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The Canadian Engineer

Vol. I.—No. 10.

TORONTO AND MONTREAL, FEBRUARY, 1894.

PRICE, 10 CENTS
\$1.00 PER YEAR.

The Canadian Engineer.

ISSUED MONTHLY IN THE INTERESTS OF THE
MECHANICAL, ELECTRICAL, MARINE, LOCOMOTIVE, STATIONARY
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Offices: { 62 CHURCH ST., TORONTO.
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E. B. BIGGAR, PUBLISHER R. R. SAMUEL, BUSINESS MANAGER
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MONETARY TIMES PRINTING CO.
OF CANADA (LIMITED).

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

Toronto, February 1, 1894.

THE IMPERIAL INSTITUTE.

We have more than once referred to the Imperial Institute which was opened to Londoners, by Her Majesty the Queen, last May. We are glad to note that this institution, the importance of which to the best interests of the whole British Empire can hardly be exaggerated, is meeting with, or appears likely in the future to meet with, the success it certainly deserves. We are favored by the Executive Council with a copy of their annual report for 1893, which, besides lists of the governing body, the Executive Council, committees, etc., contains the speeches made with reference to this Imperial scheme by the Prince of Wales and the Lord Chancellor. An account is also given of the progress made in the different Indian and Colonial sections.

As was to be expected, the Dominion of Canada is thoroughly well represented in the Imperial Institute Collections, and there is no doubt that this will be the case to a much greater degree before long, as consignments from the exhibits at Chicago of several of the provinces are shortly expected. A considerable collection of the products of the different provinces was transferred from the 1886 Exhibition, and these have been supplemented by several consignments, the Provinces of Quebec, Ontario and British Columbia being at the present time those most adequately represented. Prominent among the Quebec exhibits is a fine collection of furs obtained from the Hudson's Bay Company through the kindness of one of the Governors, Sir Donald Smith, who has been, from the first, a generous supporter of the Institute. This collection is really representative of the wealth in furs of all parts of the Dominion. The mineral resources of Quebec are well represented, the most prominent among them being *apatite* or natural phos-

phate of lime, a valuable material for artificial manure, and *asbestos*. The Ontario collection is chiefly prominent in the exhibits of the mineral wealth of this Province, nearly all the economic metals being represented by ores which occur there in abundance, and among which the nickel ore of the famous Sudbury mine is of prominent interest. The petroleum wells of Ontario are represented by a good collection of specimens of the various products obtained at Petrolea. The mineral wealth of British Columbia is, at present, scarcely adequately represented. On the other hand, the Province exhibits an excellent collection of agricultural produce, prepared fruit, and tinned salmon, one of its most important articles of commerce. It also displays magnificent specimens of the Douglas Fir and other native woods, and in this direction the Quebec, Ontario and New Brunswick sections are also all well represented, while all three have excellent displays illustrating their agricultural wealth. At present, the Nova Scotia exhibits are chiefly confined to some illustrations of the great fish industry of the Province, and to some large masses of iron ores transferred from the 1886 Exhibition. The great agricultural resources of Manitoba are worthily represented by a very comprehensive collection of cereals, etc., and attention is directed to the attractions which this Province offers to the sportsman by an interesting collection of stuffed birds, and of heads of wapiti, cariboo and other large game. The contributions from the North-west Provinces are at present limited chiefly to some illustrations of the agricultural wealth of this vast district. The attractiveness of the Canadian Courts is increased by a number of fine photographs of scenery, pictorial illustrations of agricultural operations, and maps of the districts through which the great Canadian railways pass, and a very interesting and instructive tabular statement of statistics for several years past, illustrative of the great progress of Canadian trade, is shown at the end of the Court.

UNDER the caption "Abolish the Bonding Fraud," the New York *Sun* has a lengthy article endeavoring to show that the present system is an injustice to United States railways, and complaining that at least \$20,000,000 worth of traffic created by and legitimately belonging to them, is annually diverted to Canadian lines⁷¹ The construction of the Canadian Pacific, says the *Sun*, was a deliberate planned scheme to deflect American traffic to Canadian ports. Not a single promoter of the Canadian Pacific Railway was simple enough to expect that it could even earn operating expenses if confined to Canadian traffic. The charter of the Canadian Pacific and the subsequent railway legislation of Canada were deliberately intended to secure for it a monopoly of Canadian traffic for many years, and at the same time leave it free to prey upon American business. The general Railway Act of Canada was expressly amended to permit the Canadian Pacific Railway Company to make discriminating charges against shippers, whenever this might be necessary in order to divert American traffic to its lines. This policy of the Government of Canada not only justifies, but requires that the Government of

the United States should now promptly exercise all lawful powers to protect and defend their own trans-continental lines against this Canadian competition. But it is when it takes a political view of the C. P. R. that the *Sun* waxes most bitter; it objects to the fact that this line makes a military highway along the United States northern frontier to England's colonies in the Pacific, and between her fortifications at Halifax, Quebec and Esquimalt. The Canadian Pacific Railway, it goes on to say, was built to strengthen and prolong British power upon this continent, and also to aid England in securing as much as possible of the traffic between the Pacific Ocean and Europe. Our bonding system directly aids her at the expense of our own people. The Canadian Pacific Railway Company is the most arrogant anti-American corporation upon this continent. By continuing the bonding system we are practically aiding the Government of Canada and Great Britain to destroy American investments in trans-continental railways.

SOME Canadian may compete for, and possibly win, one of the prizes offered by the *Société Française* during the next three or four years. A prize of \$2,280 will be made in 1898 for the discovery that is most useful to French industry. A prize of the same amount is given every three years by the society (the next award will be made in 1895) to the person making the most useful industrial discovery. The Henry Giffard prize of \$1,140 is awarded every six years (the next award will be in 1896) for services of signal value to French industry. The Metzen's prize of \$95 is awarded every three years (the next award will be in 1896) to the discoverer of a valuable chemical or physical application in electricity, ballistics or hygiene. The special prizes for 1894 are \$380 for a motor whose weight is not less than 50 kilogrammes per horse power; a prize of \$570 for an apparatus that shall decrease materially the smoke of furnaces, especially those under boilers; a prize of \$190 for a heavy oil engine; a prize of \$570 for a steam engine consuming at the maximum speed, under average load, seven kilogrammes of steam per horse power per hour; a prize of \$570 for the discovery of a substance that can be substituted completely for gutta-percha in at least one of its applications, or for work that will continue to develop the production or improve the cultivation of the gum. The following prizes are to be awarded in 1895: A prize of \$380 for a small motor designed for use in a shop located in a house; a prize of \$380 for the preparation industrially of ozone and means for its application; a prize of \$380 for an apparatus or a process which shall make it possible to measure or determine the insulation of the different parts of an electric installation while the current is on; a prize of \$570 for investigations which shall contribute to the discovery and application of the best means in domestic and general product for the purification of drinking water. Competitors must submit their proofs by the 31st of the December preceding the year on which the prize will be awarded.

Two fine steamers have just been built for the Northern Steamship Co., plying between Buffalo and Duluth, in connection with the Great Northern Railway. Some peculiarities are evident in the design of the hulls, these being constructed around the shafts in such a way as to give not only great strength to the vessels' after-body, but also to form as little resistance as possible, and also allow the water to pass freely to the wheels. The ships are fitted with Belleville boilers,

which were chosen owing to their light weight and ability to carry high pressure, for these steamers are intended to be the greyhounds of the lakes. One of these Great Lake steamers, the "Northwest," was launched on the 6th of January, in "lake-fashion." The location of the Cleveland yard, where the vessel was built, is such that the vessel had to be slid a distance of 60 feet and then dropped about five feet before touching the water. The effect of the sudden plunging into the lake of such an immense weight, about 4,200,000 pounds, was said to be quite startling, the water forming a huge wave, and rocking the vessel two and fro with some degree of violence.

FERDINAND SCHLESINGER thinks the iron interests of Lake Superior have not so much to fear from the importation of Cuban ore as they have from the development of Canadian deposits along the north shore of Lake Superior, which would be sure to follow the removal of duty. The *Marine Review* deems Mr. Schlesinger to be entirely correct. There are certainly immense quantities of good ore in the Canadian territory above Duluth, which has not been mined on account of the duty, and strangely enough, adds our contemporary, "this feature of the ore tariff question has been overlooked, while the argument against imported Cuban ore is open to the criticism that the long rail haul from the seaboard would prevent competition with Lake Superior ores west of the Alleghenies."

In the Exchequer Court recently an important judgment was given affecting the Canadian patent law. It was in the case of the *Queen v. Laforce*. The latter was granted letters patent for an improvement on pneumatic tires. Thomas Jeffrey, of Chicago, whose patent in Canada was dated two months later than Laforce's, but who had it patented in the United States prior to Laforce's, claimed that Laforce's patent should be set aside, as he (Jeffrey) was the inventor. Judgment was given in favor of Laforce, with costs.

A REPRESENTATIVE OF THE CANADIAN ENGINEER recently witnessed some tests made by Prof. Bovey, at McGill College, upon the strength of some samples of machine steel, and of some oak from Ottawa. The steel, which was in the form of a round bar 1 inch in diameter, broke at a tensile strain of 99,600 pounds, the yielding point (that at which the metal begins to elongate) being 47,600 pounds. The timber, which measured 4.55 inches square, bent and split up under a strain of 98,100 pounds.

A MINING and metallurgical exhibition is to be held in Santiago, Chili, beginning next September. It will include motive power, electricity, and general mining machinery. The cost of transporting exhibits, as well as men in charge thereof, will be defrayed, we understand, by the Chilian Government. Further information may be obtained of G. B. Day, Imperial Buildings, Montreal, the Consul-General for Chili.

A FLASH light on a new principle by Prof. Schevin is said to have been adopted by the German admiralty. The light is produced by running finely powdered magnesium through a bensoletted air flame. The flashes are stated to be visible even by day at over six miles distance. The light is equal to 400,000 candles, and will be especially useful in foggy weather.

THE attention of our advertisers is called to the classified directory appearing in this issue. Should any of our patrons find they are not correctly classified we shall be pleased to make the necessary alterations.

CANADIAN IRON INDUSTRY.

BY GEORGE E. DRUMMOND, OF THE CANADA IRON FURNACE COMPANY

(Continued from last issue.)

In considering the progress made it is well to remember the various Acts of Parliament enforced from time to time by England to protect her national iron industry, by preventing the emigration of her skilled artisans to other countries, by guarding against the sale of her inventions to competitors, and lay the imposition of customs duties upon foreign products.

For instance, while the growing scarcity of wood for the supply of charcoal convinced the Government and the people of England as early as 1750 (before mineral fuel had come into use) that it would be to their advantage to allow the free admission of iron in its rudest form from the American colonies, and that as a matter of fact they passed an Act in that year setting forth that it would be of great advantage, not only to the colonies, but also to the kingdom, that the manufacturers of England should be supplied with pig and bar iron from the colonies free of duty, yet they so tully believed in protecting their own home industries, that the same Act that made the rudest forms of iron free of duty (because England was unable to produce the material herself) contained the following clause:—

"That pig and bar iron made in Her Majesty's colonies in America *may be further manufactured in this kingdom*; be it further enacted . . . that from and after the twenty-fourth day of June, one thousand seven hundred and fifty, no mill or other engine for slitting or rolling of iron, or any plating forge to work with a tilt hammer, or any furnace for making steel, shall be erected, or after such erection continued in any of His Majesty's colonies in America, and if any person or persons shall erect or cause to be erected, or after such erection continue, or cause to be continued, in any of the said colonies, any such mill engine, forge or furnace, every person or persons so offending shall for every such mill, engine, forge or furnace, forfeit the sum of two hundred pounds of lawful money of Great Britain, and it is hereby further enacted . . . that every such mill, engine, forge or furnace so erected, or continued contrary to the directions of this Act, *shall be deemed a common nuisance, etc., etc.*"

By the Act in question Great Britain undoubtedly encouraged the production of pig and bar iron in America by exempting them from duties to which like commodities were subject when imported from any other country, but she did this simply because she had not until that date found a fuel substitute for charcoal. A glance at the Act will moreover show that she imposed an absolute prohibition upon the erection of steel furnaces and slit mills in any of her American colonies.

Various other restrictive Acts of Parliament were passed in 1781, 1782, 1785 and 1795 to prevent the exportation to foreign countries of machinery and tools used in the manufacture of iron and steel, and to prevent skilled mechanics from leaving England.

A glance at the protection afforded to the British manufacturers of iron from 1782 to the close of 1825, will demonstrate to Canadians the fact that England owes her greatness in the iron industry very largely indeed to the protection granted to her native industries in the early years of the trade.

Mr. James Mavor, the present Professor of Political Science in the University of Toronto, quoting from Conrad's "Handwörterbuch der Staats Wissenschaft-

ter," vol. 3, page 45, and also from various other authorities, gives the following data in regard to duties imposed at various times by Great Britain in the interest of her iron industry:—

"The duty imposed on pig iron in 1787 was 67s. 2d. per ton. Duty increased 1819 to 130s. per ton on pig iron. Duty raised 1825 by 10s. per ton. Duty altered 1842, 25 per cent. ad valorem on pig iron. Duty abolished 1845.

"Duty on manufactured iron altered 1845, 15 per cent. on manufactured iron and steel; this subsequently reduced to 10 per cent. Duty on iron wholly abolished 1860."

Among other measures quoted by this authority are special rates for carrying coals to iron works, embodied in the earlier railway acts.

The period of protection by high customs duties extended from 1787 until 1860, giving to the iron industry protection of a permanent character for upwards of 73 years.

The restrictive measures cited, although they were in many cases harsh, undoubtedly resulted in building up an industry of great value not only to Great Britain, but to the world at large.

UNITED STATES.—Great as has been the progress made in the iron industries of Great Britain, still more marvellous has been that of the United States, especially when we consider that the development of the American iron industry has been made very largely within the past forty years, and a full consideration of the facts will show that the rapid growth of this great industry has been due almost altogether to the fact that during that forty years the Government of the United States has stood firmly by the policy of protection to the native industry, and that the greatest progress was undoubtedly made when the protection was at its highest point.

In an able article, "From Mine to Furnace," Mr. John Birkinbine, past president Am. Inst. M.E., recently said:—

"In 1866 the United States had reached the production of Great Britain in 1835, that is to say, she was then thirty-one years behind the latter country. In 1884 she was about twenty-one years behind England, and at the same rate of increase for both countries the United States will be about fifteen years behind England in the year 1900, and will reach and pass her in 1950. The production of pig iron of each country for that year, as determined from the equation of their respective curves, being a little over thirty million tons.

"The facts are that in 1890 the United States passed, and has since that time led, Great Britain, as a producer of pig iron."

In a paper read at a meeting of the American Institute of Mining Engineers, in October, 1890, by its then president, Hon. Abram S. Hewitt, he showed a comparative rate of increase in population and pig iron production in the United States for six decades, and brought out the striking conclusion that the production of pig iron has always increased more rapidly than the population, and that the ratio is an increasing one.

Between 1830 and 1860 the production of iron increased twice as fast as the population. Between 1860 and 1890 it increased four times as rapidly, in reality over four times, thus proving that the national wealth continues to grow from decade to decade, at a rate of acceleration of which the world affords no previous example.

Iron Ores.—The following figures taken from the "Report of Mineral Industries in the United States" at the eleventh census, 1890, will give some idea of the magnitude of the iron industry of the United States:—

In 1889 the production of iron ore in the United States, including red hematite, magnetite, brown hematite and carbonate, amounted to 14,518,041 gross tons, of a total value of \$33,351,978.

The total capital invested in the ore mines in the same year is given as \$109,766,199. This is all expended within the country on the native ores.

In addition to this, iron ore was imported in the same year from foreign countries to the extent of 853,573 tons, valued at \$1,852,392.

With reference to foreign ore imported into the United States, Mr. Birkinbine in his "Production of Iron Ore," 1892, says:—

"While the United States has large deposits of iron ore of all kinds, widely distributed throughout the various states and territories, still the low rates of wages in foreign countries, and cheap water transportation rates, have admitted considerable quantities of iron ore into this country, in spite of a specific duty of 75 cents per ton, which is collected on all iron ore imported. In the year ending December 31st, 1892, iron ore to the amount of 806,585 long tons, valued at \$1,795,644, or \$2.23 per ton, was thus imported. All of this iron, however, is consumed near the ports of entry, and much of the ore entering the port of Baltimore is unloaded direct from the vessels to the stock piles. This is also the case with one Pennsylvania furnace.

"All the iron ore imported from Cuba is taken from the mines operated by American companies. Until 1892 but one company was mining and shipping ore from Cuba, but last year a second enterprise was represented by actual shipments, and 1893 is expected to add at least one more active corporation to the list of Cuban mines."

It is significant in looking over the list of imports for 1889, to find that whereas Cuba supplied 243,255 tons, of a value of \$535,524, the Provinces of Quebec, Ontario, Manitoba and the North-West Territories combined, supplied (be it remembered under equal conditions as to tariff) only 4,091 tons, of a value of \$10,697.

Again in 1892, statistics show that whereas Cuba supplied 307,115 tons, valued at \$618,222, Quebec, Ontario, Manitoba and the North-West Territories supplied only 8,606 tons; British Columbia, 2,749 tons, a total value for all Canada of 11,355 tons, valued at \$27,340. Spain was the largest supplier of ore in 1889, sending 298,568 tons, of a value of \$621,481.

These statistics prove that up to the present time Canadians have found it impossible to compete successfully against the negro labor of Cuba, and the cheap labor of Spain, in supplying ore to the American market. The question Canadians have to ask is, whether under uniform free trade Canada can hope to improve her position as against her Cuban and Spanish competitors. This seems highly improbable. All the facts point to one conclusion, viz., that Canadians must turn their attention to smelting their own ore for the home market.

With splendid facilities for economical working, with ample capital, and many other benefits accruing from a long continued policy of protection, the American iron industry stands to-day in a perfectly safe con-

dition, the trade (aside from the ordinary periods of depression common to all industries) is bound to increase in volume the whole future of the industry linked with the life of the nation.

CONTINENTAL STATES.—Following the example of Great Britain and the United States, France, Belgium, Germany, and other Continental States, established, and still maintain, high protective duties with most beneficial results in many branches of the iron industry. Germany's case is especially worthy of mention.

On the 14th May, 1892, Bismarck, in a speech before the German Reichstag, said:—

"The success of the United States in material development is the most illustrious of modern times. The American nation has not only successfully borne and suppressed the most gigantic and expensive war in all history, but immediately afterwards disbanded its army, found employment for all its soldiers and marines, paid off most of its debt, gave labor to all the unemployed of Europe, as fast as they could arrive within its territory, and still by a system of taxation so indirect as not to be perceived, much less felt. *Because it is my deliberate judgment that the prosperity of America is mostly due to its system of protective laws, I urge that Germany has now reached that point where it is necessary to imitate the tariff system of the United States.*"

Bismarck gave to Germany a protective policy with something of a permanent character, and the result has been the building up of a great national industry in that country.

In 1834, Germany and Luxemburg, included in the Zollverein, produced only 110,000 metric tons (2,204 lbs.) of pig iron.

In 1881, Germany and the grand duchy of Luxemburg produced 2,014,009 metric tons (2,204 lbs.) In 1890 the production had increased to 4,637,239 metric tons. This increase in pig iron has been accompanied by an enormous increase in the output of coal and lignite. As an illustration showing Germany's progress in the manufacture of basic steel, in 1890 England produced 503,400 tons of basic steel; Germany, Luxemburg and Austria produced 1,695,472 tons.

CANADA.—Canada's "natural fitness" for the successful establishment of the iron industry is beyond question.

The earnest work performed by the Geological Survey of Canada, and by private prospectors, has well established the fact that throughout a very large portion of her vast territory (three and a half millions of square miles in extent) Canada is rich in iron ores of almost every variety known to metallurgy.

Commencing at the Atlantic seaboard, Canada can claim in Cape Breton extensive deposits of brown hematite, magnetite and spathic ores, lying side by side with coal fields of great magnitude.

Nova Scotia—The limonite, specular and spathic clay ironstone and hematite of Pictou County; specular ore in Guysboro County. At Londonderry an immense vein of ankerite, holding brown hematite.

Between Truro and Windsor numerous deposits of brown hematite, often highly manganiferous.

A range of ferri-ferous strata extending from Digby to Windsor, embracing red hematites and magnetites of Nictaux and Clementsport.

Throughout the whole of this district mineral fuel and fluxes occur in close proximity to the iron mines, affording exceptional facilities for economic furnace practice.

New Brunswick—Magnetic and bog ores, with coal fields at Grand Lake and elsewhere, and a plentiful supply of hard wood for charcoal purposes.

Quebec—The bog and lake ores of this province are probably the most extensive of a like nature in the world. The ore-bearing area extends from the borders of Ontario in the west, to Gaspé in the east, and on the other hand from the Eastern Townships to the Laurentian range of mountains, embracing the historical Three Rivers ore district.

Good deposits of magnetic ores are found at various points throughout the entire province, especially in the vicinity of Sherbrooke, Leeds, Sutton, St. Jerome and in Pontiac county.

An almost inexhaustible growth of hard wood, suitable for the manufacture of charcoal, is everywhere found side by side with the iron deposits. Limestone for flux is most abundant throughout the Province.

Ontario—Vast deposits of ore exist throughout Ontario, from the Ottawa Valley to the head of Lake Superior. The ore is of many varieties, magnetic, red hematite, limonite, specular, and occasionally bog ores, all more or less rich in metallic iron.

At the recent World's Fair in Chicago, Ontario exhibited no less than 120 samples of iron ore taken from her various mines, all of these samples averaging 60 per cent. and over in metallic iron, and many of them exceptionally free from impurities. Most notable among the localities sending exhibits were the Ottawa Valley, including Lanark, and the Kingston and Pembroke district, Madoc and other points in the county of Hastings, Haliburton, Coehill, and other locations in the county of Peterboro, East Algoma, Thunder Bay district, including the Atak-Okan range.

In the matter of fuel, Ontario, like her sister Province Quebec, possesses extensive forests of hard wood, admirably suited for the production of charcoal. She is also rich in flux.

Manitoba—Deposits of magnetic and bog ores on Lake Winnipeg, with an abundant growth of hard wood suitable for charcoal in the vicinity of the mines.

British Columbia—While the work of exploration has necessarily been limited, yet the magnetic ore deposits at Texada Island and Cherry Creek Bluff are already fairly well proved by actual work. The ore from these mines has found a market at Tacoma, Washington Territory, U.S.

British Columbia is very rich in both coal and wood, the outputs of her collieries at Nanaimo, Wellington and Comox showing a steady increase in tonnage.

(To be continued.)

HOISTING MACHINERY.

George A. Goodwin wrote a very able paper for the International Engineering Congress of the Columbian Exposition. The subject was "The Relative Merits of Working Hoisting Machinery by Steam, Water, and Electricity," and in his paper are given the results of a careful investigation into the advantages and disadvantages of each system. In summing up the *pros* and *cons* for each, the author takes the following points for granted:

1st. That steam-worked machines are supplied with steam drawn from a centre or distributing boiler or boilers, or that each machine is supplied from a self-contained boiler.

2nd. That where hydraulic power is used, the

water is supplied from a central pumping station and distributing plant.

3rd. That where electricity is used, the current is supplied, as in the hydraulic system, from a generating plant from a central station; for, obviously, if the hydraulic or electric power were generated by an engine self-contained on the machine, the conversion of the energy in the steam into hydraulic or electric energy, to be afterwards re-converted into mechanical power, would entail considerable loss in useful effect as compared with driving direct, unless some system of storage were introduced.

With regard to the efficiency of steam, it appears from a comparison of different steam cranes and hoisting machines that about 1.1 to 1.4 lbs. of steam, on the average, are utilized in the cylinders (at 60 lbs. boiler pressure) in small and large cranes, respectively, for every horse-power of work done on the weight lifted, and taking the evaporation of water per pound of coal in the case of a central supply battery at 9 lbs., and in self-contained power machines at about 7 lbs., the figures show that in plant supplied from a central battery 7.33 lbs. of coal are required per hour per horse-power alone on the weight, and in self-contained machines, 9.4 lbs. For large concrete block-setting machines, or for yard travellers, contractors' cranes, excavators, and such tools, machines with self-contained engines and boilers would no doubt prove the most serviceable. In steam-hoisting machinery there are necessarily a large number of working parts, both in the engines and the machines proper, including the various shafts, gears, clutches or cones for putting the different motions in and out of action. These not only give rise to much rattle, wear and tear, but necessitate a heavy amount of up-keep, and require the attention of an experienced driver.

Hydraulic power is without a doubt peculiarly adapted for all kinds of lifting purposes, the working of all sorts of presses, and last, but not least, as a means of obtaining powerful jets of water for the extinction of fires. The action of the water in the hydraulic cylinders, viz., the moving of the rams in a rectilinear direction, renders this power the most direct of all, as all hoisting machinery has obviously to move weights straight up and down, and all rotary motion can be dispensed with. With regard to wear, the friction of the rams in the glands is almost infinitesimal; the only parts subject to much work and abrasion are the ropes or chains and the axles of the pulleys over which they pass. This is small, owing to their slow speed of rotation. One great disturbing element to the proportioning of the supply of water power to the work to be done always exists to some extent in hydraulic machinery, and is due to the fact that water is non-compressible and non-expansive, the result being that the same quantity of water is used whether the load lifted is great or small.

With regard to electricity, it can be applied and made to work all the known kinds of hoisting machinery, says Mr. Goodwin, but whether it can ever compete successfully with hydraulic power for general use still remains to be proved. In the case of lifts or elevators, there is no doubt that the direct working ones are far preferable to those that are worked by electricity. The author concludes a valuable paper by throwing out one or two suggestions towards the economical working of hydraulic elevators. When a load is moved at a constant level and not against gravity, obviously no power would be required except

for overcoming friction. Again, if it were possible to so arrange the machinery and the work that all loads should restore the water on which they descend into a reservoir, that is to say, should force the exhaust waste previously used in the hydraulic cylinders as power-water into a reservoir, where it would be subjected to yielding pressure or utilized to assist the steam engines in pumping, it will be seen that a great gain is possible.

FORGED CUTTING TOOLS.

It will simplify this heading to look at it from a machinist's point of view, otherwise it may not be perfectly clear what to expect from it.

The small tool department has much to do in machine shop economy, as well as in the success of manufacture, although it is customary to think that when work is completed standard in dimension, it is also standard in every other way. At least whatever be the requirement for the aforesaid standard, the worry and energy of the mechanic are seldom thought of, and these have certainly a commercial value to the manufacturer, and are the all of the workman. The success of a mechanic, next to his stock of natural aptitude, depends upon the facilities he has in doing work and is in direct proportion to these.

Of the many classes into which cutting tools may be divided, those which are made and completed by the smith in the one operation of forging are worthy of attention, such as (in shop language) the diamond point, half diamond point, side tool, round-nosed, etc., which are used almost exclusively in lathe and planer work. With these may be taken the common flat drill—another forge product.

Every shop has its peculiar way of regulating the use and abuse of these small tools. In some it is a rigid system, but such can be very well dispensed with, considering the order of intelligence required in the machinist's trade, combined with the ingenuity which cannot profitably be fettered.

In a few machine works the small tools are all kept in a tool room where the workmen go for them and return them again. Of course under such arrangements the dressing, tempering, and even the grinding are attended to by those who are employed in the tool room, often boys, who have at best a very vague notion of the proper way to prepare a tool for any given job. Thus the tool-maker and the tool-user—the principals in regard to the tool question—do not meet at all; consequently no suggestions, no improvement, and generally no satisfaction, especially in the case of the tool-user. Certainly it seems to be an economy to have such a class employed in the tool room, where the best mechanics should be; but against the saving of salary in the case of a few in the tool room, must be considered not only the loss of time, *i. e.*, of salary of the whole force of machinists in the shops, but the loss of their patience and energy in trying to do something well with tools not suited for the purpose.

It seems most reasonable that each machine tool should have its own outfit of cutting tools, and that these should be under the care of the operator of that machine. If he does not do his duty under this arrangement, it is probable that he would be a troublesome character under the tool-room system, and it becomes the foreman's business to look after him. It may seem extravagant that ten lathes or planers of the same size and doing the same class of work, should each have a

complete outfit of small tools, yet it is the only successful, as well as the most economical, management in the ordinary machine shop.

Without any more authority for saying so than general practice, the diamond point seems to be the most efficient tool for removing stock. It is a favorite in America, and in some machine works it is often used as a finishing tool, with, of course, a fine feed motion, *e. g.*, in planing a surface. Although such a surface may not be so smooth as if finished with a round or square-faced tool, there is less tendency to spring, and therefore, a more accurate job. The form varies somewhat according to the size of the angle at the cutting-point, the tool for general use being about 75° at the point. When it is to be used on small and fine work, it is mostly made with a small angle at the face, 40° or less; this makes it more serviceable in cutting up to shoulders, or in its adjustment for such places. This form is also greatly used in planer work when a lot of stock is to be removed in taking a deep cut with fine feed.

The half diamond point, right and left, is a modification of the original tool used for same purpose as the acute-angled diamond point, as well as for ordinary side tool work. It has more stability than the common side tool and has over it the same advantage that the acute-angled diamond point has over the common round-nosed tool in respect to top and side rake, for the latter is mostly made almost straight, and whatever rake it has depends on the grinding altogether.

The diamond point of greater than 90° on the cutting face is better adapted for heavy work and hard stock, and after repeated grinding it frequently degenerates into a kind of round-nosed tool. There is a preferable way of forging the diamond point. With ordinary small tool stock, $\frac{1}{2}$ in. x 1 in. or $\frac{3}{8}$ in. x $1\frac{1}{4}$ in., the method of most smiths is to begin by using the fuller, and when the first operation is over the tool that is to be used looks something like this:



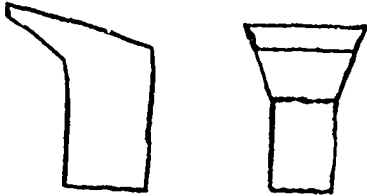
The slot thus made is evidently to facilitate drawing out of the *point*, and if the fuller is not driven down to a reasonable depth, there is nothing to be gained by the operation; so that when done the tool has often too great a space between the point and the shank—too long a neck, if it may be called so, and consequently being faulty in design it is weaker than it should be, as well as being unsightly. Granted that when finished it is a good tool practically and theoretically, it is not so economically made as it might be. As a matter of experience the stock can be bent over by the striker, when held over the anvil at the proper inclination by the smith, and the cutting point formed just as easily as when the fuller is used. The advantage is, first, less time required, also less heating of the stock, for as much progress is made by one heat in the second case as by two in the first. The weak point caused by the fuller is perhaps a greater defect when the tool is to be used for planer than for lathe work.

In making large tools, the fuller is allowable—perhaps necessary, but as the scale of work is larger it can be used with better results.

The well known side tool is the only one that can be used in some operations, *e. g.*, squaring the ends of

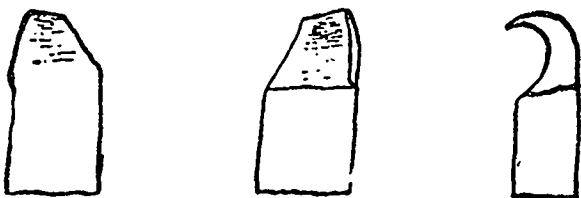
shafting between centres, where a half diamond point would be of no use.

In forging these, there are two ways of giving the necessary offset. The older way is to give this by hammering over the blade or cutting edge alone. The later is to bend over the end of the shank, which then carries with it the thin cutting part. This ought to be the stronger tool, there being less chance of a crack being developed in the steel. In appearance also it is better. This side tool is not used so much in planer work as formerly. A tool shaped somewhat like this cut is used very much for a down feed motion.



A modification of this latter, having round corners, and called in some places a shovel tool, is prominent among the round-nosed class. The usefulness of having the point in advance of the shank is obvious, *e. g.*, in planing up to a shoulder at right angles to the direction of stroke. The common round nose, having the cutting point in a line with the shank, is perhaps the cheapest tool in the shop to make and keep in working order. It is especially good for roughing cuts and *getting under* hard surfaces. A very efficient tool, especially for cast iron when hard, is a cast iron tool with chilled point, but it should not be mentioned here. A good tool for almost any kind of hard metal is a round-nosed mushet.

For planing such stock as Bessemer steel, Norway or Lowmoor iron, or such soft material, a tool such as is in the cut is useful. Its best use is in taking rough-



ing cuts with a comparatively coarse feed motion. Sometimes, too, it may be used on cast steel annealed. It is merely a side tool bent round into a semicircle approximately, thus having large cutting capacity.

The common flat drill is good enough for a variety of rough work to be found in every machine shop, and its existence is justified if only on the plea of cheapness. It is useless to compare it with the Morse or any other twist drill for quality of work. Again, in the matter of chucks or drill presses it comes short, for it requires to be made to run true, by a process of bending, every time it is put into the machine. As with other tools, it will not be lost energy to try and make its use as convenient as possible, if it is to have a place in a shop.

No matter how well a tool may be made, its excellence depends upon the tempering. This the smith has altogether in his power, and if the machinist cannot be present at this operation, or at least give suggestions as to the stock he is cutting, etc., so much the worse for himself and the system which prevents him. It is a wearisome thing, *e. g.*, to try to cut a thread of any kind with a brittle tool. The separate

outfit system seems to have the greater argument in its favor from the machinists' point of view, while if the average manufacturer considers the small tools at all, it is merely as a means to an end.

W. M. S.

NOTES ON THE (WHITE) MICA DEPOSITS AND MINES OF THE SAGUENAY REGION.*

BY J. OBALSKI, INSPECTOR OF MINES, P. Q.

This district, from a mining point of view, is an entirely new one, the first working having been commenced in the fall of 1892.

Some time prior to this date it was known that mica existed at certain places, but no attempt was made to work it. Recently, however, the increased demand for mica, by reason of its extensive use in the generation of electricity and its accompanying requirements, caused prospectors to take the field and certainly the results have proved satisfactory and gratifying.

The locality most prominent in this district, at present, is in the township of Bergeronnes, Saguenay County, and situated about twenty to thirty miles below the village of Tadoussac, and at a distance of about ten miles from the shores of the St. Lawrence.

In addition to the discoveries made in above-mentioned locality, indications have been found in the adjoining townships of Tadoussac and Escoumains, also in the valley of the River "Aux Canards" on the other side of the Saguenay river.

The formation belongs to that of the Lower Laurentian, the country rock being mainly feldspathic and dioritic, easily discernible on the formation bordering the Saguenay river.

The character of the country is generally speaking barren, and is as yet unsurveyed and belongs to the Crown; the facilities for transportation, although one would think differently at first, are in reality good, by following the valleys of the streams unning to the St. Lawrence.

Numerous veins of quartz and coarse granite traverse the country rock, and in some instances are of great magnitude; we will only consider the latter kind. The elements, quartz, feldspar and mica, are well separated, and in some places large enough to warrant the name of "Mica Mines" being applied to them. The general direction of the veins is N.E., the dipping as well as the forms of same being variable.

While prospecting this district, I met with several veins, not less than fifteen of these well defined and worthy of consideration, but they do not all merit the title of mica mines; sometimes the mica being too small, or the veins themselves too narrow to admit of being profitably worked.

I will now give some details concerning the two most important properties, which have been developed with a marked degree of success. The kind of mica found in this district is uniformly of the white (Muscovite) variety, and of a brownish color when in thick crystals, whereas the same variety in the Ottawa region is invariably green under the same circumstances. It is remarkably clear, free from spots, is elastic and the cleavage is excellent. I have not any minute test of this mica, but have seen by the correspondence of the operators that it is highly appreciated and the demand is much in advance of the production

* Read before the Mining Association of the Province of Quebec.

up to the present time. The mica is used for stoves, and also for electrical purposes.

The McGie Mine.—This mine is the property of Daniel McGie, Esq., and others of Quebec, and is situated in the township of Bergeronnes, twelve miles from Escoumains Bay (Block G.). It comprises an area of 58 acres. The vein, about a quarter of a mile long, which crosses the property in a north-east direction, is crooked, and the dip is on an average about 40° north-west, and crosses the stratification of gneiss country rock. This mine, the pioneer property of the district, was opened in October, 1892, and was worked during the summer season with a force of not exceeding ten men.

At the southern extremity of the property the vein is 15 ft. to 25 ft. wide, and was operated on a length of 140 ft. by means of an open trench 15 ft. deep and a shaft 25 ft. deep. About 15 tons of undressed mica have been taken out, from which 15 per cent. of dressed or cut mica has been obtained and marketed. The largest pieces produced cut 7 in. x 10 in., and the average may be considered as 3 in. x 4 in. In addition to the above, I may say that roads have been constructed and the necessary buildings erected. From the south to the other extremity of the mine the vein gradually widens and expands, until a width of 55 ft. is reached, showing numerous crystals and as yet untouched.

The feldspar (orthoclase) is found, as usual, in large quantities, and appears to be of an excellent quality. Crystals of black tourmaline, garnet and emerald (beryl) are found, the latter sometimes 3 in. in diameter.

Beaver Lake Mine.—Bergeronnes Block H.—This mine is the property of P. P. Hall, Esq., and others of Quebec. It is situated at the head of the Little Bergeronnes River, in proximity to Lac aux Sables and about eleven miles from the shipping point on the St. Lawrence, of which distance six miles is preferably traversed by water in crossing said lake. The area comprised is 100 acres, the veins run north-east on a length of one mile, with a vertical dip; about one-half the length of the vein has been prospected, showing same to carry a width of from 100 to 300 as per the latest reports. While inspecting this property I measured one exposure 140 ft. wide and several others of 100 ft. in width, with numerous crystals in sight. An exceptionally fine view of the vein is obtainable from the base of a cliff 50 ft. high by 142 ft. wide, including a strip of barren rock about 20 ft wide; here and there a large number of crystals of merchantable mica may be observed, disseminated all through the vein, in some instances capable of cutting 4, 5, and 6 in.

These two properties are the only ones in a workable condition at present, but numerous other places have been held under prospecting license, and the results, although not so encouraging, have firmly established the fact that several other veins of a similar character exist, some of them not workable but others favorably situated, and which in all probability will be developed next season.

Labor in the district is plentiful at current prices, but the men are not accustomed to mining work; nevertheless with a practical man as superintendent, they soon become skilled. The original prospectors had no knowledge of mining to speak of, and especially as regards mica. It is necessary to erect buildings at the mines, as the hands have to be housed there.

Cost of transportation from the two working mines at present would not be more than fifteen cents per

hundred pounds from the mine to the shipping point on the St. Lawrence, and from there to Quebec, by schooner, say ten cents per hundred pounds, or five dollars per ton to Quebec, including the handling. If the mica were selected and dressed at or near the mines, the above figures, as applying to cut mica, are very moderate.

I must again repeat that the district is as yet unsurveyed, and the prospecting was done by people very slightly experienced in such work.

I cannot give any better or more illustrative idea of this country than by comparing it with the Ottawa phosphate region, the important mineral here being of course white mica, and the principal veins quartz and coarse granite.

In conclusion, I would remark that if there is a future in store for the white mica industry, there is here a large field for a search and investigations, which may well repay practical and intelligent prospecting.

In addition to the above notes, I would mention that white mica in workable deposits has been located at Lake Manouan, near the head of the Peribonka river, two hundred and fifty miles north of Lake St. John; at Watseshoo, on the north shore of the Gulf of St. Lawrence, about four hundred miles below Tadoussac, and also at Lake "Pieds des Monts," seventeen miles north of Murray Bay. These properties, I must observe, however, to avoid confusion, are not in the same district, although of the same character and containing the same variety of mica, viz., Muscovite.

IRON SMOKE STACKS.

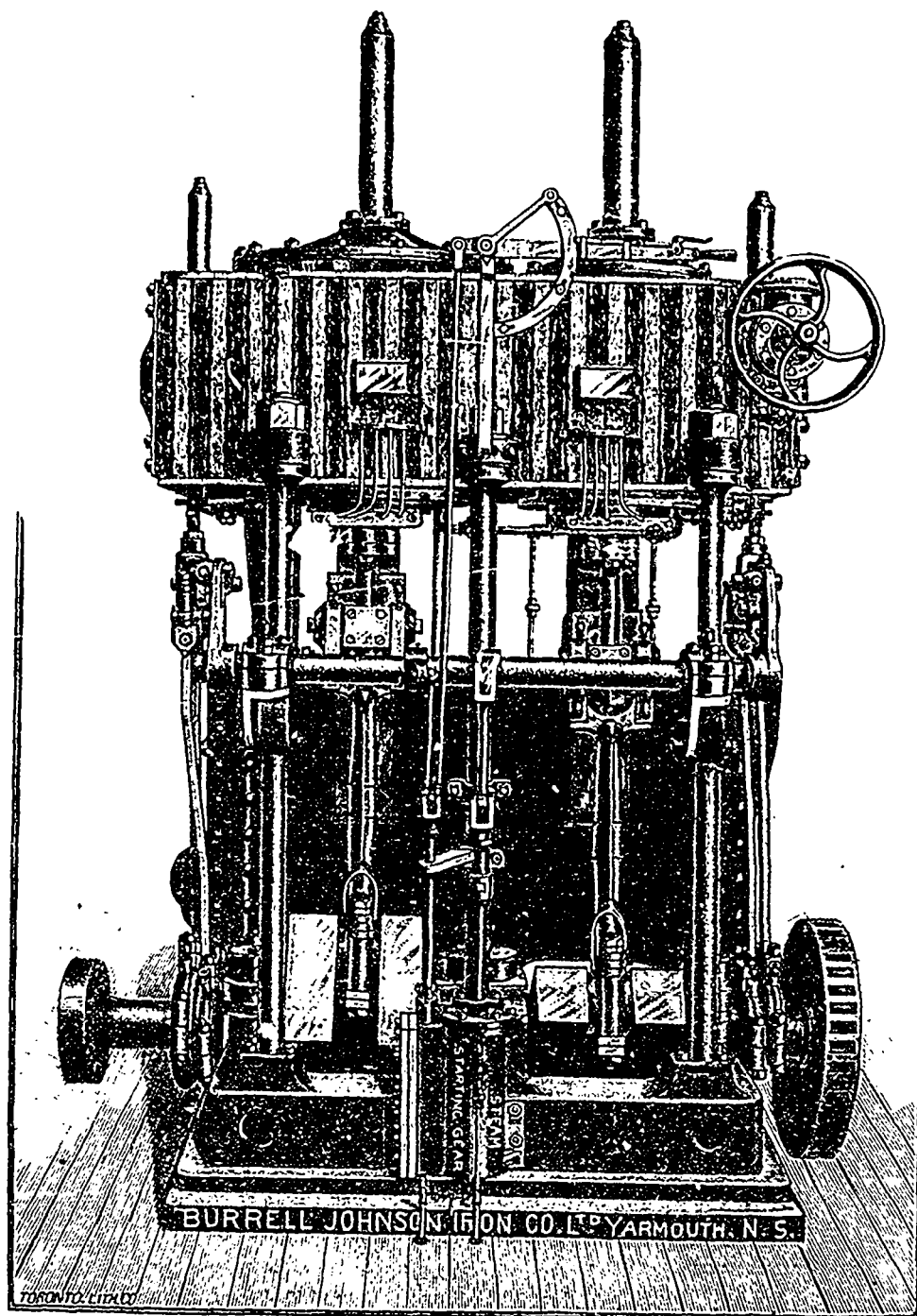
There are often special reasons for erecting an iron smoke stack, though, as a rule, those of brick are much to be preferred. There are cases in which the use of brick involves an expense almost prohibitive, as where the nature of the soil makes a proper foundation difficult, etc. Iron chimneys are useful where a temporary stack is desired, as they can often be bought ready-made, and they are much used by iron works where they can be readily and cheaply made on the premises. The advantages which they have of not permitting the influx of cold air through the wall, as is so often the case in old brick chimneys, is counterbalanced by the great radiation of heat which takes place from the comparatively thin plates of which an iron stack is composed. The effect of the weather and of the products of combustion on iron stacks is often very marked, and we have known cases in which holes were corroded through these stacks so rapidly that the entire stack had to be replaced every year. Of course, this is an extreme case, but the same action goes on more slowly in many other cases. To lessen the corrosive effects of the weather iron stacks should be kept well painted. Iron stacks are sometimes lined with brick to protect them from the action of the hot products of combustion and add to their stability. Iron stacks are usually held in position by four wrought-iron guy-rods, secured to a ring of angle-iron, that is riveted to the stack about two-thirds of the way up and anchored at a distance from the base of the stack about equal to the height of the ring of angle-iron to which they are secured above. The sectional area of these guys should be sufficient to withstand the action of the strongest winds that are experienced in the neighborhood of the stack. This should be determined for each locality separately. A stack can be constructed without guys so as to resist the pressure of wind when

blowing at the rate of seventy miles an hour. A brick stump, one-fourth the height of the chimney, should be built on a stone foundation. The brick base receives the flue from the boilers and supports on top a cast-iron frame or base-plate, to which the stack is riveted, and which is itself fastened to the stone foundation by iron rods running down through the brick work. This construction, though more expensive than many in use, gives a very substantial and durable stack.

lined, and have good large and long bearings for crank shaft. The connecting rods are of forged steel, fitted with bush metal boxes, babbitt lined. The crank shaft is also of forged steel, made solid, with cranks cut out at right angles, with large crank pins.

All eccentric rods and other parts have a convenient and practical way for taking up wear.

Propeller shaft is of forged steel, with brass sleeves, shrunk and screw pinned on shaft, where work-



TANDEM COMPOUND SURFACE CONDENSING MARINE ENGINE.

This cut represents the 16 in. and 28 x 18 in. and 14 in. and 26 x 18 in. sizes of the Tandem Compound Surface Condensing Marine Engine, made by the Burrell-Johnson Iron Co., Yarmouth, N.S.

The steam cylinders are cast with receiver, and connected between the two with flanges, and form a reservoir for the steam from the high pressure to the low pressure cylinders.

The condenser at the back and steel columns in front form the frame. The bed plate is of the hollow box pattern, and fitted with bush metal boxes, babbitt

ing through stern bearing and stuffing box. Propeller made in one piece, or built with blades to bolt on, and is of improved shape and lines.

The pumps are all worked independently of the engine, and can be regulated to run at the speed required, and have the advantage of the vacuum when starting the engine. The pumps are of the Burrell-Johnson Co.'s own make, and are guaranteed to give good satisfaction.

The engine is fitted with steam-reversing gear which works with perfect ease, and as quickly as desired.

The cylinders are covered with a non-conducting

material, and lagged with walnut, cast iron or mahogany, and fitted with heavy brass bands, or nickel-plated if desired.

The engines are built for 125 lbs. steam pressure, and will run 140 revolutions with all safety.

The work is well finished, and there is nothing but the best work and material throughout.

The company also build and furnish suitable boilers for these and all other marine and stationary work.

The above engines are now in use and giving good satisfaction in wear, strength and economy. The B. J. I. Co. are one of the oldest marine engine builders of the modern type in Canada, having been engaged in building and furnishing surface condensing engines for the past twenty-eight years.

LITERARY NOTES.

F. W. HELMICK, music publisher, New York, has sent us a pretty little song with a waltz chorus entitled "The Girl Across the Way." The music, which ought to be popular, is by Alberto Himan. The price of this song, which may be obtained by writing to 265 Sixth Avenue New York, is 40 cents, but readers of THE CANADIAN ENGINEER will be favored by receiving it at 20 cents.

RIDOUT & MAYBEE, solicitors of patents and experts, Toronto, have sent us a booklet entitled the "Inventor's Guide," containing much information respecting patents, trade-marks, copyrights and designs. Details also are given in full as to how a would-be patentee should go to work in obtaining protection in Canada or elsewhere. Copies of this useful little book may be obtained by writing to Ridout & Maybee, 103 Bay Street, Toronto.

We have to thank the publishers of the "Tinsmiths' Pattern Manual" for a copy of that useful work. It is written by Joe K. Little, C. E., who speaks of the ordinary pattern work from experience, having served a painstaking apprenticeship in the workshop system of setting out patterns before his discovery of the fact that geometrical principles might be applied with advantage. The book is designed not so much to furnish a batch of isolated patterns in common use, as to lay down general geometrical principles, from each one of which the worker can draw a number of different patterns, the construction of which is fundamentally the same. The usefulness of the book to tanners, plumbers, coppersmiths, zinc and sheet-metal workers, generally, thus becomes manifest. A word of praise is due for the clear manner in which the diagrams, of which there are a large number, are portrayed. The whole work in fact is nicely got up, and is a credit to the publishers, American Artisan Press, 63 Dearborn street, Chicago, Ill.

DYNAMO AND MOTOR BUILDING FOR AMATEURS.—With working drawings. By Lieut. C. D. Parkhurst. In this book clear and concise instructions, accompanied by working drawings, are given for the construction of such forms and types of motors and dynamos as are simply made, and yet will produce fairly efficient results. While primarily intended for the amateur, the detailed information, particularly in the chapters on armature-windings, connections and currents, and on the design of a 50-light dynamo, will be of value to every electrician. Full descriptions and working drawings of motors for running sewing machines and other small mechanisms. There is a chapter on armature windings, connections, and currents, giving minute instructions illustrated by drawings, in regard to these subjects, and based upon the latest and best practice. A chapter on a 50 c. p. dynamo will be found instructive aside from the construction of the dynamo, as all the technical points involved in the design are very fully treated, such as the proportioning of the armature and the armature wire, the calculation of the magnetic circuit, etc. In an appendix, data of some high class dynamos and motors are given that will be of assistance as guides should the amateur wish to design any other types than those treated in the book.

CANADIAN SOCIETY OF CIVIL ENGINEERS.

The society's ordinary fortnightly meeting took place in their rooms at Montreal on Thursday, January 18th.

A paper by E. Mohun, on "Concussion in Sewer Pipes," was read by the secretary —

"The writer desires to lay before you what he believes to be an unrecognized source of danger to pipes, under certain conditions,

during the construction of sewers. In Victoria, B.C., about 2,000 feet of 20 inch pipe were laid, and before many weeks had elapsed it was found that a very considerable number were broken. Examination showed that near a ventilator or a manhole on a straight line, the pipes were intact, while in a manhole on a curve they were sometimes fractured. In rock tunnel, where there was open space above the pipes and clear entrance to a manhole, the pipes were undamaged, while when laid in earth, near which blasting had been necessary, they were often cracked. The natural inference in the first place was, of course, that this result was due to improper laying and insufficient tamping; but it was felt that the damage could not be attributed to such a cause. The pipes had been tested for crushing (while unsupported at the sides) up to 2,500 lbs. per lineal foot without fracture; an inspector was present when each pipe was laid, whose duty it was to see the back filling properly tamped, while the work was frequently visited, at uncertain intervals, by the engineers and chief inspector. Further, it was found that in work performed by the same men, when the superincumbent weight was far in excess of that above the broken pipes, no damage had been done. Mr. G. A. Keefer, Mr. E. A. Wilmot, Mr. G. E. Tilton and the writer finally came to the conclusion that the damage arose from concussion caused by the blasting in the trenches and tunnels beyond where the pipes had been laid, and this conclusion appeared to be justified by the facts before narrated. It should be explained that between 60 and 70 p.c. of this pipe was laid through solid trap rock, nearly all in tunnel. The rock was intensely hard, with a day and night shift the progress was only 5 feet a week to the face. The charges were heavy and the air was naturally driven out of the tunnel with great force. Since the discovery was made, all pipes in the neighborhood of blasting have been stopped at their upper ends and covered with sacks of earth, and no pipe has been laid into the lower end of a tunnel until the latter had been driven through. These precautions proved successful and no further damage was done. The writer has often heard of sewer pipes being found broken after the work had been taken off the contractor's hands, the cost in these cases falling upon the city, and the blame upon the contractor. Is it not possible that in some instances, at all events, the breakage might be due to concussion?"

Some discussion on the paper ensued. Mr. Irwin gave a case which had come within his own experience, in which a large amount of dynamite had been exploded near a sewer, where a workman was standing at the time. The man was knocked on his back, but, apart from one or two small bruises, was quite uninjured. This the speaker attributed to the formation of a heavy cushion of air between the man and the wall, owing to the sudden and great pressure of air caused by the explosion.

Mr. Peterson said that most of the fractures which came about in sewer pipes were due to bad laying. They should be properly set in a bed of clay.

The discussion on the Cheat River bridge was then resumed.

An ordinary meeting of the society was held in their rooms at Montreal, on Thursday evening, 1st inst.

After the minutes had been passed, the secretary read some correspondence upon the "Professional Status" question, the writer being Gustave Lindenthal, New York.

A paper upon "Railway Turnouts," by H. K. Wicksteed, was then read.

"Having occasion to lay out a railway terminal not long ago," says the writer, "and being cramped for room and steel, and having frogs of only two or three numbers on hand, we had quite a lot of figuring and scheming to do, and was struck with the utter inadequacy of the pocket-book tables and formulae." The present paper was an attempt to supply this deficiency.

Discussion on Mr. Wicksteed's paper was postponed until the following meeting.

Mr. Heckman presented a handsomely framed and finely-executed portrait of the members of the Society as they appeared on the morning of the annual meeting last month. It now adorns the walls of the Society's rooms.

AN IMPORTANT INVENTION.

Scientific men have for years been trying to invent something that would save loss, when transmitting power from one place to another by means of belts. Now it is claimed that the firm of R. & J. Dick, Glasgow, Scotland, are the fortunate inventors of such a material.

Dick's Patent Gutta Percha Belts have been thoroughly tested for the past six years, and are admitted by all who have used them to be the best ever known. The quality and uniformity of these

belts prevent any danger of them either slipping or stretching while on the pulleys, and ensure perfect smoothness in the most difficult drives.

A most important feature is their strong gripping power, which enables them to transmit the whole power given off by the engine.

They can run in any atmosphere, damp or dry, and through water, if desired, as they have no joints. A frequent source of failure in other belts is thereby avoided. It has been proved that Dick's Patent Gutta Percha Belts, running for more than six years, not only retain their original strength, but show not the slightest sign of wear.

Thomas Forrester, 118 St. James street, Montreal, informs us that he has been representative for the above firm in the Province of Quebec for the past year, and has placed belts with nearly every saw mill, manufacturing concern, etc., throughout this province. He is now extending his trade throughout the Dominion, and says he is willing to send trial belts to parties requiring same, and if not found satisfactory, they can be returned at his expense.

REVIEW OF THE METAL TRADES.

MONTREAL, Feb. 7th, 1894.

The market appears to have improved somewhat during the past month and material is moving more briskly, but there continues a prevailing dullness, and there is not the activity that we would wish to see at this season of the year. Merchants generally seem to think that the trade will not show any marked improvement till late in the summer, when a good fall trade is confidently looked forward to. A good many large consumers of iron and steel material are doing practically nothing in their factories just now. This to some extent is owing to stock-taking, but in most cases is due to trade depression. Very little buying will be done till after the tariff question is settled, and this is not looked forward to till about the first of April. It is pretty evident that the duties on some classes of iron and steel will be reduced, but to what extent is not known. The present specific duty of \$12 per ton on some low grades of steel amounts to an ad valorem duty of over 75 per cent., and this seems an enormous protection. It is thought that the duty on scrap iron will be raised, and this is keeping the rolling mills from purchasing any stock for spring delivery. They do not think, however, that it will be sufficiently high to prevent this material from being imported. During the past week some purchases of basic wire rods have been made to the extent of about 1,000 tons; prices paid were much lower than at this time last year. Steel sheets in England have advanced 2s. per ton, but this will not affect the price here to any extent. In tin plates, Canada plates, galvanized iron, etc., there is very little doing, and no big contracts or orders can be heard of. From all accounts we think during the past year the volume of business has been up to that of previous years, but values have been much lower.

TWO NEW ASSOCIATIONS.

A. W. Glassford, secretary-treasurer of the Brass Manufacturers' Association, has also formed an association of Sanitary Earthenware Manufacturers, which seems to be working to the satisfaction of all concerned.

We hear that the Soil Pipe Manufacturers called a meeting on the 7th inst., to come to some decision as to whether it would be to their advantage to fall into line and form an association of their own. The first move in this direction was made last spring, but owing to some of the manufacturers declining to look with favor upon the scheme, it was dropped. Since then, however, the great competition and the very low prices at which they had been obliged to sell their goods have been the means of bringing them together once more, and it is probable that an association will soon be in full working order.

DEVICE TO INDICATE WATER LEVELS IN A RESERVOIR.

An apparatus to indicate the water level in a reservoir, boiler, etc., at any distance, by means of electric signals conveyed by a telegraph wire, is described in the proceedings of the Institution of Civil Engineers of Great Britain as having been devised by Mr. Diendenne. It indicates the water level in a reservoir, boiler, etc., at any distance by means of electric signals conveyed by a telegraph wire. The float is connected by a cord to the edge of a circular sector free to turn on its centre, and the pull of the cord is counteracted by that of a dead weight, so that the angular motion of the sector always corresponds to the rise or fall of the

float. The sector is of metal, and passes over, in its rotation, a number of metallic arms equally spaced. The electric current reaches these arms through the sector, so that in various positions of the sector different numbers of the arms are in the circuit. Another part of the transmitting apparatus is a semi-circle of ebonite, on which there are a number of metal plates, each of which is separately connected by wire with one of the arms above spoken of. On this ebonite plate is a radial arm, which, when it revolves, successively touches each of the metal plates. At the receiving station, when it is desired to know the water level, all that is necessary is to complete the circuit by pressing a button. Suitable electro-magnetic apparatus then causes the radial arm to travel over the ebonite plate, and in doing so the circuit is made and broken for a number of times, which indicates the position of the sector, and so of the float. A telephone is used to count the number of breaks in the circuit, and any degree of precision may be obtained by choosing the number of radial arms to correspond with any desired scale.

A MEETING of the Atlantic & Lake Superior Railway Company was held in Montreal last month to consider arguments for the purchase or lease of the Baie de Chaleurs, Great Eastern, Montreal & Sorel, Ottawa Valley, Pontiac & Pacific, and the Ontario Pacific Railways, also the control of the proposed new bridge over the St. Lawrence at Montreal. The proposition had been favorably reported on by the Montreal & Sorel, and it was thought the other roads would be favorable. The proposed system will extend from Gaspé to Sault Ste. Marie, in opposition to the C.P.R. Nothing will be decided till the meetings of the other roads named. C. N. Armstrong, St. James street, Montreal, is secretary of the A. & L. S. company.

Personal.

THE magnificent residence built for Prof. Bell, of telephone fame, at Baddeck, Cape Breton, is now complete.

ALEXANDER McINNIS, manager of the Cumberland Railway & Coal Co.'s mines at Springhill, N. S., is dead of pneumonia.

NAPOLEON DESCHENS, foreman mechanic at Miller Bros. & Toms' machine shop, Montreal, died last month at the age of 38.

C. A. SCOTT, civil engineer, who was prominent as promoter of the Lower Laurentian Railway, died on the 15th ult. of influenza.

MR. HALL has resigned as manager of the Joggins, N.S., coal mines, and Mr. Archibald of Glasgow, Scotland, has been appointed in his place.

K. J. MORRISON, traveller for the Robb Engineering Company, Amherst, N.S., was married last month to Miss Nettie McKay, of Stellarton, N.S.

G. P. RAY, C.E., Quebec, expects to have completed this summer the new cadastral plans for the eastern division of the county of Bonaventure. This work, which has involved a large amount of surveying, has occupied Mr. Ray for the greater part of the past five years.

R. C. CLEVELAND, son of C. C. Cleveland, of the firm of J. L. Goodhue & Co., Danville, Que., is going to make his home in Massachusetts, having formed a partnership with a gentleman in Worcester in that State. Mr. Cleveland was for some time with the Ingersoll Rock Drill Co., of Montreal.

ALEXANDER POTTER, C.E., Assoc. M. Can. Soc. C. E., of New York, has been awarded second prize of \$500 for the best design of a new system of water-works for Evansville, Ind. There were twenty-two plans submitted, and Mr. Potter, who is a Canadian, was by far the youngest of the competitors, says the *Toronto Empire*.

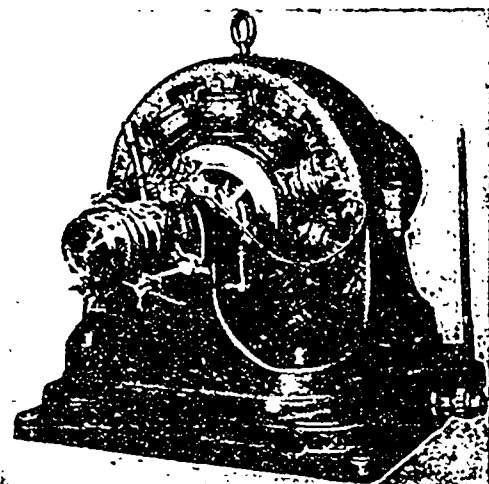
ALEX. McINNIS, manager of the Springhill, N.S., coal mines, died last month after a few days' illness from pneumonia. Mr. McINNIS had raised himself from a position of miner to that of manager of the largest colliery in Nova Scotia, and was well known as an able and energetic engineer. He leaves a wife and several children.

WM. D. LOVITT, who died at Yarmouth, N.S., this month, was probably the wealthiest man in Nova Scotia. He was interested in the Yarmouth Duck and Yarn Co., the Yarmouth Woolen Mill, the Burrell-Johnson Iron Works, the Yarmouth and Annapolis Railway, and other local works. He leaves a widow and two sons, W. L. Lovitt and Dr. J. M. Lovitt.

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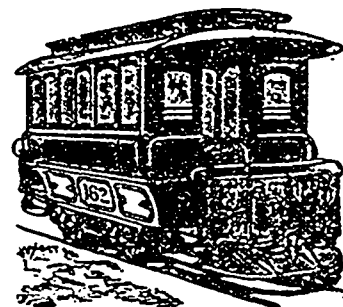
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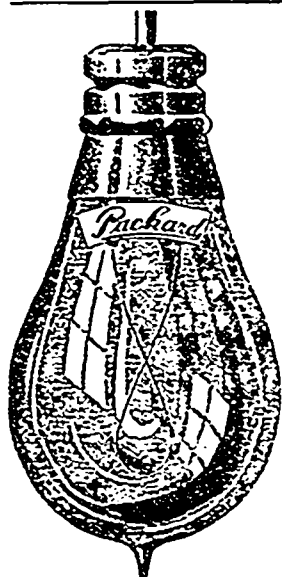
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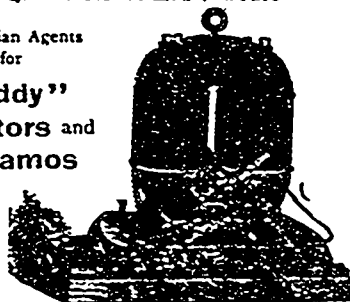
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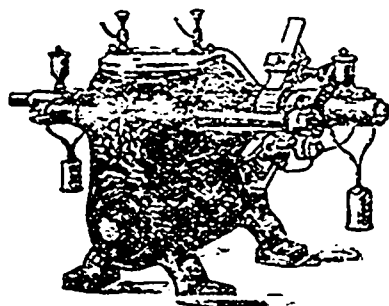
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KAY ELECTRIC WORKS

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.

ARC AND INCANDESCENT LAMPS.

The same amount of electrical energy spent in an arc lamp will give from eight to nine times the amount of light that an incandescent lamp will give. An arc lamp gives, say, 1,000 c.p. for 400 watts; this is at the rate of 2.5 candles per watt, or .4 of a watt per candle-power. An incandescent lamp of 16 c.p. absorbs, according to calculations by A. T. Guy, in the *Electrical Engineer*, 56 watts, and this at the rate of .28 candle per watt, or 3.5 watts per candle power. These lamps are made with a great variety of candle-power, and also to burn at various pressures. The standard size is a lamp of 16 c.p. to run at 100 volts pressure, because this is the most common pressure adopted in consumers' houses. The same sized lamp can, however, be made to run at a higher or lower voltage, such as 50 volts or 120 volts. For indoor illumination, 8 c.p. and 32 c.p. are also greatly used, the smaller one being very useful for lighting places that do not require much light—such as corridors, staircases, small rooms, recesses, etc.; the larger light is useful for places where an extra illumination is required—as shop windows, billiard tables, etc. The very large sizes—as 100, 200, 500—are known as "Sunbeams," and are mostly used for lighting large rooms, entrance halls, or outdoors. These lamps are not used very much, because their "life" is not long, and they blacken and decrease rapidly in candle-power. In addition to all the above, there are very small lamps of 5, 3, 2 and $\frac{1}{2}$ candle-power—3 c.p. is generally found in miners' electric hand lamps, where the lamp is connected up to an accumulator battery. The smallest lamps are used in theatrical effects, and in surgical and such like operations. A lamp of same candle-power and efficiency consumes the same energy, whatever voltage it may be made for, because the lower the pressure the greater must its current be. For example, a 16 c.p. lamp at 100 volts pressure has a filament of about 180 ohms resistance, and will therefore take a current of $100 \div 180 = .55$ of an ampere. Suppose a similar lamp is required to run on a circuit which is at a pressure of 50 volts, evidently at this pressure only half the current would flow through the filament: therefore to have the same current the resistance of the filament must be halved, and this means doubling the sectional area. But although we have now the same current, we only use half the pressure, consequently only one-half the electrical energy, or number of watts, because $50 \times .55$ is one-half of $100 \times .55$. To get the same quantity of light we must utilize the same amount of energy. By again halving the resistance, or again doubling the sectional area of the filament, we get 1.1 amperes through, and then 50×1.1 equals $100 \times .55$; so that to run a lamp at half the voltage requires double the current, and the filament will have four times the sectional area, or double the diameter. Generally, then, as the working voltage decreases, the diameter of the filament increases. It is very easy to distinguish between an 8 c.p. and a 16 c.p. lamp when the candle-power number is illegible; the 8 c.p. lamp has a much finer filament than the 16 c.p. when both are made for the same voltage.

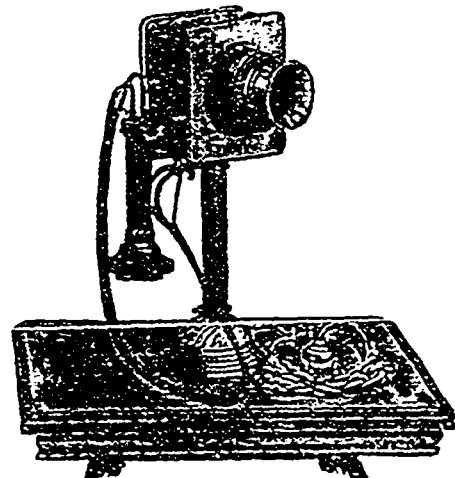
ELECTRICITY IN FARMING.

Electricity, like the mysterious power of gravitation, is everywhere in and around the earth, but unlike gravitation, which exerts its force in one direction, its power can be contracted to a certain extent and its energy can be sent in any direction. It is, perhaps, a question only of time and study when the electrical fluid, present everywhere, can be caught without a stationary plant and harnessed up for the universal use of man. But many a hard road has to be travelled by the student, or otherwise many a happy accident in discovery has to be met with before this is attained.

From a machine which will gather and use electricity as it moves, it is only a step to aerial navigation. But a great advance will be made on the lines of even our present limited knowledge of electricity, when road locomotion and agricultural work can be successfully carried on by it. O. W. Ketchum, a Canadian inventor, believes he has appliances which will, at least, solve the problem of ploughing, cultivating, reaping, threshing, etc., when power can be cheaply got within half a mile of the field of operations. This he proposes to do by a traction engine operated by electricity and having several implements attached. Should our readers be interested in the subject sufficiently, we shall give a drawing of Mr. Ketchum's proposed electrical farm engine.

WAREHOUSE TELEPHONES.

The accompanying cut shows a Portable or Desk Telephone, handsomely gotten up with heavy nickel base and polished case, manufactured by John Starr, Son & Co., Halifax, N.S. A flexible silk covered cord is provided with each, as shown, by which means the



instrument can be moved about at will, thus avoiding the necessity of leaving one's seat to answer a call. The silk cord terminates in a nicely finished wall rosette and connected to binding posts thereon, to which are connected the main line and battery wires; this is screwed to the wall, giving a very neat appearance. By the addition of a few extra batteries, the central office can be called up by merely pressing the push on top of transmitter box, after which the batteries are automatically cut out of circuit; this is more convenient than having to use a magneto bell. The

only additional cost for this is the extra batteries, and if these are not wanted, no change is needed in the telephone.

The battery supplied with telephone is sufficient for ringing up the warehouse bell, when used in connection with other styles, which is done by pressing the push as above described. When a magneto bell is necessary to ring up, as in case of a private line, this can be placed under the desk, or in any convenient place within reach, and connected on the ground line at the wall rosette. By use of a combination switch, the Desk Telephone can be switched on to either the main or warehouse circuit. This is very convenient, as a subscriber can sit at his desk and converse with any part of his warehouse or connect with the exchange. The manufacturers furnish with all their telephones the well-known "Samson" Batteries, which are the very best battery in existence for telephone work, owing to their great strength and the small amount of attention required, and also on account of their great recuperative powers. A special circular fully describing these will be sent on application to John Starr, Son & Co., manufacturers of telephone and electrical appliances, 2 to 6 Duke street, Halifax, N.S.

On the last two days of the present month and 1st of March an important electrical convention is to be held at Washington, D.C., under the auspices of the National Electric Light Association. Among the subjects discussed will be "Underground Circuits," the "Economic Size for Arc Dynamos," "Storage Batteries," "Complete Metallic Circuits for Electric Railways," besides many others of interest to electric light and railway men. The secretary, G. F. Porter, 136 Liberty street, New York, informs us that a special railway rate of a fare and a third for the return journey has been arranged for delegates from Montreal.

FELIX MELOTTE, in a letter addressed to a French Association of Electrical Engineers, refers to the most generally used methods to determine the efficiency of electrical plant, and to the method which he employs to avoid heating of the band brake. At the School of Mines in Belgium use is made of hollow pulleys, which receive a current of cold water, which afterwards passes freely away. This system is not directly applicable to the pulleys of electric motors, which on account of their great circumferential speed might have thrown the water violently on all sides. To avoid this, M. Melotte inserts a bent tube in the opposite direction to that in which the motor is revolving, and in the interior of the pulley. The water introduced in the pulley is held on the felly by the effect of the centrifugal force, and takes part in its motion. When there is a certain quantity of it, its surface touches the tube, enters it, and passes out without a drop being lost. In this manner it has been possible to test a motor of 6 horse h.p. at a speed of 1,200 revolutions with a pulley 15cm. in diameter, and keep the speed for more than 10 minutes.

THE *Telegraph* draws attention, in a powerful article, to the waste which has been going on for centuries in connection with the enormous water-power possessed by St. John, N. B. Every flood time the great volume of water fed by the Bay of Fundy and the Atlantic Ocean, rushes northward in an irresistible stream, and every ebb tide the accumulated water in the river, together with that immense quantity, rushes southward with equal strength. Excepting for about one hour each day, this current is in constant operation, and if the

proper appliances for utilizing it were at hand, would be capable of turning an almost inconceivable amount of machinery. The use of coal for running the large amount of electrical machinery at present in St. John costs a large amount of money, but many times the required amount of power could be obtained from this water for practically nothing, by the simple use of a few wheels so arranged as to turn in either direction. On the east side of the river there are two islands from eighty to a hundred feet distant from the land, and the *Telegraph* suggests that power wheels could be placed in both channels at an outlay comparatively small, by erecting a strong truss across the narrow channels and placing the wheels beneath it. The power now belongs to the City of St. John, and would be a valuable franchise if leased to a company, for in time this company would give power to all the machinery in the city, and at a cost, perhaps, equal to one quarter of the present outlay.

MR. D. PAUL SCHOOP describes in the *Electrical Engineer* a process of preparing a gelatinous electrolyte for storage batteries which has many advantages over the dilute acid. This process has been tried in this country, but not as successfully as in Europe, probably on account of some fault in the preparation which will not occur if this process is followed. Short circuits and much of the dirt usually attending the use of storage batteries are avoided. The gelatinous electrolyte is prepared from sulphuric acid, silicate of soda and asbestos fibre. The sulphuric acid, which must be free from all impurities, is diluted with three parts of distilled water. The silicate of soda must be prepared by a special process to free it from all foreign matter, and the asbestos fibre is prepared by boiling asbestos mill-board in dilute sulphuric acid. The mill-board disintegrates into a fine pulp, which is washed and gently pressed when it is ready for use. Four gallons of the dilute sulphuric acid is mixed with one pound of the asbestos fibre, and when evenly distributed one gallon of water glass is added and quickly stirred in. The solution should appear like ordinary dilute acid free from lumps. This should be stirred for some time until it gets thicker; when it has stood for an hour it will appear oily, and is then ready to turn into the cell, which should first have been washed with dilute acid. In twenty-four hours it will have become sufficiently thick so that the cell may be inverted without anything dropping out.

Electric Glashes.

NANAIMO, B.C., Telephone Co. has just declared a dividend of 10 per cent

THE capital stock of the Citizens' Light and Power Co., Ottawa, is now \$200,000.

A GOOD deal of double-tracking will likely be the order of the day in Ottawa next spring.

A CHARTER is to be applied for for the construction of a bicycle electric railway from Winnipeg to Louisburg, N.S.

TORONTO Street Railway Co. will shortly extend their powerhouse to twice its present size and add six 1,000 h.p. engines.

THE Peterboro' Light & Power Co. are now putting in a new engine. It is of 180 h. p., and will be used as a reserve force.

H. BROWN & SONS, proprietors of the Carleton Place Electric Light Works, have put in a fine new engine of 120 horse power.

THE Kingston, Ont., Telephone Co. is metallizing its lines so as to overcome the induction created by the electric railway system.

ELECTRIC cars operated by storage batteries are to be used for transporting lumber from Conroy Bros. saw mills at Deschenes, Que.

H. P. LABELLE & Co., furniture manufacturers, of Montreal, have put in a dynamo supplied and installed by T. W. Ness & Co., Montreal.

THE Central Prison, of Toronto, has had a large telephone plant, with complete switchboard exchange, recently installed by T. W. Ness & Co.

THE corporation of Three Rivers, Que., has settled the dispute with the Royal Electric Company by purchasing their electric plant at about \$35,000.

AHEARN & SOPER, of Ottawa, have been awarded the contract for the new incandescent light plant soon to be introduced by the St. Hyacinthe Gas Co.

THE directors of the proposed electric railroad between Berlin and Preston, Ont., to connect with Galt, are applying for incorporation. The capital is \$100,000.

AT Hendrie & Co.'s large stables, Hamilton, the horse feed is chopped and prepared by electric power, the plant having been put in by the Kay Electric Works.

THE Bell Telephone Co.'s task of placing their wires underground is nearing completion. Three hundred and fifty telephones were added to their list last year.

IT is stated that George Morgan, who has bought the Lowrie Wagon and Carriage Works, Sarnia, Ont., intends to convert them into some form of electric works.

THE new power station at the Selkirk, Man., Electric Light Co.'s works is complete. The company will probably furnish power for the electric railway to Winnipeg.

THE number of passengers carried by Toronto street cars in 1893 was 21,215,000, an increase of over 2,000,000 upon the previous year. The earnings for 1893 were \$363,000.

HAMILTON'S contract with its Electric Light and Power Company will terminate in September, and the council are discussing the advisability of purchasing their own plant.

WE note that three Ontario routes are being proposed for electric railways, viz., one between Kilburn and Pakenham, one between Belleville and Trenton, and another in Cornwall.

P. D. DODS & Co., of the Island City Paint Works, Montreal, recently had installed at their works by T. W. Ness & Co., of Montreal, a dynamo by which they will do their own lighting.

THERE is some talk of the formation of a syndicate for the purpose of supplying St. Lambert, Longueuil and other places along the bank of the St. Lawrence opposite to Montreal, with the electric light.

FOUR large 100 horse-power motors are being constructed for the Toronto Street Railway Co. They are for the purpose of drawing a large number of trailers, especially during the extra traffic in the evening.

THE Bell Telephone Co. have made an arrangement with the Owen Sound, Ont., council whereby, in return for a five years' franchise and the payment of a certain sum, they will maintain an electric fire alarm system.

THERE was an ice blockade the other day at Carleton Place, Ont., which stopped the Electric Light Co.'s water-wheel. The new steam plant, however, is now in operation, and this will do away with such hindrances.

A DEPUTATION representing some of the chief electric companies in the Dominion recently waited upon the Dominion Government for the purpose of inducing it to pass legislation for the inspection of electric light meters.

THE Hamilton, Grimsby and Beamsville Electric Railway Co. has let the contract for eleven trolley cars to Ahearn & Soper, of Ottawa, and for 50 tons of copper wire to the Eugene F. Phillips Electric Works, Montreal.

RECENT mails report that great satisfaction is expressed in Nelson, B.C., at the completion of the C. P. R. telegraph line to that town, as one of the chief drawbacks to the development of the Kootenay mining district is thus removed.

ON the demand of the Worthington Pump Company, a receiver has been appointed for the Thompson-Houston Electric Company of New York. The liabilities, as stated by the president, are \$738,000, including bonds to the amount of \$600,000.

IF the Royal Electric Company, Montreal, carry out their proposition to establish works at Carleton Place, Ont., at least a hundred men will be employed. The company ask for a bonus of \$20,000 and exemption from taxes for fifteen years.

JOHN FORMAN, Montreal, of the Laurentide Pulp Co. has secured the agency for the Edison Swan United Co., of London, Eng.

THE electric light plant supplying the College of St. Hyacinthe, Que., has been destroyed by fire. Loss, \$15,000, insured for \$10,000.

THE new transfer system, by means of check tickets bearing a clock dial, was inaugurated on the Montreal Street Railway system the other day.

DARLEY—"My dear, what plant bears the brightest flowers?" Mrs. Darley—"I'm sure I don't know. Which is it?" Darley—"The electric-light plant."

THE Bell Telephone Co. has brought an action against the Montreal Street Railway Co., claiming \$27,626 as the expense to which they had been put in changing their underground system on account of the introduction of electric cars.

A NEW company is being formed in Montreal, under the name of the Handy Telephone Index Co., and under the leadership of F. L. Parker, of Worcester, Mass. Part of the scheme is to make an index that will supersede the present telephone book.

THE Springhill, N.S., Electric Light Company now run 600 to 700 incandescent lights from their station. Wm. Hall is president, and John Murray, jr. secretary. The only arc lights running in that town are those operated by the coal company for use in their works.

IT is stated that contracts have been let for the construction of motors which are to be used on two sections of the Rocky Mountain Division of the C.P.R. The trolley system, it is hoped, will be able to obviate the difficulties caused by the steep grades in these districts.

NOT many complaints on the score of the expense of electricity would be heard, were all places like Truro, N.S. In this progressive little town one can have his house lighted throughout by electricity, telephone communication, and an instantaneous fire-alarm system, all for \$25 per year.

OXFORD, N.S., now has the electric light. The local company operating it has 120 lights, but there is a demand for more, and it is proposed to add a new engine and boiler, the capacity of the water-power being taken up with the existing lights. Mr. Hewson is president and Mr. Ross is superintendent.

IT is reported by the St. John Sun that a quantity of the quartz taken from the Memramcook gold mine has been cleaned up by the new electrical process which is creating quite a stir in gold mining circles, and that it yielded over \$4 to the ton, or more than double the quantity obtained by the ordinary process.

A DYNAMO at the Amherst, N.S. electric light works was burnt out the other night by a few drops of water which, owing to a change in the weather, condensed in the ceiling and fell on the wires of the machine, causing it to be short circuited. Such a simple thing might be the unsuspected cause of more than one case of burning out.

THE Halifax Illuminating and Motor Co.'s tender for street lighting for a term of three years has been accepted. The prices are: 150 two thousand c. p. arc lights at \$78.75; 50 twelve hundred c. p. incandescent lights at \$23.87; and 50 thirty-two c. p. incandescent lights at \$17.52. The city has the right to increase the number of lights at the contract price.

ONE more use for electricity! It has been discovered that an electric fan placed near a window causes all moisture to be expelled from the glass owing to the current of air produced. This has been turned to account by many Montreal storerooms of late, who find in this simple appliance a ready means of preventing their goods being hidden from view by the usual layers of frost.

J. F. GUAY, who has for some time past been manufacturing telephones in Sault au Matelot street, Quebec, is this month opening out in more extended works in St. Valier street in the St. Roch's suburbs of that city, where he will start the making of dynamos. The new shop is being fitted with lathes and all necessary tools, and there should be a fair field in a city like Quebec for the enterprise in which Mr. Guay has embarked.

THE Quebec Electric Light & Power Co., organized with a capital of \$400,000, have at their works at Montmorency Falls a capacity of 3,700 horse-power, which can be increased whenever required. They have eight large water wheels, and expect to start arc lighting in April and incandescent lighting in May next. The falls, which are the source of power, are seven miles from the distributing point in the city. The engineers of this work were Thos. Pringle & Sons of Montreal.

ELECTRICITY was unknown twenty-five years ago as a mechanical power, but to-day there is estimated to be \$900,000,000 invested in various kinds of electrical machinery.

THE engine which is to supply Fredericton, N B., with power for the electric light has just been placed in position. In a test the other day, it worked very satisfactorily.

YARMOUTH, N S., is being fitted up with a novel form of fire alarm system. The various points will be connected with the electric car station, where there is a constant supply of steam, and the alarm will be sounded from a large steam whistle instead of by means of bells.

ONE of the engines of the Montreal Street Railway's Cote street power house broke down one day towards the end of last month and disorganized the service for a time. The damage is said to be irreparable. It will not be long before the new engine house, a description of which appeared in our last number, will be ready to supply the necessary power.

A PROMINENT Montreal physician, interested in electricity, has laid a wager that by A D 1900, electric carriages will be seen in general use on the streets of Montreal. In all probability the doctor will win his wager, as vast strides are being made daily towards mastering the control of this great motive power, and while as yet the electric carriages that have been invented have not proved suitable for all practical purposes, the storage battery system is being brought to such perfection that we may soon expect to see it put to the most ordinary everyday uses.

AMONG the new cards in THE CANADIAN ENGINEER is one from R. E. Thomas Pringle, who has just commenced business on his own account as electrical engineer. Mr. Pringle is a son of Thomas Pringle, whose reputation as an engineer is well known in Montreal, and he has been trained in mechanical work from boyhood. He served his time as an apprentice, and afterwards as a machinist, in the large works of John McDougall & Co., Montreal, and was afterwards for three years with the Royal Electric Co., subsequently going for a term to the Thompson & Houston Works, at Lynn, Mass. Mr. Pringle is, therefore, well qualified both by inheritance and study for the special field he has entered on, and we have every confidence in commending him. He is now engaged in installing the lighting plant for the new Riverside Cotton Co., at Montmorenci Falls.

The Bell Telephone Co. of Canada, Limited

MONTREAL

Manufactures and has for sale every description of

Telephonic and other Electrical Apparatus Line Material and Supplies

Will furnish tenders for supplying Warehouses, Public Buildings,
Hotels and Dwellings with

Private and Local Telephone Systems, Burglar Alarms
Hotel, Elevator and other Annunciators, Hotel Room
and Fire Calls, Electric Bells, Push Buttons, etc.

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Brief, but Interesting.

THE most ancient coins are of electrum, four parts of gold to one of silver.

THE copper industry of Japan is assuming important size. The output has quadrupled since 1881, and the exports have increased even more rapidly.

By the decision of Judge Macdougall, last month, the question whether the City of Toronto can tax the gas mains of the Consumers' Gas Co. has been settled in favor of the city. The assessment was made on the strength of a decision given by the County Judge 30 years ago. The mains have been assessed at \$500,000, and the city will get \$7,500 in taxes from the gas company.

THE deepest artesian well in the world is one near Berlin, which is 4,194 feet deep, and the next deepest well is reported to be at St. Louis, which is 3,843½ feet in depth, and that the third deepest is said to be at Titusville, Pa., which is 3,553 feet deep. The deepest bore hole in the world is that at Schladebach, near Kethan, Germany, which is 5,736½ feet deep and was sunk for scientific research.

S. A. SEFERIADES, a Greek merchant of Smyrna, Asia Minor, who visited the World's Fair with the object of securing the best form of traction engine, has chosen a pattern made by John Abell, of Toronto. It will be used in connection with large irrigation works which he has near Smyrna. He has left orders for several, and believes his example will be followed by many other merchants of Asia Minor in other lines of Canadian machinery when they come to learn its high quality.

A COAST gun built by Krupp, when being tested at the Meppen proving grounds recently, threw the projectile 65,616 feet, or nearly thirteen miles, the gun having an elevation of 44 degrees. The projectile weighed 474 lbs.; the charge of powder 253 lbs.; giving an initial velocity of 2,099 feet. It is estimated that the projectile reached an altitude of 21,456 feet, and its flight occupied 70.2 seconds. The Krupps have had a drawing made showing the flight of the projectile relatively to Mont Blanc, from which it is evident that it would be possible for the gun to fire over the mountain from Pre St-Didier.

THE almost miraculous power of steam may be partially realized by thinking over the following comparison, made by the *Polytechnic*. If it were possible to place 300 oars on each side of the "Campania," making 600 oars altogether, each worked by three men, there would be 1,800 men at work at one time. As they could not work continuously for twenty-four hours, but only for a total of eight hours each man, divided into four hour watches, it would be necessary to have a crew of 5,400 men alone to man the oars. If six men could develop one horse-power, the total horse-power developed by the 600 oars handled by 1,800 men would be but 300, as against 30,000 in the "Campania," or the same power would require the employment of 180,000 oars and a crew of 558,000 men to manipulate them.

AN interesting departure in engineering is the introduction of marine engines for land service, and the plan is commended by so good an authority as the *Age of Steel*. One of the great electric illuminating companies, it appears, has adopted them in its work, and concerning their economy in respect to space and power it is reported that the land engine takes up some ten times as much space as a marine engine, and the marine quadruple expansion engine has ten times the heating surface of the land engine. Further, the new quadruple two-crank expansion engine is twice as powerful as the triple expansion three-crank engine, occupies also thirty per cent. less room, and carries regularly 200 pounds of steam; the land engine carries only eighty or ninety pounds of steam, and gets one-horse power out of from four to ten pounds of anthracite coal, while the quadruple expansion marine engine develops one-horse power out of one and a quarter pounds of Welsh coal, that is, according to these data, the land engine requires from two to four times as much coal as the marine engine to produce the same power.

THE Sanitary Association of Hamilton is agitating for the appointment of a plumbing inspector. They state that the inspection of the members' homes by the officer of the society had been attended with satisfactory results, and they desired to have such an inspection instituted on behalf of the whole city.

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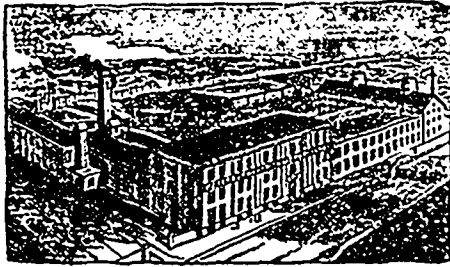
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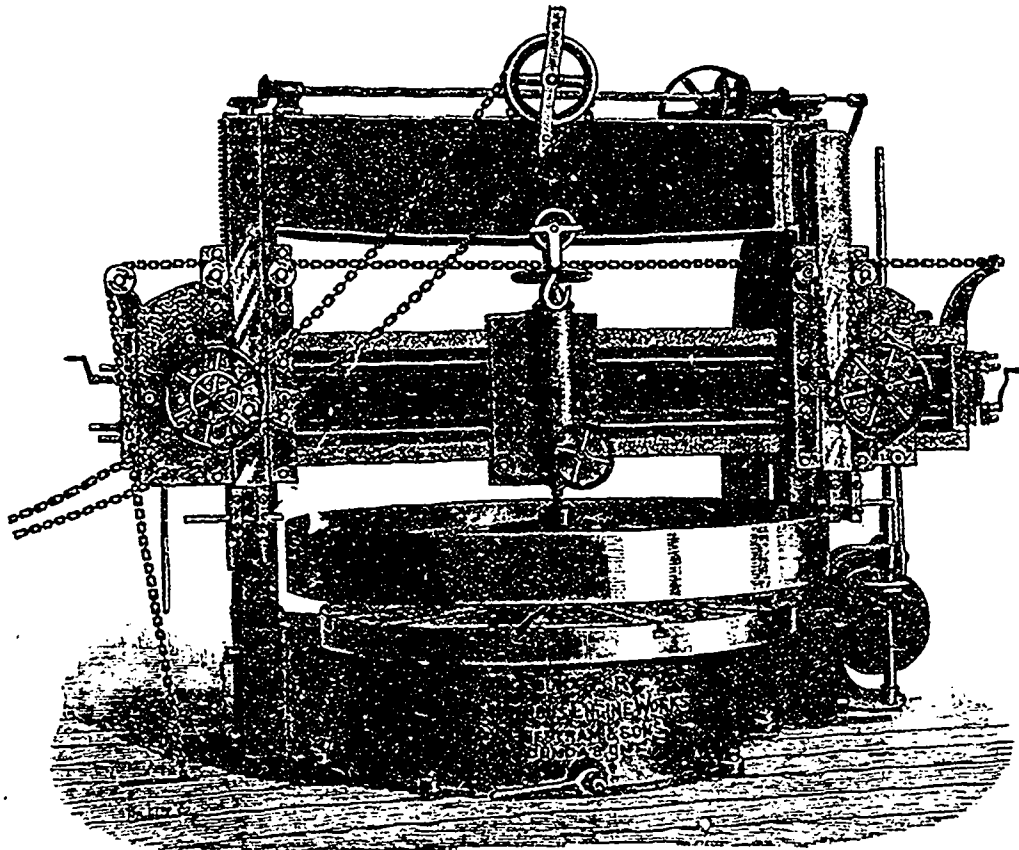
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CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

One of the best banquets ever held by Montreal, No 1, took place at the Richelieu Hotel on Friday evening, February 2nd. The occasion was a great success from beginning to end, and reflected the greatest possible credit both on the Richelieu management and upon the members of the association and their dinner committee. At the conclusion of a very enjoyable repast the members and their invited guests spent a few hours in the usual toasting and merry-making. Bro J G Robertson, who was in the chair, gave the toast, "Queen and Country," and after that had been drunk in the time honored fashion,

Bro. Nadin sang a song

The next toast was "Electrical Engineering," coupled with the names of J Smiley and J J York

Mr Smiley in reply, observed that there was no one living in these modern times but who felt a deep interest in the progress of that most important science, electrical engineering. Referring to the electric cars of this city, he remarked that thousands of horsepower were running in the streets on a slender wire. Thirty years ago people would have looked with suspicion upon any one saying it was possible. It was often said that an electrical engineer ought to be three parts of an engineer and one part electrician. Mechanics and electricity, however, were now more in proportion one with the other. Dynamos now ran twelve months without needing repairs. Ten years ago, if a machine ran for twenty-four hours, it was considered well. Electrical science had advanced with mechanical science, but recent accidents showed that something had yet to be accomplished in chaining down this mighty force.

Bro T Rvan informed the members that Mr Smiley had had something to do with the first electrical plant which had been put in the city of Montreal

Bro J. J. York said it was strange that no proper solution of the question as to why these accidents happened should have been offered by the scientific or mechanical papers. He himself had been making some experiments in this direction, and hoped soon to be able to explain why the generator should work so much faster at times than at others, causing it to break down. Engineers of modern times had increased the size of the fly-wheels, and yet occasionally they still broke down. He then gave some instances of men who had combined a knowledge of mechanics and of electricity with great profit. Electricity, he found, was a most intoxicating study, it was like drink was said to be—the more one had, the more one wanted.

"Our Manufacturing Interests" was the next toast on the programme.

Hugh Vallance, who rose to reply, said he was pleased to be able to say that these interests had been well looked after during the past year. They had been flourishing much more than those of the United States, though the Ottawa Government had been trying to put Canada in the same position, owing to threats of tariff reform. If the Government would only come out straight and say what they were going to do, the state of affairs would be better. Manufacturers at present were on the fence, and did not know which way to turn. He thought it a mistake for scrap iron to be imported free of duty. If there were a duty placed on this article, rolling mills and smelting works would become numerous all over the country.

Andrew Young and H Nuttall also made replies.

The next toast proposed by the chairman was "Steam Engineering."

Mr. Cowper (of the Canadian Rubber Co.) said we had improved on the manner of doing things in steam-engine work, but the principles were practically the same as in the time of James Watt. In his time there were no horizontal engines, they were all upright. He then rapidly traced the evolution from the first form of steam engine to the present highly-developed form. A boiler was like a man's heart, if pricked, all the muscles of the body stopped work, just so with a boiler, and in boilers very little improvement had been made.

Bro. Cooper then gave a song.

The next toast on the list was to the "Faculty of Applied Science," coupled with the names of the Professors of McGill University.

This was drunk with enthusiasm, but unfortunately the McGill guests were not able to be present

Bro Wheeler gave a song

"License Law and Inspection" was next toasted.

S. Fisher, in replying, said that if we appointed governments for the greatest good of the greatest number, they certainly ought

to see that they appointed men who were pledged to bring a license law before Parliament. People had no right to kill their neighbors with impunity, but unfortunately, the law was very lenient in this matter. If a man wanted to rid himself of an enemy, and used a revolver or poison for that purpose, the government would punish. But all a person had to do was to invite his enemy to see his boilers, taking care to get the pressure up, and then blow him into eternity. The verdict would be "accidental death."

Bro G Hunt gave a song.

Secretary York read some letters from those who had been invited to the dinner but who could not attend

A toast to the "Brotherhood of Locomotive Engineers" was coupled with the name of Thomas Clark

Mr. Clark strongly recommended legislation, which was to be obtained by everybody putting his shoulder to the wheel. The idea nowadays was to do away with strikes by means of legislation. He then gave some particulars of the Lehigh Valley strike from the men's point of view. Money, he said, had not entered into the question, the quarrel was owing to the officers of the company not having kept to their agreement with the men.

The next toast was the "National Association of Stationary Engineers" and the "Canadian Association of Stationary Engineers"

Bro G. Hunt said that the watchword of the Canadian Stationary Engineers was "Forward, Engineers." He hoped the time would never come when the S. E. should be obliged, in self-defence, to resort to strikes.

Bro. J. J. York, the energetic executive secretary of the association, said that when he had been honored with the position, he felt that his daily duties hardly left him time for the onerous work of such an office, though it would always be his endeavor to do his utmost for that fine body. He wanted employers to understand that their association endeavored to educate the engineers of Canada.

Mr. Cowper advised the younger members, even if they were going to leave employers next week, to keep the machinery in the best possible order for the next man to begin on.

Bro. York thoroughly agreed with the preceding speaker. Whatever wages one had, he said, one ought to work as though the wages were three times as high.

Bro. Badger then spoke a few words on behalf of the Dinner Committee.

J. G. Robertson, the chairman, invited all friends, whether members or not, to their public meetings

The last toast on the programme was "The Press," coupled with the name of THE CANADIAN ENGINEER. F. Page Wilson briefly replied, commenting on the wide publicity which the Press could give to the vast amount of information to be found in the proceedings of such a body as the C. A. S. E., causing the instruction which could only be heard by a few score of people to become the public property of thousands.

And then, with "Auld Lang Syne," a thoroughly enjoyable evening, full both of mirth and of more serious matters, came to an end

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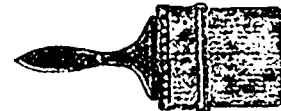
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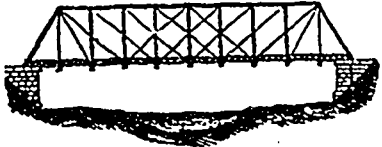


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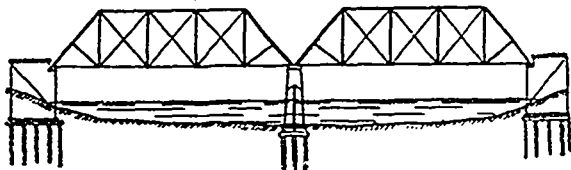
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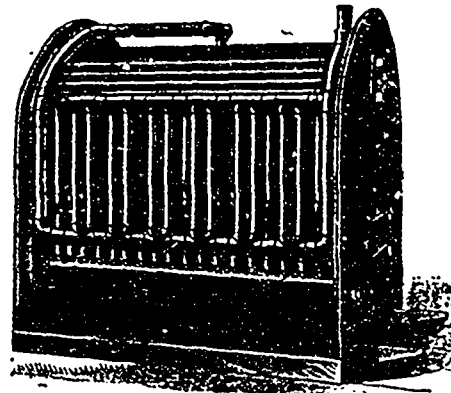
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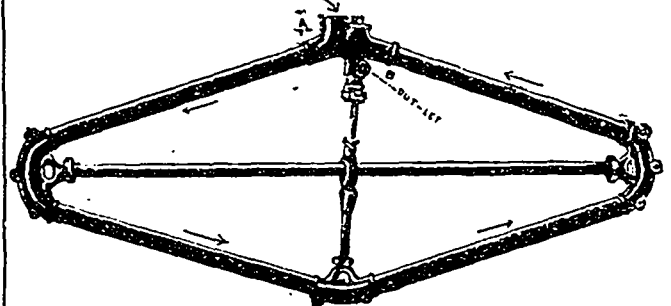
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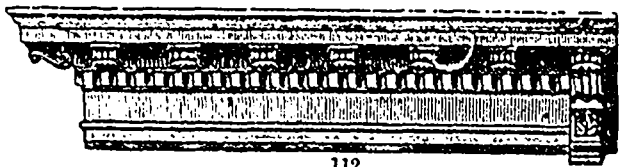
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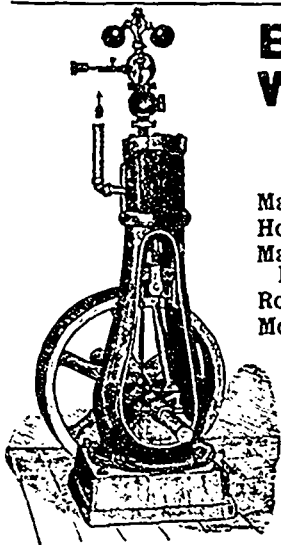
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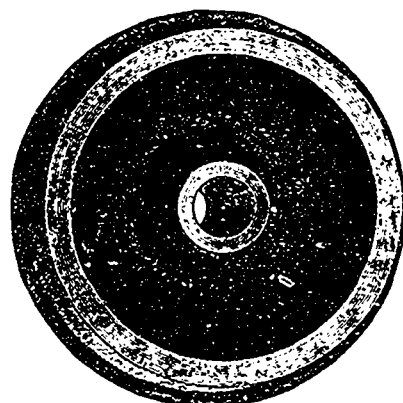
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Industrial Notes.

THE new pumping station of the Peterboro' Water Co. is complete.

PEOPLE at Guelph, Ont., are thinking of erecting a grain elevator.

THE new bridge at the narrows, near Campbellford, Ont., is nearly complete.

PLANS are being prepared for a new \$30,000 church in Cote St. Antoine, Montreal.

N. K. & M. CONNOLLY have registered a new partnership at Quebec as contractors.

AN engine and three boilers are being constructed for use in the Sumas dyking scheme.

MONTREAL Fire Department will ask for a sum sufficient to purchase 10,000 feet more hose.

THE *Telegraph* reports that the St. John Nut Works are rapidly increasing their business.

THE Williamson Plow Co., of Toronto, has assigned liabilities, \$18,000; assets rather less.

THE St. Boniface, Man., by-law for \$75,000 for a bridge over the Red River, has been defeated.

THE Vulcan Iron Works, Winnipeg, will close down for a good while, owing to the scarcity of work.

PLANS for the new Maternity Hospital at Ottawa have been prepared. The cost is to be \$9,000.

St. HENRI, Montreal, will repair and widen its principal streets next spring, besides opening several new ones.

MONCTON, N. B., Presbyterian Church has been destroyed by fire. Loss, over \$30,000; insured for \$15,000.

CHAGNON & Co., manufacturers of doors and sashes, Cote St. Louis, Montreal, have assigned. Liabilities, \$8,000.

SOREL, QUE., is discussing the granting of a bonus of \$50,000 for an iron bridge and viaduct across the Richelieu.

ARRANGEMENTS are being made for the rebuilding of Woodstock, Ont., Opera House, which was burned down.

THE Robb Engineering Co. are making a good deal of pulp-making machinery for the factories near Halifax, N.S.

THE Hault Upholstered Goods Manufacturing Co., Ingersoll, Ont., has assigned in trust to W. A. Campbell, Toronto.

THE G. W. Cornwall & Co. Organ Co., of Huntingdon, Que., has failed. Liabilities over \$4,500; assets about the same.

OFFICERS of the Montreal Rolling Mills Co. have been elected as follows: President, Andrew Allan, vice-president, Hugh McLennan.

CHIEF BENDIT, of the Montreal fire service, recommends that a by-law be passed forbidding the use of sawdust as "deafening" in buildings.

THE new offices of the Standard Drain Pipe Company, St. Johns, Que., are: President, W. C. Trotter; vice-president, Capt. C. J. Coursol.

R. C. PERCIVAL, of Merrickville, Ont., Foundry, has entered into a partnership with his son T. H. Percival, and the works have re-started operations.

A COMPANY is being formed under the initiative of R. Rinfret, Montreal, for the purpose of supplying Campbellton, N. B., with water for fire purposes.

COLCHESTER SOUTH council is figuring on a steel bridge with stone abutments over Cedar Creek. The bridge is to be over 100 feet long.—*Amherstburg Echo*.

A DEMAND of assignment upon the Montreal firm of E. Chanteloup, founders, was made, but they contested the demand, claiming that their assets were more than \$150,000 in excess of liabilities.

THE scheme for the new waterworks at Windsor, Ont., will probably have to be abandoned, an injunction having been obtained restraining the commissioners from overstepping the limits of the city's borrowing powers, which would be necessary under the plans proposed.

PLANS have been prepared for the new Laval University, Montreal, which is to cost over \$150,000. The architects are Perrault, Mesnard & Venne. The contract for steel and iron work has been awarded to Loignon & Frere; and that for heating apparatus, to Lessard & Harris.

A. BELANGER, carriage maker, Rigaud, Que., has assigned, with liabilities of about \$7,000.

RICHMOND, N. S., can now boast of a local lodge of the International Association of Machinists.

THE Dominion Oil Cloth Co., Montreal, have put in a new boiler, made by Mr. Kingsley, St. John, N. B.

P. W. ST. GEORGE, Montreal city surveyor, has been awarded \$5,857 royalty for the use of his patent gullies.

THE Ontario Pressed Brick and Terra Cotta Works, Campbellville, are proposing to move to Toronto Junction.

CHARLES FAWCETT has decided to rebuild his factory at Sackville, N. B., which was burned down a few weeks ago.

MCNEIL's agricultural implement factory and foundry at New Glasgow, N. S., have been burned down. Loss, \$6,000, not insured.

MCQUILLAN & Co. are constructing waterworks at Beeton. The plans of these works were prepared by John Galt, C. E., Toronto.

MR. LYONS, Ottawa, has the contract for the new St. Columban's Church at Cornwall. The contract price is \$44,000.—*Standard*.

JAS. BRYANT's saw-mill near Lutterworth, Ont., has been completely destroyed by fire, which is attributed to incendiarism. No insurance.

A COMPANY is being organized at Toronto, under the name of the Teller Envelope Co., for the manufacture of paper boxes, envelopes, etc.

IT is stated that mineral water bottling works are likely to be established at Apohaqui, N. B. There is a spring on the I. C. R. near the village.

A BOILER exploded at Legendre's furniture shops at St. Jerome, Que., causing a fire by which the premises were destroyed. Insurance only \$600.

IT is likely that a new glass factory will shortly be established in Montreal for the manufacture of what is called Pennycuik prismatic glass. This glass is said to diffuse and increase light to a remarkable degree.

THE works of the Halifax, N. S., Shovel Company have been destroyed by fire. Loss, \$25,000, insured. They will be rebuilt on a larger scale.

IT is not unlikely that a branch factory will be established at West Toronto Junction of the McCallum Steel Wagon Works, referred to elsewhere.

HARPER & WEBSTER's shoe factory at Shediac, N. B., has been totally destroyed by fire. Origin of fire unknown. Loss, \$20,000, insured for \$16,000.

QUEBEC Academy of Music will be changed into horseshoe shape and new galleries will be erected. The cost of the contemplated change will be about \$30,000.

THE probable architect of the C. P. R. new east-end depot, Montreal, will be Felix Labelle, who had charge of the construction of the large new hotel in Quebec.

THE excavations for a new cold storage building in London, Ont., have been completed. It will be two storeys high, will measure 114 by 38, and is to cost \$7,000.

CORNWALL, Ont., council are in correspondence with the Cone Coupler Carriage Co., of Kalamazoo, Mich., with reference to the establishment of a branch factory there.

THE pulp mill buildings at Milton, N. S., are about completed. The grinder room measures 30 x 52 ft.; the wood room, 30 x 40; machine room 40 x 70, and boiler house 16 x 30.

St. ANTOINE MARKET, Montreal, was last month almost completely consumed by fire, which started in the weigh-house. Loss, \$20,000, partly insured. It will be re-built, and, meanwhile, a temporary shelter is being erected.

A DEPUTATION representing the Hamilton Smelting Works recently waited upon the government at Ottawa with the object of inducing them to abolish the duty on coke, and also to admit the machinery for their works free of duty.

THE Presbyterian Church at Moncton, N. B., was burned on the 21st ult., the supposed cause being a disconnected pipe in the furnace. The church cost \$23,000 and was insured for \$17,000. It will be rebuilt during the coming summer.

OWING to the extremely high state of the water in the river at Montreal recently, the mills of Peck, Benny & Co., and of Pellow-Hersey Manufacturing Co., have had to close down for a while, throwing large numbers out of employment.

THE summer hotel to be erected in Brockville, Ont., is to cost \$125,000.

THE finishing shop at Fawcett's foundry, Sackville, N.B., will shortly be enlarged.

A NEW Wesley Methodist College is to be erected at Winnipeg, at a cost of \$80,000.

THE Reinhardt Brewing Co., Toronto, are extending their brewery at a cost of \$25,000.

MAGOG, Que., town council has just purchased a chemical engine from W. C. Waterhouse, Sherbrooke.

THE sum of \$15,000 will be spent at Rockwood Asylum, Kingston, in introducing a sewage disposal system.

JOHN BOSTON, of Halifax, N.S., has the contract for supplying steam-heating to public buildings in Dartmouth.

OWING to recent floods, two or three bridges near Brantford, Ont., have been badly damaged or washed away.

OTTAWA council will shortly ask for tenders for the building of a bridge from St. Patrick street to Porter's Island.

FIRE at J. W. Patterson & Co.'s roofing material establishment in Montreal did \$2,000 worth of damage the other day.

O'NEIL & SIMPSON, of Lindsay, Ont., are starting a well-equipped saw mill at Biscotasing. It is to be the largest in the district.

A FIRE broke out last month in the Spring and Axle Co. Works at Gananoque, Ont., doing damage to the extent of about \$2,000; insured.

THE Davidson Mill, at Jarvis, is being supplied with a 50 horse-power, internally fired boiler, made by the London firm of Geo. White & Sons.

LONDON, ONT., Furniture Manufacturing Co., which had been closed for a long time, have now started again on short time and reduced wages.

THE contract for supplying steam heating at Chatham, N.B., has been awarded by the Public Works Department to Thos. Campbell.—St. John Sun.

THE new saw-mill at Glenboro', Man., is now nearly complete. A hundred horse-power engine is now being put in and a dynamo will be added shortly.

THE new Worthington pumping engine which has just been fitted up at Montreal, is guaranteed to supply ten million gallons a day. It cost \$55,000.

THE pulp mill at Sheet Harbor, N.S., idle for the past three years, was recently advertised for sale by auction, but so far as we have heard no sale was effected.

A CITY IMPROVEMENT ASSOCIATION has been formed at Charlottetown, P. E. I., to agitate for a new sewerage system, which it is felt to be seriously needed there.

ANY corporation wanting an efficient fire engine on very reasonable terms will consult their interests by writing the Burrell-Johnson Iron Co. Ltd., Yarmouth, N.S.

THE Canadian Office and School Furniture Company at Preston are so pushed with orders at present that they are running their works until nine o'clock each evening.

A PARTY proposes to establish a pulp mill at Mispec, and put in \$80,000 worth of machinery, if citizens will subscribe \$12,000 towards the cost.—St. John, N.B., *Telegraph*.

THE engine in the Mooney Roller Mills at Alexandria, Ont., was wrecked the other day, owing to the breaking of the strap connecting the piston rod with the cross-head.

BARNES & Co., of Rouse's Point, N.Y., and formerly of Ottawa, propose, if the American tariff on lumber is cancelled, to re-start their box shock works at the latter city.

MOORE, HALL & FISHER, Victoria, B.C., have turned their business into a company entitled the Victoria Chemical Co., capital, \$100,000. Their premises will be extended.

PLANS have been drawn up for a handsome building to be used as a McGill auxiliary college for women. This will make still one more gift to Montreal from Sir Donald Smith.

PLANS have been prepared for an immense new building in Ottawa to cost \$150,000. It will be five stories high, the second to be used as an opera house, with a seating capacity of 1,900.

La Minerve says that the new zinc factory being built to replace the one recently burnt down at Three Rivers, Que., is nearly finished. The company have elected R. W. Williams, president; N. L. Denoncourt, vice-president; A. L. Potier, secretary and manager, and U. Carignan, treasurer.

THE bridge over the stream near Smithtown, N.B., was burnt over a year ago, and the people of Hampton are indignant because no attention has been paid to their petitions to have it rebuilt.

STANLEY & DIGHT's storehouse at Lucan, Ont., has been burned, together with 17,000 bushels of wheat. Loss \$10,000, partially insured. The cause of fire is believed to have been incendiary.

OWING to the demoralized state of the oil trade of late, the Consumers' Oil Co., of Petrolia, Ont., have decided to go into liquidation. The nominal assets are considerably in excess of the liabilities.

JOHN GILLIES & Co. are building a Marsh power pump for the Arnprior Electric Light Works. This firm are sole makers of the Marsh pump, and make all sizes from half a horse power to the largest required.

C. C. APPLEBEE has begun an action against his former employers, M. Brennen & Sons' Manufacturing Company, Hamilton, for \$200 damages for injuries to one of his hands caused while working at a machine.

H. J. DONAHUE, representing the McCallum Steel Wheel and Wagon Works, now proposes to build wagon works both in Toronto and Hamilton; steel smelting works in the former city and nickel smelting works in the latter.

BOUTILLIER, DION & Co., Roxton Falls, Que., will probably erect a factory for the manufacture of window blinds, barrel staves and lumber, at a cost of \$13,000. They ask the corporation for a loan of \$8,000 for twenty-five years.

THE Montreal Park and Island Railway Company are operating nine miles of line between Montreal and Sault au Recollet. Three double truck cars are used, equipped with the Westinghouse system by Ahearn & Soper, of Ottawa.

FIRE last month destroyed the engine-house of the Empire Oil Works, London, Ont., containing eight pumps worth \$1,000 each, besides the engine, boiler, etc.

THE Jenckes Machine Co., of Sherbrooke, are putting in a battery of five 100 horse-power boilers for the Rand Drill Co.'s Oil Works, at Sherkston, Ont. The boilers will be delivered this month.

THE Stove Plate Manufacturing Company, of Markdale, have started in their new factory at Weston. Moffatt & Son, the proprietors, will employ some twenty-five moulders, or seventy-five men in all.

THE Chatham, N. B. Gas Light Co. have just gone out of business, as they have only barely paid expenses for some time past. They will apply to the legislature for power to sell their property, the proceeds to be divided amongst shareholders.

THE Robb-Armstrong Engine Co., Amherst, N.S., have put in a 15 horse-power engine at St. Joseph's College, Memramcook, N.B. The engine is at present used to run the new laundry, and is also to run the dynamo for the electric light which will be put in this year.

THE Port Hope Binder Twine Factory, owned by the Consumers' Cordage Co., has closed down, throwing 90 hands out of work. The company says this is done in consequence of the Dominion Government going into cordage manufacture at the Kingston Penitentiary.

TORONTO City Engineer Keating estimates the cost of proposed improvements in the waterworks system, including his tunnel scheme, at \$710,000. The whole cost of works in other departments he estimates at \$408,300, an increase upon the appropriation for last year of about \$7,000.

A KAINDLER, of 14 Rue de Conde, Paris, has a project before the people of St. John, for building a pulp mill at Mispec near that city. The following are the main points of the scheme: horse-power available 700, daily production of mill $7\frac{3}{4}$ tons of pulp; capital, \$60,000 in shares of \$1,000 each.

S. M. BROOKFIELD, manager of the Halifax Shovel Co., says the new works which are to replace those burnt down last month, will be larger than the old one. The machinery will cost about \$20,000, and will include a steel skate department. It is expected the factory will be working in the spring.

THE reservoir of the new waterworks at Canning, N.S., recently completed, has a capacity of 1,600,000 gallons, and is supplied by gravitation. An 8-inch main carries the water to the town two miles, where there are 14,000 feet of sub-mains and 29 hydrants. The normal pressure is 78 lbs. to the square inch. The works were laid out under W. R. Butler, Professor of Engineering at King's College. The officers of the company are: S. Sheffield, president; J. W. Borden, secretary, and R. W. Kinsman, managing director.

WM SCLATER & Co., agents of the Magnesia Removable Coverings for steam pipes, have recently fitted up the pipes in the new Chateau Frontenac, Quebec, the Royal Victoria Hospital, the Toronto Incandescent Light Co.'s Trolley Station and the St Jean Baptiste Electric Light Co.'s Light Station, Montreal.

F. X. DROLET has nearly completed a three-story addition to his machine shop in St. Roch's, Quebec. The addition will be 70 x 32, the lower story to contain the engine and boiler rooms and forge, and the upper flats to be used for pattern and store rooms. Mr. Drolet's shops are employed to their fullest capacity.

THE loss on Charles Fawcett's foundry, burnt last month at Sackville, N. B., proved not to be so great as at first reported, being about \$15,000 to \$20,000, only partly covered by insurance. Mr. Fawcett is not disheartened by his loss, but has already begun to rebuild on a scale probably larger than before. He expects to be running next summer.

J. E. BELCHER, Peterboro town engineer, has completed his plans for a new timber bridge over the Otonabee, near Auburn, Ont. He proposes three 66-foot spans, two piers and two abutments, but thinks it may be advisable to dispense with one of the piers, which could be done by employing a steel superstructure in two spans of 100 feet each and one central pier, with abutments.

THE Keewatin Power Co., who have in hand the scheme for utilizing the power from the waters issuing from the Lake of the Woods, expect to get 40,000 horse-power, and they think the time is not distant when all this power will be needed by the manufacturers there. The milling industry will be the leading one. Richard Fuller, of Hamilton, is president, and John Mather, of Ottawa, vice-president.

IN last number we had an item regarding J. C. Wilson & Co.'s (Montreal) removal of premises. This firm advise us that it is only their paper box department which they are changing to the premises formerly occupied by the Star Paper Box Co., at 30 St. George street, the paper department remaining on Craig street as at present. Geo. A. Mace, late of the Star Collar and Box Co., will undertake the management of the box department.

CROSSMAN & LAWS, founders and machinists, of Amherst, N.S., have bought a piece of property adjoining their present foundry, and in the spring will start to extend their works. They will build a new moulding shop 55 x 110, a building for iron and coal 26 x 28, and a fitting shop 28 x 75, two stories high, with an engine room at the end of the fitting shop. This firm are at work on a new style of wood furnace which it is expected will show excellent results.

IN the case of the Canada Paper Company against A. A. Little, tried in Montreal, plaintiff claimed \$2,335.19 for machines delivered to defendant. The latter leased the machines to Waters Bros. for \$2,000, which was to be paid to plaintiff, defendant to be responsible for \$2,335.19. The defendant alleged that the lease bore a subsequent date to the written agreement to pay. The court held that this did not change the nature of the demand, and it was granted.

WE have already mentioned the fact of a new file factory having been started in Almonte. The chief promoters of this new industry, which is called the Banner File Works, are D. Shaw and W. A. McLeod. Although only in operation about three months, the new factory has been overrun with orders, several men having to work overtime to cope with the work. The samples turned out by the company were pronounced by the trade to be equal to the best imported goods, and hence the immediate favor with which the products of the new factory have been received.

THE firm of Cassidy, Bonner & Co. are new candidates for favor in the leather belting line in Montreal. Mr. Cassidy was for some years superintendent of the well-known belting works of Robin & Sadler, and has therefore a practical knowledge of his work, while the finances of the new firm will be managed by Mr. Bonner. They will manufacture leather belting of all kinds, and will deal in rubber belting and some lines of mill supplies connected with the trade. Their office is at 767 Craig street, and we have no doubt they will be given a fair field and the generous support usually accorded to young firms.

APPLICATION has been made for incorporation of the "McAfee Foundry and Machine Company (Limited)," St. John, to purchase, sell and manufacture all classes of iron, brass and other metals and their products, including castings for stoves, furnaces, machinery, ships, mills, agricultural implements and other goods: and to purchase, sell and manufacture all kinds of goods in iron or wood, or both. The capital stock is \$20,000. The applicants are: Joseph McAfee, manufacturer; Thomas Reid, accountant; Wentworth

Wilson, fish merchant; J. Frederick Lawton, manufacturer, and William T. Fanjoy, clerk. The first three are provisional directors.

THE new Consumers' Gas Company of Montreal are making progress at their buildings at Cote St. Paul, and as soon as the frost leaves the ground will push the laying of pipes. They have franchises from St. Henri, Ste. Cunegonde, and Cote St. Antoine, while Montreal is negotiating for future supply. The board of directors of the company are: President, John Coates, C.E., of John Coates & Co., Montreal, London and Melbourne, vice-chairman and engineer of the Colonial Gas Association, London; vice-president, Andrew F. Gault, of Gault Bros., Montreal, Charles Magee, president of the Bank of Ottawa, Richard White, member of Montreal Harbor Board, Henry L. Hammack, director of the City of London Commercial Gas Company, and chairman of the Colonial Gas Association, Robert Blackburn, president of the Ottawa Electric Light Company. The company will supply Montreal at 95 cents net per 1,000 ft., whereas the Montreal Gas Company charge \$1.20 net.

Mining Matters.

NATURAL gas in considerable quantities has been discovered at Thamesville, Ont.

THE Lievre Phosphate Mines, near Aylmer, will continue to be operated probably for some months to come.

PARTIES in Kingston, Ont., propose to erect a blast furnace there, provided a bonus of \$25,000 be given them.

THE Hall Mining Company are asking for tenders for a million feet of lumber. They are going to build a concentrator.

A NEW site for a mining town called Mannville has been laid out on the Kootenay river at the mouth of Cherry Creek.

THE "Dardanelles" mine in Slovan district recently shipped about nineteen tons of ore, averaging 310 ounces of silver to the ton.

GALENA has been discovered near Ainsworth, B.C., six feet in thickness and running \$100 to the ton. A concentrator will be erected in the spring.

THE Pictou Gold Mining Development Co.'s Mine at Renfrew, N. S., realized \$3,000 as a result of only one month's work.—*Truro Daily News*.

THE Truro Gold Mining Co.'s mine at Cariboo, including the machinery, will be sold by the sheriff to satisfy a claim of one of its directors for \$1,600.

PREMATURE explosion of a blast at the Copper Cliff mine, Sudbury, recently blew Tuffield Bouchard's eyes out and blackened and shattered his face. Bouchard died, leaving a wife and family.

SOME properties with a good show of gold and asbestos, as well as an excellent show of surface copper indications, says the *St. Johns, Que., News*, have been bonded along the line of the Quebec Central Railway, east of Sherbrooke.

THE Gibbs, Franchot & Maclaren Co. (Ltd.), with a capital stock of \$50,000, and headquarters at Buckingham, Que., are applying for incorporation. They have in view mining and smelting works, besides other industries.

FOR the quarter ending December, 1893, mica was exported from Canada to the United States to the value of \$2,170, being about one-seventh of the amount for the corresponding period in 1892. Ground phosphate also shows a considerable decrease.

A SYNDICATE is being formed, under the leadership of J. A. Kirk, J. F. Richie and F. M. McLeod, of Nelson, B.C., to acquire and develop the Boulder placer claim on Forty-Nine Mile Creek, eight miles west of Nelson. The mine will be stocked for \$100,000.

E. L. GAVIN, superintendent of the company formed for the purpose of working placer ground near Elk City, B.C., says that the floating dredge has been a complete success. The gravel runs about 6 feet deep, and gives an average return of \$4,000 per acre.

IT may be recorded as an interesting fact that within the past three months sixty Canadian families have returned from Michigan to settle down in the region of Radnor Forges, Que., where they have found permanent employment in the iron mines of the Canada Iron and Furnace Co.

A LEGAL fight is on in Welland Co., Ont., concerning the gas wells. The company, who have pipes laid to Buffalo, propose to put in pumps to increase the pressure, but this the other companies object to, as it will soon exhaust the wells.

THE Salisbury mine, Montague district, is being vigorously worked and fine ore is coming to the surface. The mill gives entire satisfaction.—*Halifax Critic*

THE whole face of the main tunnel at the Le Roi, Kaslo-Slocan, is said to be a solid mass of ore, which can be taken out at comparatively little cost. The mine will be worked all winter.

W. R. ROBERTSON, A. F. Griffiths and D. R. Young, of Vancouver, and H. K. Lee and Donald McPhee, of Montreal, have been incorporated under the name of the British Columbia Mining and Manufacturing Co. (Ltd.). Capital stock, \$100,000; place of business, Vancouver.

THE Parrsboro', N. S., *Leader* says the Chignecto coal seam, found near Maccan station, on the Lawson area, lately purchased by J. T. Smith, of Amherst, has been further developed. A slope has been sunk on the outcrop. The seam is five or six feet in thickness. It looks promising.

THE yield at the Thompson-Quirk mine in the Uniacke district has been fairly rich for the past season, says the *Halifax Critic*. The net returns for less than three years work up to the end of 1892 were about \$75,000, and last year is believed to have shown an equally good record.

THE year just entered on gives promise of being a memorable one in the mining of gold and silver in British Columbia, for profitable results will give confidence to capital, and investments in the various branches of the industry will be made on a scale hitherto unknown, but long sought.—*Victoria Colonist*

A GOLD brick of 92 ounces was received last month by Blair & Co., from the Country Harbor Mine in Nova Scotia. It represents some ten days' crushing and is taken from less than 200 tons of quartz. The brick is worth \$1,800, and was forwarded to the Park National Bank, New York.—*St. John Sun*

THE Canada Iron and Furnace Co. have shipped a fine case of their sample ores to the Imperial Institute, London, Eng., and are preparing another for presentation to the new School of Mines at Kingston. These samples include bog and magnetic ores of the St. Maurice district and finished pig and charcoal fuel.

AN agreement has been entered into between the owners of the Beaver gold mine at Sheet Harbor, N. S., and G. H. Metz, representing a New York company, by which the latter buy the mine at \$75,000, conditional on the New York men withdrawing within nine months, if they do not find the mine as represented.

THE only mica mine at present in operation, says an Aylmer paper, is John Stevenson's. This will probably be worked throughout the whole winter. Work will be commenced shortly upon a deposit of amber mica which has just been discovered a little distance from the above mine. The superintendent will be Mr. Marcillet.

THE Moncton *Times* says that the new process for extracting gold by means of electricity, now being tested at Windsor, N. S., by the Dominion Reduction Co., of Boston, is daily proving its value. Some ore was tested which was generally supposed to be valueless, the tailings realizing nearly \$11 per ton of clear gold and about \$34 of sulphates.

APPLICATION has been made to the N. B. legislature by James Hayden, Woodstock, Frederick H. Hale, Grafton, James Carr, Woodstock, J. Fraser Richardson, Lower Brighton, Almon I. Teed, St. Stephen, James W. Boyer, Victoria, W. Henry Phillips, Pembroke, and Randolph K. Britton, Upper Woodstock, for incorporation as the Eureka Mining Company. The object is to purchase the property of the Britton Mining Company. The capital is \$290,000.

REPORTS of operations at the Gold River gold mines near Chester have been so favorable that a company has been formed to increase the output. They have a ten-stamp mill in operation, and a new air compressor is to be put in. The following are the principal shareholders, who met in Halifax on the 21st January: J. T. Burgess, Walter G. Brookfield, A. G. Cunningham, Geo. E. Boak, Geo. S. Campbell, A. N. Whitman, Arthur E. Curren, Geo. Cunningham, Dr. Fitzgerald, Dr. Anderson, J. W. Crichton and R. G. E. Leckie.

WITHIN eighty feet and directly under the well-known one thousand ton "Dykeman pocket," two new discoveries were made the other day at the Tenuycape, N.S., manganese mines. The work that has been done on these deposits shows that it is possible that the "Dykeman pocket" may not be the largest deposit in these workings. It is quite evident that the new Tenuycape Manganese Mining Company have fully as much value in sight now as any of the old companies ever had. The output from this new find alone is equal to one ton of pure ore a day per man.—*Halifax Herald*

CHRISTOPHER HARGREVES, the new mine manager of the Springhill, N.S., coal mines, in succession to the late Alex. McInnis, is another sample of a Canadian who has risen from the ranks. He has been in the employ of the Cumberland Railway and Coal Co. for years and started as an ordinary miner. In course of time he became an "overman" in one of the pits, and afterwards was promoted to the position of underground manager, and now he holds a position next in importance to the managing director.

Railway and Marine News.

A RAILROAD is proposed to connect Gleichen with Victoria, Alta.

A NEW boiler is being made at the Phoenix Foundry, St. John, for the steamer "Arbutus."

THE survey for the proposed railway between Yarmouth, N.S., and Lockport has commenced.

A NEW railway is proposed from Renfrew to Pembroke, via Beachburg and Forester's Falls.

G. H. CROSBY has been elected president and general manager of the Wiscasset and Quebec Railway.

PARLIAMENT will be asked to increase the subsidy for a fast Atlantic mail service to \$750,000 a year.

WINNIPEG will probably grant a bonus of \$100,000 for the purpose of deepening the St. Andrew's rapids.

EFFORTS are being made to induce the Government to grant a subsidy for a railway from Canso to Louisburg via St. Peter's.

DAVID RICE, who lost both legs in an accident recently on the Ottawa & Gatineau Valley Railway, has been awarded \$3,500 damages.

A NEW tug, the "Reginald," was recently launched at Kingston, Ont. She is 108 feet long, of 1,800 horse-power, and will be used for wrecking and towing.

H. T. McEWAN, of Charlottetown, P.E.I., has the contract from the Public Works Department for the construction of the beach protection works at St. Peter's Bay.

THE following are the new officers of the Carillon and Grenville Railway Co.—President, G. W. Simpson, vice-president, H. W. Shepherd; secretary, R. W. Shepherd, jr.

W. B. DAWSON, C.E., son of Sir J. W. Dawson, has been appointed by the Dominion Government officer in charge of tidal observations. His headquarters will be at Ottawa.

THE Lindsay, Bobcaygeon & Pontypool Railway Company are applying for power to incorporate the company and to extend the time for commencing and completing the work of building.

THE Furness Line have added a new steamer, the "Halifax City," on their Halifax-London route. She is a fine ship, fitted with triple expansion engines and lit with electricity throughout.

HENRY SMITH, contractor, of Ottawa, has begun work on the Government contract of building a new breakwater at Point du Chene. The job will cost \$36,000, and is likely to last six or eight months.

THE Bridge and Railway Extension Company have elected Judge Barker, president; John H. Parke, vice-president; Thos. R. Jones, superintendent; and T. B. Robinson, secretary and treasurer.—*St. John, N.B., Sun*.

WORK will be commenced on the construction of the line between St. Hyacinthe and Sorel, Que., next spring. A branch of this line (the United Counties) will also be run south from Iberville to connect with the Boston and Maine.

THE annual meeting of the Montreal Transportation Company was held last week, when the following board of directors was appointed: Hugh McLennan, president; Andrew Allan, W. W. Ogilvie, G. M. Kinghorn, T. A. Crane, and D. G. Thomson.

JAMES D. LEARY, of raft and dock fame, has been awarded the contract for building the new speedway in New York. The contract price is nearly a million dollars, and, with the modifications of the plans, it is expected it may eventually reach three million. This is good for a Canadian.

THE proposed new C.P.R. line through British Columbia via Crow's Nest Pass, will leave the main line at Dunmore, follow the Galt line to Lethbridge, cross the country from Lethbridge to MacLeod, where there will need to be built a link twenty miles long; thence to Crow's Nest Pass and Nelson.

A COMPANY is in course of formation with the object of building a line from Wolseley, situate on the C.P.R., to Fort Qu'Appelle. The distance is forty miles.

THE Lake Megantic Railway Co. are applying for incorporation. They will rebuild a railway from Lake Megantic, Que., to the international boundary.

THE contract for the iron work in the Brock street tunnel, Montreal, has been awarded to the Dominion Bridge Company, the price being a trifle over \$4,000.

STOCK in the new incline railway in Hamilton is being subscribed for rapidly, and the company expects to begin operations early in the spring.—*Evening Times*.

JOHN McFEE, who took the contract last fall to build the extension to the low water wharf at White's Cove, N.B., expects to have it finished by the latter part of June.

A RAILROAD is proposed to be constructed from Nepigon, Ont., to James Bay. The Duluth, Nepigon and James Bay Railway Co. are applying for a charter for this purpose.

THE Nine-Mile-Point fog bell, on the west extremity of Simcoe Island, at the east end of Lake Ontario, will on the re-opening of navigation, be replaced by a steam fog horn.

THE following have been elected officers for the Montreal, Portland and Boston Railroad: President, G. W. Hendee; vice-president, A. H. Gilmour; and, secretary-treasurer, H. C. Fisk.

THE officers of the Montreal and Occidental Railway are as follows: President, J. A. Chapleau; vice-president, D. Rolland; managing director, H. J. Beemer; and secretary, E. Rodier.

THE St. Lawrence & Adirondack Railway Company will transfer their head office from Salaberry de Valleyfield to Montreal. The line will probably be leased to the Central Vermont Railroad.

IN the case of the Central Trust of New York against the Buctouche & Moncton Railway, which was to be sold under an order of the N. B. Supreme Court, the auction sale of the railway and plant has been postponed till the 6th March next. This is the fourth postponement of the sale, the first sale having been announced for August last.

THE Quebec & Lake St. John Railway Company want the Government to convert their land grant for the La Tuque extension into one of money, half of which they want to apply to the Chicoutimi extension.

VICTORIA, B.C., should be happy! C.P.R. trains will run there direct, and a ferry steamer is being built to ply between the mainland and Sydney at the terminus of the New Island line. Arrangements are also being made for opposition steamers to work in connection with the Great Northern Railway.

THE South Shore Railway Company have elected the following as officers: President, L. Tourville; vice-president, J. R. Wilson; managing director, H. Beauchemin. Preparations are being made for the construction of the line between St. Lambert and Sorel, and the line will eventually be extended to Chaudiere.

A PAISLEY (Scot.) firm have been awarded the contract to build a steel-screw steamer for buoy and lighthouse service, and also to act as a fishery protection cruiser on the east coast of Canada. The dimensions of the vessel will be 180 ft. long, 31 ft. broad, 16 ft. deep (in hold). The price is about \$85,000.

THE Nova Scotia Legislature some time ago made a claim on the Dominion Government that the latter should recoup a large subsidy which had been paid by the Provincial Government in aid of the Halifax & Cape Breton Railway, which is now operated as a portion of the I.C.R. Mr. Haggart has decided against the claim on the ground that the Nova Scotia Government had voluntarily granted the amount in the interests of the people in the district. The Exchequer Court has granted the right to bring a suit against the Dominion Government.

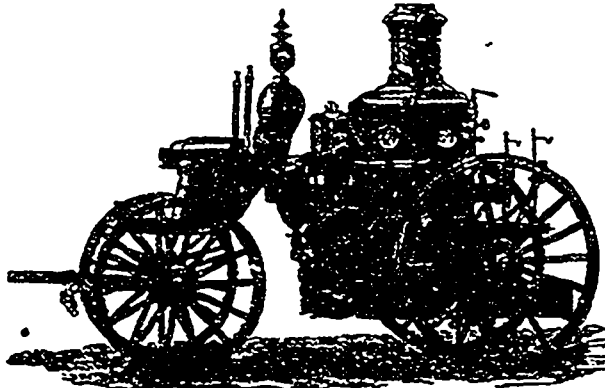
MR. DEATH recently gave an address before the St. John, N.B., Board of Trade, pointing out some of the peculiarities of hemlock wood. This wood is said to be the only kind capable, in the tropics, of withstanding the attacks of ants, rats, etc., and was likely therefore to pay exporters well, especially as the supply was limited and chiefly local.

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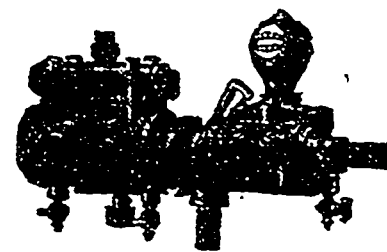


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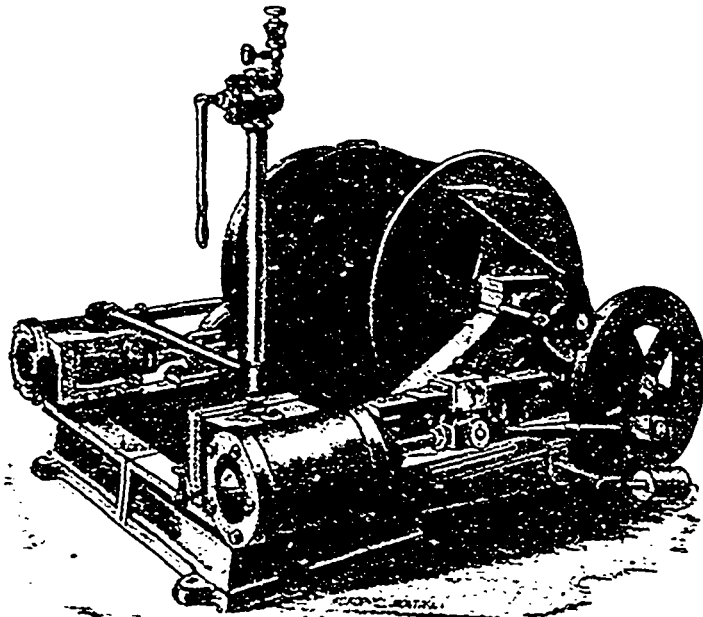


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The Patent Review.

- 44.142 Karl Koen, Elsey, Prussia, Ger., commutator brusher
 44.143 Henry P. Felton, Columbus, Ohio, conduit electric railway
 44.146 Thomas Crancy, Bay City, Mich., electrolytic apparatus.
 44.148 E. H. Jenkins, Daniel, Maryland, electric railway trolley
 44.149 S. L. Wiegand, Philadelphia, Penn., telephonic transmitter
 44.150 Charles E. Lipe, Syracuse, N. Y., electro-magnetic coil
 44.157 Welhs Mitchell, Malden, Mass., electro-magnetically heated receptacle.
 44.158 John W. Gibboney, Swanscott, Mass., system of telephone
 44.162 James F. McElroy, Albany, N. Y., electrical heater
 44.163 G. A. Norcross, San Antonio, Texas, car coupling.
 44.164 T. Gordon Hall, Chicago, Ill., pyro-electric generator, an apparatus whereof such generator is an element, a process carried out by the aid of such apparatus, and a new compound gas made by such process
 44.166 W. McLea Wallack, Montreal, yard shaft and street gully
 44.172 G. A. Boyden, Baltimore, Maryland, valve for automatic air brake.
 44.173 A. Ford, Golden Gate, Cal., gas generator.
 44.174 A. Caldwell, Providence, R. I., mode of attaching tip to flexible tubing for gas.
 44.178 F. L. Decaire, Montreal, P. Q., scavenging incinerator.
 44.183 J. Des Georges, Paris, France, safety appliance for elevator.
 44.184 C. S. Hopkins, Arlington, N. J., boiler.
 44.187 E. P. Westmore, Helena, Montana, electric heater
 44.202 C. E. Harvey, Waterloo, P. Q., fire escape
 44.204 Joseph Wood, Red Bank, N. J., railroad frog
 44.205 Frank Peck, Peterboro', Ont., car coupler
 44.219 John Milton, Washington, D. C., smoke consuming furnace.
 44.221 R. T. Brooke, Paris, Ont., boiler tube cleaner
 44.222 Wm B. Anderson, Elizabethtown, Kentucky, car brake
 44.223 J. W. Dawson, St. Louis, Miss., car seal.
 44.224 J. Musgrave, London, Eng., steam engine.
 44.228 H. Wilbrant, Brussels, Belgium, electric arc lamp.
 44.235 Patnck O'Brien, South Bend, Indiana, apparatus for setting and cooling tires.
 44.237 F. E. Hansman, New York, water gauge
 44.246 Thomas Wood, Montreal, Que., telephone switch operating mechanism.
 44.247 H. M. Fellows, G. Yarmouth, N. Y., apparatus or means for obtaining motive power
 44.248 J. A. Farlinger, Montreal, Que., compressed air motor system
 44.254 J. C. Welter & Co., New York, N. Y., current adapted for electric light circuit.
 44.255 S. J. Morris, St. Paul, Minn., apparatus for relining railway tunnels.
 44.256 L. E. Simoneau, Montreal, Que., automatic telephone system
 44.257 S. P. Graham, Detroit, Mich., lathe
 44.261 Robert Harrison, Erie, Penn., injector
 44.262 Felix Melache, Montreal, Que., combination lock.
 44.257 John Thomas Ellis, Toronto, Ont., smoke consumer.
 44.272 William A. Simpson, Petrolia, Ont., machinery for operating sand pumps when sinking artesian wells
 44.273 John R. Moss, Webster, Penn., elevator.
 44.275 Lu'ien A. Pinkston, Corsicanas, Texas, air brake.
 44.277 Alexander Black, Toledo, Ohio, passenger car cooler and ventilator
 44.278 John L. Halyburton, Philadelphia, Penn., self-adjusting metallic packing for steam engines, pumps, etc
 44.279 Foussant Richeroux, Dusseldorf, Prussia, Germany, method and apparatus for the manufacture of rolled rails, girders, bars, etc.
 44.280 Eugen Post, Ehrenfeld Hohn, Prussia, Germany, grinding and polishing apparatus for wire, rods and tubes of any material and any form and dimensions.
 44.286 Harrison Rich, Muskegon, Mich., railway switch
 44.288 Alexander H. Costigan, Montreal, Que., file.
 44.289 J. James Gordon, St. John, N. B., the process of manufacturing wire spikes, nails, tacks, brads, and rivets.
 44.295 Patrick Brownley, St. John, N. B., injector.
 44.299 James H. Scoggin, Peterburg, Virginia, car coupler.
 44.302 Hubert Claus, Thale am Harz, Ger., enamelling metal wire.
 44.303 E. Emil Clauser, Hartford, Conn., screw machine.
 44.310 Henry Howarth, Detroit, Mich., transom pivot



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- 44.313 Aleck Saunders, Goderich, Ont., hot water generator for stores.
- 44.314 Aleck Saunders, Goderich, Ont., hot water generator for furnaces.
- 44.319 L. D. Chatterton, Pembroke, Ont., roofing cement.
- 44.327 H. McCormack, McGreen, Ill., roof scaffold brackets.
- 44.329 Charles J. McLennan, Toronto, Ont., agitator for mixed paints.
- 44.330 John Bowing, Telbury, Essex, Eng., cooking process
- 44.334 Thomas Parker, Wingham, Ont., pump.
- 44.337 Richard Dowling, Woodstock, Ont., rotary engine
- 44.340 G. A. Watson, Toronto, Ont., apparatus for producing gas
- 44.342 F. D. Curmer, Cleveland, Ohio, process of drying and disintegrating clay, etc
- 44.347 H. S. Robins, Phil., Penn., safety fenders for tram electric and cable cars
- 44.348 Joseph Temperley, Reigate Surrey, Eng., travelling pulley carriage for raising, lowering and traversing loads.
- 44.349 R. C. Gennar, San Antonio, Texas, cleaning tools.
- 44.353 J. Ex. Greenhill, London, Eng., in speed governors for clock-work and holders for cigars.
- 44.355 A. E. Cody, Sweaburg, Ont., wire tightener
- 44.357 G. Spiecker, Bown, Ger., manufacture of blocks or briquettes of fuel from small coal, slack coal dust and coke dust.
- 44.358 W. J. Hall, Varna, Ont., wire tightener.
- 44.361 F. G. Ward, Alleghany, Penn., dry closet system
- 44.363 Henry Manty, Orizata, Vera Cruz, Mexico, edge runners or vertical mill stones
- 44.364 Joseph Schneible, Brooklyn, N. Y., art or process of carbonating liquids.
- 44.369 M. R. Ruble, Newark, N. J., induction apparatus.
- 44.371 Wm. Hardly, Shelton, Conn., wood barking machine.
- 44.372 Thomas Ryland, Brixton, Surrey, England, machine for carving and engraving wood and other materials
- 44.373 A. D. Williamson, Canonbury, Middlesex, England, means for heating metals, rods, bars, or wires; machinery for making nails, screws, key blanks, file blanks, or other articles therefrom.
- 44.377 J. A. Gowans, Toronto, Ont., street rail clearing brushes.
- 44.381 Augustus Wright, Providence, R.I., support for electric lamp.
- 44.382 Henry Froehling, Richmond, Va., apparatus for making Portland cement.
- 44.386 Z. T. French, Boston, Mass., channeling machine
- 44.389 James Jasper, Detroit, Mich., electro-magnetic bell
- 44.393 Patrick O'Brien, Presbytery, Riverhead, St. Johns, Nfld., construction of the hulls of vessels.
- 44.396 Wm. T. Lacon, Toronto, Ont., life saving guard for street cars
- 44.398 N. H. Gilmore, Greenville, Mich., hoisting apparatus.
- 44.401 A. W. Wright, Chicago Ill., electric railway conduit
- 44.402 Edward Ethel Gold, New York, N.Y., steam radiator
- 44.407 George Fee, North Bay, Ont., refrigerator
- 44.408 John McMurchy, Gananoque, Ont., process of rolling blanks for making socket shovels, spades, scoops, etc.
- 44.409 J. F. Gorges, Berlin, Germany, incandescent lamp.
- 44.410 Wm. Faint, Peterboro', Ont., mode of preventing surface ice stopping water wheel shafts.
- 44.411 Wm. E. Dillon, Toronto, Ont., magnetic brake.
- 44.416 F. W. Lee, Northenburland, London, Eng., blocks or briquettes of fuel.
- 44.419 Isaac D. Smead, Toledo, Ohio, furnace.
- 44.420 Dillon Beebe, Newark, N.J., faucet and vent bungs and bushings.
- 44.424 F. J. Freeze, Lowell, Mass., shoe sole channeling machine.
- 44.429 Wm. J. Thomas, Sansalito, Cal., slide valve for steam engines.
- 44.430 Amos H. Perkins, Chicago, Ill., apparatus for repairing asphaltum pavements.
- 44.433 John C. Tiester, Reading, Penn., split pulley.
- 44.435 John P. Buchanan, Boston, Mass., circuit controlling device.
- 44.437 Howard H. Cherry, Syracuse, N.Y., ventilated brushes for dynamos.
- 44.438 Duncan C. Macorquodale, Toronto, Ont., fare and transfer ticket boxes.
- 44.439 B. L. Launme, Pittsburg, Penn., armatures for electric machines.
- 44.441 R. F. Carnes, Wingfield, Alabama, electric shoe sole.
- 44.445 Clinton Higbee, Philadelphia, Penn., bolt and nut; also tool for cutting down screw threads (44.446).
- 44.447 Edward A. Colby, Newark, N.J., system of electrical illumination.
- 44.451 Moses H. Cameron, Lancaster, Eng., machines for cutting or shearing various sections of iron or steel bars, beams or girders.
- 44.455 Emil J. Franch, Philadelphia, Penn., circular knitting machine.
- 44.459 Wm. Christie, Toronto, Ont., biscuit making machine.
- 44.464 J. F. Barker, Grand Rapids, Mich., process of finishing wood veneers.
- 44.466 Albert J. Bennett, Woodsocket, R.I., radiator shelves and devices for attaching the same to radiators.
- 44.467 Winfield Curtis, May, Cal., rail joints
- 44.468 Leon M. Cabana, Buffalo, N.Y., metallic basket
- 44.469 A. E. Kenney, Boston, Mass., mattress frame.
- 44.472 Samuel Hughes, Lindsay, Ont., ventilating railway carriage
- 44.473 Fred A. Gaudet, East Lonmeadow, Mass., car coupling.
- 44.474 Isaac Mills, Hamilton, Ont., fire escape
- 44.475 J. H. Tennyson, New York, N.Y., auxiliary cut-off for engines.
- 44.478 Charles F. Carlson, Honolulu, Hawaii, hub attaching device
- 44.479 T. B. Dousley, Owen Sound, Ont., elliptic carriage spring
- 44.481 Adolf Worner, Budapest, Austria, drive chains, also for tram car (44.482)
- 44.484 Thomas E. Caddy, Nottingham, Eng., furnace regulator.

AMERICAN PATENTS.

The following is a list of patents recently granted in the United States to Canadians. This list is specially furnished to THE CANADIAN ENGINEER by H. B. Willson & Co., Washington.

- John Abell, Toronto, Ont., steam engine, No. 510,561.
- George Coxon, Toronto, Ont., seat spring, No. 510,838.
- David A. Grant, Raleigh, land roller, No. 510,785
- Chas. T. McLennon, Toronto, Ont., agitator for mixed paints. Nos. 510,543, 510,544, 510,545 and 510,546
- H. H. Neilson, assignee, Perth, Ont., sash holder, No. 510,614.
- A. R. Woodyatt, Guelph, Ont., lawn mower, No. 510,753.
- Samuel S. Arnold, Toronto, box for wheel hubs, No. 510,229.
- Albert Bradford, Morden, Man., wind mill, No. 509,866.
- John H. Cairncross, Toronto, advertising device, No. 510,157.
- Samuel G. Curry, Toronto, ventilation of cars, No. 510,001
- Wm. King, Ottawa, diaphragm for boilers, No. 510,347.
- George W. Mallory, Guilds, Ont., gate latch, No. 510,181.
- Chas. Ward, Toronto, reversing gear, No. 510,218

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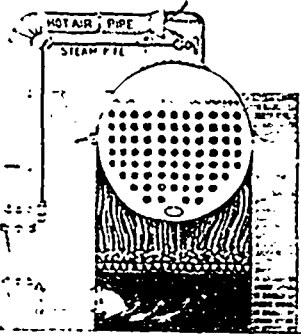
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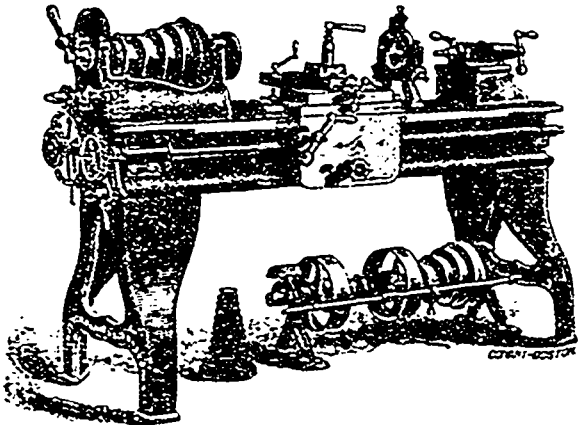
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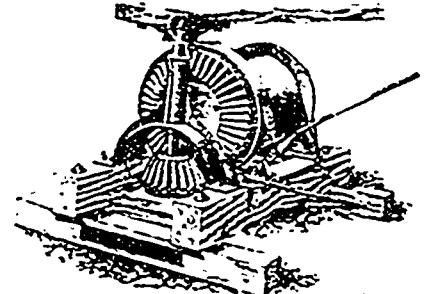
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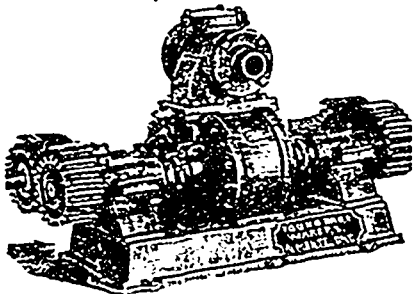


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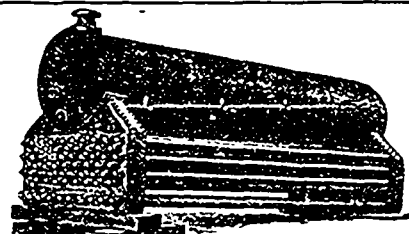
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The Halifax Herald reports the shipments in round numbers for the Cape Breton mines during 1893 as follows:


Sydney mines.....	200,000
Victoria	100,000
Bridgeport International Gardner.....	185,000
Reserve	132,000
Little Glace Bay ..	114,000
Caledonia	152,000
Gowrie.....	120,000

This makes a total of over a million tons. The accident to the Victoria mines last fall in the bursting of boiler, and the burning of the part head of the International, somewhat lessened the output of these mines.

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The object of this Association is to drive out of the market the inferior lines of brass work which have lately been introduced, and to manufacture none but standard goods. Every manufacturer of standing is a member of this Association, and well pleased with the results already achieved. A meeting was held on the 11th and 12th ult., at the Queen's Hotel, Montreal, at which it was unanimously decided, owing to the friendly feeling which existed between the members, and the very-satisfactory way in which they had worked together during the previous year, to extend the present arrangements for another year, or until further notice. No change in prices was made, on account of the low price at which American goods were being imported. The general feeling was that the Canadian Government should withdraw the duty on raw metals, as it was impossible to meet the keen competition now existing. There was some talk of the brass manufacturers forming themselves into a joint stock company, and it is not unlikely that this question will soon be finally settled.

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