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The Canadian Engineer

Vol. I.—No. 4.

TORONTO AND MONTREAL, AUGUST, 1893.

PRICE, 10 CENTS
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The Canadian Engineer.

ISSUED MONTHLY

BY THE CANADIAN ENGINEER COMPANY

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GINEER for the month of July.

MONETARY TIMES PRINTING CO.

OF CANADA (LIMITED).

Per A. W. LAW, Sec.-Treas.

Toronto, August 1, 1893.

TRADE DEPRESSION.

Such a sudden and general collapse has never been known in the history of manufacturing and trade in the United States as has occurred during the last month. Every branch of business, from the railways down to the most obscure manufacturers, have been affected. Cotton mills, iron and steel works, mines, wood-working establishments, and in short, factories of all classes, have closed down, throwing thousands upon thousands of people out of employment. Of course there is no essential reason for this, in the face of a plentiful harvest, and it can only be described as a panic resulting from the silver trouble. Now that the strong hand of Cleveland is felt at the helm, and when the Sherman law is repealed, confidence ought soon to be restored, and business revive almost as quickly as it collapsed. In fact there are already signs of returning confidence in the resumption or prospective resumption of many of the idle establishments. If, however, the panic should be long continued, it is idle to blind ourselves to the fact that we in Canada may get the backwash of the trouble, for two reasons: one is the invasion of the country by unemployed skilled workmen, and the probable lowering of the standard of wages, and another is the exportation to this country of surplus stocks which would not find an immediate market in the United States. These stocks would no doubt be sold at slaughter prices here

and thus would introduce a new and unwelcome element into competition. It is to be hoped, however, that these troubles will be avoided on this side by the early restoration of business faith in the United States.

A SUGGESTION FOR HAMILTON.

There was much talk during the past spring of a company, with headquarters at Hamilton, to furnish both electric light and power to that city and intermediate places, the power to be derived from Niagara Falls, and transmitted by large cables of copper wire. The Siemens-Halske Co., of Germany, were to put in the plant, but so far the stock subscribed is not sufficient to enable the promoters to go on with the work. THE CANADIAN ENGINEER gave the opinion of an electrical expert, that the practical success of the scheme would be doubtful, and though other experts have since given equally confident opinions of its feasibility, the fact remains that hitherto no transmission of electrical power such a distance, 35 to 40 miles, has yet been accomplished on a commercial scale, or so far as we know, even experimentally. There is no doubt the thing can be done, but in the present state of the science, will it pay? That is the unsolved problem. If the great German firm are sure of its success, why do they not take stock in it, or build it themselves?

We have a suggestion for the people of Hamilton, by which they can bring a small Niagara to their own doors, thus solving their power problem and that of their future water supply at the same time. The distance from the top of the Hamilton mountain to Lake Erie is under 30 miles. If a canal were dug from Lake Erie to Hamilton, the city would have an exhaustless supply both of pure water and electrical power and light. The water from Lake Erie is the same as that now pumped up at great annual expense from Lake Ontario, and the supply of which is already too limited for the present reservoirs and pipes, so that once the canal was completed, the annual cost of water for the city would be a mere trifle in comparison.

As for power, we have only to mention that an electrical engineer estimates 10,000 horse power as the amount which could be taken from the water-power of the Welland Canal without affecting the commercial service of the canal in any serious degree. Now the height of the Hamilton mountain is such that ten or more dams or reservoirs of power can be built one under the other from the outlet of the canal, affording say 100,000 horse-power. This very water can be used direct from the lower dams for the city's supply, and its quality would only be improved by the aeration it would receive in its fall. The possession of such an enormous supply of electrical energy, which the city could keep under its direct control, would start Hamilton off on such a manufacturing boom as its citizens have never yet dreamt of. The sale of electric power and light, and the saving in the annual cost of pumping, together with the saving of machinery and reservoir, etc., which would have soon to be built under present conditions, would more than pay interest on

the investment, unless the engineering difficulties of the canal are greater than seems apparent. Looking at it in the light of present utility, as well as of safety in case of war, it seems strange that the Welland Canal was not cut to Hamilton or the Dundas valley in the first place.

CANADA does better than Great Britain, in point of a tool display, the tools shown being essentially American in design, modified somewhat, however, by British ideas. So the *American Machinist* says, speaking of World's Fair exhibits.

THE theory has just been advanced that natural gas results from salt water coming into contact with the molten carbides in the earth's interior. The author of this theory claims to have produced, by subjecting salt water to the conditions, a gas exactly similar to that found in nature.

THE joint report of Messrs. Vanier and Keefer on the Montreal waterworks recommends that an additional steam pump, of a capacity of 10,000,000 gallons per day, be bought. A comparison which these engineers make shows that proportionately Toronto has a better waterworks system. They estimate the cost of necessary improvements at \$100,000, for the low level station, and a new engine is advised for the high level service, which is now of increased importance. The report is now before the Council for discussion.

"A VERY common cause of vibration in steamships," says the *New York Engineer*, "is unbalanced screws. Very little attention is paid to this by engine builders. As a rule, not one screw in 100 is balanced in the shop; a running balance, not a static balance, is what we refer to. Centrifugal force increases as the square of the velocity, and a wheel that is only 100 pounds out of balance develops a tremendous centrifugal force at seventy-six revolutions per minute. Many instances have been known where vibration was cured by balancing."

THE velocity at which steam flows in pipes and through apertures is governed by the same law as the flow of liquids, if the gravity is considered. It is more convenient, however, to compute the flow from temperature, as follows: $V = 60 \sqrt{T + 460}$, or the velocity per second equals 60 times the square root of the degree of temperature with 460 added. The flow is nearly uniform at different pressures, and the following table will answer for nearly all cases without further calculation:

Pressure in lbs. per inch,	25	30	45	60	75	100	150
Velocity in ft. per second,	863	867	877	885	891	898	908

A NEW method for making steel with high carbon and low phosphorous economically in a basic furnace has been devised. It consists in melting scrap with carbonaceous materials. On the bottom and banks of the bath of a Siemens furnace, with a basic lining, is, evenly-placed, a layer of coarsely-broken limestone, and on this coke is laid; the scrap (which averages 0.07 of phosphorus and 0.03 of sulphur), is then charged on the top of the coke, and the charge melted down as quickly as possible. The scrap, as it melts, trickles down on to the coke, which reduces the oxide of iron formed in melting, and at the same time carbonizes the steel. When the charge is melted, additions of manganese ore and limestone are made as required. The amount of slag produced by this process is small, and it usually contains about 15 per cent. of ferrous oxide, and 25 per cent. of silica.

ONE of the best filters for removing the grease which often passes into the boiler with the feed water, consists of a metallic chamber or filter box, in which there are a series of gratings. Between the latter are placed layers of wire gauze, and flannel of a special texture, which forms the filtering medium. The feed water from the donkey-pump enters the filter box on one side, passes upward through the filter cloths, and thence out to the boiler, the scum passing away through another outlet. It is found that by this means, says the *Industrial World*, all the greasy matter and other impurities are arrested by the filter cloth, which can readily be taken out for cleansing or for renewal. The filter may be used either for land or for marine boilers.

So many of the earlier suspension bridges have failed through the corrosion or disintegration of their important members, that French engineers give the opinion that forty years is the limit of life for iron suspension bridges. Consequently, in making calculations for railways, provision should be made for replacing such bridges at the end of that time. Whether any similar limit should be set to the life of iron girder bridges is not so certain. Many such bridges have failed through decay, but whether decay in a girder bridge can be easily detected, and the weakened members economically replaced or repaired, is a problem as yet unsolved. The opinion is also now generally held that the tests ordinarily applied to old bridges suspected of serious corrosion, namely, that of running a train of locomotives over it, is far from being adequate. Bridges thus tested have failed soon afterward under moderate strains.

H. KENDRICK, secretary to the Chignecto Marine Transport Railway Company, has, says *Transport of London*, replied at greater length to the strictures of the *Financial News* with regard to the undertaking. It is pointed out that the directors have never ceased to endeavor to obtain funds sufficient to complete the undertaking, but in the present condition of the money-market it is difficult to raise money for any purpose whatever. The shareholders and bondholders, the persons chiefly interested in the completion of the line, are well acquainted with all the steps which have been taken towards the attainment of the object in view. The owners of the coasting craft fear the competition of the railway, and the hostility of Halifax to the enterprise is notorious. Credence should not, therefore, be too readily given to injurious statements as to the Company. Here is an extract from the Company's official at Halifax, taken from a letter dated 30th June:—"You will be glad to know that, in spite of the late severe winter and great amount of frost, very trifling damage has been done, either to the cuttings or embankments. I walked over the railway to Tidnish on Thursday, and found everything, both on the line and at Tidnish, in a satisfactory state."

WHEN testing a steam gauge to ascertain its correctness, says the *Stationary Engineer*, it is better to make the pressure at which steam is usually carried the important point for determination. A gauge may be true at low pressure and wrong at high pressure, or *vice versa*. By many it is not considered advisable to use a gauge for recording pressures as high as shown on the dial, for few springs will stand such an extension without becoming permanently set, to a certain extent, and especially is this the case with the cheaper gauges. It is not a difficult matter to devise means for compar-

ing with a test gauge, as any kind of force pump will serve the purpose, and in the absence of a special pump the boiler feed pump can be utilized. Gauges can be tested by fitting them to a piece of lead pipe, a gauge at either end, the pipe being bent to bring the gauges vertically. The pipe should be filled with water and then inserted between the jaws of a vise, when screwing up on the vise will bring pressure to bear on both gauges. This is, perhaps, as convenient a way as any, providing the lead pipe can be obtained, for in the absence of a vise a lever can be applied which will serve a similar purpose. An occasional test of a gauge should be made if its indications are to be relied upon, and it is better to keep the pressure gauge in good order, and be certain that it records correctly, than to depend on the safety valve, whether of the lever or spring type, for these, too, are liable to improper working, if not given proper attention.

STEPHEN H. EMMENS, of Youngwood, Pa., writes as follows to the *Engineering and Mining Journal*, of New York, touching on the peculiarities of Canadian nickel: "Your interesting editorial of May 13th upon the subject of nickel contains the remark: 'Indeed, it may be said that the day of wet processes for nickel-winning is past.' Will you allow me to suggest a qualification of this assertion? The word nickel has two significations in commerce. It may mean true elemental nickel, commercially pure, or it may signify an alloy of nickel and cobalt, associated with appreciable quantities of copper, arsenic, sulphur, iron and manganese. For some purposes, such as armor plates, the nickel-cobalt alloy is good enough; but for the manufacture of German silver, and for anodes in 'silver-white' nickel plating, first-class results can only be obtained by using pure nickel. And as no wholly dry process hitherto employed is capable of separating cobalt, or even (to a thoroughly satisfactory extent) copper, arsenic, and manganese, from nickel, it would appear that a portion of the nickel consumed in the world's industries will continue to be produced either altogether in the wet way, or by a judicious combination of wet and dry methods. The introduction of the Canadian nickel into the market has caused the distinction here drawn to become of practical importance. So long as the market was supplied with metal from the comparatively pure New Caledonian ore, there was not very much to choose between the French article and that made in the wet way by America's 'Nickel King,' Mr. J. Wharton, of Camden, N. J. But the Canadian pyrrhotite carries much copper, cobalt, arsenic, and manganese, in addition to its normal iron, sulphur, and nickel; and metal produced by dry methods from such a raw material is not fitted for fine uses. Hence, there are now two grades of fine nickel in the market, and consumers are becoming aware of the fact."

T. J. MILTON, Chief Engineer Surveyor of Lloyd's, says that though the cylindrical form of boilers is the one generally made use of, under the idea of its perfect equilibrium under a uniform pressure, yet there are several conditions thus given rise to, which result in deformations. The most important changes are the variations of transverse dimensions of the combustion chambers, and the alteration of shape of the cylindrical shell. The sides of the combustion chambers are stayed to the shell, and unless the staying be continuous round the crown and bottom of the boiler, the pull of the stays must distort the boiler, lessening its horizontal and increasing its vertical diameter. With

regard to flat surfaces, when unequal surfaces are stayed together, it is evident that the load on the larger surface, being greater than that on the smaller, cannot produce supporting forces in the stays sufficient to prevent all yielding. The stays moving in the direction of the larger surface will bulge outwards, while the smaller surface will be drawn inwards. Thus, the area of the front tube plate is greater than the combined areas of the three back tube plates. They are tied together by the tubes, and when under pressure the front tube plate bulges outwards, drawing the back tube plates with it. The pressure on the sides of the combustion chamber tends to bulge them inwards, and this puts a tension on the stays which distorts the shell from a truly cylindrical form. In one case, the increase of vertical diameter of the shell of the boiler at a working pressure of 160 pounds was 1-16 inch, whilst at the test pressure the increase in vertical diameter was $\frac{1}{2}$ inch, the test pressure being double the working pressure. On the other hand, the decrease of horizontal diameter at the test pressure was 1-32 inch. This was a boiler 14 feet in diameter and 10 feet long, having 3 flues. The thickness of shell plates was $1\frac{1}{2}$ inches.

A BOILER'S HORSE POWER.

The horse power of a boiler is now nearly always figured by engineers upon the basis of the amount of water it will evaporate under certain conditions. The term, however, is somewhat misleading. The boiler simply supplies steam for an engine to use, and it is in the engine itself that the horse power developed by the steam shows itself. If a boiler driven its hardest could just furnish steam enough for 100-horse power developed in an engine using forty pounds weight of steam per hour per horse power, this would be an evaporation of $40 \times 100 = 4000$ pounds of water into steam. The useful work of the boiler produces but 100-horse power. If, however, the engine used but 20 pounds weight of steam per horse power per hour, then the 4,000 pounds that the boiler evaporated would in this engine produce $4,000 \div 20 = 200$ -horse power, or twice as much power. The standard of horse power used for a boiler has nothing whatever to do with horse power. It signifies simply the amount of water the boiler will evaporate, and because the name is a common one, this unit of duty is called a horse power. This unit is the evaporation per hour of 30 pounds of water at 100° temperature to a steam pressure of 70 pounds. The standard of horse power of a boiler serves the purpose of being a measure of its ability compared with other boilers. It simply measures the absorption of heat by the water in a given time, and does not undertake to account for the consumption of coal.

MARINE BOILERS.

The main problem before the marine engineer, says Prof. W. F. Durand, in the *American Shipbuilder*, is to obtain from the minimum weight of material the maximum amount of power, due regard being had to first cost, durability, reliability and economy generally. The boiler, which is a part of the engine in which these conditions must be rigorously observed, consists naturally of two parts, a place for the fire and a place for the water. These must be separated by a surface through which the heat is transferred from one to the

other. Further, the water and steam must be inclosed in a chamber capable of standing the pressures which will be developed. Again, the fire must be inclosed in a suitable chamber or volume, so that the hot gases may be led along and brought into contact with the heating surface, and finally conducted to the stack. These requirements are fulfilled in various ways, according to the type of boiler. In the fire-tube boiler the gases are subdivided by being passed through a large number of comparatively small tubes, the water being on the outside of them. The result of this is that no particle of either gas or water is far from the heating surface, the vital point being the subdivision, rendering possible the ready transfer and absorption of the largest amount of heat in the smallest space and time. In the water-tube boiler, the water is subdivided by being passed through the tubes, and the hot gas is subdivided, so to speak, by having the tubes passed through it. As before, the important point is the subdivision, the objects to be kept in view being the keeping of the necessary amount of surface for the efficient abstraction of the heat from the gas, and subdivision sufficiently minute so that the various particles of water and gas will readily find their way to the heating surface, the one to give, the other to receive. In the fire-tube boiler we necessarily must have, surrounding the water, steam, and fire tubes, a shell, water and steam tight, and of strength sufficient to withstand the internal fluid pressure. In the case of the water-tube boiler we must have a space wherein may occur the efficient separation of the water and steam, but no all-embracing water-tight shell is required, as in the other case. Instead, however, provision must be made for the proper retention of the hot gases on their way to the stack.

"GROOVING" IN BOILERS.

An engineer of an English boiler insurance company, speaking of the various forms in which corrosion goes on, says that grooving or channeling is one of the most frequent. It usually occurs at the joints of the plates, and is due to the fact that the stress is not transmitted directly, and consequently a bending action is set up close to the lap of the seam. Sometimes the grooving is of a much more acute form than this, being very deep and narrow, and like a fine fracture. It sometimes occurs in cases where the water does not appear to be of a particularly corrosive nature, and is probably due to straining of the plates during construction. Locomotive boilers (in which this kind of grooving usually occurs), are often made with the rivet holes in the shell plate punched before the plates are bent. When this is done, it is difficult to avoid undue bending, and distress being caused near the line of rivet holes when rolling the plate to form, and, in some instances, the final bending of the plate near the edges has been done by means of a sledge hammer. Considering the high pressure made use of in locomotive boilers, and the great degree of straining to which they are subjected in the ordinary course of their work, it is not surprising that defects should soon appear, unless in their construction the best workmanship and greatest care have been exercised. Another form of grooving is that which sometimes occurs at the vertical seams; and it should always be remembered that it is much more dangerous at these parts, especially low down where damp ashes may be lying, than near the centre of the

plate. Internal grooving at longitudinal and ring seams may be ascribed usually to corrosion localized near the joint, caused by slight bending to and fro at this part. The same mechanical action which results in grooving in the first instance tends to accentuate and cause it to be more acute near the lap of the plate afterward. In determining the weakening effect of grooving, therefore, the strength of the grooved plate to resist this bending action must be taken into account, and in this connection it must be remembered that, generally speaking, the resistance of a plate to bending varies with the square of the thickness. It must usually be considered, therefore, in such cases, that the ultimate resistance of the plate is reduced by grooving in a much greater ratio than is indicated by the ratio of the wasted thickness to the original thickness. In many cases the water used for the boilers contains various minerals, rendering it violently corrosive, and quite unfit for use. There are many instances also in which the danger arising from this cause has been much increased by the wasting having been concealed by means of new plates bolted over the defective parts. This has often led to a wrong estimate of the boiler's strength, and subsequently to disastrous explosions. When the feed water is found to be corrosive, an endeavor should be made to procure a better supply, or if this is not possible, steps should be immediately taken to neutralize its acid properties.

J. B. GRIFFITH succeeds the late T. B. Griffith as manager of the Hamilton Electric Ry.

THE Pembroke Electric Light Co. have removed their plant to their new station. They will soon begin to run all night.

THE Truro town council are considering an offer to provide the town with more electric lights, and also an electric fire alarm system.

ON a motion in the Supreme Court, R. L. Borden has been appointed trustee of the Halifax Illuminating and Motor Company. The trustees till now were the National Trust Company of Boston.

LEWIS ABBEY, engineer for the Moose Jaw, N.W.T., electric light company, was accidentally drowned last month. He was once an engineer on the Regina section of the C.P.R., and leaves a wife and five children.

THE Chaudiere Electric Company, of Ottawa, has closed arrangements to expend \$50,000 on a supplementary steam plant to arrive for their water power. The new chimney will be 120 feet high. They have now some 20,000 incandescent lights in the city.

PROF. C. A. CARUS-WILSON, M.A., Professor of Electrical Engineering at McGill College, has gone to England to marry Miss Mary Louisa Georgina Petrie, B.A., eldest daughter of the late Colonel Martin Petrie, of Hanover Lodge, Kensington Park. The marriage takes place at the end of August, previous to his return to Montreal to resume his duties at McGill.

THE Edmonton *Bulletin* gives a full report of a public meeting in that town to consider an electric street railway. A resolution, moved by N. D. Beck, was carried to the effect that the town council obtain legislation for the establishment of an electric railway system in Edmonton and vicinity, one branch of which should be to the railway station, and providing for the operation of the system by the municipality or by a company as should be afterwards decided.

THE CORRIVEAU-WILLIAMS SYNDICATE.

A charter was granted in 1885 to the Montreal Park and Island Railway Company, which had for its object the construction and running of railways or tramways to the summit of Mount Royal and to the various parishes on the Island of Montreal. By this charter the company was empowered to run electric railways and establish an electric lighting system practically everywhere except within the limits of the city proper, and provided that, if necessary to run the lines within an arpent of the turnpike roads, the trustees of such roads should first have given their consent. The capital was stated at \$500,000, with power to increase it to \$1,000,000. Owing to unforeseen difficulties practically no attempt was made to take advantage of this charter until its terms were undertaken by the Corriveau-Williams syndicate. This company have lately made an arrangement with the Street Electric Railway Company, whereby the former have exclusive rights except in the city and in Maisonneuve, Cote St. Antoine, St. Henri, and St. Cuneconde. They already have contracts for running electric cars and supplying electric lights in the following municipalities:—St. Louis du Mile End, this fall; Notre Dame de Grace (including Blue Bonnets and Montreal Junction), in 1894; Sault au Recollet, this fall; Pointe aux Trembles, in 1895; Cote St. Michel, in 1896; St. Laurent in 1896; St. Leonard, Port Maurice, in 1896; and St. Genevieve, in 1897. The company hope, by running and trackage arrangements with the Street Railway Company, to run their cars and set down passengers in the centre of the city. This year they will have to rent power, but they propose next year to have two power-houses of their own, one on each side of the island. They also propose to build a belt line around the mountain, connecting with the park and cemeteries and taking in Notre Dame de Grace, Cote des Neiges, and Cote St. Antoine. On this line funeral cars for the cemeteries will be run. Another large belt line is one proposed to start from Maisonneuve to take in Pointe aux Trembles (with connection with Varennes and Boucherville), Riviere des Prairies, Sault au Recollet (with connection with St. Vincent de Paul), Bord a Plouffe, Ste Genevieve, Ste. Anne, Pointe Claire, Valois, Dorval, Lachine, Cote St. Paul, and Verdun. An innovation proposed by the company is to carry at night vegetables and freight generally, and they will endeavor to make arrangements with the post office regarding the mail service between the city and neighboring municipalities.

SANITATION BY LAW.

Should sanitation be fostered by legislation? Most certainly it should. We are supposed to send our wisest men to our legislative halls, where with facts and figures not available to all the people, they can see farther into economic problems than their constituents. The sanitary laws which they enact should be ahead of the sanitary practice of the people, constantly leading them on to greater cleanliness and better health. Had Hamburg had a code of sanitary laws enforced, she would not have been so ravaged by cholera. Were one-half the money now expended on the Czar's standing army spent in enforcing sanitation, the disease, poverty and desolation which that unhappy country knows to-day would be a thing of history. The authority of the commonwealth in sanitary matters should be supreme. It is an old and wise maxim in statecraft, the health of the people is the supremest law. These laws should be general for the State and specific for the municipality. Among the general laws which I think most important, is one regulating the practice of plumbing. The business of the plumber is of as vital importance to the dwellers in towns as is that of the physician, and more so, as the plumber's work properly done is preventive, while the physician's is curative. If the plumber can prevent myotic diseases from entering a house, the physician's skill is unnecessary. Therefore let us work for a law requiring the rigid examination of plumbers, their qualifications to be guaranteed by a diploma from a competent board of examiners.—*T. C. Boyd in the Sanitary Plumber.*

A TRADE MARK CASE.

Justice DeLorimier, at Montreal, has just delivered an interesting judgment on trade marks and labels, in the case of *William Johnson v. The Canada Paint Company (Limited)*. William Johnson had been doing business for many years prior to 1889 as manufacturer of paints, etc. In that year he transferred the good will of the business to the "Johnson Magnetic Iron Paint Company," and sold them the receipts and formulae for the manufacture of his paints. It was then stipulated that Johnson should not engage in

a similar business for five years unless he was dismissed from the management of the said business, to which he had been appointed for five years. Then the Johnson Magnetic Co. changed its name to that of the William Johnson Co. by letters patent, and transferred their stock to defendants. Subsequently, Johnson, on March 1, 1892, commenced business under his own name on Mill street, and caused to be registered a new trade mark, consisting of a circle with a white centre and a monogram "W. J." The Canada Paint Company continued to do business under Johnson's name. The plaintiff alleged that the Canada Paint Company had applied his name to inferior brands, and had also infringed on petitioners' trade mark, and he wanted an injunction restraining the company from infringing and from using the name of Johnson. The defendants contended that all Johnson's rights had been transferred by their agreement, and that Johnson had undertaken business again similar to that of theirs, and that the new company was so similar as to deceive traders into the belief that it was their own. They also complained that he used their trade marks. The Court granted a writ of injunction restraining William Johnson, for the present, until the hearing of the case on its merits.

METAL TRADE OF GREAT BRITAIN WITH CANADA.

Below are the values in English money of the export in metals, etc., from Great Britain to Canada for June and the half year ending June.

	Month of June.		Half year ending June.	
Hardware and Cutlery	£ 6,712	£ 8,303	£ 46,342	£ 47,757
Pig iron	3,405	6,733	20,387	18,370
Bar, etc.	4,134	3,289	19,406	14,194
Railroad	35,070	92,145	114,507	220,604
Hoops, sheets, etc.	4,317	9,110	22,678	25,795
Galvanized sheets	6,894	6,506	21,020	28,171
Tin plates	26,255	28,534	110,793	89,215
Cast, wrought, etc., iron . .	9,032	17,576	53,933	63,340
Old (for re-manufacture) . .	12,751	12,636	35,924	50,074
Steel	11,990	12,681	58,344	63,193
Lead	2,154	2,854	13,699	7,905
Tin, unwrought	4,575	3,851	10,471	10,118
Alkali	7,853	6,433	32,346	31,276
Cement	5,935	6,974	16,326	23,984

REVIEW OF THE METAL TRADES.

MONTREAL, 14th August, 1893.

The iron, steel and metal business has been on the whole fairly satisfactory during the past month, although slow collections and a stringency in the money market have kept some large consumers from placing their requirements, waiting better times. A few large orders have been taken for Canada plates, and the usual amount of small business transacted, prices ruling about the same. We can scarcely believe they will go much lower, and the tendency may be slightly upward. The coal strike which is taking place now all over England has enhanced the value of fuel, and this is a serious thing to manufacturers of iron and steel, and makers may feel justified in raising prices on this account. Just at present steel manufacturers are unwilling to guarantee deliveries at any specified time, and should the strike continue for any length of time, it would have a tendency to affect the agricultural implement makers here. We know of some Ontario firms who have sent over good large orders for immediate shipment, but they have only been accepted by agents to do the best they can as to delivery.

In Rolling Mill stock, there appears to be little doing. Most of the mills are pretty well bought for their requirements, and are only open to pick up bargains at low prices. Some double-head iron rails have been on the market the past week, but buyers seem disinclined to purchase or make any offers. Some small quantities of shovelling and No. 1 wrought scrap iron will likely be required before close of navigation. The wire manufacturers have been anticipating their requirements, and some 1,500 tons have been purchased lately. Prices are growing firmer, and owing to labour troubles among the makers in Germany, they are not anxious to sell forward to any large extent. However, considerable requirements will have to be supplied before close of navigation.

There has been a good demand for Scotch coal, but little or no business has been done, shippers being unable to obtain freight room, and now, owing to the strike, they cannot obtain delivery of parcels previously bought. Unless the situation changes, there promises to be a scarcity of Scotch coal in this market during the coming winter and spring, and prices, no doubt, will rule high.

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Multipolar Railway Generators
Single Reduction Railway Motors
Alternating Slow Speed Dynamos
Direct Current Dynamos
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Every successful and dividend earning railway in Canada is equipped with Our Motors.

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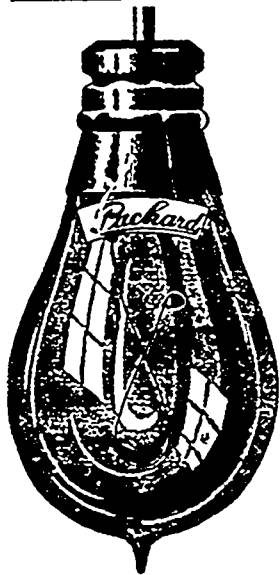
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Manufacturers of every style of

Electric Cars

FACTORY AND OFFICE:

Corner Kent & Slater Sts.,
OTTAWA.

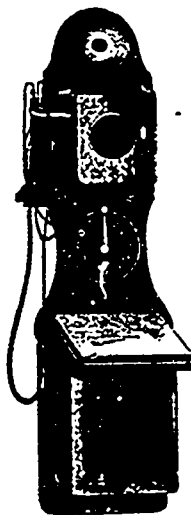


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INCANDESCENT
LAMP.

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Maintenance of Candle Power.

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MONTREAL.



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SAMPLE LETTER. TORONTO, July 15th, 1893.

T. W. NESS, Esq., Montreal.

DEAR SIR:—The telephones are working satisfactorily so far, and if they continue to do so we shall have our system extended.

TORONTO LITHO. CO.
W. STONE, Manager.

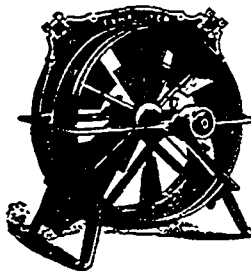
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MECHANICAL ENGINEER & MANUFACTURERS' AGENT



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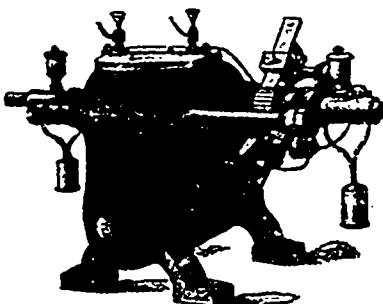


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MANUFACTURERS OF

DYNAMOS FOR ARC AND INCANDESCENT LIGHTING

Electric Motors from 1-2 to 50 Horse Power

Plating Machines, Medical Batteries and all kinds of Electric Batteries

263 James St. N., HAMILTON, Ont.

STATE VOLTAGE REQUIRED

Electrical Department.

OPERATION OF LOCKS BY ELECTRICAL POWER.

THE NEW EXPERIMENTS ON THE BEAUHARNOIS CANAL.

The experiments now being made at Lock No. 4 of the Beauharnois Canal have proved quite successful. The gates are easily operated by an application of electrical power.

A contract was given for this purpose some time ago to the Canadian General Electric Co., who have carried on the trials from plans based on the designs of Thomas Monro, M. Inst. C. E., which were prepared with a view of adopting electricity in the operation of the Soulanges Canal now under construction. The apparatus is very simple. It consists of a steel I beam, one end of which is hooked on to the top of the gate, at a point about midway between the heel and mitre posts. The other end, which lies in a trench formed in the masonry, has a rack bolted on to its web in which a pinion works, and either pushes the gate shut or pulls it open as may be desired. The present experiments were made with a dynamo of about forty-five horse-power, driven by a water wheel and connected with an old street car motor of about fifteen horse-power, which is greatly too large for the purpose, but saved the construction of a new machine. As far as can now be ascertained, but little power will be required to work the gates. At present it is nearly all taken up in overcoming the friction of the train of heavy gear, by which the speed is reduced from about 900 revolutions on the motor to a motion of 10 to 15 feet per minute on the I beam, which is in direct connection with the gate. Of course the permanent machines will be properly adapted to the work they have to do.

It is intended to operate the whole lock from one point near its centre on one side, as for example: Suppose a vessel to enter a lock. Then the lower gates will be shut simultaneously by the apparatus and the filling sluices opened. When the lock is filled the upper gates will be pulled back and the vessel permitted to pass out. It is evident that the system will not only greatly reduce the operating expenses of the canals, but will guarantee both increased speed and safety in locking. The electrical apparatus is supplemented by gear, by which the work can be done by hand in case the former power should be temporarily disabled.

We are informed that Mr. Monro has also in view the regulation of the canal levels by an automatic electrical arrangement, which we trust will have the same measure of success as has apparently attended the operation of the gate machines.

A NEW INSULATING MATERIAL.

A new insulating material bearing the name of "Stabilit" has been tested by the General Electricity Company, of Berlin, and the results having proved satisfactory, it is now being brought into commerce. This material, which has for some time past been used in the insulation of armatures and magnet and transformer coils, is made in plates, bars, and tubes, or in any desired form, in red or grey-black color. It can be turned, bored, and polished more easily than india-rubber or

vulcanized fibre. It is free from acidiferous or corroding substance, and does therefore not attack metal, and is consequently considered better than any material for the insulation of commutators, magnet coils, switches, etc. After four weeks exposure to a damp atmosphere, stabilit showed no alteration in weight or in insulation resistance, whereas under the same conditions vulcanized fibre increased in weight by 20 per cent. in 24 hours, and its insulation correspondingly decreased. After being boiled for 12 hours no increase in weight was noticed, whilst hard rubber and vulcanized fibre soon became soft. When placed in a paraffin bath vulcanized fibre became brittle at 200 deg. C., and at 250 deg. C. it began to carbonize; rubber became soft very early, and only stabilit withstood that temperature. Stabilit, the specific weight of which is 1.6, is not attacked by muriatic acid or dilute sulphuric acid, and is therefore suitable for accumulator cells and battery jars, as experiments have shown. The following figures show the specific resistance of the material as compared with vulcanized fibre. The first line shows the insulation resistance of both after being exposed to a temperature of 30 deg. C. for eight days; the second after they had both been exposed for 24 hours to the influence of ordinary atmospheric temperature; and the third, after the materials had been exposed to a moist atmosphere for four weeks: specific resistance in megohms (15 deg. C.) per cubic centimetre.

	Stabilit.	Vulcanized fibre.
In a dry condition.....	10,000	8,000
Exposed to the temperature of a room for 24 hours	9,000	45
After four weeks exposure to moist atmosphere	8,500	6

The above figures were obtained by the use of a Thomson astatic galvanometer. The test pieces were plates of 100 square centimetres, and from 0.5 mm. to 5 mm. thick. In the course of tests made to determine the usefulness of stabilit for high-tension insulation, plates of 0.7 mm. in thickness were not pierced or broken at 5,000 volts.

COMBINING DYNAMOS.

When two dynamos are subject to a rapidly-changing load, it is impossible, says W. L. Puffer in the *Technology Quarterly*, to divide the current evenly, and thus the two dynamos are not double the capacity of either one, and a considerable waste is brought about. It is very desirable on many accounts to have a dynamo which will automatically maintain an approximately constant potential at the switchboard, irrespective of the amount of current flowing. We may add a series winding to the dynamo of just sufficient number of turns to give such a magnetising effect as will produce a voltage which shall be at all times exactly equal and opposite to the combined effects of the change in engine speed, belt slip, armature reactions, and the drop of voltage due to the resistance of the armatures, lead-wires, ammeter, safety devices, and the like, up to the 'bus bar. The net characteristics will now be made up of the sum of the individual effects, and the voltage at the switchboard would be constant at all times were it not for the hysteresis of the iron in the magnets, which will very slightly prevent the instantaneous rising and

falling of the effect of the series coils, and any change in resistance due to temperature change. The temperature change will be slow, and is corrected by an occasional change of the rheostat in the shunt-coil circuit, and can be neglected for the present. Should it be necessary to use a second dynamo of similar design, we cannot proceed as in the case of single shunt dynamos, for if the second dynamo be at exactly the same voltage as the mains at the switchboard when connected in parallel, the combination will be unstable, because if for any reason the voltage of either dynamo varies a little, the effect of the reverse current in its series coil will be to weaken the legitimate current still more, and this in its turn will allow the reverse current to flow more strongly until something burns out. If however there is a third connection made, so that the brushes as well as the terminals of the two dynamos are connected, it becomes impossible for this reversal to happen, and the machines will run perfectly under all changes of load.

The action of compound constant-potential dynamos in parallel is generally misunderstood, and the equalising connection is credited with a remarkable power of control over the output of such dynamos, which it does not and cannot have, as can be seen by watching the dynamos while at work. The common idea is that the equaliser has the property of compelling a lagging dynamo to take its share of the work, and we hear of the wonderful power of control which it has even over dynamos of different types and sizes running under somewhat different conditions. Now the real effect of the equaliser is to put the series coils in parallel, so that the total flow of current from the plant will divide between them inversely as their resistance, without any regard as to whether this current comes from one armature alone or is divided among many, and hence it follows that it cannot in any way exercise even the slightest regulating effect on any one dynamo that it does not have over all the rest. The armatures themselves are running in parallel under the usual conditions of ordinary shunt dynamos, and the total current will divide between them under the same laws that would hold if there were no series coils at all, and the current were taken from the two main wires to which the brushes are connected. Should the demand for current be more than equal to the capacity of one dynamo, the addition of a duplicate machine will render it impossible to maintain a constant potential at the distant centre unless both dynamos are run all the time.

CAR LIGHTING FROM THE AXLE.

A highly satisfactory trial trip of the car lighted by the new Young-Muskowitz railway electric-lighting system was made recently over the New Jersey Central Railroad from Newark to Roselle and return. It is an ordinary railroad passenger coach, in which there are twenty-five eight-candle power incandescent lamps. The one-horse power dynamo by which the electricity is generated gets its power from the axle by a series of sprocket wheels and chain belts, and two shafts between the axle and the direct connecting shafts of the dynamo. One of the intermediate shafts is movable or swinging, and makes the chain belts conform to every movement of the car at whatever speed. The power taken from the car axle has, heretofore, gone to waste, and the process by which it is being used to make electricity is called equalizing of power, and by the mechanical

contrivances the ill effects of oscillation and vibration have been overcome. While the train is in motion the lights are made directly from the electricity generated up to a certain limit of speed, which is fixed. When higher speed is attained the superfluous electricity generated is stored in batteries under the car, so that at any given time there is sufficient electricity on hand to supply the lights four hours without the train moving. The machinery, complete, weighs about 900 pounds.

ELECTRICAL PURIFICATION OF WATER.

The *Water and Gas Review* gives an account of a new method of purifying water, which has been put to the test at Brewsters, in the United States. The plan is described as being simplicity itself, and is chiefly based on the powers of salt water and electricity. On the occasion referred to, the machinery consisted of a small steam engine supplying power to a dynamo capable of a strength of 750 amperes, and giving a current of four volts tension.

The electric current passes through a series of electrodes in the bottom of a thousand-gallon tank. At an elevation above this tank is another of three thousand gallons capacity, in which is a four per cent. solution of salt water.

The thousand-gallon tank full of the salt water was exposed to the electrical current, and immediately bubbles began to arise to the surface. These were caused by the disorganization of the chloride of sodium, the hydrogen of which rose to the surface and escaped in bubbles which were as effervescent as highly charged soda water. What remained in solution and free to be applied to its destined purpose was chlorine and ozone. The first is a disinfectant in which scientists place great reliance, but the ozone is incomparable. No morbid microbe can exist in any fluid in which it is present.

The contents of the 1,000 gallon tank thus charged were applied to the stream of filth passing through the sewer. One hundred feet away, the sewer stream purled over a bowlder and there the test was made. There was a faint taste of sewer smell given off by the water. A solution of iodide of potassium gave an inky reaction when applied to some of the sewage water. This demonstrated the presence of the ozone, and the chlorine demonstrated itself to the olfactories. To make still surer, the disinfecting water had been shut off, and a stream of undrugged sewer water came. There was not a sign of the inky reaction caused by the iodide of potassium.

Further experiments were made with electrozone, which is the fluid generated by the decomposition of salt water. Putrid meat was freed from all smell, and a bucket of sewer matter dipped up reeking foully from the sewer became odorless.

In practice, it is found that the upper or positive carbon in an electric lamp burns away at about twice the rate of that of the negative or lower carbon.

A WRITER in the *Chemical News* describes an electric saw, consisting of a platinum wire heated by an electric current, and with which he states the hardest woods can readily be cut. Unfortunately the platinum wire is liable to break, and hence he has also tried a steel wire, platinized by immersing it in a solution of chloride of platinum in ether.

THE ELECTRIC CAR FENDER.

THE photo-engraving herewith represents a fender for electric or cable cars. The sectional platform projecting under the wire cushion is held in the position shown by strong springs, and is by them forced under any movable object which may be on the track in front of the car, while the wire cushion prevents the object receiving a sudden blow from the front of the truck or the fender itself.

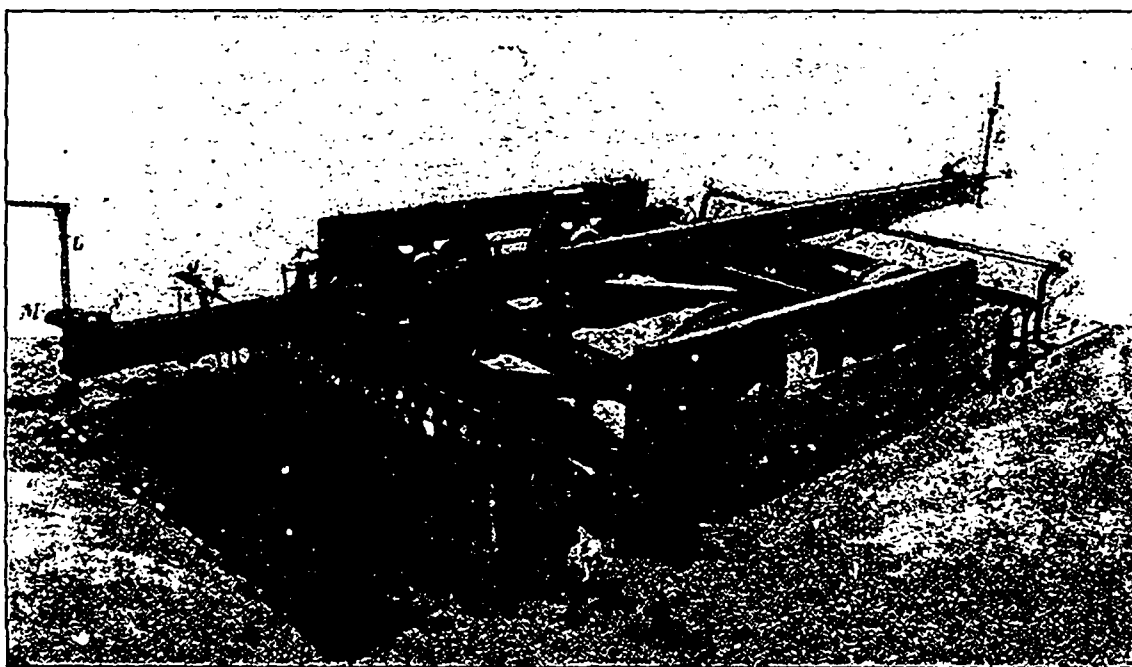
The frame from which the sectional platform is suspended is adjustable and under the immediate control of the motorman by means of the ratchet and chain, and is set by him to just clear the average level of the street between the rails. Should any object be in front of the car, a kick from his foot releases the pawl from the ratchet holding the chain, thus allowing the platform, which is hinged to the truck, to fall, and the ends with the rollers attached to ride on the ground. The platform being in sections, and each having an independent action, the rollers will follow the surface of the ground under them, and, being covered with rubber, will cushion any blow they may give.

Each section is held in position by a strong spring,

"F" are skeleton iron rods, each end drilled (in the same plane and eight inches apart) to receive a bolt; the lower ends are attached, in pairs, to the sockets "C," the upper ends to the main frame "G."

Each finger "B" is thus held in position by two swinging arms "F," which allow it to play back and forth in the same direction as the path followed by the car, and with a motion exactly similar to that of a parallel ruler when being opened and closed, one side being held stationary.

The frame "G" is made long enough to support one finger on the outside of each rail, and consists of two members of such length (on which the lugs supporting the arms "F" are cast), and two cross pieces joining them. These cross pieces extend backwards about a foot from the main frame and are forked vertically, one fork curving downwards, the other upwards; but both ending in hubs which are drilled horizontally for bolts, one for each hub. The lower hub is attached by said bolt to a bracket permanently fixed to the truck or car, and acts as a hinge by which the frame "G" can be raised or lowered. To the upper hub "H" is attached a chain "J" which runs round the chain-blocks "K" and thence forward to the rod "L,"



THE ROCHESTER ELECTRIC CAR FENDER.

but when the strength of the spring is overcome it has a swinging motion, and should the whole or any part of this platform strike a permanent obstruction (a raised crossing, for example), the sections so obstructed will simply rise until above and beyond it, when the springs referred to will force them back to their original position.

An efficient protection for the side of the car is afforded by a swinging frame filled in with wire netting, the same as that hanging over the sectional platform.

"A" are rubber rollers one inch in diameter, and attached to the ends of the fingers "B."

"B" are wooden fingers three inches wide and thirty inches long, clamped tightly, in separate iron sockets "C."

The sockets "C" consist of two bands connected by a rib "D." On each of these bands, on the upper sides, are a pair of lugs drilled to receive the bolts "E," by which the sockets "C" are hinged to the rocker arms "F."

to which it is attached. Rod "L" carries a ratchet "M" controlled by the pawl "N"; the latter is placed convenient to the motorman's foot.

The springs "O" are circular, and are bolted to the upper side of the rear member of the frame "G"; the circle is cut diametrically opposite and the ends thus made press against opposite sides of the rear arms "F," thus keeping the fingers "B" at the greatest possible distance from the frame "G."

From the bolts "P" on each side of the car is a semi-circular iron frame "Q" sustaining a tightly-stretched spring-wire netting "R" vertically about four inches in front of the frame "G," which acts as a cushion for anything sliding up the fingers "B."

A frame carrying a similar netting to "R" is hung on each side of the truck or car by the rods "S."

In practice the fingers "B" are set by the ratchet "M," so that the rollers "A" will just clear the average level of the street between the rails, and will in this position absolutely prevent any person getting

under the wheels. Should the motorman see the accident in time, which is the case nine times out of ten, a kick from his foot at once releases the pawl "N" and allows the frame "G" to drop, thus forcing the rollers "A" to ride on the street and under anything lying thereon, which will be carried by the arms "B" until the car is stopped. This fender is the invention of Edward Rochester, of 54 Rochester st., Ottawa.

J. D. HANNAY, of Scotland, has a process for separating gold from refractory ores, by means of electricity, which, besides taking only a few hours, is said to be very cheap.

AN opinion has been given by Mr. Ethier, city attorney of Montreal, to the effect that the Montreal Street Railway Company has no exclusive privileges for running electric railways in the city.

THE *English Mechanic* describes a method of photographing the "electric rays" of the spectrum, by causing an electric current to pass over the photographic negative during exposure, and thus obtaining a secondary spectrum.

ON Southampton Quay, Eng., there is an electric crane capable of lifting three tons. At trials, it has been found practicable to slew at a speed of 520 feet per minute. The hoisting motor is designed for 225 amperes at 200 volts, at 600 revolutions per minute. The crane is said to be a complete success.

T. A. EDISON, in an interview recently, mentioned some of his plans for the future. "I think," said he, "I shall turn my attention to one of the greatest problems I have ever thought of solving, that is, the direct control of the energy which is stored up in coal, so that it may be employed without waste, and at a very small margin of cost. Ninety per cent. of the energy that exists in coal is now lost in converting it into power. Now, that is an awful waste, and even a child can see that if this wastage can be saved it will result in vastly cheapening the cost of everything manufactured by electric or steam power. In fact, it will vastly cheapen the cost of all the necessaries and luxuries of life, and I suppose the results will be of mightier influence upon civilization than the development of the steam engine and electricity have been. It will, in fact, do away with steam engines and boilers, and make the use of steam power as much of a tradition as the stage coach now is."

THE American Bell Telephone Company are experimenting with a new instrument called the telephone, which is to transmit sounds by a ray of light, and which may possibly rival the telephone for some purposes. A transmitter has been placed in the west gallery of the Electricity Building of the World's Fair, and is used to direct the rays into the receiver placed on the steps at the north end of the telephone temple. The apparatus as described by *Electrical Industries* is very simple, and the experiment is said to be an unqualified success. The transmitter is made up of a very thin diaphragm of glass mirror set in a brass frame, with a mouthpiece facing the silvered side. The reflecting side receives the ray of light from an arc lamp directed through a strong lens. This ray is reflected from the mirror into a parabolic receiving reflector which concentrates the light on a small glass bulb filled with very dry burnt cork. Two wires are taken out of this bulb to small ear pieces similar to those used with the phonograph. The vibration of the transmitting diaphragm by the voice converges or diverges the ray of light, mak-

ing it stronger or weaker in the parabolic receiver. The heating of the bulb carbon is varied, thus causing a variation in the vibrations of the carbon which are transmitted to the ear pieces.

AN electrical process has been devised for preventing boilers from being corroded and pitted. It consists in fixing electrodes in the boilers and sending periodical currents of electricity through them under definite conditions, adjusted and controlled by apparatus which is automatic in its action, says the *London Engineer*. When the current is passing from the anodes suspended in the boiler to the shell, hydrogen is liberated on the shell and tubes, and oxygen on the anodes; then by means of the depolarizing apparatus the action is changed, and most of this hydrogen and oxygen recombine, the result being that during the first period the hydrogen performs two distinct functions; first, it disintegrates mechanically by its volume the scale formed on the shell and tubes; and secondly, some of the hydrogen combining chemically with the oxygen of the oxide of iron on the shell and tubes, reduces this oxide to metallic iron, thus doing away with the oxidation of the boiler without wearing away the metal. The secondary action, in short, is to facilitate the disintegration of the scale, hasten the mechanical action of the hydrogen in bursting it off, and prevent polarization of the shell and tubes. Oxidation, it is well known, cannot take place in presence of hydrogen gas; consequently, the patentees contend that it will be impossible for corrosion or pitting to take place on the interior surfaces of the boiler so long as this electrolytic action is maintained; and, further, the mechanical action of the hydrogen, which is capable of disintegrating the scale, will likewise prevent its re-formation.

Electric Flashes.

DAVIDSON & HAY are putting an electric light plant in their saw-mills at Cache Bay, Ont.

THE promoters of the Galt and Preston electric railway hope to commence construction at once.

THE first trip on the Peterboro', Ont., Electric Street Railway was made successfully on July 29th.

THE C P R contemplates the employment of electricity in drawing trains up Kicking Horse Canyon.

THE extension of the projected street railway in Calais, Maine, to St. Stephen, N.H., is being agitated for.

THE London, Ont., Street Railway Co. are replacing the rails which were recently torn up by order of the city council.

THE Canadian General Electric Company's new electric light station, at London, Ont., is being fitted with new boilers.

J. & J. TAYLOR, safe manufacturers, Toronto, have added a new silver-plating outfit from the Kay Electric Works, Hamilton.

DR. CHAMBERS' buggy was knocked down by a trolley car at Toronto on July 29th, the doctor having a narrow escape from death.

THE generator of the St. John Electric Railway burnt out the other day, and the cars were stopped two or three days in consequence.

THE Toronto employees of the Bell Telephone Company, on July 22nd, held a picnic at Dundurn Park, Hamilton. It was a success.

STRINGS for musical strings are now being twisted by electricity. Along a 40-inch banjo string, the motor is said to twist over 13,000 coils.

THE Kingston Street Railway Co. have purchased Kingston Mills. The power of the mills will be used in connection with the electric railway.

ARRANGEMENTS are being made by the Chaudiere Electric Light Co., Ottawa, for the placing of four engines and six boilers

in their power house at Chaudiere Falls, so that, if necessary, they can use steam during the winter months. The contract will probably be given to the Doty Engine Works.

EFFORTS are being made in Hamilton to make the H. G. & B. and Hamilton and Dundas Street Railways pay a mileage rate for the use of the city streets.

THE large Reliance dynamo, at Cook & Sons' power station, at St. Catharines, Ont., broke down a few days ago, and all the motors in the city stopped suddenly.

MANAGER THOMSON, of the Hamilton Electric Company, has given up his appointment. The company are dispensing with his services from motives of economy.

WHILE George Stratford was driving near West Brantford, a call-bell wire accidentally fell across the trolley line, and his two horses, touching it, fell down dead.

BRANTFORD citizens are subscribing a bonus of \$3,000 to the Brantford Electric Street Railway Company to induce it to extend its line to Terrace Hill and Grandview.

THE shareholders of the Montreal Street Railway have authorized the issue of new bonds to the amount of \$700,000, to be used chiefly for the conversion of the road to electricity.

THE Chambers Electric Light and Power Co., of Truro, N.S., have made an offer to place and light in that city forty arc lamps, and set up a fire alarm service for the sum of \$3,000 per year.

CLOSE & FRASER, of Toronto, who have in hand the construction of the Belleville Electric Railway, have asked for an extension of time in which to begin operations. The City Council have granted the extension on a deposit of \$1,000.

MR. DAWSON, C.E., is at Hector, B.C., looking into the matter of introducing electricity to obtain power for hauling the trains from Field up the heavy grade of the hill. Another electrician has also been there recently with Mr. Dawson for the same purpose.

AT a special meeting of the Fredericton city council the tender of the Brush-Swan Company to light the city with fifty arc lights, each of twelve hundred candle power, for \$2,000 a year, was accepted. The work of putting in the plant will be commenced at once.

WALTER GREEN, proprietor of the Wingham, Ontario, Electric Light Works, is building a brick dynamo house in Lower Wingham, where work will in future be carried on. The water resources are being much improved, also, as water is to be the motive power employed.

THE Kay Electric Works, Hamilton, recently put in a motor for the Lawson Printing Co. of that city; and a 25 h. p. generator and 20 h. p. motor for the flour mills of Thos. Cook, Corvell, Ont., replacing rope transmission. Mr. Cook formerly got 5-horse power from rope transmission from the water power, whereas he now gets 20-horse power from the same source through electricity.

It is said to be a question whether the Hamilton, Grimsby and Beamsville Electric Railway will ever be built, in the event of the opposition to the laying of a double track on Main street being successful. Before starting construction work Myles and Rutherford, the principal projectors, are awaiting the result of the vote on the bonuses from the townships through which the road will pass. If the bonuses are given work will be commenced this fall.

A CHANGE has been made in the well-known electrical business of T. W. Ness, Montreal and Toronto. Mr. Ness has taken in as partners N. W. McLaren, son of W. D. McLaren, of baking powder fame, and J. L. Rankin, son of the founder of the old commission house of Rankin, Beattie & Co., of Montreal. The business of Mr. Ness has grown to such proportions in the last three years that such a step was forced upon him. The new partners not only bring further capital to the business, but will be active workers.

T. B. GRIFFITH, manager of the Hamilton Electric Railway Co., died in that city on the 22nd ult., from paralysis, brought on largely, it is thought, through overwork during the construction of the new lines and their conversion to electricity. Mr. Griffith was only 39 years old, and by his own industry had risen from a poor boy to a position of influence. He had just finished a fine residence, and had a controlling interest in the street railway, besides being one of the chief shareholders in the Hamilton Steamboat Company, owning the *Macassa*, *Modjeska* and *Mareppa*.

TELEPHONES.

THE subject of telephones is one which is of especial interest at the present time, when the patents are expiring in the United States, where the Bell Co. have had a huge monopoly for the last fourteen years. Canada has, however, been a free country for telephones, as the patents were not sustained, and it will therefore be in keeping to give a brief review of the business of T. W. Ness (now T. W. Ness & Co.), Montreal, who for a number of years has been the largest manufacturer of telephones in Canada.

To show the wonderful growth of the business, it is only necessary to state that four years ago the telephone sales for the first month numbered two instruments, and at the present time over sixty hands are employed on the premises besides many local agents throughout the country. Branch show rooms have been opened in Toronto, Ont., and also in the United States.

A visit to the factory of this firm is an exceedingly interesting one, as a novice has little idea of the great variety of different tools and machinery required for turning out the many different parts of a telephone.

Mention will be made first of the standard main line telephones, which are suitable for private lines or regular exchanges. They can be used on lines up to 200 miles long. Many of these instruments are in constant use in local exchanges, and the firm have a number of very flattering letters showing the great satisfaction which they are giving. The No. 3 telephone is a popular one, as in it the transmitter and magneto are combined in one box, and it thus takes up very little space, in fact may be mounted on a stand and attached to a desk or other convenient place.



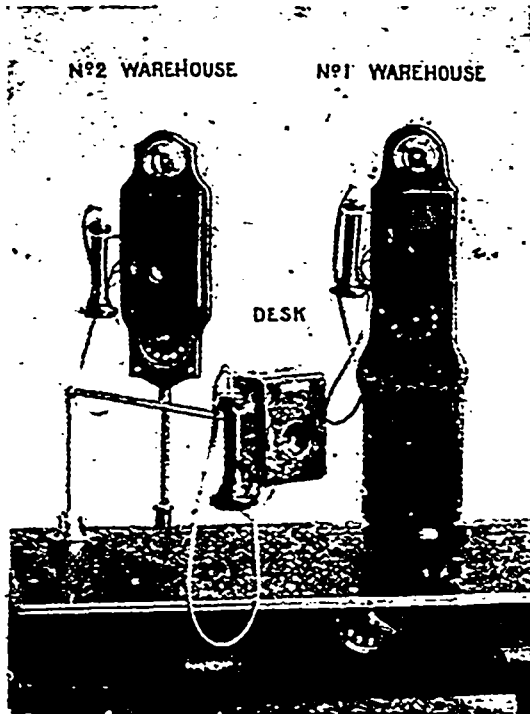
The accompanying cut shows a small switchboard in operation, the drop used in these instruments being the very best that can possibly be constructed.

The system of warehouse telephones used by this firm deserves more than a passing notice, as it is coming into general use throughout Canada, especially in cities where large manufacturers wish to connect the different parts of their premises. These instruments are so arranged that the manager in the office may at a moment's notice call up any of the departments without leaving his desk. This certainly insures a vast saving of time, and those using the instruments report that they very soon pay for themselves in the saving of time sending messengers to and from the office, to say nothing of the immense convenience that they afford to those using them. Briefly described, the system is such that each telephone is its own switchboard and therefore no central exchange whatever is required. All the objection to the old fashioned "plugging" system is done away with, as no plugs whatever are employed. Each instrument may be used to call up any of the others by simply turning the lever to the point desired and pressing down. This rings a bell on the instrument with which communi-

cation-is desired, and on that one only, so that no annoyance is caused to other persons by having the bells rung when not wanted.

Some of the principal features to be noticed are the following.

The wiring being placed in a cable prevents all possibility of the wires becoming crossed. Absolute privacy is insured, as the instruments are installed and sold outright, and the wires do not run outside of your own premises. The lines may be used by more than two persons at one time, for instance Nos. 1 and 3, 2 and 5, and 7, 4 and 9 may converse at the same time.



Instruments are finished in any way to suit taste of customer, either in wall instruments, with or without battery-box, or mounted on swinging arms for desk. These may be stationary or placed on stands with a flexible cord to permit of being moved about. An important point is made by stating that these instruments are all sold outright, so that those using them will have no rentals whatever to pay.

In addition to the telephone business, this firm manufactures annunciators in large numbers, many of them being used by the largest hotels in Montreal and other cities. Several other departments are also quite extensive, as, for instance, the telegraph and electric lighting. In fact a General Electrical Supply and Manufacturing Business is conducted successfully, and anything required in the line of electricity may be obtained from this firm. A better place for experimental work could not be found, as they are well equipped for this.

Mr. Ness has had a remarkably successful career, and some American electricians have given him the credit of being in advance of manufacturers in the United States in his warehouse telephone system and in other items of his work. This is no small compliment when we remember that the Americans are at the top of the tree in this field of science.

MORE WORDS OF WELCOME.

We give below a few more of the kind expressions of good-will that have been showered on THE CANADIAN ENGINEER:—

I RECEIVED your paper and am pleased with it. Enclosed please find \$1 for subscription.—R. BURGAR, Port Credit.

THE SECOND NUMBER of THE CANADIAN ENGINEER is to hand and brimful of interesting matter, handsome, newsy and fresh.—*Algoma Pioneer*.

A PROMINENT manufacturing firm writes, "We like the style of your paper and especially appreciate the immense budget of news you give regarding the industrial progress of the Dominion"

VOLUME 1, No. 1, of THE CANADIAN ENGINEER, is another addition to an already large visiting list, and a call which *The Miner* will be very glad to return. The new venture in trade journalism is published in Toronto and Montreal, and judging from

its 28 well-filled pages, is destined to make a high reputation along the lines of mechanical, mining, marine, sanitary, locomotive and other branches of engineering. It contains a large amount of news from all parts of Canada of interest to the trades named. It should and no doubt will be a successful venture.—*Nelson Miner*.

It is thoroughly Canadian in tone, every article has a practical purpose, and it gives an immense amount of Canadian news of interest to the trades concerned.—*Geyer's Stationer*.

THE representative of a Canadian machinery firm at the World's Fair writes to THE CANADIAN ENGINEER: "I think highly of your paper and I have no doubt it will take well with the manufacturers and others."

We are indebted to the courtesy of THE CANADIAN ENGINEER for the admirable engraving accompanying our article on the beaver. THE CANADIAN ENGINEER is handsomely printed. The subscription price is only one dollar a year.—*Onward*.

EVERY profession, art, trade, society or line of business, seems to have a paper now to represent it. And right it is that such is the case. The latest arrival in the arena of trade journalism is THE CANADIAN ENGINEER. The new paper is a practical one.—*Uxbridge Journal*.

It will be welcomed as a technical journal containing the elements of Canadian news and information bearing upon the special needs and circumstances of the country. As an advertising medium it deserves an extensive patronage, and if articles as good as those contained in the initial number are continued, we predict that it will be favored with a large circulation.—*Municipal World, St. Thomas*.

THE CANADIAN ENGINEER, a new journal published in Montreal, may not supply a "long felt want," but it does appear at a time when there seems to be an opening for such a publication, and it promises to be worthy of the engineering profession in this country. If the enterprising publishers will add a department on road-making they will do much to popularise it among general readers.—*Woodstock (Ont.) Sentinel Review*.

THE CANADIAN ENGINEER, from which we have made numerous extracts, is a new monthly issued at Toronto and Montreal in the interests of the mechanical, electrical, marine and locomotive engineer, and the manufacturer and contractor. In addition to all Canadian news relating to a live subject, it contains summaries of progress made in other countries, which one cannot secure without obtaining a number of such class papers.—*New Glasgow Chronicle*.

THE CANADIAN ENGINEER, published at Toronto and Montreal, is a 28-page paper with a neat cover, and makes its debut as the "Metal and Trades Journal and Mechanical Science Review," of Canada. In fact it is the only one in the Dominion, and should have a very bright future in store for it. A prominent feature will be the skill displayed in its illustrations. There is no reason why such a journal should not become a power in Canada. We wish THE ENGINEER every success.—*Charlottetown Watchman*.

THE CANADIAN ENGINEER aims to interest the mechanical and marine engineer, the manufacturer, contractor and merchant in the metal trades, and, judging from its first issue, will certainly accomplish this result. The typographical appearance, relevancy of subjects and general tone of THE CANADIAN ENGINEER, are all that could be wished for in class journalism of to-day, and with even a moderately fair wind THE ENGINEER will soon reach the haven of journalistic prosperity, viz., a good long bank account.—*Marine Record*.

LE DERNIER arrive dans l'arène du journalisme commercial, est LE CANADIAN ENGINEER, magnifique publication mensuelle, 28 pages, consacrée aux mines, à la mécanique et aux autres branches du génie. Tout dans cette publication est de nature à lui attirer des lecteurs: articles bien faits, abondance et sobriété des matières, impression de luxe, gravures magnifiques illustrant les articles, bas prix de l'abonnement. Sans doute, les opinions du confrère peuvent être sujettes à discussion, mais on doit admettre qu'il les expose avec courtoisie et dignité. Tous ceux qui s'intéressent aux questions que le nouveau journal se propose de traiter, liront avec fruit LE CANADIAN ENGINEER. Ce journal est publié simultanément à Toronto et à Montreal. Son adresse à Montreal est "Fraser Building," rue St. Sacrement. L'aumentement n'est que de \$1 par an.—*La Minerve*.

In the first number of THE CANADIAN ENGINEER, which is just to hand, there is evidence of a welcome spirit of enterprise, upon which the publishers are to be congratulated. Until now, it seems the mechanical, mining and other branches of the engineering trades, in whose hands, to a large extent, lies the future development of the great Dominion, have been without an organ in which

their special needs and requirements could find expression. The various technical and trade journals of England and the United States covered this ground to a limited extent only, and, though these have their scope and their influence, it was felt that there was ample room for a paper dealing solely with things Canadian, from the Canadian point of view. The new-comer is admirably printed and illustrated, and contains, beside a large amount of news of interest to the trades concerned, articles of a scientific and technical character. Should the high standard of excellence, evidenced in its first number be maintained, there can be little doubt that THE CANADIAN ENGINEER has a useful, as well as a prosperous career before it. The offices are at 62 Church Street, Toronto, and Fraser Buildings, Montreal.—*Hardware Trade Journal of London and Birmingham.*

THE I. C. R. trainmen are asking for a further increase in wages.

AN attempt is being made by the C.P.R. to cut down working expenses by \$500,000.

ONE hundred C.P.R. employees at the car shops at Perth, Ont. have been discharged.

WORK is proceeding on the C.P.R. wharf extension at Vancouver; the stone work will cost \$30,000.

GOVERNMENT engineers are dredging a channel 16 feet wide and 100 feet deep in the Kaminstiquia river.

THE ocean dock in course of construction by R. P. Rithet & Co., at Victoria, B.C., is nearing completion.

THE Dominion Coal Company (Whitney coal syndicate), of Cape Breton, are about to put two large steel tugs and two barges

of 2,000 tons capacity on the St. Lawrence, to carry coal to Montreal and Quebec, as well as to Newfoundland.

R. M. STEVENS, locomotive foreman, Truro, N.S., is taking leave of absence, owing to continued bad health.

THE Dominion Government is being urged to build a branch line from Dartmouth to Bedford or Windsor Junction.

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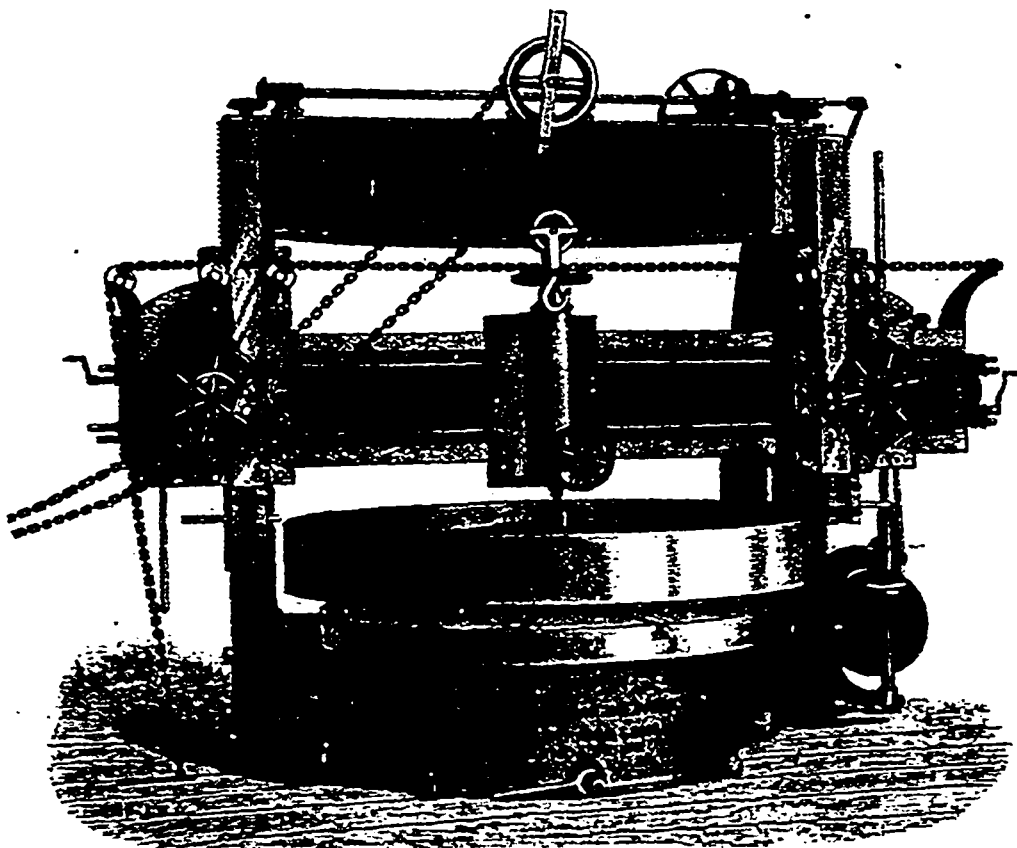
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HARVEY GRAHAM, Secretary



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Industrial Notes.

ROUSSON Bros. are building a dam and mill at Farnham, Que. THERE is some talk of establishing pulp mills at St. John, N.B. THE new bicycle factory at Brantford, Ont., is nearly complete. THE new Manitoba Normal School will be located at Brandon. JOSEPH ZINGSHEIN's furniture factory, at Hamilton, is for sale.

THE grain elevator at Wapella, Assa., has been destroyed by fire.

THE Toronto Gas Company propose to erect a gas plant on the island.

DUNK's planing mill, Campbellford, Ont., has been burned down.

M. J. HYNES, successor to the Hynes Terra Cotta Co., has assigned.

PLANS are being made for a new sewerage system in Stratford, Ontario.

A NEW steel bridge is to be built over the Sydenham, at Alvinston.

AN opera house is going to be built at Guelph, Ont., at a cost of \$15,000.

ORILLIA has the plans ready for a new market, to cost \$10,000 to \$15,000.

FRECHETTE & Co., dealers in machinery at Montreal, assigned last month.

DAVID ROY's sash and door factory at Levis, Que., has been burned down.

THE corner-stone of the new Knox Church, Montreal, was laid on July 29th.

THE Westport, Ont., Cheese Factory has been burned down. No insurance.

BOTH the Arnprior mills had to close recently on account of the low water.

H. G. WALL has moved his saw-mill from Brookville, N.S., to Five Islands.

An effort is being made to initiate a new waterworks system at Amherstburgh, Ont.

THE town of Edmonton, Alta., wants an iron bridge over the Saskatchewan there.

THE Royal Victoria Hospital, Montreal, will probably be opened in September.

C. H. KEEFER, C. E., has completed his survey of Perth, Ont., for sewerage purposes.

A GAS reservoir of 52 ft. diameter, with a capacity of 22,000 ft., is being built at Owen Sound.

THE oil mills at Baden, Ont., were closed a short time ago for a week, owing to want of seed.

TEN new hoppers have been shipped by the Amherst (N. S.) Car Works to the Dominion Coal Co.

THE Bushnell Company, of Montreal, are going to establish a petroleum depot at Sherbrooke, Que.

THE Steam Boiler and Plate Glass Insurance Company is now licensed to carry on business in Canada.

THE Galt (Ont.) Gas Light Co. are about to extend their works. The additions will probably cost \$6,000.

WEDDELL & Co., Trenton, Ont., are to build the new Narrows bridge over the Trent. The price is \$12,000.

HAYDEN & DUNBAR's foundry and machine shop, at Woodstock, Ont., have been seriously damaged by fire.

WORK has begun upon the new building which is going to be occupied by the Peterboro (Ont.) Hardware Co.

H. SCRIBNER has started a shingle-mill at Hampton, N.B. He has had a good deal of modern machinery put in.

THE Massey Mfg. Co. are shipping a number of agricultural implements to Australia via the new steamship line.

A NEW system of bolting machinery, and a new flood-gate to the dam, are being put in at the Bridgeport, Ont., Mill.

THE contracts have been let for the erection of a new cheese factory for Thomas Ballantyne & Sons, at Black Creek, Ont.

IN the Brantford, Ont., Cotton Mill, new water wheels and a fresh flume are going to be added.

ST. CUNEGONDE, a suburban city of Montreal, is making a move to get new municipal buildings.

IMPROVEMENTS are to be made in the Holmedale, Ont., water system, at a probable cost of \$20,000.

MOORE & McDOWALL have doubled the capacity of their saw and planing mills at Prince Albert, Sask.

WAY & Co.'s flour mill, Pefferlaw, Ont., has been burned down. Loss, \$15,000; insurance, \$6,000.

JAMES HAY & COMPANY's varnish works at Woodstock, Ont., have been destroyed by fire. No insurance.

A NEW hospital is to be built at Waterloo, Ont., and J. E. Seagram has made a gift of 13 acres of land for it.

THE fire wardens of St. John, N.B., are having a number of tanks or wells dug in different parts of the town.

HERRON & BALDERSON, of the Perth (Ont.) Roller Mills, have dissolved partnership, Mr. Herron having retired.

MAJOR GORDON's Nail Factory, Carleton, N.B., is now running. Three new machines have just been added.

BELL & BRITAIN's woodworking factory, at Bristol, N.B., has been destroyed by fire. Loss, \$5,000. Not insured.

THE Water Commissioners of London, Ont., have resolved to add some new pumping machinery, and to lay a new main.

A FIRE in St. Anne de la Parade, Quebec, last month destroyed Clement's cheese and box factory and Trotter's American Hotel.

CHARLES O'LEARY, an employee in Firstbrook's box factory, Toronto, caught his hand in a circular saw and lost two fingers.

THREE shingle-cutting machines have been placed in the new steam mill at Arnprior, Ont., each with a daily capacity of 25,000.

FOR the second time this year, the bridges on the Neepawa Road, Lake Dauphin district, Ont., have been swept away by floods.

JOSEPH GILLESPIE, while looking for an oil well at Petrolea, Ont., was killed by the lever pole flying back and striking him on the chest.

SOREL, Que., having voted a bonus of \$50,000 for a cotton mill, Wm. Hobbs, of Montreal, is trying to form a company to erect the factory.

REMILLARD's "Canadian" Foundry, at Three Rivers, Que., has been burned down. A good deal of machinery was saved. No insurance.

GAULT & COMPANY, late proprietors of the beet sugar works at Granby, Quebec, have commenced building a new dam which is to cost \$10,000.

WORK on the streets of St. Cunegonde, near Montreal, is progressing rapidly. Asphalt is being laid on Coursol, Albert and Quessel streets.

SOME Hamilton aldermen are in favor of cutting off the supply of water for elevators. They say that, at the present rates, they are losing money.

THE Dominion Bridge Co. have the contract for supplying the trusses, iron columns and beams for the new Massey Music Hall, Victoria street, Toronto.

THE factory of the Canada Brush Company, at Windsor, Ont., has been totally destroyed by fire. Loss \$18,000, of which about \$8,000 was insured.

JOHN WATSON's box factory at London, Ont., has been destroyed by fire. A good deal of machinery was burned also. Loss \$11,000; insurance \$2,000.

THE new Grammar School at Fredericton, N.B., is now completed. The building is 82 feet square, two stories high, and was designed by J. C. Dumaresq, Halifax.

THE North American Mill Building Co. are asking Stratford, Ont., for exemption from taxation and for free water for ten years in consideration of their rebuilding in that city.

DOUGLAS BROS., sheet metal manufacturers, Toronto, are supplying the corrugated iron roof for the new G.T.R. train shed, Toronto, through Mr. Law, the chief contractor.

D. MCGILLYFRAY, C. J. Lowen and McIver Campbell, have secured the incorporation of the Inland Construction and Development Co., at Vancouver, with a capital of \$150,000.

THE Park and Island Railway Co., now constructing the electric line from Montreal to the Back River, are going to build an overhead bridge at Mile End. The bridge will be 40 feet wide.

THE Massey-Harris Company, Brantford, Ont., are going to build an extension to their works, to cost \$8,000.

It has been decided by the Brantford, Ont., water commissioners to increase the supply owing to the increased demand.

GEO. McDougall, a naval engineer from Scotland, is suing the Montreal Transportation Co. for \$1,000 for breach of contract.

THE iron work for the Cattle Market bridge, Toronto, which is being made by Brown & Co., Belleville, Ont., is now complete.

W. H. THORNE & Co., St. John, N. B., are going to build a warehouse four stories high and 70 by 80 feet. It will cost about \$5,000.

TONEY'S BAY, a piece of marsh land near Port Howe, N.S., is being reclaimed from the sea. A dyke has been built at a cost of \$3,000.

THE village of Montreal Junction is beginning a system of drainage. Cook & Armstrong have 100 men at work on a trunk drain there.

HELDMAN BROS., tanners, Wellesley, Ont., have dissolved partnership, and the business will in future be carried on by Conrad Heldman.

AN employee at Bechtel's Brick Yard, Waterloo, Ont., named Trojhan, had his arm mangled in a crushing machine so badly that it had to be taken off.

THE contract for constructing a relief sewer in Toronto, from Degraisi Street to the Don, has been awarded to J. H. McKnight. The price is \$12,699.

THE Lake Megantic (Que.) Pulp Co. have constructed a coffer dam at the outlet of the lake, and they can now work at the foundations of the mill dam.

THE new firm of James Hay & Co., Woodstock, have paid the arrears of wages due the hands, but the sub-contractors will be treated as ordinary creditors.

A FIRE broke out on July 19th in the finishing room of D. Hibner & Company's furniture factory, Berlin, Ont., and did a good deal of damage; fully insured.

GEORGE LONER, foreman of the Robb Engineering Company's boiler department, Amherst, N.S., has been dangerously injured by the fall of a fire-box upon him.

THE bridge across the Narrows between Dartmouth and Halifax has collapsed. No cause is known for the accident, as there was no wind at the time and no load on it.

CURRY & ROBINET, Walkerville, Ont., have an order for 100,000 bricks, to be used for an extension to the L. E. & D. R. R. freight shed, and for building an oil warehouse.

PRIVY COUNCIL have decided, in the case of Toronto v. the Attorney-General of Canada, that water must be supplied to Government buildings at ordinary citizens' rates.

THE Vale Barrel Mfg. Co., Ltd., is the name of a new joint stock company seeking incorporation at Hamilton, Ont. They will manufacture barrels by machinery on a large scale.

A MOVEMENT is on foot to start a boot and shoe factory in Fredericton. The stockholders are local capitalists, and Odbur Hart, of Boston, a former New Brunswicker, is to be manager.

A MEETING is being held at Springhill this month to consider waterworks improvements and fire protection. It is proposed to have a waterworks system deriving the supply from the Black River.

THE new waterworks system at Pembroke is making good progress. The main pipe across the Muskrat River is laid, the water tower is being built and the pumping station is about ready for the machinery.

A COMPANY of United States capitalists are said to be negotiating for the purchase of the timber lands and business of Gilmore Bros., Bonney River. If they buy they will manufacture here.—*St. Croix Courier.*

WRIGHT & CUNNINGHAM propose starting the manufacture of mowers at St. Catharines, employing fifteen skilled hands and paying \$7,000 annually in wages, and they want ten years' exemption from taxes.

SERIOUS leaks are reported in the McTavish reservoir, Montreal, and the superintendent warns the council of the danger of neglecting them. These leaks have existed for a considerable time and now amount to 300,000 gals. a day.

HAMILTON requires more water pressure, and the question is whether a new main shall be laid from the beach, or a high level reservoir built at the head of James street. Meantime the thirty elevators using water may be compelled to adopt electricity.

WORK has begun upon the Bangor and Aroostook Railway station at Houlton.

THE new building in course of erection by the Kichelieu and Ontario Navigation Co., in Quebec, is nearly complete.

JOSEPH MCGILL, of Shelburne, N.S., has just completed a fine yacht called the "Jamboree," for sailing in the St. Lawrence.

It is reported in St. Catharines, Ont., that William Chaplin has purchased the Haynes Saw Works, and also those of the R. H. Smith Co. (Limited).

THE Parks and Gardens Committee, Toronto, are going to erect a 1,000 yard range, and build sidewalks, etc., at the new rifle range, at the request of the Militia Department.

THE new railway bridge over the Turtle River, which is to take the place of the Albert bridge which was burned down, will be finished in about two months.

FOR some time there has been talk of a rival to the Montreal Gas Co. John Coates, representing the new company, has deposited \$15,000 with the Bank of Montreal to carry out the preliminary work.

It is rumored that a large building suitable for offices is going to be erected by Dr G. W. Emery, of Chicago, on the corner of Queen and Teraulay streets, Toronto. The expenditure proposed is \$100,000.

WM. LEITCH, head of the late firm of Leitch & Co., Hamilton, has joined forces with Leitch & Turnbull, elevator makers of the same city, and the plant of the old firm has been added to the Queen street works.

THE new machine shop to be erected in connection with the Waterous Engine Works, Brantford, Ont., will measure 120 feet by 400 feet, with a height of two stories, or 50 feet. A foundry of 100 ft. x 125 ft. is to be built also, besides some other shops.

AN injunction has been obtained on behalf of Guelich & Co. to restrain the city of Toronto from entering into any contracts with the Warren-Scharf Asphalt Paving Co. or the Ontario Constructing and Paving Co. The question is being argued in the courts.

A. L. HUSBAND, C.E., has been making a survey in Cowansville, Que., with a view to the establishment of water-works there. He calculates that water can be brought from Bull Pond, which is 2½ miles distant, and at an elevation of 210 feet, for \$24,000. The pressure would be about 91 pounds to the square inch.

At the annual meeting of the Moss Glen Manufacturing Company of Kingston, N.B., the following directors were elected:—Joseph F. Merritt, A. P. Barnhill, J. Fen. Fraser, W. H. Murray and C. E. Macmichael. This company have in operation a mill which is turning out large quantities of matches, boxes, staves, barrel heads, pickets, shingles and treenails.

ACCORDING to the report of Andrew Jackson, a large increase had taken place in the tonnage which passed through the American Soo Canal during the year ended June 30th. The number of vessels had increased 5 per cent., the registered tonnage 4 per cent. The actual freight carried shows a gain of 17 per cent., which was chiefly in grain (other than wheat), lumber, and silver.

MR. FRASER, engineer for the New Toronto Natural Gas & Oil Co., has seized the whole of the gas plant at Mimico on the strength of a judgment for \$1,200, obtained some time ago. The plant at Islington was also seized and advertised for sale, as the Mimico plant will be, and if the proceeds do not cover the judgment, it is proposed to bring the directors, Alex. Manning, S. F. McKinnon, Dr. Emery, and A. J. Thompson, into court.

R. DOWLING, of Harriston, draws his supply of water for his factory from the river. The mouth of the pipe became choked with mud, and while cleaning it out the other day, he came upon a catfish about a foot long with a head like a bulldog. Man and fish were equally frightened. Mr. Dowling fled and the fish darted up through the pipe. About two months ago his steam pipe refused to work, and upon taking the pump apart a large catfish was found between two of the valves. It had been drawn up the piping, over 200 yards, passing through two check valves on its way.

A VERY largely attended meeting of the Queen City Lodge of the National Brotherhood of Boilermakers was held the other day in Toronto. A resolution was passed to the effect that as a strike is on in New Orleans and St. Louis, of the members of the International Brotherhood of Boilermakers and Iron Shipbuilders for a nine-hour working day, and as a general strike will take place in the United States at such points as have not agreed to grant the reduction of the hours of labor asked for by the international body on August 1, 1893, it will therefore be wise for boilermakers to keep away from the United States.

Mining Matters.

DURING the month of June, Vancouver Island shipped 90,495 tons of coal.

GOLD-BEARING quartz is said to have been discovered near Levis, Que.

THE Forest Rose claim on Williams' Creek, B.C., now have eight men at work.

THE Dominion Coal Company's mines in Cape Breton County are extra busy just now.

THE concentrator at the Thunder Hill Mines, near Golden, B.C., is in running order.

THE Mabou N.S. Coal and Gypsum Co., limited, are erecting a calcining plant at their steam mills.

THE Shafer Gold Mining Co. have for the present suspended work on their tunnel at Ainsworth.

THE Memramcook Gold Mine Company are considering the advisability of adding a 50-ton stamp mill.

ACCORDING to Mr. Capel, mining expert, the North Hastings mining district is the richest he has visited.

MINING ENGINEER ALGER, of Hudson, N.Y., is thinking of erecting a smelting furnace in Belleville, Ont.

THE Barrie silver mine, near Belleville, Ont., has been having a good deal of attention from capitalists of late.

THE owners of the "Silver King" Mine, B.C., have several hundred tons of ore on the dump ready for treatment.

THE *Hants Journal* says that the Safe Mining Company's claims at Mount Uniacke, N.S., yielded during the month of June 62 ozs.

THE East Kootenay Hydraulic Company, Wild Horse Creek, B.C., is running night and day. The grounds are lighted by electricity.

W. H. LYNCH of the Kootenay Mining and Investment Co., has gone to British Columbia to attend to development work in his mines there.

THE amount of coal shipped into Montreal during May and June was 189,217 tons, whereas during the same period last year, it was 154,877 tons.

A NEW strike has been made on the Providence claim, at Boundary Creek, B. C. Top prospects are said to show 91 ounces silver, and a little gold.

JOHN McRAE, working in the Jubilee Mountains near Golden, is taking out copper ore, averaging 50 per cent. pure copper. It is to be shipped to England this fall.

AT a fire at Theiford Mines, Que., a few days ago, some sheds, the property of the Bell Asbestos Co., were destroyed, the damage being about \$4,500. Partly insured.

A SKILLED mining engineer is shortly going to make an examination of the St. Croix, N.B., nickel deposits, with a view to opening mines should he consider them satisfactory.

THE North Star silver and lead mine, near Fort Steele, B.C., has been sold for \$40,000 to the Dan Mann syndicate, of whom Van Horne and other prominent C.P.R. officials are members.

JOHN E. ASKWITH has formed a company with a capital of \$300,000 to work the Bobbie Burns Gold Mine, East Kootenay. A mill has been put in position at the mine, and is to be started this month.

THE Ontario Government has granted a bonus of \$90,000 to extend the railway from Deseronto, Ont., into the northern iron regions, for the purpose of facilitating the working of a smelting establishment there.

PROF. SELWYN, of the Dominion Geological Survey, thinks that it is very probable that oil exists in large quantities at Egg Lake, near Edmonton, Alberta, but that the question can only be settled by actual boring.

A GOOD deal of work is being done at the Barrie silver mine near Belleville, Ont., but the present owners are thinking of selling a part interest, in order to have at command a larger amount of capital for working expenses.

THE directors for the company recently formed to take in hand the Hall mines, B.C., are:—Sir Joseph W. Trutch, chairman; Jas. Robert Brown, London; J. R. Drake, Sydenham; Rankine Dawson; London; Robert Day, Cork; D. H. Gibb, Isle of Bute; Walter Neilson, Ayr; and F. Ramsay, London, secretary.

B. MURPHY has struck galena near Pilot's Bay, B.C.

KASLO, B.C., has been declared a customs port of entry.

A GOLD strike has been made on Sheep Track in Trail Creek district.

THE McMurdo Basin, East Kootenay, is reported nearly free from snow.

SAMPLING machinery is being imported for the Big Bertha mine, Kaslo.

THE West Waverley, N.S., Mining Company have added more stamp mills to their works.

THE Freddie Lee Mine, Kaslo, has been temporarily closed down owing to the low price of silver.

THE first shipment of gypsum from the Cumberland, N.S., mines took place last month. The cargo consisted of six hundred tons.

THE new bonders of the War Eagle, Iron Mark and Virginia Mines, in the Trail Creek district, B.C., are reported to be pushing work vigorously.

J. POPHAM has made a strike of galena sixteen inches wide near Silverton, B.C. Two assays went 500 and 700 ounces in silver to the ton.

SAMPLES of slate from James' Inlet, B.C., are being sent to Australia. This slate has been selected for the new Government buildings at San Francisco.

THE shaft on the Le Roi mine, Trail Creek, is to be sunk 20 ft. lower. Gold ore has been found, assaying \$400 to the ton. A diamond drill is to be added to its equipment.

A COMPANY is reported in the course of formation at Quebec, for working the mica mines of Charlevoix, and another with headquarters at Boston for the red sandstone quarries of Trois Pistoles Que.

THE *Golden Era*, B.C., states that gold mining is assuming large proportions there, and adds:—General mining reports are good throughout the camp, and, in consequence, many people are coming in to investigate for themselves.

THE Yarmouth, N.S., *Telegram* says:—"Some prominent capitalists of New York have arrived here and are inspecting the gold mines at Kempt. There is quite a boom in gold properties in Nova Scotia, and American capitalists are examining them."

MICA mining in the Lake Girard mine, the largest in the Rideau region of Ontario, is stopped. The reason given is the unsettled state of business in the United States and the consequent shrinkage in demand. The stoppage will probably be only temporary.

MR. WARD, a Pennsylvania mineralogist, is convinced that large beds of coal underlie the county of Lambton, Ont. He has obtained a permit to drill for a seam of bituminous coal five to nine feet thick, which he expects to strike at a depth of 500 feet, near Kettle Point.

AT Newton Brook, near Toronto, while men were boring for water, they struck natural gas at a depth of 180 feet. Wm. Holmes, who was 50 feet below the surface, was instantly suffocated, and a man named Sharp, who went to his rescue, was pulled out unconscious.

NOW that the phosphate market abroad is recovering from its stagnation, there are expectations of a resumption of work in this branch of mining in Canada. The shareholders of the General Phosphate Corporation have had a meeting in London and talk of re-opening their mines in the Ottawa valley.

THERE is a rumor that an arrangement has been made between the Golden, B.C., Mining and Smelting Company and the owners of the North Star Mine, whereby the former will acquire 5,000 tons of the North Star ore. It is stated that this will be shipped to England for final treatment, after being reduced to "matte."

A. HOLDICH, assayer, reports a great increase of business during the past fortnight, and has handled some remarkably rich samples of gold quartz, nickel-bearing rock and auriferous copper ore from Lardeau, Big Bend, and other places tributary to Revelstoke. Quite a number of claims have been bonded.—*Kootenay Star*.

THE Acme is the title given to a new mine just struck in the Whitewater Basin, B.C., by A. W. Palmer, W. S. Carson, P. H. Dechant and W. M. Stables. There are three distinct veins carrying more or less free gold, an assay showing it to run up to \$42 per ton. The nature of the vein matter is milling-white quartz, in many places containing a large percentage of oxide of iron. Close to the property is a water power sufficient to operate a 20 stamp mill.

W. A. SUTHERLAND, in a paper read before the Westville mining students, advocates that the timbering in coal mines should be done by the miners themselves. The miner, knowing his risk, is likely to do such work better than the ordinary shiftman.

THE Truro Gold Mining Company have a good property at Caribou. Although mention has been made of it before, it may be of interest to know that 708½ days' labor produced 1022.35 ounces of gold, worth \$18,982.06. Total cost of production \$1,935.32. Net profit \$17,046.71. It must be nice to own a property like this. May they continue to strike it rich.—*Atlantic Weekly*.

G. H. ANDREWS has struck what looks like a very wealthy vein of gold ore on his claim, the Goodenough, which is situate on the old Hall trail, about three miles from Nelson. Andrews has spent three years opening up his claim, and all who have watched his progress in pushing the long tunnel through surface showings that would satisfy less persevering miners, will be pleased to hear of his strike.—*Nelson Miner*.

MR. CROCKET, partner of W. B. Pool, reports most favorably of the prospects of the Pool group, at Kenilstone. Three shafts were sunk to a depth of ten feet and the result in each was similar. The size and richness of the lode increased as depth was reached. The ledge is 12 feet wide, and a set of samples from one of the shafts showed an average of 80 per cent. lead, \$57.20 silver and \$40.60 gold. Another set averaged the same amount of silver and lead, but about \$2 less gold. The ledge also carries a small quantity of free gold.

THE Pike Lake white mica mine, North Burgess, has been taken in hand by the Lake Grand Mica System, and is to be developed to its full extent. The latter firm are also working the Owen Byrne amber mica property.

TOM BROWN, a fourth year student in McGill University, Montreal, who is taking a course in mining engineering, will not lose a chance for practical study during the long summer vacation. Dressed in corduroys and top boots, he shouldered a pack at Nelson, says the *Miner*, and started for the Hall Creek placer diggings, where he has located a claim and intends building a shack beside his "Clementine," the name under which he has recorded his claim.

THE Creighton gold mine near Sudbury is controlled by Ottawa capitalists. A crusher is being put in, and it is expected that the crushing of quartz will be commenced in a week or two. The whole of the stock, amounting to \$600,000, has been taken up. Together with the purchasing of machinery, erecting the necessary buildings and making a four-mile road from Larchwood, a branch of the C.P.R., to the mine, including a bridge over the Vermillion river, about \$30,000 has been expended.—*Pembroke Observer*.

LONGNECKER AND MORRIS, representing the Pennsylvania Steel Company, have purchased the Wilson mine and all the mined ore, amounting to two hundred and fifty tons, at Calabogie. The schooner "B. W. Folger" took the first consignment of the ore to Fair Haven. Mr. Longnecker has secured a large number of acres of iron ore property along the line of the Kingston & Pembroke



GOING INTO THE MINES—THE FIRST TRAIN FOR NELSON, B.C.

THE *Ottawa Journal* gives some information concerning the zinc-blende mine, near the village of Bryson, Que. The analysis shows from 40 to 54 per cent. of zinc, 10 to 14 per cent. of lead, and from 12 to 16 ounces of silver to the ton. James Russell, the present owner, has spent several thousand dollars in prospecting and development work, and has sunk a main shaft 30 feet deep, and 12 or 15 feet in diameter. The ore itself is very beautiful, being soft, shining, brittle and heavy.

"ST. GEORGE," says the *St. John, N.B., Sun*, "is the headquarters of the granite industry in New Brunswick, if not in Canada. The hills are all composed of that material, each hill being of a different shade from that of its neighbor, the color ranging from a deep red to a kind of yellowish grey." There are four firms engaged mostly in the manufacture of monuments, but a good deal, too, is done in preparing stone for the fronts of expensive buildings. These firms employ about two hundred men in granite cutting, but it is an industry which might be much developed.

A BELLEVILLE despatch says—Leadville (Col.) silver capitalists are negotiating with John McFee, jeweller, and Col. Lazier, of this city, owners of the Barrie silver mine, with a view to its purchase. The recent drop in silver has closed most of the western silver mines, they being unable to produce silver at a profit for less than 90c. Leadville miners are paid from \$3 to \$4 a day, while wood for smelting purposes costs \$7 to \$8 per cord. Wood can be furnished at the Barrie mine for \$1 a cord, and wages at proportionate rates, which makes the cost of the production of silver less than 25c. an ounce.

Railway, and intends beginning mining operations about the first of September. The ore of this district has been assayed and found to be very valuable.—*Perth Expositor*.

J. F. BLEDSOE writes the *Colonist* from Nelson: The Trout Lake country is just now attracting considerable attention, owing to some unusually rich finds recently made, and a few notes on this section may be of interest. Trout Lake City is situated at the head of Trout Lake, a day's journey from Revelstoke. The altitude is 2,300 feet above sea level, and just now the climate is all that could be desired. The place has been quite busy lately, as the various trails which lead from the town off into the mountains are thronged with prospectors laden with heavy packs of provisions and tools, each one intent on pushing his way up under those frowning crowns of snow, where lie, perchance, ease and comfort for the remainder of his life. The ores of this section are argentiferous galena, of the usual high grade found in this section. More or less placer gold can be found in almost every mountain stream, and it is only a question of time when paying hydraulic claims will be located. Copper has been located in a sufficiently high percentage to pay well for working so soon as the transportation problem is properly solved. Graphite nickel and manganese are also known to exist, but as yet have been located only in small quantities. The leading properties around the head of the lake are the Haskins group, the Wagner group, the Great Northern, the Blackburn group, Pool group, Horne group, Silver Cup, Livingstone group, North Star, Leroy and Sharon groups.

Railway and Marine News.

FRASER & Co.'s new steam tug has been launched on the river at Edmonton.

THE C. P. R. are having fifteen coal-shutes built at Carleton Place, Ont.

SURVEYING for the Kingston, Smith's Falls & Ottawa Railway will be commenced shortly.

ABOUT half the men employed on the Harvey and Salisbury Railroad have been dismissed.

WORK has begun between Fort Coulonge and Pembroke, upon the Pontiac and Pacific Junction Railway.

THE C.P.R. will next month take possession of the Montreal & Western railroad as far as St. Jovite, Que.

THE Great Northern Railway is ordering three steel steamers for a line to the Orient from Seattle, calling at Victoria.

THE Donaldson line S.S. "Alcides," sailing between Glasgow and Montreal, went ashore at Heath Point, Anticosti.

THE Micheliu & Ontario Navigation Co. have taken the steamship "Canada" off the route until further notice.

THE Stewiacke and Lansdowne Railway, N.S., defaulted in the payment of its bonds on the London, Eng., market.

THE work of grading the railway connecting the Lake Megantic Pulp Company's works with the C.P.R. is almost finished.

A. T. HUNTING, of Teeswater, Ont., was crushed while coupling C. P. R. cars at Kenilworth, and died on the 25th July.

THE purchase of the right of way for the O. & P. S. R. in the neighborhood of Haggarty, Ont., is now being proceeded with.

THE G.T.R. has dismissed fifty mechanics from the Fort Gratiot and Point Edward shops, owing to slackness of business.

D. W. BROWN, C.E., is said to have been offered an important position on the Hall's Bay Railway, Clodes Sound, Newfoundland.

THE Mallory Line steamship "Winthrop," which was recently wrecked, has been sold at auction to Peter Doyle & Co., for \$2,300.

THE work of dredging Port Elgin harbor is complete, and there is now sufficient depth of water for the largest ordinary lake boats.

MUNRO BROS., New Glasgow, N.S., have the contract for supplying seat springs on the new cars for the Windsor and Annapolis line.

PRIVY COUNCIL have decided, in the matter of the Grand Southern Railway, in favor of Col. Green. The latter is awarded \$50,000.

AN express train on the M. C. R. was derailed near Springfield on July 29th. The engineer was scalded, but otherwise no one was injured.

THE Tobique Valley Railway is now in regular operation. The road skirts the Tobique river for the whole twenty-eight miles of its length.

THE steamer "Agnes" was on July 18th sunk while passing through the Little Rapids locks, owing to a heavy sawlog forcing itself in between her and a scow.

A NEW Government dredge built for use in the ship channel below Montreal has been launched in Ottawa River. She is 152 feet long and 30 feet 6 inches broad.

THE Department of Marine and Fisheries are going to have a light placed above the wrecked schooner "David Vance," near Point Pelee, till the obstruction can be removed.

GARSON, PURSER & Co., St. Catharines, Ont., have a contract for building thirty-five miles of the Boston and Nova Scotia Coal Company's railway, viz., from Broad Cove to Orangedale.

THE claim, amounting to \$322,029, of E. E. Gilbert & Sons, of Montreal, contractors, against the Government for the deepening of the Galops channel, has been referred by the railway department to the Exchequer Court.

EX-ALDERMAN CUNNINGHAM, president of the Central Counties Railway, says the company is prepared to make an air line between Cornwall and Ottawa, if the two places will bonus the line. The distance would be only sixty miles.

THE city attorney of Montreal has been instructed to prepare a report on the obligations of the C.P.R. to the city. These obligations are the result of different Acts passed since the time when the city voted \$1,000,000 for a service to connect with Ottawa.

It is said that the reason of the Dartmouth (N.S.) bridge disaster was that the piles were worm-eaten nearly through.

MATTHEW BUNTON, a C.P.R. brakeman, was so badly hurt by falling between the cars at Toronto that he died on July 25th.

THE idea of floating the "John E. Sayre," which was wrecked off the coast of Newfoundland, has been abandoned as impracticable.

IN order to mark the rise and fall of water in the Bay of Quinte, J. B. Benson has set up water gauges in Deseronto and Pictou harbors.

THE C.P.R. have notified three hundred of its employees that their services are required no longer. This step was taken on purely economical lines.

THE breakwater at Sand Point, says the *St. John Sun*, is very much in need of repairs, the waves having made large gaps in some places towards the outer end.

THE new engine for Thomas H. Moffat's yacht has arrived. This was the pioneer steam pleasure yacht on this section of the Ottawa.—*Pembroke Observer*.

THE surveys for the extension of the Central Railway to the Queen's County, N.B., coal-fields are now finished, and actual work will in all probability be begun soon.

A SMALL steamer owned by Mr. Snodgrass, of Okanagan, has been launched at New Westminster, B.C. She is to be transported by train to Dog River, on which she will ply for passengers.

IT is reported that the capital necessary to the construction of the railway from Shelburne, Ontario, to New Germany, has been secured, and that operations will be commenced as soon as possible.

THE Mallory Steamship Line having been unable to procure a suitable boat to take the place of the "Winthrop," have been compelled to withdraw the service between St. John, N.B., and New York.

W. E. Tisdale, of Simcoe, has given formal notice of application to Parliament to incorporate a company for the construction of the ship canal from Lake St. Clair to Lake Erie, referred to in past numbers.

THE steamer "Garden City" of Toronto, on July 29th, became jammed in the bay between the "Empress of India" and the "Primrose." The collision tore away about 17 feet of the latter's lower deck.

THE supplement of the Georgian Bay and North Channel chart, prepared by the Department of Marine and Fisheries, and giving the result of Staff Commander Boulton's survey, was issued by the Queen's Printer last month.

THE contract for the Nakusp and Slocan railway has been let to D. McGillivray, and several hundred men are being put on the work. Twenty-four miles of the road, from Nakusp to Slocan Lake, are to be finished this year.

THE new steamer "Transfer," of the C.P. Navigation Co., has arrived at New Westminster, and will ply between that city and the South Arm. She is 124 ft. long, 24 ft. beam, and draws only 30 inches of water. She is on the model of the "Rithet," and will be quite as fast.

THE first of New Glasgow's steel ships, "The Mulgrave," is described by the *Eastern Chronicle* as being 122 feet long, 34 feet wide, and 16 feet deep. Her machinery consists of compound condensing engines, cylinders 22 and 42 inches diameter, 30 inches stroke, and of 600 horse power. Her boiler is 12½ by 10½ feet. Her hull is made entirely of steel, and is of extra strength in order to resist the ice.

THE new dredge "Laval," built at Ottawa during the winter by Walter & Sons, of Hull, for the department of Public Works, has been launched. She proceeds to the Government workshops at Sorel to receive her dredging machinery. She is specially intended for deep dredging in the ship channel at Barre a Boulard, near Portneuf, about half way between Three Rivers and Quebec. The "Laval" is one of the best dredges ever built in Canada, and can work in 50 feet of water.

IN 1885, Macdonald & Preston had a contract for building the portion of the Souris and Rocky Mountain Railway between Brandon and Battleford. In the following year the Great North-West Central Railway Co. obtained a charter covering the same territory, by the terms of which the company were liable for all prior claims for construction. Macdonald & Preston agreed to accept \$75,000 in settlement of theirs, but only received a portion of this sum, and brought an action against the company for the balance, in which the former won; the G. N.-W. C. R. then appealed, with the result, however, that the appeal was dismissed with costs, and Macdonald & Preston retain a judgment for \$60,000.

Personal.

JOSEPH SPRAGGE has been appointed locomotive inspector for the Ontario and Atlantic Division of the C. P. R.

T. McGRATTON, of Uxbridge, Ont., is the inventor of the Oxford Furnace put on the market by the Gurney Co.

WM. HALL, of Springhill, has been appointed manager of the Canada Coal Co.'s mines at the Joggins, in place of Mr. Baird.

LOUIS COSTE, chief engineer of Public Works, Ottawa, has gone to England to gain information with regard to submarine work.

HON. JOHN HAGGART and Collingwood Schreiber are on a tour inspecting all the St Lawrence Canal works now under construction.

THOS. A. EDISON, the great electrician, was in Ontario at the beginning of this month, looking at some mining properties in the Sudbury district.

THOMAS FRASER, who was foreman at the building of the steel steamer "Mulgrave" at New Glasgow, N.S., has been overseer of construction of over a hundred vessels.

DONALD C. RIDOUT, the well-known patent solicitor, of Toronto, died suddenly on the 2nd inst. at his home, Tindall ave., age 45. A fit of apoplexy was the cause of death. He was a brother of Theo. Ridout, of the Department of Railways and Canals, Ottawa.

SUPERINTENDENT PINCOMBE, of the Laurentide Pulp Mill Co., Quebec, whilst inspecting the dam, stepped on a loose plank and fell backwards on to the rocks beneath, fracturing his skull. He died on the 21st July.

ENGINEER CLIFFORD, of the Ottawa, Arnprior & Parry Sound Railway engineering staff, slipped off some loose logs into the Madawaska River. He would have been drowned but for the timely intervention of Mr. Rost.

J. J. BROWNE, the well known Canadian architect, died at his home in Montreal, on the 3rd inst., at the age of 56. His death resulted from a runaway accident last November. Mr. Browne studied under Lord Russell, the famous engineer and architect.

F. E. LEONARD, of London, Ont., has been elected vice-president of the Boiler Manufacturers' Association of the United States and Canada, the annual convention of which was held in Chicago in June. The next convention will be held in Boston on the 17th July, 1894.

Brief, but Interesting.

THE length of the great Siberian railway, with its branches, will be 5,000 miles, and its estimated cost is \$200,000,000. The entire road, according to present plans, is to be finished in 1904.

THE bearing power of piles is enormous. At some recent tests made on piles driven into clay it was found that each one bore a load of over fifty tons for a fortnight without the slightest sign of settlement.

THE telemeter is the name of a recent invention, which has for its object the recording of temperatures in storage rooms, warehouses, etc. It requires no attention for a month or more at the time, and prints the day of the week and hour of the day in plain characters on a ribbon, together with the temperature.

THE *Locomotive Engineer*, speaking of the enormous amount of labor performed by a watch, says that if the six-foot driving wheels of a locomotive be run the same number of revolutions as the balance of a watch does in a year, they will have covered a distance equal to seventy-eight complete circuits of the earth.

A CEMENT for steam pipes, valuable in filling up small leaks, such as a blow hole in a casting, without the necessity of removing the injured piece, has been compounded. It is composed of 5 pounds of Paris white, 5 pounds yellow ochre, 10 pounds of litharge, 5 pounds red lead, and 4 pounds black oxide manganese, these materials being mixed with great thoroughness, a small quantity of asbestos and boiled oil being afterward added. This composition will set hard in from two to five hours, and possesses the advantage of not being subject to expansion and contraction to such an extent as to cause leakage afterward. Its efficiency in places difficult of access is of special importance.

The Patent Review.

RECENT CANADIAN PATENTS.

- 43,152 Artemas Hiram Ward, Wichita, Kansas, cooking apparatus
 43,153 Henry W. Thurston, Woodside, New York, machine for making fish and other nets.
 43,154 Mark Wesley Dewey, Syracuse, New York, electric water-heater.
 43,155 James Plewkharp, Columbus, Ohio, machine for forming and hooping barrels
 43,156 Almon H. Colkins, Evanston, Ill., oil burning apparatus
 43,157 Wm. Hewitt Meldrum, miller, Peterborough, Ont., rotary scalper.
 43,158 Duncan G. McBean, Winnipeg, Man., air pump attachment to wheels.
 43,159 Wallace R. Kinkand, Kansas, Mo., car wheel and axle.
 43,160 James Ford, Laughton Hall Mains, Edinburgh, Scotland, self-binding reaping machine.
 43,161 George W. Towar, Detroit, Michigan, emulsifier.
 43,162 Jerome Q. Cook, Huntington, Indiana, boiler cleaner.
 43,163 Leon Durocher, Charles Edm. Sansoucy, Duluth, Minn., fire escape.
 43,164 Charles P. Tatro, Spokane, Washington, underground conduit for electric railway.
 43,165 Wm. Emery Nickerson, Cambridge, Mass., vacuum pump. (Two patents.)
 43,167 Ernest Bockmuhl, Barmen, Rittershausen, Germany, machines for the manufacture of paper-links for driving belts.
 43,168 Howard Sanford Whitcomb, Chicago, Ill., umbrella.
 43,169 Archibald Buchanan, junior, Ayr, Scotland, floors for stables, cattle sheds and the like.
 43,170 Thomas Haskell Besse, Buffalo, N.Y., ice cream freezer.
 43,171 David Lancaster Dwinell, Montreal, syphon cistern.
 43,172 Michael Murray, Baltimore, Maryland, holder for lids of vessels.
 43,173 Reuben Dillon Bulver, Veedersburg, Indiana, railway sleeper block.
 43,174 Willard F. Richards, Buffalo, N.Y., car coupler.
 43,175 Leonidas Sennett, Russell, Kentucky, air-brake coupling.
 43,176 Eddy L. Rayburn, San Jose, Cal., hand truck.
 43,177 Martin J. Bobo, Rockmart, Georgia, vehicle brake.
 43,178 Gotthulf L. Ludwig, Raton, New Mexico, drain for stall floors.
 43,179 Thomas Ashley Bissell, Buffalo, N.Y., car buffer.
 43,180 Alexander Klinger, Telluride, Colorado, lace fastener for shoes and other articles.
 43,181 Nicholas J. Woolsey, Lawrence, N.Y., thill coupling.
 43,182 Harriet Sophie Lowry, Harrisonburg, Virginia, lamp heater.
 43,183 John McKinnon, Kingston, Idaho, clothes drier.
 43,184 William King, Ottawa Ont., diaphragm for locomotive and other steam boilers.
 43,185 Hannah S. Diack, Detroit, Michigan, lid strainer.
 43,186 John Athens Bowler, New York, N.Y., twisted metal band for box strap, etc.
 43,187 Asa Mutchenbacher, Rosseau Falls, Ont., boom chain.
 43,188 Stanley Eskell Clifford, South Kensington, Middlesex, England, bit for bridles.
 43,189 Perry Brown, Sharonville, Ohio, car coupling.
 43,190 Joseph Augustus Treat, Stuart, Iowa, cash register.
 43,191 John Callahan, Durango, Colorado, carpenter's and builder's jack.
 43,192 Wm. Watson Grier, Hutton, Pennsylvania, machine for graining wood.
 43,193 Harvey Isaac Leith, Providence, Rhode Island, bottle.
 43,194 Richard K. Dorsey, Allandale, Ont., automatic car coupler.
 43,195 Benjamin Viau, New York, N.Y., universal drafting pattern for dress cutting.
 43,196 John Hooper Crocker, Shelburne, Ont., cornice brake.
 43,197 James Clement Nervey, Birmingham, England, spring hook.
 43,198 Delos Irish, Salt Lake, Utah, automatic circuit breaker.
 43,199 Jared E. Belt, Minneapolis, Minn., running water motor.
 43,200 John A. Barker, Pasadena, Cal., wrench.
 43,201 George E. Desmond, Brule, Wis., tree-felling saw.
 43,202 Ernest Feige, Saginaw, Mich., letter press.
 43,203 Philip Trick, Crestline, Ohio, machine for making wire fences.
 43,204 Henry Sacks Kaliske, Boston, Mass., vacuum pump

- 43.205 Patrick Jones, Woodstock, Ont., manufacturing cigars.
 43.206 Cajetan Banovits, Budapest, Hungary, nut screw clamp.
 43.207 Rachel A. Shellard, Virginia, Nevada, sewing machine attachments.
 43.208 Jacob Hiram Myers, Rochester, N.Y., voting machine.
 43.209 Philip Henry Holmes, Cardiner, Maine, projectile.
 43.210 Hanson Hoyt Adams, Everett, Mass., carving machine.
 43.211 Gamaliel Jenkins, Queensbury, N.Y., car coupling.
 43.212 John Edward McEachram, Montreal, Que., pad and pencil holder for telephone tables.
 43.213 Frank Merrick Ryan, San Francisco, Cal., car coupling.
 43.214 John Danford, Thorold, Ont., car coupling.
 43.215 Hallack Abbey Renrose, New York, N.Y., machine for molding plastic material.
 43.216 Jackson Richards, Philadelphia, Pa., locomotive and other engines.
 43.217 The Vacuum Brake Co., Ltd., James Gresham, Craven, Salford, Manchester, Eng., improvements applicable to the vacuum automatic brake apparatus.
 43.218 Isaac T. Dyer, Chicago, Ill., railway gate.
 43.219 Adrien Eugene Thouret, Toronto, Ont., attachment for brooches.
 43.220 Edwin A. Leland, Brooklyn, N.Y., spring hinge.
 43.221 Hugh McPhail, Wakefield, England, method of and apparatus for generating steam and evaporating liquid.
 43.222 Fortune L. Bailey, Freeport, Indiana, cash register and indicator.
 43.223 Robert Fulton Phillips, San Diego, Cal., band and socket, mouth mirror.
 43.224 Wm. Wallace Wood, Elbridge, N.Y., bank note.
 43.225 Montague James Bretherton, Fort Worth, Texas, rotary engine.
 43.226 John Franklin Wiswell, Medford, Mass., process of and apparatus for treating ores.
 43.227 Julian Walter Chadwick, New York, N.Y., type setting machine.
 43.228 John W. Wilks, Chester, South Carolina, stop for auger and brace bits.
 43.229 Thomas Clarke Stockport, Lancaster, England, the manufacture of loom linking bands and the apparatus used therein.
 43.230 Richard Timinis, Westley, Salop, England, securing together the ends of travelling bands for use in sheaf-binders, straw-trussers and other like implements.
 43.231 Lewis Dean Mason, Buffalo, N.Y., folding camp-stool.
 43.232 George Meloche, Sandwich township, Ont., ditch gate.
 43.233 Joseph Hoover, Hubbard, Iowa, cow milker.
 43.234 Adolphe Charles Schutz, Brooklyn, N.Y., apparatus for forming the fillers for bunches of cigars, and for forming tapering long filler cigars.
 43.235 Hercule Lanche, Detroit, Michigan, connections and terminals for electric and other wires and cables.
 43.236 Hugh Stephenson, New York, N.Y., folding bed.
 43.237 Roy Stone, New York, N.Y., steam cultivator.
 43.238 Joseph R. Worcester, Waltham, Mass., bridge floor.
 43.239 Robert S. Wiesenfeld, Baltimore, Maryland, bottle, packing vessel or jar.
 43.240 Lewis Telephone Hebert, Quebec, baking pan.
 43.241 Arthur Ethelbert Hotchkiss, Mount Holly, N. J., elevated railway system and vehicle therefor.
 43.242 Woodburne Landmuir, Toronto, Ontario, vehicle tire.
 43.243 Edward Smith Higgins, London, England, relating to typewriters.
 43.244 Alexander W. McArthur, San Francisco, Cal., game apparatus.
 43.245 Wm. Henry Thompson, Hamilton, Ontario, mechanism for propelling boats.
 43.246 The International Self-closing Gas Burner Company, Milwaukee, Wis., self-closing cut-off for gas burners.
 43.247 Thomas J. Carroll, Hamilton, Ont., cash or package carrier for stores.
 43.248 George John Altham, Swansea, Mass., steam turbine.
 43.249 Eugene Bregier, Terrebonne, Minn., wind wheels.
 43.250 Otto Elster, Bodenbach, Bohemia, spring coupling.
 43.251 John Anderson Carlaw, Toronto, Ont., bag for containing monies or other valuables for transmission from one place to another.
 43.252 Wm. F. Beasley, Oxford, North Carolina, bag and lock therefor.
 43.253 Samuel Cleland Davidson, Belfast, Ireland, the manufacture of bifurcated rivets or two-pronged U-shaped fasteners for leather or other substances, and apparatus therefor.
 43.254 George Washington Cable, New York, N.Y., machine for separating the stems from tobacco leaves.
 43.255 Charles A. Chase, Moro, Maine, water wheel.
 43.256 James I. Bernard, Hamilton, Ont., a hand or foot-power grinding machine.
 43.257 Charles Cooper, Bennington, Vermont, hop-motion attachment for knitting machine.
 43.258 John Franklin Newell, Cardine, Maine, composition for self-lubricating bearings.
 43.259 Wm. A. G. Birkin, Nottingham, England, process of and solvent for separating precious metals from their ores.
 43.260 David Wells Carter, Stratford, Ont., motor for the transmission of power.
 43.261 David Mendelson, New York, N.Y., window washer.
 43.262 John Cunningham, Toronto, Ont., cooking stove.
 43.263 Harman Bunker, Barrie, Ont., self-acting street car coupler.
 43.264 Christian Winhold, East Zorra, Ont., hay and grain unloader.
 43.265 Elwyn Waller, New York, N.Y., method of manufacturing white lead.
 43.266 Carter Hawkins Briddle, Souris, Man., railway car coupling.
 43.267 G. Duneau & Co., Boston, Mass., overhead tramway.
 43.268 Hugh Steven Wallace, Hamilton, Ont., can.
 43.269 Lemuel H. Dotterer, Graceham, Maryland, milking machine.
 43.270 Wm. H. Brewer, New Brighton, Pennsylvania, method of treating clay for potteryware.
 43.271 Thomas Henry Noxon, Ingersoll, Ont., cultivator.
 43.272 Matthew Harcourt, Detroit, Mich., vehicle gear.
 43.273 Wm. Henry Thompson, East Stroudsburg, Penn., cash indicator.
 43.274 Thomas Shoenberger Blair, Allegheny, Penn., reducing metallic ores.
 43.275 Thomas Murphy, Sewickley, Penn., method and apparatus for equalizing links.
 43.276 George Walter, Duluth, Minn., dust collector and catcher.
 43.277 William Bellaway Guernsey, Norwich, N.Y., automatic grain brake.
 43.278 Duncan MacPherson, Montreal, Que., railway switch.
 43.279 Romeo Couillard, Warwick, Que., rotary engine.
 43.280 Wm. E. Bishop, Aylesford, N.S., fork and back.
 43.281 Frank Morton, St. Louis, Missouri, ventilating apparatus for grain bins.
 43.282 Ernest Winhelm Orth, Zeppelhaus, Hamburg, Germany, egg cup.
 43.283 Francois Schmalz, New York, N.Y., process of ornamenting glass, porcelain and other vitreous ware.
 43.284 Same as the other, except improvements in process of ornamentation.
 43.285 Emory Willis Gurney, Seattle, Wash., machine for raising and loading timber.
 43.286 Copeland Roller Bearing Company, New York, N.Y., roller bearing.
 43.287 Joseph Lafayette, Washington, Missouri, shaft tug.
 43.288 Henry C. Fishel, New York, N.Y., boutonnières (three patents).
 43.291 Edwin G. Munnery, Detroit, Mich., an oil stove and burner.
 43.292 George Maxwell Graham, Chicago, Ill., sectional mould.
 43.293 George Lowry, Tiffin, Ohio, stone crusher.
 43.294 Isaac St. Clair Goldman, Los Angeles, Cal., coupling.
 43.295 Wm. Lewis, South Centre, Minn., draught equalizer.
 43.296 Wm. D. Winfield, Winfield, Kansas, corn paper.
 43.297 Moses Beal, Elyria, Ohio, drilling machinery.
 43.298 Edward Ethel Gold, New York, N.Y., steam radiator.
 43.299 Clarence D. Pruden, St. Paul, Minn., ice cream freezer.
 43.300 Robert Ashton Lister, Dursley, Eng., improvements in or applicable to centrifugal machines for separating liquids.
 43.301 Charlotte Nellove, Toronto, Ont., medical compound.
 43.302 Casper Mannebach, Detroit, Mich., measuring and drafting device for garments.
 43.303 Alfred L. Simpson, New York, N.Y., acoustic telephone.
 43.304 Wesley Webber, Pittsburg, Penn., deep well drilling apparatus.
 43.305 John D. McEachren, Galt, Ont., disc fan.
 43.306 Moses Nimrod Seiver, Vernon, Texas, sea beam.
 43.307 Michael Brabau, Detroit, Mich., wrecking apparatus.
 43.308 Andrew Gardner, Atlantic, Iowa, grain binding harvester.
 43.309 Andrew Gardner, Atlantic, Iowa, elevating and packing mechanism for harvesters.
 43.310 David J. Bowser, Cadillac, Mich., planter.

- 43.311 Willard C. Grande Bundy, Binghamton, N.Y., workmens time recorder.
- 43.312 Frank Henry Cathcart, Philadelphia, Penn., rotary engine or motor.
- 43.314 Mark Ashman, Township of Westminster, Ont., gate.
- 43.315 Louisa B. Saddina, Hot Springs, Ark., water cooler.
- 43.316 Arthur Ethelbert Hotchkiss, Mount Holly, N.J., vehicle for elevated railway systems.
- 43.317 Hermann Schneider, Lissa, Prussia, grain polishing and cleaning apparatus
- 43.318 Lyman Melvin Jones, Toronto, Ont., cultivator.
- 43.319 Frederick Schrader, Philadelphia, Penn., wheel tire.
- 43.320 Charles J. Hartley, Decatur, Ill., grain weigher.
- 43.321 Peter Gewdron, Toledo, Ohio, bicycle.
- 43.322 James E. Wilson, Easton, Penn., machine for cutting bones.
- 43.323 John H. Morris, Maquoketa, Iowa, fence machine.
- 43.324 Leon Moses Cabana, Buffalo, N.Y., leather washer.
- 43.325 Joseph de Labroquerie Tache, St. Hyacinthe, Que., milk and cream heater and cooler.
- 43.326 Thomas Barnes, Lowell, Mass., life-guard for street cars.
- 43.327 Henry H. Garrard, Cleveland, Ohio, sulky.
- 43.328 Arthur John Houghton, Toronto, Ont., car fender.
- 43.329 Edward Brooks Loomis, Memphis, Tenn., dust guard for car windows.
- 43.330 Isaac Booth Futvoye, Waterloo, Que., rail joint fastening.
- 43.331 John Thomas Smith, New York, process of treating cork.
- 43.332 Ellis J. Woolf, Minneapolis, Minn., single cylinder compound engine.
- 43.333 Joseph Cathrein, Innsbruck, Austria, door-locking device.
- 43.334 Herman O. Lange, Muskegon, Mich., log turner.
- 43.335 Arthur C. Gillette, Jersey, N.J., detachable tire and guard.
- 43.336 John Bernard Thies, Dayton, Ohio, liquid discharging nozzle
- 43.337 August Miller, Burlington, Iowa, hot air pipe.
- 43.338 Edward Thomas Burrows, Portland, Maine, attachment to frictional mechanisms for spring actuated shades.
- 43.339 Charles Cloz, Webster, Iowa, grain separating screen.
- 43.340 Peter Hocuscheid, Akron, Ohio, twist drill milling machine.
- 43.341 Edwin Julien, Montreal, Que., railway car seat.
- 43.342 Jean Francois Chazotte, Montreal, smoke-consuming furnace.
- 43.343 Albert F. Smith, Chesley, Ont., clothes-dryer.
- 43.344 Samuel Raymond Scottron, Toronto, Ont., bracket.
- 43.345 Emery B. Smith, St. Louis, Missouri, wrench.
- 43.346 Alvin George Gekeller, Frostburg, Maryland, potato planter.
- 43.347 Hubert Trefle Chalifoux, St. Hyacinthe, Que., combined drag and circular saw-mill.
- 43.348 Thomas Brooks, Peterboro, Ont., hot water boiler for heating purposes.
- 43.349 Waldo W. Valentine, Washington, Columbia, vehicle wheel.
- 43.350 Alexander James, Wellington, New Zealand, apparatus for hanging window sashes and the like.
- 43.351 Wm. N. Eichberg, Racine, Wisconsin, insulator bracket.
- 43.352 Hodevah Henry Erlam, Digby, N.S., combined culinary pot.
- 43.353 James Finney McElroy, Albany, N.Y., car-heating apparatus;
- 43.354 Wm. McKee, Petersville, N.B., running gear.
- 43.355 Richard Keeling, Walhalla, North Dakota, separator attachment for threshing machines.
- 43.356 Henry James Stuart Brown, Egremond, Lanark, Scotland, packing case for bottles and the like.
- 43.357 George Frederick Simonds, Fitchburg, Mass., apparatus for hardening steel (two patents).
- 43.359 Charles A. Nicholson, of Assamoosick, Virginia, water wheel.
- 43.360 Eugene Robert Burnes, Toronto, Ont., saw handle.
- 43.361 Josiah Augustus Webber, Brooklyn, N.Y., car wheel.
- 43.515 Wm. Clark, Sydney, New South Wales, latrines and automatic flushing apparatus in connection therewith.
- 43.516 Eugene H. Ford, New York, N.Y., typewriting machine.
- 43.517 Hiram A. Bacon, Pontiac, Michigan, bean pickers.
- 43.518 James Douglas Morrison, Reinbeck, Iowa, railway car.
- 43.519 Francis Louis Osborn, Windsor, N.Y., horse hay brakes.
- 43.520 Ludlow George Cook, Minneapolis, Minn., bolster standards.
- 43.521 Alonzo W. Cram, Haverhill, Mass., soil pipe collars.
- 43.522 Wm. Henry Heeson, Toronto, Ont., rocking grate bars for furnaces.
- 43.523 Vital Alfred Edmond, Quebec, P.Q., machine for oiling the rods of pistons.
- 43.524 John Cunningham Mongomerie, Dalmore, Ayr, Scotland, extraction of gold and silver from ores or compound containing the same, and apparatus applicable for use in the treatment of such materials by means of the solvents.
- 43.525 Andrew McEachran, Fitchburg, Mass., elevators.
- 43.526 Odeon Horace Titus, Wilmington, Delaware, fanning mills.
- 43.527 Charles Warren Brown, Montreal, P. Q., telephone systems.
- 43.528 John Thomas Avery, St. Louis, Miss., lasting machines.
- 43.529 Andrew Henry Fletcher, Kingsville, Ont., breast collars for horses.
- 43.530 George E. Anders on, Grantsburg, Wis., potato diggers.
- 43.531 Frank Cowan Rheobottom, Union, Mich., grave vaults.
- 43.532 Madison W. Beeves, Sayre, Pa., door holding devices.
- 43.533 George Turner Orton, Winnipeg, Man., water closets, sewers for introducing disinfectants into them.
- 43.534 Edward Ethel Gold, New York, N.Y., valves for steam pipes of railway cars.
- 43.535 John Chambers Lundy, Winnipeg, Man., band cutter and automatic feeder for threshing machines.
- 43.536 Frank O. Skoglund, Chicago, Ill., portable snow screens.
- 43.537 George H. Coburn, Laconia, New Hampshire, thread splicing mechanism for knitting machines.
- 43.538 Harvey Hallock Burrith, Newark, N.J., method of and means for tapping water mains and forming branch connection therewith under pressure.
- 43.539 Wm. Albert Clark, Toronto, Ont., machines for purifying and bottling milk.
- 43.540 Edward A. Colby, Newark, N.J., electric glow lamps.
- 43.541 Bryan Atwater, Berlin, Conn., milking machines.
- 43.542 Stanislas Payette, Montreal, P.Q., advertising devices.
- 43.543 Thomas Spencer Miller, South Orange, N.J., conveying apparatus.
- 43.544 George A. Cline, Toronto, Ont., new game.
- 43.545 Ernest Nickoff, Tacoma, Washington, apparatus for raising sunken vessels.
- 43.546 Archibald A. Dickson, Cote St. Antoine, Montreal, P.Q., process for reducing crude peat into a marketable form for fuel.
- 43.547 Fred G. Mitchell, London, Ont., automatic speed regulator for governors.
- 43.548 Wm. Bell, Michael Robert Conley, Brooklyn, N.Y., metallurgical furnaces.
- 43.549 James W. Pepper, Akron, Ohio, drum snares.
- 43.550 Harman Bunker, Barrie, Ont., friction clutch.
- 43.551 " " " " two-wheeled carts.
- 43.552 Jos. Wood Wilkinson, Philadelphia, Pa., leaf holders for music.
- 43.553 Hans A. Frash, Cleveland, Ohio, the art of manufacturing sulpho-acid from petroleum.
- 43.554 James Baker Pollard, Roanoke, Virginia, cigarette machine.
- 43.555 Charles Wiese, Ottawa, Ont., electric current and current generator governors.
- 43.556 Thomas A. Briggs, Arlington, Mass., compound levers.
- 43.557 Berlin A. Keefer, Russell, Arkansas, car couplings.
- 43.558 Ernest Korting, Hanover, Prussia, injectors
- 43.559 The Economical Gas Apparatus Construction Co., Toronto, Ont., apparatus for spraying oil or hydrocarbon liquids in connection with an apparatus for the manufacture of gas.
- 43.560 Walter Scott Shipe, Toronto, Ont., sheet metal rolling mills.
- 43.561 James Findlay, Toronto, Ont., street car replacer.
- 43.562 Daniel Conboy, Toronto, Ont., concealed joint.
- 43.563 John L. Gustin, Chicago, Ill., insulated trolley wire support.
- 43.564 Same as the above.
- 43.565 James Finney McElroy, Albany, N.Y., electric switches.
- 43.566 Wm. Joseph Still, Toronto, Ont., electric motors.
- 43.567 Thomas E. Hall, Chicago, Ill., manufacture of butter.
- 43.568 Jos. Wm. Sutton, Eagle street, Brisbane, Queensland, the wet process for the extracting of gold or silver or both from pulverized ores or other finely divided material, and apparatus therefor.
- 43.569 Woodburn Langmuir, Toronto, Ont., cushion tire.
- 43.570 Edward Preston Usher, Grafton, Mass., storage batteries.
- 43.571 Same as the above.
- 43.572 Archibald Brake, Toronto, Ont., brake shoe.
- 43.573 Oscar Axel Enholm, New York, N.Y., electric railways.
- 43.574 J. George Lloyd, Township King, Ont., automatic stock feeder.
- 43.575 John H. Jackson, Pen Argul, Pa., adding machines.
- 43.576 Sir Charles Stewart Forbes, Bart., London, Eng., telephone combination.
- 43.577 John Bearman, Township of Elderslie, Bruce, Ont., pea harvester.
- 43.578 Wm. Joseph Still, Toronto, Ont., electric motors.

- 43.579 Joseph Eastwood, Norwich, Eng., the production of matrices or moulds for stereotyping and apparatus employed therein.
- 43.580 John Henry Clauss, Tremont, Ohio, bread and cake knives.
- 43.581 Woodburn Langmuir, Toronto, Ont., rubber tire.
- 43.582 James Franklin Welch, Brooklyn, N.Y., worm gear.
- 43.583 Robert Adams, 67 Newington Causeway, London, Eng., opening, closing, regulating and controlling fanlights, swings, windows, doors, and analogous articles and appliances for effecting the same.
- 43.584 Thomas Hodder, Derby, Eng., method for securing the handles of cranes to their shafts.
- 43.585 Hermann Sichelshmidt, Dortmund, Prussia, axle-box with removable oil well and elastic oil cushion.
- 43.586 Hermann Sichelshmidt, Dortmund, Prussia, contractors, colliery and other similar railway wagons.
- 43.587 Henry Allen, London, Eng., relating to projectiles and the use of high explosives therein.
- 43.588 Thomas Alva Edison, Llewellyn Park, N.J., heating ores.
- 43.589 Jean Leembruggen Hoofstraet, Amsterdam, Netherlands, improvements in or relating to the closure of receptacles for food and other substances.
- 43.590 Gustavus Albert Waeber, New York, N.Y., hermetically sealed sheet metal vessels.
- 43.591 John Henry Hill Duncan, London Eng., improvements in the manufacture of butter and in apparatus therefor.
- 43.592 Rudolph B. Dettweiler, Galt, Ont., mitre machine.
- 43.593 Edward Preston, Usher, Mass., battery plates.
- 43.594 Otte Van Oostrum, Portland, Oregon, waterproof garments.
- 43.595 Charles Wesley Davis, Montreal, sewing machine.
- 43.596 Elihu Thompson, Swanscott, Mass., lightning arrester.
- 43.597 Same as the above, except lightning arrester and discharge protector.
- 43.598 George V. Wyant, Petrolea, Ont., sleigh.
- 43.599 Christian C. A. Sienknecht, Tennessee, gate brace.
- 43.600 Carl Huhn, Buckenheim, Prussia, apparatus for carrying and keeping horses.
- 43.601 Albin Kuhn, Heidelberg Grand Duchy, Germany, contrivance for fastening scaffolds.
- 43.602 Wm. West, Roseville, Roundhay, Leeds, York, England, apparatus for moulding flower and other pots, saucers, pans and other ceramic and earthenware articles.
- 43.603 Ephraim Alpaugh, Preston, Ont., braces for turning bits.
- 43.604 Wallace Cutchbert, St. Johns, Que., improvements in kiln system.
- 43.605 Wm. Robinson, Makoduku, New Zealand, lifting apparatus for sack barrows.
- 43.606 Albert Whitehouse, Bridgetown, Stafford, Eng., improvements in the means for and mode of securing pneumatic tires on wheels.
- 43.607 Joseph G. Folcon, Evanston, Ill., improvements in ball and socket joints.
- 43.608 Sarah Newell, Versailles, Ill., milkpan covers.
- 43.609 Richard B. Holmes, Marcus, Iowa, attachments for chimneys.
- 43.610 George W. Thompson, Leadville, Colorado, safety tunnel warning device.
- 43.611 Henry Schmitz, Wymore, Nebraska, harness saddle.
- 43.612 Samuel Murray, St. George, New Brunswick, lard and butter cutter.
- 43.613 Robert Orlando Graham, Bloomington, Ill., oil pump.
- 43.614 Wm. H. Jellison, Petrolia, Penn., roofing joint.
- 43.615 Thomas C. Searls, Hamilton, Ont., clothes dryer.
- 43.616 George Coxon, Toronto, Ont., seat spring.
- 43.617 Samuel Raymond Scottron, Toronto, Ont., self-fastening shade pull-plate.
- 43.618 Charles Boeckh, Toronto, Ont., butter mould.
- 43.619 Charles Howard, New York, N.Y., methods of drying and vulcanizing wood.
- 43.620 Fernando G. Lane, Austin, Texas, clothes lines.
- 43.621 Harry Stanley Griffin, Philadelphia, Penn., dumping scows.
- 43.622 Henry O. Thomas, Kimball, Nebraska, tree balers.
- 43.623 Benjamin F. Stockford, South Bend, Indiana, speed and whistle recorder for locomotive engines.
- 43.624 John T. Wilkin, Connersville, Indiana, machine for cutting cycloidal revolvers.
- 43.625 John Belgiano, Baltimore, Maryland, portable water motors.
- 43.626 Albert Graft, Rykon, Swiss Republic, rustic seat.
- 43.627 Ernest August Weinhold, Louvain, Belgium, circular sifting machines.
- 43.628 Eldridge R. Johnston, Camden, N.Y., wire stapling machines.
- 43.629 Ross Guilmore, Chicago, Ill., book-binders' revelling.
- 43.630 George Monteith, Cincinnati, Ohio, hub bands.
- 43.631 Wm. Joseph Still, Toronto, Ont., electric propulsion of cars.
- 43.632 Ernest Gustave Hoffman, New York, N.Y., machines for manufacturing balls and like articles.
- 43.633 Carlo Sacco, Turin, Italy, car starters and brakes.
- 43.634 John Francois O'Brien, Montreal, Que., rubber overshoes.
- 43.635 Fernando G. Lane, Austin, Texas, clothes lines.
- 43.636 Gardner Clish, Truro, N.S., machine for jointing shingles and short boards.
- 43.637 Joseph Cloutier, Hull, Que., glaziers' tables.
- 43.638 Mary Sanders Hungerford, Island Clonakilty, Cork, Ireland, instantaneous fastening for boots, shoes, gaiters, and the like.
- 43.639 Joseph Hill, Williamsport, Penn., rotary steam engines.
- 43.640 Joseph McIntyre, Camlachie, Ont., sleighs.
- 43.641 Hector T. Sutherland and Charles H. McKay, New Glasgow, N.S., potato vine sprinklers.
- 43.642 Robert F. Hargraves, Providence, R.I., friction ratchet clutches.
- 43.643 Wooster B. Metcalfe, Hanover, Penn., cash recorders.
- 43.644 John Joseph Harnett, London, Eng., apparatus for the inhalation of compressed dry or medicated airs.
- 43.645 Wilhelm Stefan Heinrich Schmidt, Iverlohn, Prussia, buckle for endless straps, leather straps, and the like.
- 43.646 Herman Henry Hoffman, Chicago, Ill., blank books.
- 43.647 Robert Galloway, Macedon, N.Y., supports for the hoes of agricultural implements.
- 43.648 Richard Sylvester, Lindsay, Ont., cultivators.
- 43.649 Robert H. Wilson, Baggs, Wyoming, washing machines.
- 43.650 James Lochrie, Toronto, Ont., cycles.
- 43.651 Wm. G. Copp and James McCreath, Hamilton, Ont., disc harrows.
- 43.652 Amos Herbert Nobson, 9 Victoria Street, London, Eng., the production of non-alcoholic ale or beer.
- 43.653 Francis Lattimer, Halifax, N. S., attachments for door knobs.
- 43.654 Eli Danner, Black Creek, Ont., churn.
- 43.655 Israel Wolfe, Goshen, Indiana, nut locks.
- 43.656 Nelson R. Streeter, Grotton, N.Y., knockdown paper roll holder and cutter.
- 43.657 Herkert Ellsworth, Hamilton, Ont., alphabetical railway guide.
- 43.658 Gerolt Glicson, St. Louis, Mo., nut lock.
- 43.659 Thomas Henry Noxon, Ingersoll, Ont., harvester binder.
- 43.660 Robert W. King, Montreal, P.Q., steam boiler.
- 43.661 Joseph A. Knewson, Rogersville, Mo., stirrup for riding saddles.
- 43.662 Sarah Rosaline Thompson, Henrietta, Texas, fruit press.
- 43.663 Wm. Redford Mulock, Winnipeg, Man., knee cap.
- 43.664 John Abell, Toronto, Ont., steam engine.
- 43.665 Wm. J. Whittaker, McCook, Nebraska, implement for tightening fence-wire strands.
- 43.666 James Lang Pope, Cleveland, Ohio, automatic locking device for railway joints.
- 43.667 Same as the above, except improvements in rail joint securing device.
- 43.668 Jay Spencer Corbin, Prescott, Ont., disc harrow.
- 43.669 Marcus S. Henry, Minn., Kansas, harrow attachment.
- 43.670 Perry Ries, Goodrich, Mich., sulky plow.
- 43.671 Hector Gawley, of Grand Rapids, Mich., set works for saw mills.
- 43.672 Wm. R. Jairman & John Goulding Stamp, Buffalo, N.Y., velocipede.
- 43.673 D. M. Osborne & Co., and Charles Stephen Sharp, Auburn, N.Y., disc harrow.
- 43.674 George W. Morris, Brantford, Ont., separators.
- 43.675 James Watson, Easton, N.Y., improvements in methods of and apparatus for the regulation of dynamos and motors.
- 43.676 Bernhardt Hellman, Prague, Austria, stove.
- 43.677 George Coleman, Toronto, Ont., coffee mill.
- 43.678 Andrew Baldwin, Viroqua, Wis., sheeting lath.
- 43.679 Walter Herbert Avis, Toronto, Ont., wire covering mechanism.
- 43.680 Wire P. Young, York, Pa., coin and slot machine.
- 43.681 John W. O'Mill, Robert Warg Dreaftman, Milwaukee, Wis., printers' quoins.
- 43.682 James Yates, Sombra, Ont., machine for coupling cars.
- 43.683 Robert Austin, Surrey Hills, Sydney, New South Wales, washing machine.
- 43.684 George Wm. Morris, Brantford, band cutter and automatic feeder for threshing machine.

- 43.685 John Smith Mercer, Township of Alliston, Ont., harvester binder.
- 43.686 Lemuel Sargeant Manning, Alessandro, Cal., car couplings.
- 43.687 Charles Henry Haag, Cleveland, Ohio, wire-drawing machine.
- 43.688 Abraham Calvert Scarr, Harriston, Ont., measuring machine for stock taking.
- 43.689 Alfred F. Morgan, Clinton, Wis., spool holder.
- 43.690 John N. Parker, Caldwat, Mich., combination tool.
- 43.691 Lysaght Brothers & Co., Sydney, New South Wales, improvement in wire netting and method of manufacturing the same.
- 43.692 Bernard Charles Molloy, London, Eng., dissolving gold and other metals out of ores and compounds, and obtaining the metals therefrom.
- 43.693 John Williams, Sterling, Ill., locomotive ash-pan.
- 43.694 Erle Vinton Beals, Muskegon, Mich., relating to the setting of type, and the production of matrices, stereotyping and apparatus therefor.
- 43.695 Caldins A. Dunn, Denver, Colorado, automatic car coupler.
- 43.696 John Alexander Leggath, Walkerton, Ont., bolt and bar door.
- 43.697 John Morrison McLeod, Goderich, Ont., medical compound for the cure of anemia, impoverished blood, dyspepsia, liver and kidney, and kindred diseases.
- 43.698 Lyman Prentice Converse, Chicago, Ill., air heating stove.
- 43.699 Wm. H. Wartman, London, Ont., hay carrier.
- 43.700 " " " adjustable hay carrier pulley.
- 43.701 John McLachlan, Cannington, Ont., grain crusher or grinder.
- 43.702 Adolph Wahlin, Bainbridge, N.Y., centrifugal separator for cream and butter.
- 43.703 James F. McElroy, Albany, N.Y., rotary engine.
- 43.704 John E. Catterson, Dayton, Washington, car coupler.
- 43.705 Ophiny Louis Gadoury, St. Placide, Que., cook stove.
- 43.706 Frederick William Harris, Woolstock, Ont., locks, doors, drawers, chest, etc.
- 43.707 George H. Hitchcock, Danville, Ill., stuffing box.
- 43.708 Willard Fillmore Richards, Buffalo, N.Y., car coupling.
- 43.709 Angelina M. Freeman, Winamac, Ill., bell or chime attachment for wheels.
- 43.710 George A. Lintner, Minnesota, plential indicators.
- 43.711 George Beatty, Beamsville, Ont., shovel plow and cultivator, with adjustable rake.
- 43.712 Charles H. Waterous, Brantford, Ont., pulley.
- 43.713 Abraham C. Cody, Midland, Mich., hydrocarbon lighting device.
- 43.714 George F. Burton, Toronto, Ont., advertising device.
- 43.715 Walter Wormley Peay, Toronto, Ont., street car fender.
- 43.716 Thomas Davies, Toronto, Ont., street car fender.
- 43.717 Benjamin T. Lawton, London West, Ont., combined sofa and bed.
- 43.718 Walter Charles Church, Brixton, Surrey, Eng., improvements in or connected with steam and other motive fluid engines.
- 43.719 Charles B. Woodward, St. Louis, Mo., improvements in the art of printing.
- 43.720 Albert B. McEwan, Whippany, N.J., paper board.
- 43.721 Jacob Wm. Schuckers, Newark, N.J., mechanism for justifying composed lines of type.
- 43.722 James C. Meem, Buena Vista, Virginia, knock-down box or crate.
- 43.723 John Innes Smith, London, Ont., scale for cutting coats and vests.
- 43.724 Ludwig Herman, Cleveland, Ohio, chair.
- 43.725 Edwin Emanuel Biederman, Brooklyn, N.Y., balling device.
- 43.726 Nicholas Putschinsky, Odessa, Russia, method of and means for automatically taking and indicating sounding for purposes of navigation; applicable also for taking and indicating sounding for hydrographical, topographical, geological and like purposes.
- 43.727 Norman W. Stearns, Middleboro, Mass., curtain fixture.
- 43.728 Wm. Sharkey Hull, Sheffield, Alabama, electrical protective system.
- 43.729 Leopold Richard Blunstegei, Loschwitz, Saxony, nut and bolt lock.
- 43.730 Collea K. Whittier, Vancouver, B.C., self-countersinking screw.
- 43.731 George H. Colton, Hiram, Ohio, fuel feeding device.
- 43.732 Wyman Boardman, Toledo, Ohio, coin controlled apparatus.
- 43.733 John Fullerton Palmer, Riverside, Ill., pneumatic tire.
- 43.734 Same as No. 43.733.
- 43.735 Same as No. 43.733.
- 43.736 Edward Ethel Gold, N.Y., hose coupling.
- 43.737 James Cook, N.Y., convertible still and cooker.
- 43.738 John F. Zalsmans, Holland, Mich., winter velocipede.
- 43.739 Horst Gohler, Freiberg, Saxony, expansion valve for engine.
- 43.740 Henry P. Kyes, Riverside, Cal., check rein detaching or attaching device.
- 43.741 John Stewart Wallace, Belfast, Ireland, —
- 43.742 Fritz August Kleemann, Berlin, Germany, apparatus for heating and cooking liquids.
- 43.743 Philip A. Jenkins, Somerville, Mass, independent electric clock.
- 43.744 Benjamin S. Van Tuyl, Petrolea, vehicle springs.
- 43.745 Alexander Allen, Toronto, pocket ticket case.
- 43.746 John Tudor Richards, Gardiner, Maine, dust guard for hub.
- 43.747 Augustus Brooks, Sayre, Penn., combined flour and meal sifter.

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THE STRENGTH OF SHAFTING.

SOME FACTS AND RULES GOVERNING IT.

In considering the strength of shafting, the engineer ought to keep in mind several important facts. One is, that a shaft increases in strength very much faster than its diameter, its strength being in the proportion of the cube of the diameter. Men will often say "a 2-inch shaft ought to do it, but we will put in a size larger to be on the safe side." By doing so they allow a much larger factor of safety than they thought of, because a small increase in diameter means a large increase in strength. If we assume that a 1-inch shaft will safely drive at a certain speed 3-horse power, a 2-inch shaft under the same conditions would drive 24-horse power, and a 3-inch shaft 81-horse power. Their strengths vary as the cube of their diameters vary. The cube of 1 is $1 \times 1 \times 1 = 1$, the cube of 2 is $2 \times 2 \times 2 = 8$, and the cube of 3 is $3 \times 3 \times 3 = 27$. If a 1-inch shaft will drive 3-horse power, the 2-inch shaft will drive as much more as the cube of its diameter is in excess of the cube of 1. The cube of 2 is 8, and therefore its comparative power is $8 \times 3 = 24$ -horse power, and the cube of 3 being 27, its power in this case is $3 \times 27 = 81$ -horse power. To use a shaft of 3 inches diameter, instead of 2 inches, would have given in this case a shaft capable of driving 81-horse power, instead of 24. On this basis a 1-inch shaft having a strength of 1, a 2-inch shaft would have a strength of 8, a 3-inch shaft a strength of 27, a 4-inch shaft a strength of 64, a 5-inch shaft a strength of 125, and so on, as the cube of the diameter. This fact of the rapid increase in the strength of shafting with a small increase in diameter, must be borne in mind, and that this strength varies as the cube of the diameter.

The second fact is, that the power a shaft will drive is in direct proportion as its speed. If a shaft drives 3-horse power at 100 revolutions per minute, at 200 revolutions it will drive 6-horse power, and at 300 revolutions 9-horse power, and so on. Therefore, the faster a shaft runs the diameter may be smaller in proportion in order to drive a given horse power.

The third fact is, that shafts break more often from bending than from the torsional strain put upon them, and therefore that shafts must be of sufficient size to prevent bending or else must have the hangers so near to each other that they will bend very little. To bend a shaft there is the weight of the shaft itself between the points of support, and also the weight of the pulleys and the weight of the stress and load on the belts. The weight of the pulleys and shaft is downward, and the pull of the belts may be up or down or at any angle. It follows, then, that a shaft loaded with pulleys must have a larger number of hangers than an unloaded shaft, and that the pulleys must be placed as near to the hangers as possible. The bending of a shaft brings about a considerable loss in power from the friction of the shaft in its bearings, beside the tendency of the shaft to break. The bending and twisting of the shaft both contribute to break it, but the bending has most to do with it. Shafts, therefore, should be of such size that they will not bend more than $\frac{1}{16}$ of an inch per foot in length.

The fourth fact is, that heavy lines of shafting cost more money to put up and cost more money to run them. The condition of the surfaces of shaft and bearings may be the same in the case of the small and large shafts, and this would make the co-efficient of friction the same. The power required to drive the shaft alone being the product of the weight of the shaft, the distance the surface of the shaft moves through, and the co-efficient of friction, the larger shaft will take more power to turn it, because it is heavier and its surface moves through a greater distance. Take the case of a 2-inch and 4-inch shaft. The 4-inch shaft weighs four times as much as the 2-inch shaft, and this weight is moved through twice the distance because its circumference is twice as great. It is a costly proceeding from the coal-pile standpoint, to put in heavier shafting than is necessary to do the work with the least bending and twisting.

Shafts are subject to a torsional strain to twist them, and in long shafts or lines of shafting this becomes an important factor. A shaft should be strong enough to limit the twist to 1° in 20

diameters. For instance, a 2-inch shaft should not twist more than 1° in every 40 inches. This shaft would have to be 600 feet long to twist half a circle, that is, for one end of the shaft to be one-half a turn behind the driving end. Where the power is taken off the end of a long line of shafting the twisting of the shaft will be more noticeable, and give trouble by oscillating so that a balance wheel is necessary.

The fifth fact is, that shafts are designated by the character of their work, as first movers, second movers and third movers. The first, or prime mover, is the engine-crank shaft, and the jack shaft receiving the load. The second movers are the long lines of distributing shafting, and the third movers are the shorter lines of countershafting. The prime mover is made much stronger to do a certain amount of work than a second mover, and the third mover is of still lessened strength.

Having these facts in mind, the following rules are given.

To find power a shaft will safely transmit: Cube the diameter, multiply by revolutions per minute, and by 1 for prime mover, 2 for second mover, and 3 for third mover. Divide product by 100.

To find diameter of shaft for given horse power: Multiply horse power by 100, divide by revolutions per minute, and this quotient by 1, 2 or 3, according as shaft is to be used as first, second or third mover. Extract the cube root of quotient.

To find greatest permissible distance between hangers for loaded shaft: Square the diameter, multiply by 200, and extract cube root of product.

Where the shaft has no pulleys between hangers, instead of multiplying by 200 use 500, and proceed as before.

Taking examples: What power will a 3-inch shaft, as a second mover, transmit at 225 revolutions per minute?

$3 \times 3 \times 3 = 27 \times 225 = 6,075 \times 2 = 12,150 \div 100 = 121\frac{1}{2}$ horse power.

What is diameter of shaft used as second mover to transmit 75-horse power at 175 revolutions?

$75 \times 100 = 7,500 \div 175 = 42.86 \div 2 = 21.83$. Cube root of 21.83 is 2.75, equals diameter of shaft.

What distance apart shall hangers be on 3-inch shafts, pulleys and belts on?

$3 \times 3 = 9 \times 200 = 1,800$. Cube root of 1,800 = 12.4, equals greatest distance in feet between hangers.

What distance apart may hangers be to support a 3-inch shaft with no pulleys between supports?

$3 \times 3 = 9 \times 500 = 4,500$. Cube root of 4,500 is 16.4, equals greatest distance between hangers.

In very long lines of shafting the bearings should be nearer together toward the end of the line, and shafts running at a high speed should have the hangers nearer together to give a greater bearing surface to prevent heating. In cases where these rules are used the pulleys should be placed near the hangers or else the distance between hangers reduced. The rules give the maximum in either direction.—*Boston Journal of Commerce*.

ANTIQUITY OF STEAM HEATING.

Steam heating is not new. When at Pompeii, Geo. H. Babcock found that the old Roman baths there were heated by steam, and heated in a better and more scientific manner than is practised at the present time. The walls were double, and the steam, of course not above atmospheric pressure, was carried up through these walls all round the room. The walls were thus heated to a temperature approximating to that of the steam, and the occupants of the room were exposed to a radiation from all directions. This, Mr. Babcock held, is the true theory of heating, and the system of steam heating by indirect radiation, or heating the enveloping air only, is unscientific, expensive and uncomfortable.

It is of interest to add here that the late Joseph Harrison, Jr., of Philadelphia, in delivering a lecture before the Franklin Institute several years ago, said that he had seen in the Museum at Naples a boiler substantially of the same construction as the modern, vertical, tubular boiler. This boiler was found at Pompeii, and was made of copper.

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THE SOUTH AFRICAN METAL TARIFF.

Cape Colony, Basutoland, Bechuanaland, and Orange Free State are now joined together in what is called the South African Customs Union. Several of the states in South Africa, however, still have their own distinct tariffs. Our readers will very likely be interested in the enumeration of some of the points distinguishing these various systems.

Cape Colony, and indeed all the countries where the Union regulations are in force, admit machinery of all kinds, and railway and telegraph material, chains and anchors, materials for wire fencing, wire rope and pig iron, free of duty. Fifteen per cent. is chargeable on oils, and ten per cent. on agricultural instruments, bolt, bar, and rod iron and metal for sheathing. The duty on cement is 2/- per 400 lbs., on common salt 5/- per ton of 2,000 lbs. Under certain regulations, goods consigned to the Transvaal, or countries outside the Customs Union, are allowed to pass through Cape Colony in bond, and a rebate is allowed of three-quarters of the duty payable. This is a very considerable concession, as the great bulk of the goods for the Transvaal is landed at Cape ports.

Natal admits machinery, railway and telegraph materials, nails, bar or sheet copper, iron (not corrugated), steel (in plates or bar), brass, tin (in sheets or ingots), and wire rope free of duty. On cement the duty is 2/- per 400 lbs.; on oils, not essential or chemical, 6d. per gallon; on linseed oil, raw or boiled, and on paraffin, 3d. per gallon. All merchandise not scheduled pays at the rate of 5 per cent. *ad valorem*. There is an arrangement by which certain goods, when consigned to places beyond Natal, are allowed to pass through in bond, the payment of transit dues taking the place of duty.

The Transvaal tariff only came into operation last year. It levies duties of 1½ per cent. on all kinds of machinery, of 7½ per cent. on goods imported from neighboring states, of 7½ per cent. on invoice, with 20 per cent. added to it, of goods imported from over sea and specially scheduled. In addition to 7½ per cent. as above-named, there are duties upon certain articles, such as 3d. per pound on lead, 3s per 100 pounds of cement, 7s. 6d per ton on coal, and 6d. per pound on copper wire.

In the Portuguese possessions on the west coast, there is a uniform duty of 3 per cent. *ad valorem*.

The tariff in force at Loando, Benguella, and Mossamedes imposes a duty of 10 per cent. *ad valorem* on gold and silver, ½d. per pound on copper in sheets or ingots, 2½d. per pound on copper wire or tubes, 1s. 1d. per pound on plated copper, 7½d. on tin, and ½d. on lead and iron. Steamships or sailing vessels of less than 600 cubic feet in dimensions, 12 per cent. *ad valorem*. Iron in pipes or columns ½d., sheets (tinned) 7½d., manufactured 2½d. per pound, not specified 1½d. per pound. Petroleum 1d.; un-specified merchandise, 20 per cent. *ad valorem*. Coal, ships of over 600 cubic feet in dimensions, machinery, railway plant are admitted duty free, as also are several other items, providing they have been naturalized by having been entered at a port in Portugal.

In German south-west Africa, no duties are levied at present.

A COMPANY of Eastern Canada capitalists has been formed to develop natural gas deposits which have been lately discovered near Winnipeg.

At Ingersoll, Ont., there are strong indications of the presence of oil or gas. Preparations are being made for operating it.

A MACHINE has been invented, and is in use at the Montreal docks, for loading ships with coal. It is said to do as much work as sixty men.

AN old master plumber uses a putty-like mixture of litharge and glycerine for preventing leaks from porous places in cast iron pipe. It is said to harden enough to stand any ordinary pressure test in two days, and subsequently sets perfectly hard and impervious to moisture and ordinary changes of temperature.

M. LAMBOTTE, of Brussels, Belgium, is working a process for recovering tin from clippings of tinned iron in the form of chloride. A mixture of air and chlorine is made to pass through a spiral surrounding a furnace. It becomes warm, enters the furnace from below, and attacks the tin clippings inside. The chloride of tin volatilizes, and is collected upon moist surfaces, while the iron, freed from its tin, is ready for use again.

A SYSTEM of paving which seems to be coming into favor consists in the laying of wooden blocks upon a steel basis. Above a thick stratum of sand, solid steel plates are laid; and rising from and securely fastened to, this solid plate, to the height of about two inches, are steel tongues. The bottoms of the wooden blocks are fitted tightly on over these tongues. These blocks, which fit together very closely, combined with the solid stratum of steel, form what is believed to be, and what ought to prove, a wonderfully durable pavement.

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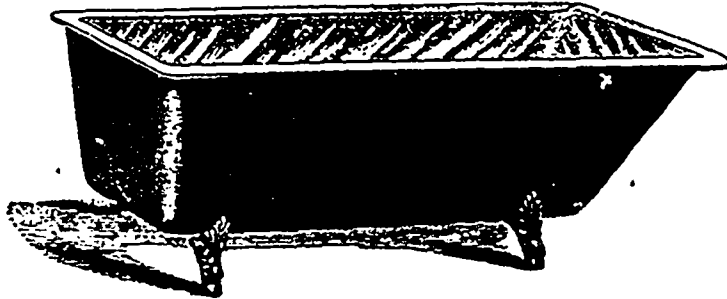
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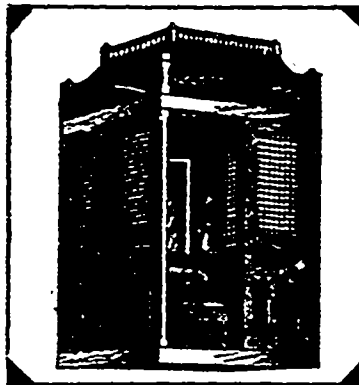
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Toronto Branch, No. 1—W. Phillips, President; H. E. Terry, Secretary, 19 Hayter Street. Meets 2nd and 4th Fridays of the month, at 8 p.m., in Room D, Shaftesbury Hall.
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STATIONARY ENGINEERS.

A meeting of Montreal Lodge No. 1, Canadian Association of Stationary Engineers, was held on the 3rd inst., President Jos. Robertson in the chair. There was a very large attendance. After routine business the election of officers for the ensuing term was taken up, with the following result. President, Jos. Robertson (re-elected); first vice-president, H. Nuttall; second vice-president J. Badger; recording secretary, John J. Yorke; financial secretary, Wm. Wilson, Hon. treasurer, Bro. District Deputy Thos. Ryan, conductor, H. Rollins; doorkeeper, T. Allsopp; trustees, the executive, vice-presidents, and Bros. Geo. Hunt, E. Hayes and J. Murphy.

The president, first vice-president and secretary were appointed delegates to the coming international convention of stationary engineers, to be held in Montreal on the 7th, 8th and 9th September, which will be one of the features of the Montreal Exhibition. The engineers intend issuing a handsome souvenir of their fourth annual convention, and one which will be a credit to the order.

The officers and delegates to the convention from Toronto are as follows. President A. E. Edkins, 139 Borden street, Secretary W. G. Blackgrove, 45 Brant street; Conductor Chas. Heal, High Level Pumping Station. Delegates, W. Phillips, 50 Shaftesbury Ave., W. Lewis, care of Toronto Silver Plate Co., G. Moring, 34 Manning Ave. Alternates, W. Sutton, 15 Gifford street, and G. Gilchrist, 179 Argyle street. The Hamilton delegates are P. Stott and D. Robinson; alternates, W. Sweet and E. Johnson. Ottawa delegates, J. H. Thompson and F. Robert.

For convention purposes the general executive board this year is as follows. President, A. E. Edkins, Toronto, vice-president, Geo. Hunt, Montreal; secretary, W. G. Blackgrove; treasurer, R. Mackie Hamilton, conductor, Chas. Heal, Toronto, doorkeeper, F. Brisbois, Montreal.

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