still actively going on.

CHARLES BRENT is adapting the old smelting plant near Tower Bay to the manufacture of barytes, which is obtained from a small island near Port Arthur. The vein is 75 feet wide, and the barytes sells from \$12 to \$25 per ton, according to purity.

CAPT. PETER PASCOE, on the behalf of some Milwaukee capitalists, is examining the Michipicoton mine, located on Michipicoton Island in Lake Superior, with a view to working it.—*Canadian Colliery Guardian*.

THE Dominion Government are taking steps to ascertain the extent of the petroleum deposits in the Athabasca district, north of Edmonton. A. W. Fraser, of Toronto, and an exploring party will make a trip of exploration to Athabasca Landing and Pelican Lake, and will make borings in the vicinity.

C. F. LAW, the B. C. commissioner at the World's Fair, is reported to have discovered in British Columbia a deposit of kainite. This is a valuable discovery, as the mineral is used extensively both as a fertilizer and as an ingredient of several drugs and acids.

MESSRS. PARKER AND LEAVENWORTH, of Seattle, representing a New York syndicate, will take over a large amount of placer ground adjoining Fort Sheppard, and running south for two miles along the Columbia River. They will construct a \$30,000 ditch to convey water on to their property from Cedar Creek.

THE owners of the Silver Cup on the Lardeau have been doing development work. They are well pleased with the continued improvement, and hope soon to be able to ship out some of the ore they have on the dump. The ore assays, it is said, from 300 ounces to 1,100 ounces of silver to the ton.—*Victoria Colonist*.

THE Canadian Pacific Mining and Milling Co., Minneapolis, Minn., have been incorporated in British Columbia, to engage in mining, smelting, etc. Capital stock, \$500,000. Active work is being commenced on Woodberry Creek, near Ainsworth, and machinery is being erected.

THE North Star Mining Co. (Ltd.) are applying for incorporation, in order to carry on mining operations in East Kootenay and elsewhere. The capital stock is \$100,000, and the applicants are J. M. Browning, E. Pease Davis and Chester B. MacNeill, of Vancouver.

THE granite required in the construction of Port Orchard, Wash., dry dock will all be obtained from the Nelson Island, B.C., quarry. It is not improbable that the same stone will be used for building the sea wall of the new canal which is to connect Lake Washington with the sea at Seattle.

THE mine at Eustis, Que., is at present only employing about one-third the usual force, and little or nothing is being done at the other mines in the vicinity of Capelton. Many of the hands have left for other points. Owing to this depression in the mining industry, the publication of the Capelton *Miner* has been discontinued. We regret to hear of this, as the *Miner* was an ably edited journal. We trust that its editor will, before very long, see his way to resuming publication.

THE owners of the Bocabec, N.B., black granite quarry have made an arrangement with a syndicate, headed by Gen. S. D. Leavitt, of Eastport, whereby the latter will erect a building and purchase plant at Eastport for the polishing of granite. The question of establishing such works near the quarry had been under consideration, but this will now be postponed for some time.

ACCORDING to the report of experts, the cannellite deposits at Baltimore, N.B., are likely to prove of value, and it is estimated that there are nine million tons which can be mined above water-level drainage. There are outlets at present sufficient for a daily output of 1,000 tons. W. F. Wortman, of Salisbury, the owner of the property, is projecting a line of railway to the mines, and hopes to proceed very soon with their further development.

THE classes in mining at the Kingston School of Mining and Agriculture open on October 2nd. The Prospectors' Course for mine foremen, assayers, prospectors and mining men generally begins on January 8th next, and continues for eight weeks. It will include lectures on chemistry, mineralogy, geology, lithology, the discovery and mining of ores, milling, blow-piping, assaying, drawing, etc., with practical illustrations.

THE Baltimore Coal Mining and Railway Company, headquarters Hillsborough, N.S., capital stock \$300,000, are seeking incorporation. They purpose constructing a railway from Baltimore mines to some point on the Petitcodiac River. Charles and B. Archibald and F. Steeves are among the incorporators. They ask for exemption from taxation for ten years, and power to issue bonds to the amount of \$10,000 per mile of the railway.

A COMPANY has been organized to develop the extensive marble deposits at Marble Mountain, on the Bras d' Or Lake, C.B. R. Macdonald is president; G. E. Francklyn, vice-president; Geo. Hattie, secretary-treasurer; and D. MacLachlan, manager. A steam channeling machine, mill machines, and castings for derricks are on the ground, and active operations have been commenced.

THE Windsor, N.S., Gypsum Co. now have about thirty men at work taking out large quantities of plaster. They have purchased the right of way for a railway from the quarry to a shipping point near Wentworth, and they may possibly soon build a line. They are now building a wharf at Windsor, where vessels will receive the plaster direct from the cars, thus effecting a considerable economy in shipment savings.

THERE is another strike at the Jiggins Coal Mine. It arose from the fact that the company refused to protect their men from the legal process known as a garnishee order, by which their wages may be "attached" at the order of the court. The men notified that unless the company would guarantee the overlooking of such legal orders, they would strike, but the company could not see its way clear to do this.

THE St. John's, Newfoundland, *Herald*, says: "James R. Hayes, president of the Port-au-Port Asbestos Co., has been visiting the Canadian asbestos mines for information that will help him in the working of the company's property at Lewis Hills. Mr. Hayes has been all through the Thetford and Black Lake District, and saw no surface indications which could compare with those of the Lewis Hills. A competent manager has been engaged, and work on the mine began last month.

THE Lincoln Gold Mining & Milling Co., which has taken in hand the development of the "Victor" gold mine and other property in the Gold River, N.S., district, has appointed officers as follows: President, Benjamin Heath, Boston; vice-president, W. E. Barrett, Melrose, Mass.; secretary-treasurer, Benjamin L. Heath, Melrose, Mass.; manager of works, Don C. Butterfield, New York. The yield from the quartz is claimed to be \$20 to the ton. The company is to be capitalized at \$250,000.—*Canadian Colliery Guardian*.

AT No. 2 slope of the Jiggins mines, two Lancashire boilers 30 feet in length have been installed. The present output here is 400 tons per day. At No. 3 slope two more boilers of the same size are to be erected. These boilers are built by the Robb Engineering Co., Amherst, N.S. The *Journal-News* says the coal from No. 3 will be conveyed from No. 3 to No. 2, the boxes running on a trestle. A new lift will be sunk as soon as steam is up in the new boilers at No. 2. This will carry the slope down to 2,700 feet, its present length being 2,300. Some seventy pairs of cutters are employed. The total number employed by the company is three hundred, a large number of whom are employed in construction or new work.

THE Rat Portage Mining Co. are going ahead with development work on the "Black Jack" gold mine with satisfactory

results. The shaft has been sunk to a depth of 90 feet, and is about 10 feet by 5 feet. In one place, says the *Canadian Colliery Guardian*, a vein of 21 feet wide has been uncovered. Assays run, it is reported, from \$5 to \$400 per ton. The company hope to develop about 750 acres of mineral lands which they own in the vicinity, and will bring the product to the reduction works at Rat Portage formerly owned by the Lake of the Woods Gold and Silver Mining Co. These works they will equip as a ten-stamp mill with a chlorinator plant of ten tons capacity per day, at a cost of about \$20,000.

A CORRESPONDENT of the Montreal *Herald* reports on the mining prospects of the Ottawa district as follows: With one exception, the present prospects cannot be said to be very bright. Little mica is being taken out, because of the absence of appreciable demand. The tariff levied upon the useful mineral in the United States, the principal market for it, also operates as a depressing factor. The phosphate industry, once so prosperous, is practically at a standstill, the only mine now worked being that of High Rock, near Buckingham. The output, however, is small; and it is nearly all taken by the English Fertilizing Company, who are the proprietors. That there should have been so large a falling off in the export to the United States and to the United Kingdom is easily explained. In Florida, which supplies these two important markets, phosphate can be put in the boats at about \$3 a ton. It costs from \$10 to \$12 a ton to put it in the boats at Montreal. The exception is plumbago, which the Canada Plumbago Mining Company are taking out in large quantities and exporting with profit. For this mineral there seems to be a cheering outlook. It appears that in the United States there is only one small plumbago mine, which is situated at Ticonderoga, in the Adirondacks. Outside of this mine the American market has to look to Canada or Ceylon for its supply. Quality being equal, the great distance of the latter country must tell largely in favor of the Canadian article.

Personal.

ALEXANDER DICK, C. & M. E., has entered upon his duties as business manager and associate editor of the *Canadian Colliery Guardian*.

R. C. BROWN has resigned the position of electrical engineer to the West End Street Railway of Boston, in order to accept a similar position with the Montreal Street Railway Co.

HENRY BERTRAM, of the firm of John Bertram & Sons, machine tool makers, Dundas, is now in England as one of the Canadian crack shots at Bisley.

E. B. EDDY, the manufacturer of wooden goods, matches, paper, etc., of Hull, Que., was last month married to Miss Shirriff, daughter of John Shirriff, High Sheriff of Northumberland county.

J. J. LANNING, the popular assistant general manager of the G. T. R., went last month for a short rest to Caledonia Springs. His friends wanted to give him a public banquet, but he modestly slipped out of that "onerous honor."

HENRY F. PERLEY has been appointed to a position in the office of the Public Works Department. He formerly held the position of Chief Engineer, but was dismissed after the investigations into the Quebec Dry Docks contract. Mr. Perley has had the sympathy of a great many friends.

R. E. H. BUCHNER, agent for machinery and railway supplies, Toronto, has just returned from an extended trip through Manitoba, the Territories, British Columbia, and the Hawaiian Islands. Mr. Buchner reports many enquiries for Canadian and English machinery during his long trip.

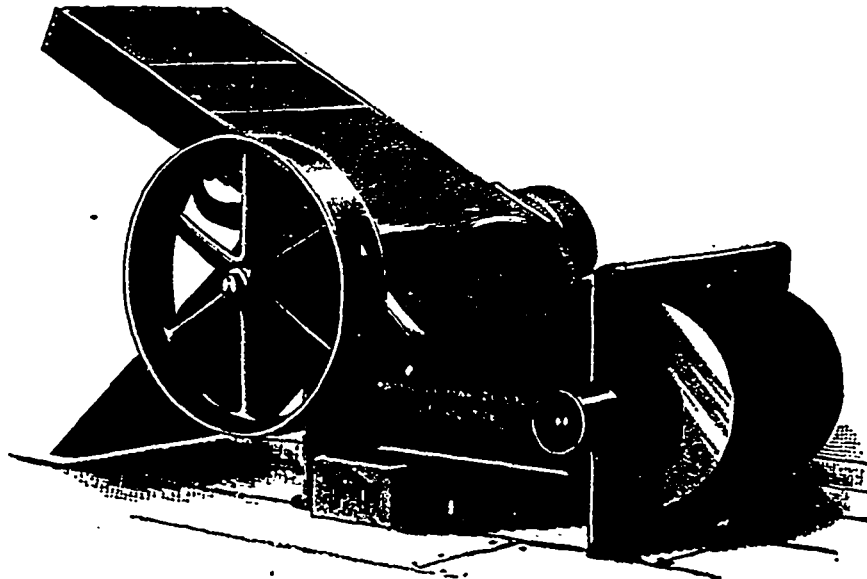
C F PERRY, second son of William Perry, the well known hydraulic engineer, of Montreal, has left for Honolulu, where he will take charge of the pattern-making and drawing section of the school for training the natives in different trades. Mr. Perry, jr., learnt his profession with Garth & Co., Montreal, after which he went to Worcester, Mass., where he worked as tool maker for the Crompton Loom Works. He then went to the Technical College, in that city, but found he required a different role as far as education was concerned, and decided to take a course at Cushing Academy, Ashburnham, Mass. There he spent three years, receiving his diploma with honors. He at once returned to the Technical College, where he studied as a mechanical engineer, and returned to Montreal a few days ago, after another three years hard work, with his diploma as Mechanical Engineer and Bachelor of Science.

WILLIAM FREDERICK MACLAREN, eldest son of Major MacLaren, of Hamilton, Ont., has finished his study at Cornell University, and now has the degree of Mechanical Engineer.

GEORGE BRUSH, of the Eagle Iron Foundry, Montreal, was on the evening of the 29th ult. thrown out of his buggy, owing to a collision with an electric car. He was at once removed to the general hospital, where his injuries were attended to. We are glad to be able to state that Mr. Brush, a day or two later, had so far recovered as to render a further stay at the hospital unnecessary, and he was taken to his home.

THE WOODRUFF PATENT SEPARATING MACHINE.

The Woodruff Patent Separating Machine here illustrated can be set up and started by any ordinary mechanic. It can be successfully operated by any laborer who is intelligent enough to ship a belt, use an oil can and shovel the refuse into the screen or hopper. If you are not equipped with cinder barrel, the saving effected by this machine in connection with such a barrel will pay for both in a short time, in spite of present low price of iron. It is an ingenious combination of vibrating screen and fan for extracting all shot and other small iron from foundry refuse. It occupies ground space about 4 x 8 feet, requires about 1½ to 2 H. P. to drive it, and can be set up anywhere, in doors, or out under shed, where power may be had, preferably near the cinder barrel. Best results are obtained by having openings in cinder barrel 1-4 or 5-16 inch. A barrowful of refuse will pass through the separator in three or four minutes, all the iron being deposited in box provided for it, and all other materials thrown to rear of machine.



WOODRUFF SEPARATOR.

The inventor and patentee of "The Woodruff Patent Separating Machine" has sold a large number—nearly two hundred—solely by personal visits and representation. The Hamilton Facing Mills Company, Hamilton, Ont., the manufacturers, have received many letters commending this machine from malleable iron manufacturers, stove manufacturers, hardware manufacturers, and general iron founders.

DOBBIE & STUART.

As mentioned in a recent issue, the firm of Dobbie & Stuart, the well known founders and machinists, of Thorold, Ont., have not only built up a large business in Canada, but have made their enterprise felt on the other side of the line, where they have a foundry and machine shop at Niagara Falls, N.Y. From a recent issue of a Niagara Falls paper, we learn that their plant on the New York side of the river is situated close to the N. Y., L. E. & W. R., and their establishment consists of five separate buildings. The machine shop is a two-storey building 40 x 60 feet: another building is devoted to forging and blacksmithing work, and another to the foundry, and still another to machine work. Steam being the motive power, there is a large engine-room and boiler-house; but it is proposed to introduce electricity. The foundry alone, when working to its full capacity, will employ 50 hands. This firm make a specialty of contractors' plant, such as derricks, dredges, hoisting engines, etc.; but they do general mill and machinery work, both at their large Thorold establishment and in

their new American works, and have an excellent reputation for high-class work. They have added to their plant a Poole grinder for the regrinding of paper calendar rolls, etc. This machine will grind any sized roll from a flour mill roll to the largest size of paper mill roll now in use, which is 136 inches long.

The Patent Review.

- 45,041 Wm. P. Bement, Worcester, Mass., die for rolling screw threads.
- 45,043 Henry G. Bentley, Philadelphia, Penn., electric cable.
- 45,044 Peter V. Pettier, Ottawa, machinery for rolling glass.
- 45,046 Ewald Bellingrath, Dresden, Germany, apparatus for the propulsion of ships.
- 45,047 Frederick H. Heath, Minneapolis, Minn., means for manufacturing rail joints.
- 45,048 John Pratt, Chatham, Ont., excelsior cutting machine.
- 45,051 John Evans, Toronto, Ont., car coupler.
- 45,053 Benjamin A. Burgess, Hamilton, Ont., lubricator.
- 45,054 George W. Mallory, Harwich, Ont., door spring.
- 45,055 Lafayette D. Railsback, Indianapolis, Indiana, rotary plough.
- 45,057 Wm. Taylor, Carman, Man., threshing machines.
- 45,059 Fessender C. Butterfield, Minneapolis, Minn., method of and apparatus for separating volatile metals from other commingled gases.
- 45,064 Wm. H. Bastin, Murphysboro, Ill., method of measuring vessels.
- 45,065 Copran J. Hall, San Francisco, Cal., hydraulic elevator.
- 45,067 John Bell, Toronto, Ont., wheel.
- 45,071 Milton Walter Keene, Dallas, Texas, furnace.
- 45,072 Harry Ellis, St. Catharines, Ont., art or process of manufacturing leather ropes and belts.
- 45,075 Isaac Miles, Hamilton, Ont., automatic fire escape.
- 45,080 Septimus R. Campbell, Toronto, Ont., boiler for ranges.
- 45,081 Samuel Otis Jones, Stillwater, Minn., piston valve.
- 45,083 Mark W. Dewey, Syracuse, N.Y., electric heating apparatus.
- 45,084 Benjamin Hewitt, Birmingham, England, machinery for the manufacture of shells, vessels and tubes.
- 45,085 Charles W. B. Lyall, Toronto, Ont., pilot for street railways.
- 45,087 Hugh Johnston, Toronto, Ont., plough.
- 45,090 Wm. A. Sims, Stonewall, Manitoba, seed drill.
- 45,091 Thomas Gill, Clerkheaton, York, England, reflector for gas.
- 45,094 George W. Robertson, Haverstock Hill, England, station indicator.
- 45,095 James H. Paterson, Ingersoll, Ont., screw cutting lathe.
- 45,097 Walter H. Scott, Toronto, Ont., electric railway brake.
- 45,098 Orvin B. Peck, Chicago, Ill., ore separator.
- 45,099 George W. Lewis, Chicago, Ill., gas engine.
- 45,102 Robert Learmonth, Buffalo, N.Y., apparatus for supplying purified water to locomotives.
- 45,103 David Macdonald, Toronto, Ont., process of making air-tight covers for tins.

- 45,105 Wm. P. Sweetland, San Francisco, Cal., nut lock.
 45,106 Sberald O. Cowper Coles, London, England, metallic coating.
 45,107 Edward A. Barber, Watertown, N.Y., electric current controller.
 45,108 Longley Lewis Sagendorph, Philadelphia, Penn., metallic ceiling plate. (Two patents.)
 45,115 Charles Knapp, St. Louis, Miss., car ventilator.
 45,117 Alfred F. Slyker, Wilkesbarre, Penn., valve.
 45,121 Burt E. Tilden, Chicago, Ill., car replacer and hose-bridge.
 45,125 Frederick H. Sprang, Wallington, England, pneumatic tire.
 45,127 Thos. J. Williams, London, Eng., pneumatic tire.
 45,128 Samuel Benstein, Chicago, Ill., water heater.
 45,129 Marcus E. Ellsworth, Hudson, Ohio, apparatus for operating car brakes.
 45,130 James A. Mahood, Victoria, B.C., railway car axle.
 45,133 Frank J. Buff, Milwaukee, Wis., thill coupler.
 45,135 Josef Nagel, Chemnitz, Germany, apparatus for obtaining distilled and sterilized water.
 45,137 John La Burt, Brooklyn, N.Y., car coupler.
 45,138 Andrew J. Chindler, Chicago, Ill., reversing and cut-off mechanism for steam engines.
 45,139 Andrew Blackburn, Boston, Mass., machine file.
 45,142 Alfred T. Eleford, San Francisco, propeller for ships.
 45,145 William H. Russell, Vancouver, B.C., grip for cars.
 45,146 Charles F. Lavender, Toronto, Ont., wheel tire.
 45,147 Wm. F. Richards, Buffalo, N.Y., car coupler.
 45,148 Carman Frost, Hewletts, N.Y., car coupler.
 45,151 Stanley C. Peuchen, Toronto, Ont., method of and apparatus for vaporizing petroleum.
 45,153 Carleton W. Conner, Toronto, Ont., metallic shingle.
 45,154 Otis Jones, Atlanta, Georgia, steam generator.
 45,155 Joseph A. Coombes, 46 Southampton Buildings, Holborn, London, Eng., machine for separating gold from gravel.
 45,157 Edward A. Parson, Ottawa, Ont., electric fuse box.
 45,158 J. B. Vernay, 31 Rue de l'hotel de ville, Lyons, France, method of and apparatus for making glass articles.
 45,160 Geo. Fortin, W. don, Que., card cutting machine.
 45,161 Thos. H. Noxon, Ingersoll, Ont., harvester.
 45,163 John J. Weinert, Neustadt, Ont., water level alarm.
 45,165 John Bell, Nelson, B.C., feeder for saw-mills.
 45,168 Henry Tinkin, St. Louis, Miss., vehicle spring.
 45,169 Guillaume D. Lamarche, St. Brigide d'Iberville, Quebec, car coupler.
 45,170 Albert J. Kletzker, St. Louis, Miss., matrix-making machine.
 45,173 Justin C. Page, Independence, Miss., non-telescopic railway cars.
 45,174 Isaac Wantling, Peoria, Ill., coal mining and coal cutting machine.
 45,175 Longley L. Sagendoyh, Philadelphia, Penn., metallic ceiling plate.
 45,177 James Comaco, Port Arthur, Ont., traction engine.
 45,179 George A. Macnutt, Melbourne, Victoria, Australia, screw.
 45,180 Charles E. Tewitt, Ravenna, Ohio, friction clutch machine.
 45,182 Kennet W. Blackwell, Montreal, Que., safety device for railway crossings.
 45,184 Arthur Sampson Barwick, Montreal, Que., arm rest telephones.
 45,186 George Johnston, San Francisco, Cal., ore concentrator.
 45,189 George H. Burrows, Scmerville, Mass., carburetting machine.
 45,191 John Allan McMaster, Orangeville, Ont., harvester.
 45,192 John W. Clark, Montreal, Que., trolley wheel.
 45,193 John D. Gregory, Bertha, Manitoba, engine.
 45,194 Robert Donaldson, Montreal, Que., heater.
 45,200 Daniel Jacobs, Dighton, Kansas, improvements in snow ploughs.
 45,204 George Wilhelm Von Siemens, Berlin, Germany, conductor system for electric railways.
 45,205 John Stephen Monaham, Toronto, Ont., maintaining the current of electricity in the trolley system.
 45,207 Michael Joseph Wolfe, Hamilton, Ont., safety apparatus for electric street railway cars.
 45,209 John J. Schairer, Clint, Texas, car coupling.

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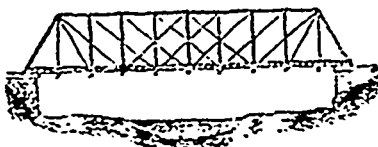
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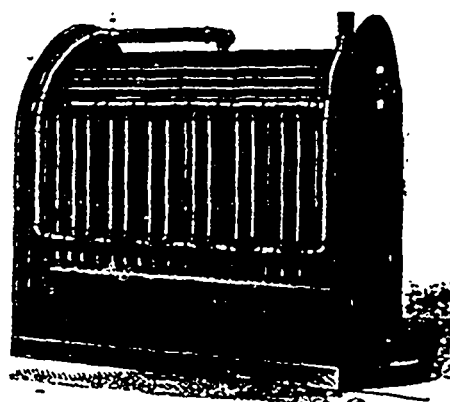
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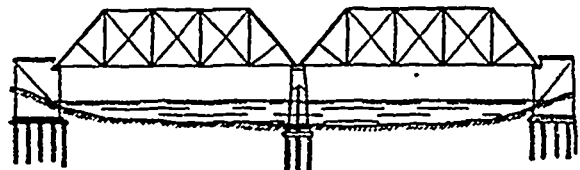
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Surveys, Plans, Estimates, etc., or Railways, Bridges, Drainage, Waterworks, etc. Construction Superintended

- 45,221 Stanley Cooper Peucker, Toronto, Ont., apparatus for refining acetic acid, also, 45,222 for concentrating or vaporising sulphuric and acetic acid, and apparatus therefor
- 45,223 William Adams, Broken Hill New South Wales, compound for and manufacture of high explosives.
- 45,224 Alfred William Palmer, New York, means for making borings at the bottom of deep waters and in tide ways.
- 45,225 Anthony Recksnauz, London, England, electric meter.
- 45,227 Daniel K. Slawson, Manitoba, Man., car coupling.
- 45,228 Charles Carter, Ipabah, stamp mill and amalgamator.
- 45,234 Clinton M. Ball, Troy, N.Y., ore separator.
- 45,237 Wm. Henry Kirby, Vancouver, B.C., adjustable clamp tire tightener.
- 45,242 Henry Hagelstein, San Angelo, Texas, hoisting device.
- 45,244 James Wright, Montreal, P.Q., stroke reducer for engine.
- 45,250 John J. Bordman, Brooklyn, N.Y., pulverizing machine.
- 45,252 Frederick Egge, Bridgeport, Connecticut, machine for making cable chains.
- 45,253 A. Bertzell Ireland, Greene, N.Y., machine for making shingles.
- 45,257 Orville Ruselle Sacket, Niagara Falls, N.Y., coupling for fire hose.
- 45,260 David G. Cross, Berlin, Ont., car-coupler.
- 45,264 Lafayette D. Railsbach, Indianapolis, Ind., rotary plough.
- 45,268 Julius Begtrup, Ridgeway, Pennsylvania, governor for steam engine.
- 45,270 Wm. J. Butler, Woodstock, Ont., signal for railways.
- 45,276 Spencer D. Thurston, Camden, N.J., indicator for steam-boats.
- 45,277 Frederick Sandford Seymour, Lake Geneva, Wis., wrench.
- 45,281 Oféré Leblanc, Montreal, Quebec, manufacture of artificial stone.
- 45,283 Paul Sattlekan, Pennsylvania, water elevator.
- 45,284 Harry T. Johnston, New York, galvanic battery.
- 45,285 Richard B. Painter, Williamsport, Pennsylvania, ship.
- 45,286 Ogden W. Dean, Chicago, Ill., brake for railroad cars.
- 45,291 Jerry Foley, Syracuse, N.Y., wrench.
- 45,298 Eugene Guay, St. Henri, Montreal, Que., machine for waxing leather.

- 45,300 Charles T. Stagg, jr., Philadelphia, Pennsylvania, rail joint.
- 45,301 Ira Nappin, Farmington, Ill., nut-lock.
- 45,308 Timothy C. VanWyck, Brooklyn, N.Y., mechanical movement.
- 45,310 Charles A. Schultz, Rondout, N.Y., brick mould.
- 45,311 Edwin Stancliff, New York, N.Y., nut lock and shaft coupling.
- 45,314 Louis Pfingst, Boston, Mass., car fender.
- 45,315 Wm. S. Reed, Marshalltown, Iowa, water heater.
- 45,316 Montague H. C. Shawn, Brisbane, Queensland, Australia, water tube boiler.
- 45,317 Elishu Gray, Highland Park, Ill., telautograph (five patents).
- 45,324 Clarence Otis White, Minneapolis, Minnesota, wire coiler.
- 45,325 Daniel Murray, Salem, Boston, Mass., thill coupler.
- 45,326 James McAllister, South Ministique, Mich., off setting device for saw-mill carriages
- 45,332 Granville White, Moreland, Victoria, Australia, smoke consuming furnace.
- 45,333 John A. Manning, Toronto, Ont., Excelsior manufacturing machines.
- 45,335 Richard Megson, Cambridge, Mass., machine for making cakes and confections
- 45,336 John B. Walton, Toronto, Ont., ventilator and check for furnace.
- 45,338 John Beaumont Hopkins, Montreal, Que., sand sprinkler for electric cars.
- 45,341 Wm Rattray, Richmond, Quebec, process of treating ores, etc.
- 45,344 Wm. H. Brand, Wiaona, Ont., wagon brake.
- 45,345 Wm H. Finlayson, Sydney, New South Wales, Australia, earth excavator.
- 45,346 Hippolyte J La Force, Toronto, Ont., wheel tire.
- 45,347 Edward Ferris Millard, Jackson, Michigan, sulphite fibre separator.
- 45,348 Charles A. Hussey, New York, incandescent lamp.
- 45,349 Charles W. Stickney, Ketchum, Idaho, process of roasting ores.
- 45,359 Wm. Richard Barrett, Passaic N.J., pneumatic tire.

Wm. McMillan, Mgr. Jno. S. Tower, Supt. H. S. Burrell, Sec.-Treas.

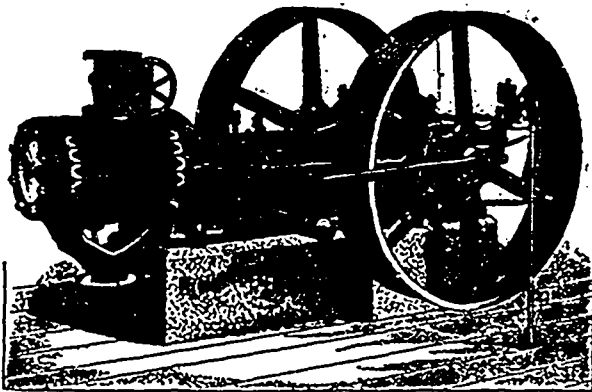
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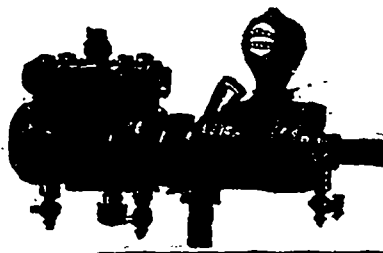
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 45.364 Wm L. Carr, Blanchard, Iowa, car mover.
 45.372 George Wolverton Collin, Atlanta, Georgia, arch support, water purifier and heater.
 45.373 Herman Bunker, Barrie, Ont., clutch pulley.
 45.374 Robert Bloom, Muchfeith, Indiana, rail joint.
 45.377 Jean D. Oligny, St. Henri, Montreal, artificial fuel.
 45.379 Thomas Harding, San Jose, Cal., rotary engine.
 45.380 David Risley, Colfax, Washington, steam boiler.
 45.382 Abner F. Erskine, Bowling Green, Ohio, generator for gas.
 45.384 David M. Williams, Edwardsdale, Penn., chain.
 45.385 John Mohlberg, New York, brick.
 45.387 Wm. Houghton, Paris, Ont., wrench.
 45.397 Frederick K. Caswell, Hartford, Conn., heater.
 45.393 John D. Dixon, Birkly, York, Eng., detonator holder.
 45.399 Job Tröp, Westerlev, Rhode Island, heater for water.
 45.402 Lyman A. Cheney, New York, vacuum pump.
 45.403 Frank A. Williams, Alhambra, Cal., button fasteners.
 45.404 Wm Cronk, Havana, N. Y., hand rake.
 45.407 Hiram D. Layman, Little Rock, Arkansas, automatic railway pumping machine

AMERICAN PATENTS.

The following patents have been issued at Washington to Canadians:—

- Geo. L. Ballard, Toronto, secondary battery, No. 517,018.
 Robt. Connell, Osprey, Man., grain shocking machine, No. 517,095.
 Wm. F. Doll, Winnipeg, ring-gage, No. 517,096.
 Chas. E. Jewell, Toronto, inkstand, No. 517,384.
 Jos. Oldfield, Toronto, duplicating check-book, No. 517,359.
 Wm. Y. Rochester and J. McArthur, Ottawa, dynamite, No. 517,396.
 N. J. and D. C. Watters, Ottawa, wrench, No. 517,074.
 Richard H. Casswell, London, milk purifier, No. 517,814.
 Jean F. Chazotte, Montreal, smoke-consuming furnace, No. 517,540.
 Wm. McCloskey, Essex, Ont., harvester, No. 517,654.
 Wm. McCloskey, Essex, Ont., harvester, No. 517,655.
 Wm. J. Still, Toronto, electric motor, No. 517,669.
 Wm. J. Still, Toronto, electric motor, No. 517,668.
 John M. McLeod, Goderich, remedy for certain named diseases, No. 24,467.
 Geo. Hay, Pictou, N. S., chalk-sharpener, No. 517,922.
 Wm. Hull, Souris, P.E.I., combined drag bar cultivator and drill, No. 517,925.
 Ernest LeSueur, Ottawa, electrolytic cell, No. 518,040.
 Chas G. Richardson, Toronto, refining nickel and copper mattes, No. 518,117.
 Wm. A. Clark, Toronto, machine for bottling milk, No. 518,306.
 Geo. Fee, North Bay, Ont., refrigerator, No. 518,233.
 Louis Jobin, Quebec, blind stop, No. 518,368.

- James R. McLeod, Calgary, Alta., bridle, No. 518,423.
 Geo. D. Hamilton, Innisfail, Alta., metal fence, No. 519,573.
 Thos. Walsh, Montreal, attachment for shovels, spades, &c., No. 519,515.

GERMAN PATENTS.

Compiled at the patent and technical office of Brockhues & Co., Cologne, for THE CANADIAN ENGINEER. Information referring to these lists given free of cost to our subscribers.

Cut-off apparatus with oscillating ball-valve for water-gauges; Anton Backhaus, Cologne.

Washing machine; Adam Schmidt, Saalfeld.

Spring-bearings for carriages with free sliding axle; railway carriage and machine works, Van der Lypen and Charlier, Cologne-Deutz.

Electric machine with fixed wire spools; Otto Diepenbach Endorf, near Alsfeld.

Knife-grinding and cleaning machine; Julius Funke, Berlin.

Horizontal boiler with Field tubes and partition receiving the inner tubes; W. H. Walther, Cologne-Deutz.

Protective apparatus for incandescent bodies; Th. Buire, Cologne.

Window-fasteners; Chr. Lammerich, Wesseling.

Stove for heating the igniting tubes of petroleum and similar engines; F. W. Gilles, Cologne.

PATENTS procured for Canada, United States, Great Britain, etc. **Fetherstonhaugh & Co.**, Patent Barristers, Solicitors and Experts, Bank of Commerce Building, King Street West, Toronto.

BROCKHUES & CO., COLOGNE, Germany
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PATENTS in Germany and Abroad.
INTERNATIONAL TECHNICAL OFFICES
 REFERENCE: AMERICAN CONSULATE, COLOGNE

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 JOHN G. RIDOUT, Barrister, etc. (late C.E.) 103 Bay Street, Toronto
 J. EDW. MAYBEE, Mechanical Engineer.

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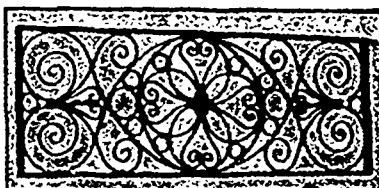


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