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 TORONTO, ONT.

CANADIAN MANUFACTURER
 AND INDUSTRIAL WORLD
 DEVOTED TO THE MANUFACTURING INTEREST OF THE DOMINION

Vol. 26 TORONTO, JANUARY 5, 1894. No. 1.

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 See Advertisement, Page 39

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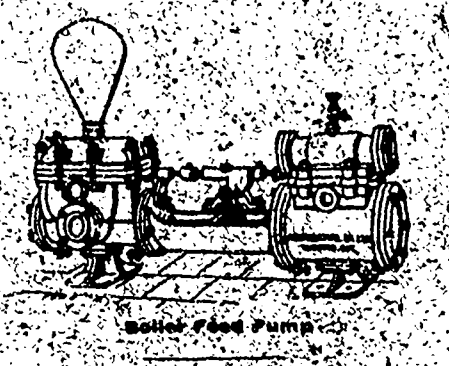
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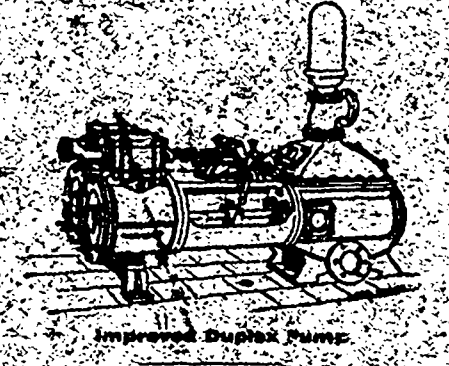
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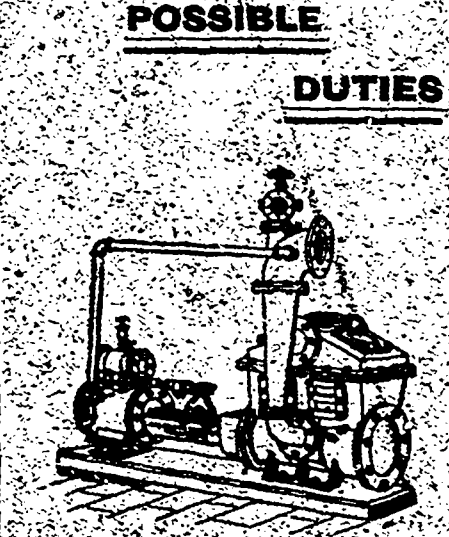
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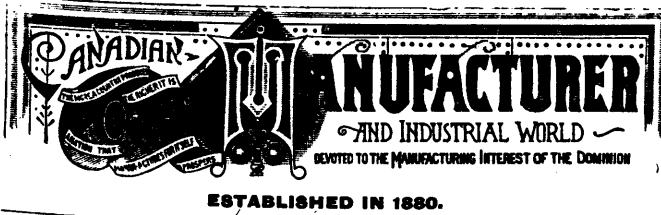
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BARNARDO'S FREE TRADE WAIFS.

This journal has always protested against the organized and persistent efforts of Dr. Barnardo to foist upon Canada the waifs and strays of humanity he makes it his business to rescue from the slums and gutters of London. We do not withhold our applause at the efforts he is constantly making to better the conditions of the unfortunates to whom he devotes the energies of his life, but we do object that Canada should be made a dumping ground for a class of humanity for whom we have no use, and whose presence cannot but be a source of contamination to the rising generation of our country. It is bad enough that Dr. Barnardo should have it in his power thus to afflict Canada largely through the donations of money he receives from British philanthropists whose love of doing good lies very pointedly in the direction of ridding their own country of a charge which would be even greater and more unbearable if British poor houses, prisons and eleemosynary institutions were forced to accommodate the unfortunates that he now so persistently dumps upon Canada. It is infinitely

worse, however, that in the infliction of this plague upon Canada, Dr. Barnardo should have the active co-operation and financial support of our own Government. Whatever else may be said of the system of protection as practised by our Government, by which our home industries are shielded from the unfair competition of the pauper labor of other countries, it is clear that in encouraging the importation of Barnardo waifs and strays great injustice and injury is done to the youths of Canada and to the whole community. Charity, we are told, begins at home; and if the aid and encouragement given to Dr. Barnardo by our Government in his business of exporting the refuse of the slums and purlieus of London to Canada, is done from charitable motives, we would suggest that the same expenditure made for the benefit of Canadian children would benefit Canada to a much greater extent. If, on the other hand, the aid afforded is with the impression or belief that the country would be benefitted by the accession of such an element, that idea should be dissipated at the earliest possible moment; and we gladly join hands with any who agree with us in the matter to abate a nuisance that is rapidly becoming unbearable.

We know that protest after protest has gone up to the Government in this matter; that many newspapers have decried against it; and that labor organizations have time and again demanded that these Barnardo waifs be kept out of this country; the latest remonstrance coming to our attention being the presentment of the grand jury of the Western Judicial District of Manitoba, at Brandon, a few days ago, who had this to say:—

We may be permitted to add that in our opinion some action should be taken by the authorities having in charge the immigration of foreign population to this country towards preventing the further importation of boys from the slums of the large cities of the Old World. We need not state that we refer more particularly to the class of youths which have been brought to the "Barnardo Home" from the Old Country.

This deliverance, we take it, is entitled to great consideration in that it represents the true feelings of that part of the country on that subject. We regret to observe, however, that the Empire shows up on the wrong side of the fence. It tells us, it is true, that some time ago, just after Dr. Barnardo's return home from a visit to Canada, it found occasion to disapprove of a plan suggested by him of Government inspection of the deported waifs upon their arrival at Montreal, as doing so would but aggravate whatever dissatisfaction there might exist towards the whole system. It objects to the presentment of the Brandon grand jury because it did not go at length into the causes which were considered sufficient for making the presentment; that without such information and a discussion of the matter it would be premature alike for Dr. Barnardo and those who do not believe in him to advance radical suggestions one way or the other. In other words the Empire chides the Brandon grand jury because it did not prepare a pamphlet on pauper immigration into Canada, and embody it in their presentment; and because they did not do so it depreciates what they did do and intimates that their presentment was radical and premature. It tells us, too, that it would not redound to the credit of Canadians to deny any honest Barnardo boy the chance of finding a home here—that it behooves us to look to what the civilized world would think of us, if we should, in our anxiety for the welfare of

Canada and the morality of the people, object to having Dr. Barnardo inflict upon us the scum and offscouring of the London slums.

We are told, too, that Mr. Justice Killam, in commenting upon the presentment of the Brandon grand jury, told them that with good care in the selection of the lads and proper regulation of their importation there ought to be but small cause of complaint. Aye, there's the rub. The Empire protested, it tells us, against the Barnardo scheme of Canadian Government inspection at Montreal, and therefore the good care in the selection of the waifs, and the proper regulation of their importation that Judge Killam speaks of, must be left with Dr. Barnardo. It is exceedingly kind of the Empire to espouse the Barnardo cause, and to sneer at the generally entertained opinion that there is such a thing as heredity, and that children born in crime and debauchery and vice will most probably inherit and display such characteristics. A strong sentiment prevails in Canada against the importation of the waifs Dr. Barnardo gathers from the slums of London; but the Empire thinks it knows better what the country needs, and tells us we have room for them. It has a glimmering idea that Dr. Barnardo does not deport his proteges to Canada because the bulk of public opinion says they are wanted here, but because thousands of people are ready to open their arms to them for the sake of the orphan and the waif. In other words the Empire desires it to be proclaimed that the mothers of Canada, who have sons and daughters whose moral welfare is their first concern, are just languishing with open, outstretched arms, to receive into their bosoms, and into the sacred retreat of their homes and firesides, these offsprings of vice and wickedness, not that they will ever become of value to Canada, but because they are what they are. Surely the school boy editor has full swing in the Empire sanctum. Dr. Barnardo is on his defence before the world and the Empire is his champion and special pleader.

In discussing this question, the London Advertiser, claiming that Canadian children should be our first care, says:—

Dr. Barnardo has again rushed into print in the British papers, defending his professional philanthropy in shipping the waifs and strays of the old world slums to Canada. He protests that the boys he sends out are not likely to turn out bad, as other children of the slums have done—in fact, he says he knows that they have not misbehaved to any extent. How can Dr. Barnardo know what comes of his proteges after they leave his hands? He has sworn in a court of justice, in the only case where official investigation was forced, that he gave away the boy to a man unknown to him, whose place of residence in Canada he had been unable to discover, and he had to acknowledge, after a long search, that no trace of the boy could be found. Whether or not these children of the slums make good citizens is always an open question. Their early environments are ever against them. What Canadian taxpayers, many of them with boys who cannot find remunerative employment, object to is the paying of their good money to encourage the importation of this at least doubtful class of newcomers. This is the reason for the protest of the Brandon, Man., grand jury, set forth in a part of the country where one would have thought the boys and girls from the old world slums would have been welcomed, if anywhere. Public money should not be paid to bring in any class of workers to compete with those already here in these dull times. But it may be urged that we have no waifs here, and that it is easy to provide for "the submerged tenth" of old world rich cities. Never was there a greater mistake. In every place of any importance in Canada we have our very poor and neglected

population. We have orphan boys and girls in need of homes, and many who are not orphans unable to get a reasonable start in life. Why, then, should we encourage any class of workers to come to us unless they have sufficient energy and sufficient means to come at their own expense and to go to that part of the country where they can provide homes for themselves?

The British Government have inflicted a heavy blow upon a most important Canadian industry, but in defence, they say, of their own interests, by excluding all Canadian live cattle from their own country on the ground of their being tainted or afflicted with a disease; and the Canadian Government have established a similar quarantine for the same reason against live cattle from the United States. This is in accordance with the law of self preservation; and the general opinion is that these Governments are doing nothing more nor less than what they should do. Is it possible to select heifers from herds of cattle known to be infected with pleuro pneumonia and introduce them into fresh pastures and among healthy cattle, without dire consequences resulting therefrom? Would it be wise to do so? Would not a man be considered a fool if he should do so? Is it not the duty of the Government to prevent such a suicidal act? Undoubtedly. And is it of more importance to prevent contagion among our cattle than among our children? We know for a certainty that for many generations past the progenitors of the waifs Dr. Barnardo is continually foisting upon Canada were, as they are now, the victims of both moral and physical disorders that have tainted and corrupted the blood and the intellect alike. And this is the poison that the Government and the Empire are assisting and encouraging Dr. Barnardo to inject into the veins and arteries of Canada.

WHICH FOR CANADA?

It is well worth the while of the working men of Canada to observe the situation in the United States. We there see an object lesson which teaches us that history repeats itself, and that like causes produce like results. Canadian workmen should judge for themselves, while they remember that work and wages are the capital of the workman.

In 1852 free trade, for the first time in the history of the United States, became a party issue, upon which the Democrats acceded to the control of the Government. From then until 1842, under Democratic free trade, there was but little employment for workmen other than the slaves in the southern states; very low wages prevailed, soup-houses were established at which to feed idle and furnishing workmen and their wives and children, and bankruptcy was general and wide-spread. The people were bankrupt, the States, most of them, were bankrupt, and the National treasury was bankrupt.

In 1842 the Whig party—the party that advocated protection—again came into power. The soup-houses were closed, factories opened, plenty of work at good wages, and prosperity was a guest at the firesides of American workmen.

In the period of 1850 to 1860 the Democratic party and their free trade ideas again ruled the country. During that time the war of the rebellion was incubated, the object being to extend the southern system of slavery into the territories and embryo states. As before there was but little employment for free labor, wages were very low, soup-houses were re-established for the benefit of starving workmen and their

families, the land became filled with demoralized wild-cat money, issued by worthless and irresponsible banks, and again bankruptcy of people, states and nation.

In 1861 the Republican party—the party for protection—obtained control of the Government, which was the signal for great increase in all manufacturing industries. This party continued in power almost uninterruptedly until last year—and during that period American workmen were paid the highest wages ever paid to labor in the history of the world. There was plenty of employment, prosperity and plenty prevailed the land, a uniform value of money was established, eight hours were declared a day's work, and the number of homes owned by American workmen became greater than the number of homes owned by all the workmen of all other countries.

In 1893 the Democratic free trade party, under Mr. Cleveland again came into power, and remembering past experiences, even before the promised free trade could be made a reality, idleness, poverty, soup-houses, low wages, bankruptcy, loss of confidence and paralysis of trade settled down upon the whole land like a black incubus.

In 1841, after nine years of Democratic free trade the United States Government were unable to place a loan of \$10,000,000 in Europe wherewith to meet current expenses; and upon a loan of only \$250,000, taken at home, from eight to thirty-two per cent. interest was paid. In 1860, after 12 years of free trade, as much as twelve per cent. was paid upon part of a loan of \$12,000,000.

When Mr. Cleveland became president ten months ago the wealth of the United States had increased nearly five fold since 1860; during which time most of the cost of putting down the slaveholders' rebellion was paid. The treasury became filled, and the Government could borrow all the money it wanted at two and a half per cent. per annum. When the protectionist Government went out of power last March there were no soup-houses in the land, and every workman who wanted to labor could find work at remunerative wages. Today, after ten months of threatened free trade, two-thirds or more of all the workmen in the United States are in enforced idleness; and the great problem now staring the American people in the face is: How shall the idle poor be housed and clothed and fed this winter?

Which of the conditions do Canadian workmen wish to prevail in this country? Prosperity and protection, or poverty and free trade? Like causes produce like results.

UNFAIR BUSINESS COMPETITION.

Quite a number of American manufacturers are complaining that certain foreign manufacturers, notably in Germany, making cheaper and inferior imitations of their goods, and flooding the American market with them, selling at exceedingly low prices, not only depriving them of the legitimate sale of their goods but imposing upon the public lots of worthless stuff under the names and styles of the superior and well-known American makers. This is a device whereby the goods of the foreign manufacturer are foisted upon unsuspecting purchasers for the goods of the home manufacturer, in fraud upon the public and of those whose goods are thus displaced. The de-

VICES most frequently resorted to in such cases are the simulation of labels, the imitation of styles of putting up goods and the reproduction of form and general appearance of both goods and packages.

The New York Indicator, speaking of this unfair competition in business, says that "within recent years a distinction has been made by the authorities between this class of controversies and technical trade-mark cases. The principles that are common to trade-mark law are thus narrowed, and to the subject of unfair competition in business, are also applicable to competition in other kinds of business besides the sale of articles of merchandise. The correspondencies between the two classes of cases are more numerous than their differences. As in cases of trade-marks, so in cases of unfair competition in business, the object and purpose of the law is, first, to secure to him who has been instrumental in bringing into market a superior article of merchandise the fruit of his industry and skill, and, secondly, to protect the community from imposition. As in one, so in the other, the underlying principle is that one man is not to sell his own goods under pretense that they are the goods of another; and as in one, so in the other, the violator of another's rights pirates upon the good will of that other's friends and customers, or the patrons of his trade and business, by sailing under his flag without his authority or consent. There is this difference however: The law of trade-mark is designed primarily to protect a property right, and, as incidental thereto, gives redress for injuries resulting from invasions of the right, a distinct, technical trade-mark being in itself evidence, when wrongfully used, of an illegal act; while the jurisdiction exercised over cases of unfair competition in business is grounded in the prevention of fraud. Where no trade-mark has been infringed or involved, courts of equity have granted injunctions on more than one occasion against the use upon goods of certain marks, labels, wrappers, show-cards, &c., when the evident design of such use was to deceive the public by concealing the true origin of the goods and making it appear that they were the product of some other manufacturer of established reputation, thereby depriving the latter of a portion of the patronage that would otherwise go to him.

It has been said that the principle in these cases is this: That no man has the right to sell his own goods as the goods of another. But the same principle may be expressed in a different form by saying that no man has a right to dress himself in colors, or adopt the bare symbols to which he has no peculiar or exclusive right, thereby personating another for the purpose of inducing the public to suppose either that he is that other person, or that he is connected with and selling the manufacture of such other person, while he is really selling his own.

If the general effect is such as to deceive an ordinary observer, having no cause to use more than ordinary caution, being acquainted with the first manufacturer's package and label, and never having seen his competitor's package and label, and not expecting to see it, so that he must be, on seeing the latter, misled into thinking it is what he has known as former's, that is sufficient to entitle the former to an injunction. A party is not compelled to file his bill at once, but may lie by until sufficient time shall elapse to enable him to gather the requisite proof."

THE PICTOU CHARCOAL COMPANY.

The Pictou Charcoal Iron Co., whose works are at Bridgeville, N.S., and head offices at New Glasgow, N.S., was organized in 1891 with an authorized capital of \$200,000. When the Summer meeting of the Mining Society of Nova Scotia was held in New Glasgow in June last, an excursion was made to the mines and furnace of this company, and the following is what Mr. B. T. A. Bell had to say regarding the enterprise:

The iron ores on the north side of the East River of Pictou have been opened up in several places between Springville and Sunny Brae, and are at present worked by the company in two places on the Grant farm at Bridgeville, and by the New Glasgow Iron, Coal and Railway Company, both at Bridgeville and Black Rock. They are contact deposits between the carboniferous limestones and the upper Silurian measures, and consist of brown hematites, "residual precipitated found from the disintegration of the older Silurian rocks above," more or less mixed with pyrolusite in form of nodules and masses, mostly in the hanging wall, but also as veins or crystals in the deposits themselves. On the south side of the river there are the Weaver and Watson specular ores, but these have as yet not been worked.

The ore deposits worked by the Pictou Charcoal Iron Company being situated but a few hundred feet from the furnace, on a hillside of an elevation of about 100 feet above the same, the mining and handling of the ore is rendered especially easy. Two tunnels have been driven, one on the east and one on the west side, back of the furnace. The latter, or "A" tunnel, goes through a seam or vein of gravel ore easily mined, and ten to fifteen feet in width. After being driven in about 300 feet, a slope was driven up through the ore, at an incline of forty-five degrees south-west, to the surface sixty feet above, which showed up a large body of ore, in some places eighteen feet wide.

The ore in No. 2 tunnel is of an entirely different character being fibrous and compact, and requiring blasting. It is besides richer in metallic iron, nearly free from manganese. This ore was first worked by an open cut on the top of the hill, as it displayed a remarkable deposit of solid limonite, yielding 58% metallic iron, and three to four thousand tons were removed. About sixty feet below this cut the company has now driven a tunnel about 200 feet in the same kind of ore, besides an air shaft (at an incline with the dip of the ore of about sixty degrees) and three different levels, all in ore from ten to fifteen feet wide.

The following analyses will serve to give an intelligent idea of the above mentioned ores:—

	Gravel Ore from No. 1 Tunnel.		Gravel Ore from No. 2 Tunnel.	
Insoluble matter	12.80	0.75	8.58	5.58
Metallic Iron	57.02	53.41	51.83	50.57
Metallic manganese	1.56	1.88	0.20	0.20
Comb. water	0.45	11.02	10.00	10.00
Sulphur	0.05	0.04	0.41	0.00
Phosphorous	0.12	0.02	0.03	0.21

The variation in manganese and sulphur is, however, even more marked than the above figures indicate, as crystals of pyrolusite and barite are met with here and there among the ore, without any regularity or warning. The intention of the company is to wash and roast the ore before using it in the furnace; but at present it is simply heap-roasted with wood and charcoal braze at the end of the tunnel track. From here it is afterwards carried on the tramway trucks to the chute above the stack house, and being here dumped on iron rails, placed about two inches apart, and broken sufficiently to pass through these, it falls in a wire netting (10 gauge 3 x 3 mesh) down in the stack house, whereby the dry clay to a large extent is screened through the ore.

The limestone used for flux is quarried at Springville, and is hauled three miles to furnace, costing about 85 cents per gross ton delivered. It contains about 94.0 per cent. carbonate

of lime, 2.5 per cent. carbonate of magnesia, 2.0 per cent. insoluble matter.

The buildings consist of offices, stables and store-houses, carpenter and blacksmith shops, a coal shed (with a capacity of 40,000 bushels), casting house, stack house and engine house. The shops and furnace buildings are all covered, roof and sides, with corrugated iron, painted on both sides with mineral paint. The working plant proper consists of the following structures: The furnace stack is 50 feet high with 11 feet bosh and 7 feet diameter under the hill. The conventional iron shell has been dispensed with and substituted by a crinoline strapping and red brick shell. This together with the 15 inch fire brick lining is supported by six cast iron columns, and the bosh is surrounded by a boiler plate mantel, and the hearth by a water cooling cast iron jacket. The tuyers, 6 in number, are of bronze and set in water coil breasts. The down-comer has a diameter of 36 inches, and the bustle pipe 15 inches. The top of the furnace is provided with a Weimer patent friction winch and gas seal for facilitating an even distribution of the stock, and to prevent waste of gas. The hot blast is a modified Cooper-Durham cast-iron stove, with 30 V pipes, built in two sections and provided with two combustion chambers side by side, and so arranged that the cold inlet and the outlet of the heated blast, as well as the two combustion chambers, are placed in the same end of the stove. This arrangement was successfully adopted by the manager some years ago at Kataldin iron works mine. Besides economizing space and gas connections, it facilitates maintaining the blast at a high temperature with a small amount of fuel gas, the 2,000 feet of heating surface sufficing to keep the 3,000 cubic feet of air per minute (engine measure) up to 750 degrees to 800 degrees Fahr. The boilers are four in number (30 feet by 36 inches), made of best $\frac{5}{8}$ Dalzell steel, and built in sets of two with separate draft stacks, and independent steam and water connections, and provided with gas valves and combustion chambers similar to those in the hot blast, besides separate grates for wood or coal, in case of shortage of gas. The blowing engine consists of two horizontal blowing cylinders of 5 feet diameter and 5 feet stroke, and a pair of horizontal steam engines, 18 inches by 36 inches each, capable of performing the work in case of necessity.

The elevator comprises a double Whitney hoisting machine, and two Wood & Co's safety cages. These, as well as the limestone breaker (a Forster "crusher and pulverizer") are run by belt from a horizontal steam engine of about 15 h.p. capacity. For the handling and weighing of the stock and pig iron, Weimer patent steel charging barrows and Richle's furnace charging and pig metal scales are used.

Water supply has been provided for by building a 25 foot dam on the Mill Brook, from which the water is conducted 700 feet through 3 inch wooden pipes to the furnace, besides which a reservoir is built (at an elevation of 75 feet above the foundation level of the furnace) for collecting the spring water from the hills above, as well as the water pumped from the river; in case of lack of water from the above mentioned sources. A Northey duplex steam pump (7½ inches s.c. x 4½ inches w.c. x 10 inches s.t.), is performing this work, and a series of iron pipes are laid to the reservoir, and to different parts of the work, and fitted with valves, hydrants and hose connections in case of fire.

For the carbonization of the wood, 19 brick kilns have been erected at different places. These are of the round (beehive) type, each holding 50 cords of wood, and capable of carbonizing 1,200 cords per annum, which will produce 5,000 bushels of coal. Those built in the woods are of the Plattsburg (conical) type, each holding about 30 cords, with an annual capacity of 700 cords of wood, or 3,000 bushels of coal. The present coaling capacity is, therefore, about 500,000 bushels per annum, requiring about 1,300 cords of wood. Three more kilns will be built in the spring of 1893, making the total capacity about 600,000 bushels of charcoal, which is the estimated requirement for producing 5,000 tons of pig iron a year.

The wood used for charcoal making is principally yellow birch, also beech and maple.

TORONTO AS IT IS.

What may be said of the prosperity of Toronto may with equal accuracy be said of Canada generally; and remembering that a tidal wave of financial distress is now working untold distress in the United States, it gives us much pleasure to reproduce the following editorial from the Toronto Telegram of a few days ago which we believe is accurate and truthful:

Toronto may have within her gates those whose acquaintance with Poverty—that grim ogre of cities—has been long and bitter, but in view of the street scenes last Saturday, of the crowds that surged and jostled along the leading thoroughfares, of the stores crowded to the doors, of the immense volume of trade which the merchants admit having done, of the smiling faces, the good clothes of the thousands of citizens who turned out, the statement that we are suffering from hard times, must be given an unqualified denial.

And first let it be taken into consideration that thousands, absolutely thousands, left the city for homes in the country, the village or the town. Never before in the history of Toronto have larger crowds awaited trains than on Saturday afternoon and night. The waiting-rooms, first class, second class, and the very platform were thronged to their utmost capacity. With the officials the day was one long to be remembered, and there is reason to believe that with all their exertions hundreds were unable to obtain tickets. It takes money, good hard cash, to purchase railway tickets, and when it is remembered that everyone in those dense crowds carried to their destination something in the way of Xmas presents, an idea may be obtained of the amount of cash expended, not for necessities, but for the luxury of going home, and for articles more ornamental than useful.

All Saturday afternoon, from King street to the St. Lawrence Market, there eddied a crowd that at intervals filled the sidewalk from street line to kerbing. A critical observer would have remarked that we have the prettiest and freshest looking girls in America in this city, and the handsomest and best dressed men. It was not a case of meeting some in fine raiment at this street corner, and of seeing tatters and rags at the next, as is usually the case in a metropolis. There were none in rags or anything approaching rags to be seen. Everybody was well dressed and looked comfortable and happy. And there seemed to be no dearth of money, for the stores—every one of them—were doing a tremendous business. When almost every man that one meets wears a fine fur cap and the latest fashion in overcoat and clothing; when women flash by in seals and sealettes, in silks, velvet and jewellery; when in every store is heard the jingle of cash and seen an eager mob of purchasers, it can hardly be said that the city is going to pieces, that the bottom has fallen out of everything, and that we are fast coming into a like condition with the domains of Uncle Sam.

"Great Scott!" exclaimed a gentleman yesterday, who had just returned from Detroit; "You people over here don't know what hard times mean. You ought to be over in the States awhile and then you would have a better idea of the snap you have got." He was standing, or forced to stand for a moment, at the corner of Adelaide and Yonge streets, where the crowd was actually so dense that it was impossible to move. Such a mass of human beings as thronged that thoroughfare Saturday afternoon and night has rarely been seen before by any of our citizens. Every shop, every store, every peanut stall was invaded and every clerk was on the jump to serve customers. Providence only knows how these poor shop hands felt when Saturday night was over. It was an excellent thing for business, but there must have been many an aching head and back when at last the doors were closed. And a very great part of the expenditure is what is known as unproductive. It was not necessary. It could be done without, and this is by no means an attempt to disparage such purchases, but simply to draw from them the conclusion that the citizens are not "hard up" in the proper sense of the

word. Notably were the jewelry shops particularly well patronized, and everybody knows that if anything requires money it is the purchase of the rich ware of the jewelry vendor. Then, too, the bookstores coined money; the tobacco shops sold enough cigars and meerschaum pipes to keep us all smoking for a month at least, if we all get our equitable share, and the fancy goods man is not yet through rubbing his hands with glee as he looks at the money harvest he has reaped. What shall be said of the candy stores—those paradises of children, and the busy trade they drove until the clock struck twelve and after. Candies are very nice, but are luxuries, and not quite so conducive to longevity as roast beef. So that if thousands of good dollars were spent in bon bons, in chocolates, in caramels, in buttercups, and other tasty sweets, it is prima facie evidence that those thousands of dollars were not required to keep soul and body together by those who made the investment.

Of course the fact of two holidays coming together may have caused a larger expenditure than would otherwise have been, but this fact alone could hardly account for such rushing and crowding, such luxurious expenditure, such carrying of parcels, and such hurrying of delivery waggons as there was on Saturday night. And not only was this the state of affairs on Yonge and King streets, but on Queen street west and east and on Spadina avenue from Queen to College, and on every little by-street that contained stores. It is within the mark to say that fifty-thousand well-dressed, contented and happy-looking people walked Toronto's streets on Saturday and made their money fly.

These being the facts how can it be said that we are in need? Where in United States or England can a city be found where poverty is less perceptible. The whole fact of the matter is or seems to be, that while none of us are exceedingly rich, still by far the greater part of the population are in very comfortable circumstances.

They have money some place where they can lay their hands upon it and join in the cry of hard times because every desire cannot be gratified. As a matter of fact it is just about as one of Toronto's social reformers put it in conversation not long since. "The word 'poverty' has no significance in Canada. You don't know what it means. If a man has to do without butter on his bread or meat two or three times a day he sets up a wail of poverty and hard times. Poverty in the older countries means almost starvation. It means plain bread and no butter, meat once a week or every two weeks and in thousands of cases it means sleeping in barrels and under waggons in back lanes. It means rags for clothing, and makes anarchy a possibility."

Pondering on this statement and then remembering the well-dressed extravagant crowds of Saturday who can say "Toronto is in a bad state?"

ONIONS AND TARIFF OPPRESSION.

In a recent issue of The Week it was shown that Mr. R. G. Horr, who, it says, was conducting the war on behalf of protection in the columns of the New York Tribune, quoted from the testimony of two members of the Bermuda House of Assembly, who had given testimony before the Ways and Means Committee of the House of Representatives, to show that under the McKinley tariff the people of Bermuda pay the duties both on the articles sent by them to the United States, and on the articles received by them from that country. The Week tells us this statement is probably the fact, because, as those gentlemen stated, the onion and other products exported by them to the United States come into competition with similar articles produced in that country, while on the other hand the articles imported into Bermuda from the United States do not come into competition with similar articles

produced in the Island. The Bermuda duty is, therefore strictly a duty for revenue only, and is consequently paid by the consumer.

"Is there no such thing as honesty," The Week asks, "between nations when questions of tariff and revenue are concerned? What has become of national pride, to say nothing of nobler impulses, when the great American nation can take advantage of circumstances or its own superior shrewdness to compel a neighbor with whom it has dealings to pay a part of its revenue, in addition to providing for its own? What should we think of such cleverness as between individual neighbours? Surely honesty, the genuine honesty which insists upon giving quid pro quo, must be in the long run the best policy for the nation as for the individual."

Our esteemed contemporary has evidently lost sight of the fact that nations, like individuals, in their business transactions are not usually influenced by sentiment. In the case alluded to we know that the United States is a large producer of onions, and that the farmers there are capable of producing enough to supply the home market. Bermuda, too, is a large producer of onions, and not only supplies its own market, but has onions to sell. Is it any part of the duty of the United States to assist Bermuda in finding a market for its onions? Is it any part of its duty to depreciate the value of the market for American onion growers, to the end that it may help find a market for Bermuda onion growers? Why is there an over production of onions in Bermuda? Why produce what cannot be sold? Is it possible that the chief product of the island of Bermuda is onions, and that the prosperity of the country depends upon selling its surplus of onions in the United States? Does The Week expect the United States to make its laws with an eye single to the interest of Bermuda and its onion growers? Other nations do not pursue that policy, neither do individuals. We were asked "What should we think of such cleverness as between individual neighbors?" Suppose The Week to be a farmer engaged in growing onions, and on the other side of the road was another farmer engaged in growing the same article; would it be considered a stroke of "cleverness" for The Week to refuse to buy onions from his neighbor? What does The Week mean by giving quid pro quo, which must be, in the long run, the best policy? We fail to see wherein a nation or an individual is derelict in duty to a neighbor merely because it or he declines to purchase abroad what is more conveniently produced at home.

EDITORIAL NOTES.

Does the iron schedule of the tariff need revising? We think so. Look at this. The general selling price of first class puddled bar iron in business centres in the United States is 1.70 cents per pound. The average cost of pig iron from which this rolled iron is made is about \$14 per ton. The price paid workmen for puddling the pig is \$4.50 per ton, and the price paid for re-rolling the puddled iron into refined iron is also \$4.50 per ton. This brings the cost up to \$23 per ton. The loss in working two times amounts to about 25 per cent., or \$5.25 per ton, which would make the cost of the finished iron about \$28.75; and this is the iron which is sold on the American market at \$34 per ton, leaving a margin of \$5.25 per ton to the rolling mill proprietor. The general selling

price of an inferior bar iron in business centres in Canada is 1.85 cents per pound, the iron being made from scrap. The average cost of wrought scrap of which this Canadian iron is made is about \$12 per ton. Having been already made from pig, and having been used for all sorts of purposes, it does not require to be puddled, and therefore the Canadian rolling mill proprietor is saved that charge of \$4.50 per ton. But he must pay for re-rolling the scrap into bar iron the same as his American competitor, say \$4.50 per ton, bringing his cost for finished iron up to \$16.50 per ton. Against this should be a further charge for loss in working one time, say 20 per cent - \$3.30—making the cost of his finished iron about \$19.80 per ton, which is sold on the Canadian market at \$37 per ton, leaving a margin of \$17.20 per ton to the Canadian rolling mill proprietor. The difference between the profit on American first quality puddled iron—\$5.25 per ton, and on Canadian inferior quality re-rolled scrap iron—\$17.20—is \$11.95 per ton. The National Policy does not contemplate such an incongruity, neither does the theory of protection. The duty on pig iron is all right, the duty on rolled iron is all right, the duty on scrap iron is all wrong. It should be made prohibitory. Canada should have a scientifically arranged iron tariff.

In another part of this journal will be found an exceedingly interesting and instructive paper entitled "Steam Boiler Tests as a Means of Determining the Calorific Value of Fuels," by D W Robb, C.E., of Amherst, N.S. This paper was printed in the transactions of the Nova Scotia Institute of Science, Session of 1890-1891, and has for some time been out of print. Our readers will therefore appreciate its reproduction in these pages at this time.

THERE are persons in this world who entertain such exalted opinions of their own perfection and immaculateness as to feel offended if any human being should happen to differ with them, and to become exceedingly indignant if a doubt be expressed regarding their perspicacity into any of the transpiring affairs of life. There are journals also that are affected in the same manner, and which, although always ready to express opinions upon subjects, whether they are familiar with them or not, incline to the idea that they are not treated with true journalistic courtesy if a contemporary happens to point out inconsistencies in some of their expressions and positions. Such sensitiveness is not a good qualification for the battle of life which goes on in this rugged Canadian climate.

A RECENT issue of the Empire contained a letter by Mr. W. H. Merritt in which were evidences that the ink with which he wrote was strongly impregnated with caustic, and that sarcasm guided his hand. Mr. Merritt discussed the absence of a comprehensive steel industry in Canada, and the policy of the Government that had so effectually repressed it. His arguments embodied many painful facts, and his suggestions were along lines which if followed out would certainly make Canada a producer of all the steel rails and all the forms of Bessemer and mild steel for which we have necessity. It gives us great joy, too, to learn that the Empire, though not agreeing with all that Mr. Merritt said, admits that there is great force in the argument that Canada should go to work in

earnest to build up an iron industry. It looks upon iron making as one of the greatest achievements which Canada ought to encourage; and that by stimulating the industry the whole nation would profit and prosper. It quotes approvingly what Mr. Blaine said about the growth of the steel rail industry in the United States since 1870, remarking that this is a practical illustration of what an iron industry has done for that country, and concludes by remarking that the question of making steel rails in Canada might now be discussed. We congratulate the Empire upon having arrived at a point where it thinks we can with propriety discuss what is perhaps the most vital industrial question demanding the attention of the people of Canada. The Empire announced this conclusion more than two weeks ago, but it has not as yet gone into the discussion. We would like to know the views of the Empire regarding imposing a duty upon steel rails, and of largely increasing the duty upon scrap iron. We are waiting for the Empire's discussion of the iron and steel question.

THE Canadian Manufacturer has confessed that "a ring of a few sugar refiners seem to have a cinch by which they are raking \$1,000,000 a year out of the pockets of the consumers of the country more than they should be allowed to do. Will the Manufacturer, or any other "protectionist" journal tell us, by what honest process the sugar refiners or any other body of men should be enabled by law to make \$1,000,000, or any other sum, large or small, out of the pockets of the consumers, without returning value, dollar for dollar.—London Advertiser.

Certainly, sonny, certainly; we are always ready to answer civil questions. We have already explained how the sugar ring rake off about a million dollars a year more than they are entitled to, and we have protested against the matter time and again. We denounce it. There is an honest process, however, by which the sugar refiners may make money in their business. All things being equal they ought to refine sugar quite as cheaply as it can be done anywhere else in the world. But all things are not equal, the chief difference being in the cost of labor—perhaps also in fuel. If Great Britain be the cheapest refiner of sugar in the world, then the difference in cost in Canada of labor and fuel over the cost of labor and fuel in Great Britain should approximate the amount of protection that ought to be afforded Canadian industry. This would be an honest process by which the Canadian manufacturer should be protected. See?

A small but most irritating corner of the labor question is undergoing treatment for solution in New York. Thousands of factory girls being out of work owing to the shutting down of the factories in New York State and New England, a league is in formation to provide working girls with situations. Four capitalists have promised prizes to such girls as will be faithful servants for a certain length of time. This is good so far as it goes; but what of the victims of the experiment? All, run, but all do not win a prize. There will be many a bitter experience for the housekeeper in the development of a factory hand into a capable servant. At least a reflex lustre belongs to one who can economize such material successfully. There should be a prize for mistress as well as for maid.—Montreal Star.

A much better way to solve the factory girl question would be to so arrange the tariff so that the factories could be again put in operation, and the girls returned to their old employment.

MANUFACTURERS in the United States are cutting down wages and closing factories for the purpose of inducing their employees to believe they suffer through the proposed reduction in the tariff. That the proposed reduction has not been the cause is shown by the fact that they have not yet reduced the prices of their goods. The factory owners have been so long protected that they can starve their employees into almost any kind of submission. But once the trade barriers are removed, and the fall of prices increases the demand for goods, they will be forced to raise the wages of the men who produce them, or give way to others who will do so.—Toronto Globe.

No doubt our contemporary desires this brilliant idea to be received as logic of the most convincing character. Because manufacturers happen to have some of their products on hand upon which they are not prepared to accept reduced prices, is an evidence of insincerity when asking their employees to accept reduced wages; while the proposed changes in the tariff, if put into effect, would undoubtedly result in the country being flooded with cheap goods, produced by the pauper labor of Europe. And then the wonderful logic of the proposition that because manufacturers have been protected by the tariff they are enabled thereby to starve their employees into any form of submission. The Globe knows that protection begets competition and that competition begets low prices for products, while it ensures the best possible remuneration to labor. But once remove protection and the manufacturer must either go out of business, or reduce the cost of production, which means that the remuneration to labor must be brought to the standard of those countries where labor is poorly paid. The logician of the Globe deserves a leather medal.

It will require an amount equal to the interest on \$20,000,000 to subsidize a line of fast Atlantic steamers to and from a Canadian port. Is Canada in condition to afford such a luxury? We think not. We should hasten very slowly in appropriating \$750,000 per year for that purpose. The expenditure of \$750,000 per year for a few years in enlarging our canals would be of infinitely more benefit to Canada than establishing a line of fast ocean steamers. The expenditure of \$750,000 a year for four or five years would give us blast furnaces and steel plants that would do much towards meeting our requirements for steel and iron. A few times that amount would give us a plant manufacturing steel rails which would make us commercially independent of the rest of the world. The expenditure of twice that amount in bounties extending over a term of years would make Canada a sugar producing country. It is pleasant to contemplate a trip around the world in less than eighty days, under the British flag, via Canada, but we cannot afford just yet to indulge in the realization of a fact that would cost us so heavily and benefit us so infinitesimally. We can do with out it for a while.

A FEW days ago the Empire contained an item to the effect that Mr. J. J. Moorehouse, the projector of the iron blast furnaces about being erected in Hamilton, had expressed surprise that the people of Canada did not seem to realize the fact that the manufactured iron consumed in the country, would, if manufactured here instead of in Great Britain and the United States, give steady employment to nearly a hundred thousand men, earning wages ranging from \$1.50 to \$2.50 per day. This means that if we had an iron industry making our own pig iron, and puddling our own bar iron, the labor employed

in such business would be paid about \$200,000 per day; and this means that if we had such industries about \$60,000,000 per year would be paid for labor in them which is not now paid. But instead of the large disbursement among Canadian workmen, that amount now goes to pay foreign workmen in foreign countries. Whether the Empire's figures are strictly accurate or not, we have not yet observed that that journal has ever advocated any modification or change of the tariff which would give to Canada so comprehensive an iron industry.

A BAY CITY correspondent says that for some years past the Saginaw valley mills have lived upon Canadian pine. Yes, and their appetite has been so voracious that they threaten to eat the supply down to the stumps within a short time.—The Empire.

It would be a terrible condition of things if the voraciousness of Yankee lumbermen should eat the supply of Canadian pine down to the stump, but we have not yet discovered that the Empire advocates a policy that would prevent such a disaster, by imposing an export duty on saw logs. In the bright and happy opening days of the New Year will the Empire kindly say if it advocates an export duty on saw logs. The communication will be treated as strictly confidential.

A CORRESPONDENT in a city daily suggests that the makers of steel rails be bonused by requiring all railways receiving Government aid to buy rails made within the Federal boundary. This is like the boyish trick of stealing the preserves from the jars at the back of the shelf. Money would be given to the railway owners, and part of it taken from them by the compulsion of buying rails where they could not be made profitably. The true situation would then be less obvious than if part of the money were given to the railway owners and part to the owners of rolling mills.—Toronto Globe.

The Globe says that the manufacture of steel rails could not be made profitable in Canada. Suppose we try it. If we impose a sufficient duty upon steel rails, and offer a bonus upon the article produced in Canada, we would soon have the industry; and if we had the industry there is no good reason why it would not prove quite as profitable here as in the United States. It is profitable there so profitable that Canada finds it advantageous to purchase more or less rails from that country frequently.

LAST summer Edward Bok, the editor of the Ladies' Home Journal, of Philadelphia, visited Canada. Previous to this visit Mr. Bok had written much and well of Canadian writers, but his personal visit gave him a new idea of Canada's literary people and their talents. He became interested in Canadian authors and literary matters, and the first indication of this was the announcement that he had secured Lady Aberdeen to write for his magazine. Then it was given out that the first prize in the Journal's musical series offered for the best waltz had been awarded to Mrs. Francis J. Moore of London, Ont. This Mr. Bok has named "The Aberdeen Waltz," in honor of Lady Aberdeen, and will be printed in the February issue. Mr. Henry Sandham, the artist of Canadian tendencies, was next heard of as making a series of covers for the Journal. Then the names of J. Macdonald Oxley and John Lambert Paine became prominent in the magazine's contents. Now Clifford Smith, of Montreal, has had his first American story accepted by this magazine. And so it looks

very much as if this young American editor had his eyes turned squarely on Canadian writers, and intended to come closer to his Canadian readers.

The January number of The Popular Science Monthly opens with an article on "The Ethics of Tribal Society," by Prof. E. P. Evans, which is to be the first of a series on ethics by the same writer. Dr. R. W. Shufeldt contributes an illustrated description of the "Night Hawks and Whippoorwills," which corrects various wrong opinions in regard to them. A fully illustrated article telling "How the Sea is Sounded," is furnished by G. W. Littlehales. Another illustrated paper, and a particularly timely one in this stormy season, is an account of the United States Life-saving Service, by F. G. Carpenter, under the title "Uncle Sam's Life Savers." The pictures show a station house and the surfboats and other apparatus used by the life savers. Equally timely is a vigorous essay on "Recent Railroad Disasters," by Lafayette C. Loomis, recommending some of the safeguards used on ocean steamers. A novel subject is treated by Prof. J. L. Greenleaf, namely, "Window Lights and Their Value." This writer shows that the light that enters a city window comes not only directly from the sky, but in part by reflection from the walls and pavements near by. A red brick wall may so tinge this light that it is unfit to judge certain kinds of merchandise by. Miss Lillie E. Warren writes on methods of teaching deaf children to speak. A very creditable chapter of "Invention and Industry at the South" is presented by Barton H. Wise. There is an account of "Elisee Reclus and His Opinions," by Miss Helen Zimmern, with a portrait of the eminent geographer. Other articles are "Emotions and Infection," "Legal Preventives of Alcoholism," and "The Past and Future of Aluminum." New York: D. Appleton & Co. Fifty cents a number, \$5 a year.

The tenth, the December or Christmas number of "The Canadian Magazine," fully justifies the reputation which this most creditable Canadian monthly has achieved. The articles are timely, bright and most entertaining; the fiction, which, like several of the articles, is well illustrated, is of superior merit, and the poetry likewise equals the best in the magazines. "Le Quete L'Enfant Jesus" is a well-written, characteristic Quebec story. "John Bentley's Mistake" represents happily Ontarioan Christmas life; while the profusely illustrated story, "A Christmas Tragedy," introduces a strange yet pleasing caricature of humbug. "Down the Yukon and Up the Mackenzie," by Wm. Ogilvie, F.R.G.S., is a most entertaining illustrated instalment of the 3,200 miles journey of that celebrated explorer. W. H. Blake's "Humors of Bench and Bar," is full of racy and delicate fun. J. L. Hughes' "An Hour with Oliver Wendell Holmes," is charming. "Salmon Fishing and Canning on the Fraser," by Rev. H. H. Gowen, is a most entertaining illustrated contribution from the Pacific Province. Lieut.-Col. O'Brien writes very suggestively on "Our Militia," and J. S. Ewart, Q.C., vigorously on the Manitoba School Question. J. C. Hopkins' "Lord and Lady Aberdeen," is timely, while the Galle Embs embrace items of decided merit. Altogether the number is a credit to Canada. The Ontario Publishing Co., Ltd. \$2.50 per annum.

Godey's Magazine for January, has a rich and varied table of contents. The complete novel is by Franklyn W. Leo, and is called "Monsieur Paganini." The illustrations are by E. L. Durand, and the story itself is fascinating. L. Clarkson has a Christmas story, "Monsieur Vigot's Diamonds;" Julius Chambers one called "The Princess of Barren Island;" Conyers C. Converse contributes a parlor comedy, "Till Luther Proposes," in which is incorporated a sweet and pathetic bit of music called "A Heart's Song," with words by Albert Hardy, editor of Godey's Magazine, and music by Ch. Crozat Converse. The water color portraits are of Mrs. J. G. Gaylord and Miss Mattie Thompson of Kentucky. All the departments are up to their standard.

Outing for January, the holiday number, is beautifully illustrated and presents a pleasant store of seasonable reading. Its contents are illustrated: "The Hammock's Complaint" (poem), by Ella Wheeler Wilcox; "A Skating Song," by Charles Gordon Rogers; "Evan of the Mask," by Ella Lorraine Dorsey; "A Winter Picnic," by "Van Eps;" "A Xmas Fox-hunt in Old Virginia," by Alex. Hunter; "Sketches from the Nile," "Nomads of the North," by C. J. Cutcliffe Hyne; "Winter Fish-Spearing," by Ed. W. Sandys; "Following Dickens with a Camera," by H. H. Ragan; "A Winter Regatta in Aztec Land," by Arthur Inkeraley; "Crossing the Simplon Pass," by Annetta J. Halliday; "The House on the Lone Tree Meadow," by H. Prescott French; "In the Land of Josephine," by W. L. Beasley; "Lenz's World Tour A-Wheel," "The National Guard of Pennsylvania," by Capt. C. A. Booth, U.S.A., and the usual editorials, poems, records, etc.

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Scrilmers Magazine for January marks the beginning of the fifteenth volume. The first great fiction feature for the year is the serial, "John March, Southerner," by George W. Cable, the author of "Old Creole Days." This the first long novel that Mr. Cable has published in many years. Another feature of this year will be a series of special frontispieces selected by the eminent art critic, Philip Gilbert Hamerton, to represent the tendencies of contemporary art. Each picture will be accompanied with a brief article by Mr. Hamerton and a portrait of the artist whose painting is reproduced. In this number Manet's "Fifer" is the striking picture chosen. A new name in magazine literature, though one of the best known and most popular to the general public, is that of John Drew, who contributes to this number his reminiscences of the every-day life of "The Actor," elaborately illustrated by W. L. Metcalf. The Hon. R. C. Winthrop (who studied law in Daniel Webster's office, and afterward when Speaker of the House of Representatives nearly fifty years ago was associated closely with Webster in his public career), has contributed his reminiscences of "Webster's Reply to Hayne, and his general Methods of Preparation." "Stories in Stone from Notre Dame," by Theodore Andra Cook, is a description of those grotesque figures adorning the pinnacles and niches of the great cathedral, which Victor Hugo has put into fiction as the familiars of Quasimodo. The illustrations are among the most novel and interesting recently seen in this Magazine. There is a brief paper of interest to all students of sacred history in regard to the "Place of the Exodus in the History of Egypt." The author is A. L. Lewis, an authority and investigator.

Frank R. Stockton, in his own delightfully humorous way, continues to make the irrepressible "Pomona" interesting in the second installment of her correspondence with her old "Rudder Grange" mistress. These letters, under the title of "Pomona's Travels," can only be found in the January Ladies' Home Journal. "How I became an Actress" is the theme of a valuable bit of autobiography from the pen of Adelaide Ristori del Grillo. A sketch, with portraits, of Mrs. Donelson Wilcox, who was born in the White House during the administration of Andrew Jackson, and whom he affectionately termed "The Sunshine of the White House," furnishes the biography. The editor discusses the vexed question of the education of our American girls. Miss Julia Magruder's serial, "A Beautiful Alien," which grows in charm and interest as it proceeds, furnishes the fiction. The four prize hymns to which were awarded the prizes in "The Journal's Musical Series" of last year, are given in their entirety. Mrs. Frances Hodgson Burnett and Mr. Birch continue to delight with fact and picture concerning "Little Lord Fauntleroy." Harriet Ogden Morison gives an exquisite piece of "Ecclesiastical Embroidery," and J. Macdonald Oxley writes of "Literary Recreation Clubs." Mothers will be interested in Miss Sewill's "Kindergarten Work at Home," and all housekeepers will be helped by Miss Parlow's "Household Hints." Altogether this New Year Journal, with its exquisitely designed cover, is an ideal number, and worth many times its price. The Ladies' Home Journal is published by The Curtis Publishing Company, of Philadelphia, for ten cents per number and one dollar per year.

The Shipping Manufacturers' List, of which Mr. M. J. Henry, Toronto, is proprietor and publisher, is now out, and is being received with much favor. The book contains 360 pages, and gives in detail a list of all articles manufactured in Canada, and the names and addresses of the manufacturers. It is a valuable reference for buyers of Canadian goods, as well as those having goods to sell to Canadian manufacturers. For the benefit of the latter the publisher has had the names contained in the list compiled in alphabetical order, and printed in pamphlet form, making 40 pages of names and addresses, and which cannot but be of great value to those who may wish to address circulars or catalogues to Canadian manufacturers. The pamphlet is compiled from a personal canvass by Mr. Henry throughout the Dominion, and contains the names of proprietors of all steam plants in Canada.

No journalistic visitor to the sanctum of the CANADIAN MANUFACTURER is more welcome than Onward, of Toronto, which Dr. Withrow, the editor, persists in calling "A paper for Young People." We have taken pains heretofore to advise Dr. Withrow that there is a tinge of selfishness in his doing this when there is not a line or an expression in Onward that is not quite as interesting to older people as to the young ones for whom he so regularly prepares his recherche literary feast. It is possible that some people might imagine, when observing Onward, that it claims to be a paper for young people, and therefore that it is not particularly adapted to the literary tastes of those who cannot be considered children, especially those who may have left behind them many years ago the milestone of life that indicates a half century of existence. We have knowledge that some who are not young do

not thus view Onward; for is it not a fact that frequently when one looks into such a young people's paper something is seen there that reminds of the long ago, and that between the paper and the eye intervene the forms and scenes that went so far to make childhood happy. The forms may have rested beneath green mounds for many years, and the scenes may have existed in far away lands, but they will re-present themselves on occasion with wonderful accurateness, and dissolve the realities of later life into the happier days of childhood, and inspire and strengthen the abiding hope and faith that at some time there will be a reunion of the dear ones where love will never more be pained by separation. We hope that Dr. Withrow will amend the heading of Onward so as to more strongly commend it to those who cannot claim to be young people.

ELECTRIC LIGHTING OF FACTORIES.

The lighting of mills by artificial means is something that has always been a subject of much moment with manufacturers. It was not many years ago when daylight alone could be depended on for perfect work in some branches of textile manufacturing, especially where the work required unremitting attention, as in the weaving of many styles of fabrics, both cotton and wool. The condition of things, in this respect, has greatly and permanently changed for the better in the utilization of electricity in a commercial form. The distribution of light, from whatever source it may come, in a factory is a matter of immense importance in the economy of manufacturing. Perfection of work is independent upon it; in fact, it cannot be attained if the light is imperfect and shadows prevail in any intense form, as is apt to be the case when the greater power of illumination comes from one direction.

Any practical method for the general diffusion of light is a desideratum of the very first importance, second only to the intensity of that light. Shadows that will throw any portion of the work in relief are to be avoided as conducive to defects in work that are unavoidable and costly. It is to avoid these that corrugated glass for windows for the admission of daylight is preferable to plain glass, to say nothing of the further fact that more light is thus obtained. The new method referred to in the article in question is to do away with all the troubles that often attend the employment of the arc light system of lighting factories, that of glare and shadows.

The lighting of factories by electricity is practically the growth of the past ten or twelve years. Very little of it was done before then, gas and oil being the only means of illumination. In 1882, or thereabouts, it seemed to jump in general favor, and its introduction became extensive. The insulation at first was very defective, being the occasion of a number of fires, not of a nature to cause much loss of property, but sufficient to excite the attention of underwriters to its hazardousness. Investigation immediately followed and improvement insisted upon and carried out for a more thorough insulation of the wires. With the system of wiring then inaugurated the fire risk from such a source has been reduced to almost nothing; in fact, it is now considered to be safer than any other form of lighting yet introduced. There is always some danger from so-called wild currents of electricity; or in the diversion of a high tension current of electricity, as was exemplified in a disastrous fire that happened in Boston a few years ago. But the danger of fire is very slight from a well-installed electric lighting system.—The Manufacturers' Gazette.

ELECTRICAL LAUNCHES.

Some timely figures have been given by R. H. Chamberlain on the operation of the fifty-four electric launches on the World's Fair lagoons. Notwithstanding that these crafts were operated under new and trying conditions, they made a most promising record. The total cost per launch per day was \$1.484, and although the actual average cost per launch mile for labor and material, exclusive of office expenses, was 5 1/2 cents, Mr. Chamberlain believes that the expense can, and will be, in the near future, be brought down to as low a figure as 3 cents per launch mile. The total number of trips run at Chicago was 561,207, and the average number of miles run by each launch was 3122. The general average of miles per launch per day was 25.57. On busy days the average run of the launches would reach 37 1/2 miles, and one launch day broke the record by a score of 54 miles. The total number of passengers carried from May 1, to October 1 was \$10,000. The greatest number of passengers carried in one day by one launch was 464, and the maximum number of people carried by one launch for one round trip was 40. A fact of great significance in the determination of the value of the electric launch for general use is that, although over three-quarters

of a million of people were carried, not a single passenger accident occurred, the list of casualties to the crafts beginning and ending with a slight occasional injury to the propeller or the shaft by the floating and sunken debris in the lagoons. One of the companies that is actively pioneering this new and important branch of ship-building in this country is making a specialty of yacht tenders, auxiliary electric yachts and independent cruising launches. One of the latest outputs from its yards is a forty-foot launch, which has been tested with most satisfactory results. The launch is six feet six inches in beam, draws normally two feet of water, giving a displacement of about three tons, is equipped with seventy-two cells of battery, weighing 3,000 pounds and having a capacity of 150 ampere hours. During the test the craft made five and one-half miles an hour, and spurted up to eight miles an hour, and this with a very dirty hull. It is not only in smooth waters that this launch can give a good account of itself. In a storm off the Connecticut coast it was nearly run down by a large naphtha launch that had dragged its anchor. To avoid collision it was forced to slip its cable and rely upon its motive power alone. Forging directly against the heavy sea and in the teeth of the gale, it weathered a dangerous reef, and then, turning in the trough of the sea, ran out of danger into the nearest safe harbor. A few such achievements as this will do much toward removing the impression, which is still quite common, that the electric launch is a mere toy, only fit for use in summery weather and the placidest of water.

THAT FEARFUL BOILER EXPLOSION.

Referring to the recent fearful explosion of a boiler in a street car stable in New York, heretofore alluded to in these pages, the American Machinist says:—

It appears to take those responsible for the laws governing boiler inspection in New York City a long time to find out that a hydrostatic test is not sufficient to determine the condition of a boiler as to its safety. In fact, there is no evidence that they ever will learn it, though it would seem the disastrous effects of the Dry Dock and Battery Railway explosion, an account of which appeared in our issue of November 16th, if properly presented, might stir them up a little towards a realizing sense of what they did not know about boiler inspection. Sergeant Mullins, of the police department, who has the matter of boiler inspection in charge, is reported as saying that he has long been of the opinion that the hydrostatic test was insufficient—which could not be doubted if it is assumed that he is fit for the position—but that he has not been able to impress his views upon the law makers in a way to have the rules amended.

The verdict of the jury concerning this explosion called it an "accident," which was wrong to begin with. It was no more an accident than when two railway trains meet at full speed through an engineer guessing that the other train is behind time, and pulling out for the next siding. It was right, however, in concluding that the hydrostatic test was not sufficient.

Sergeant Mullins is of the opinion that the boiler was all right six months before the explosion, but at that time it was burned and rusted. How he knew it was all right at the time stated he does not say, and we have no doubt he was mistaken. We do not believe that it got into the condition it was in when the explosion occurred in six months' time, that is altogether improbable. He also believes parts of the boiler to have been red hot at this time. We have seen nothing to indicate that the boiler was overheated, and believe that it was not. Our opinion is that the boiler let go because it had become so thin in places that there was not strength enough to hold the pressure allowed, with a little extra strain incident to opening the throttle, which caused some commotion in the water. Instead of being in good condition six months before the explosion, the plates had, beyond much doubt, been growing thin in spots for years, a fact that would have been revealed by a proper internal and external inspection.

The hydrostatic test has never been considered conclusive by the best engineers, and has always, by some, been considered dangerous. At the present time no engineer of ordinary intelligence places dependence upon it alone, and others will not willingly have it applied to boilers in their charge beyond the limits of the ordinary running pressure. In the first place there is always the danger of unduly straining the boiler by the cold over-pressure; and second, any one knowing the different strains in a boiler as between hot and cold, finds little to assure him in the hydrostatic test.

We believe that this example should be sufficient to stir up the authorities to get somewhere near current practice in inspecting boilers, and incidentally to amend the rules governing the examining and licensing of engineers in such a way that no one shall have boilers in charge if he cannot satisfy his examiners that he knows how to go to work to properly inspect their condition, nor be left in charge except he does make such inspection at intervals to be

decided upon from a consideration of the conditions under which the boilers are operated, and the quality of the water. Thus, in some instances, may call for the employment of better engineers, which is something on all accounts to be hoped for. The very first requisite of safety is an engineer who does not have to be told whether or not his boiler is safe.

This particular explosion has revealed nothing new. It has only emphasized the old truth that boilers will wear out, and that it is important to know how fast they are doing so. Just as many other boiler explosions, it has its lessons, from which it is to be feared that nothing will be learned. It may be hoped, however, that the contrary will prove true. It is a matter that should be agitated.

FUTURE OF ALUMINUM.

Mr. Edison was recently asked if aluminum would not solve many of the problems of science when it should ultimately become as cheap as iron, as it is soon destined to be.

"No," he said, "there is nothing in it. No matter how cheap it may become, it will be of no practical use in machinery or construction."

"How is that?"

"Aluminum has no strength," replied Mr. Edison. "You might as well use lead. It is as soft as lead. Its only peculiarity is its lightness, and it will only be useful as ornamental objects. It has fallen in price from some \$15 a pound to about the cost of brass, 50 cents a pound; and it is cheaper than brass because you can get more to the pound. Having no strength, this new metal, as it has been called, is not available for machinery."

"Can it not be used for building steamships?"

"No; because it lacks the strength, and weight does not count in the construction of a ship. An aluminum ship would hardly be stronger than one made out of paper. It only gains strength when alloyed with some other metal like copper."

"What is the metal of the future?"

"Nickel-steel is the coming thing," answered Mr. Edison, without hesitation. "It consists of steel with an addition of about 5 per cent. of nickel, which gives it ductility and increases its hardness and resistance. It is now used to some extent in battle-ships and guns. It makes splendid armor. The Harveyized steel is one variety of this metal. Steel will crack. Nickel-steel you cannot crack. Iron you can bore, but nickel-steel is hard to bore."

"It will then make the burglar-proof safe for which the world has been waiting?"

"No," said Mr. Edison, "you can no more make a burglar-proof safe than an unsinkable ship. Even with a safe which you could neither bore nor crack the burglar with a dynamite cartridge has it at his mercy. The burglar can carry in his pocket what is equal to 100-horse power. Ten pounds of coal may have the same horse power as a dynamite cartridge, but the coal in burning expends the power over a long time, while the dynamite concentrates it in a fraction of a second. No sooner is some new resisting substance found than we go to work and learn how to destroy it. This is the history of armor and guns, and they are now experimenting as to how the nickel-steel armor may be pierced. Indeed, nickel-steel has already been turned against itself, and is being made into guns, for which it is admirably adapted. The modern battleship with nickel-steel armor gains in space, and strength and lightness."

HEATHER AS A DYE-STUFF.

Heather contains a yellow colouring matter which is known as "ericin," and is obtained by extracting the plant, at the boil, for half an hour, with 1 part of alum to 10 of the plant and 30 of water. The author has examined the blossoms, leaves, stalks and roots of the plants separately and has made dye-trials on mordanted cotton, with the following results:—

On cotton mordanted with a strong iron mordant, the blossoms gave a reddish grey-brown or dark mode color; the stalks a yellowish drab; and the roots a light red drab. On cotton mordanted with a weak iron mordant the blossoms gave a reddish grey; the leaves a yellowish grey; the stalks a very light yellowish chamois; and the roots a reddish grey-medium chamois. A strong alumina mordant gave with the blossoms a reddish medium mode colour; with the stalks, a very reddish cream colour; and with the roots, a flesh colour. A weak alumina mordant gave, with the blossoms, a drab; with the leaves, a light reddish yellow mode colour, and with the stalks, a very light reddish cream; while the roots gave a light flesh colour. The blossoms dyed on chrome-mordanted cotton a full chamois shade; and the whole plant a yellow

drab. The author is of opinion that an extract of the leaves and blossoms could be used in dyeing and printing.

On wool no mordant is required, and creams, chamois and flesh colours are produced according to the part of the plant used. The use of chrome as a mordant results in the production of more intense shades; it may be added direct to the dye-bath.—*Farb. Zeit.*

WOODEN WATER MAINS.

A recent paper read before the American Society of Civil Engineers by Mr. James D. Schuyler, M. Am. Soc. C.E., on "The Water Works of Denver, Colo." contained some very interesting observations and figures relating to wooden water mains. He states that 16 miles of 30 inch wooden conduit were constructed in that work in addition to a considerable length of 44-inch pipe. The timber used was California redwood, and the 30-inch conduit was constructed to stand under a head of 185 feet. We understand from the paper named that the total average cost of the 30-inch pipe was \$1.36 per lineal foot, of which about 48 cents constituted the cost of trenching and back filling. A gang of eight to sixteen men laid from 150 to 300 feet of the same size conduit per day. These mains were composed of staves, dressed very smooth to cylindrical sides and radial edges, and were held to the cylindrical form by mild steel bands placed at a distance apart depending upon the head, but never exceeding 17 inches. The pores of the wood are filled with the water under pressure so that it oozes through to a slight extent, thus realizing the condition for permanent preservation. The pipe is framed in the trench and all handling in full size sections is avoided; at the same time the interior finish is so smooth that the most advantageous conditions of flow are secured. Mr. Schuyler estimates that the use of these wooden conduits effected a saving of over \$1,000,000 in this particular work.

In a diary kept by one of the surveyors engaged in the survey of the Holland Land Company's purchase, at the very beginning of this century, an entry occurs to the effect that near the headwaters of the Allegheny River, in New York State, was a spring upon the waters from which, when conducted into shallow pools, would

collect quantities of oil. This the Indians collected and used. For unknown generations the Indians held this spring in high veneration, believing it was a direct gift from the Great Spirit. They dried the oil by exposure to the sun, and made an ointment that they used to mix their war paint, as well as for remedial purposes. This ointment was the vaseline of the present day in its crude state, for the oil skimmed from the spring was crude petroleum. The old spring and a plot of ground one mile square were given to the Indians as a reservation, and is so held at the present time, being known as the Oil Spring Reservation. In after years the enterprising whites collected the oil, and it was bottled and sold under the name of "Seneca Oil." It had a wide reputation, and was eagerly sought by many, who extolled its merits in the most extravagant terms. Had it not been for the fact that the inquisitive whites found a way to get petroleum from the earth by sending the drill down through the rocks, "Seneca Oil" would doubtless now be a popular medicine worth \$1 a bottle.—*Pharmaceutical Era.*

Diphtheria is due to a fungoid growth. Yet its mode of dissemination is still among the obscurities of science. Water does not seem to spread it, and, contrary to the general impression, it is uncertain whether bad drainage, unless by producing a low condition of the system favorable to attacks of any malady, has much connection with it. This was the opinion of Sir William Jenner many years ago, and it is the conclusion of Dr. Thorne still. He connects it with the crowded condition of the board schools, where many of the "sore throats" for which the children are not kept at home are suspected of being something much more serious. At Enfield the spread of the epidemic was put upon the cats, which, ever since Darwin charged them with being accessory to the setting of the clover seed, have had "the scientific eye steadily fixed upon them." The pets of one family carried the disease to another, just as they carry other infectious germs, and there seems, so a report to the local government board insinuates, good reason for believing that in some instances it may have been conveyed from horses, sheep, and even from fowls to human beings. The diphtheritic germs are so vital that they are known to have communicated the disease after lying inert for four years.

An increasing number and variety of American manufactures are finding their way even into Birmingham, including locks, screws, skates, meat-choppers, carpet-sweepers, apple-peelers, re-

WHITING

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frigerating machines, etc. Quite recently, the people of Kidderminster have been electrified to find American-made Axminster carpets selling in the Midlands at something like one-half the price demanded by English manufacturers, owing, as alleged, to the superiority of the carpet machinery, laid down in the States since the expiry of the English patents.

The influence of boiler coverings on the consumption of fuel has lately been tested on the railways of South West Russia, and it was found that cooling was more rapid when working than when stationary, save when a double covering of felt was used. It is reported that the heat lost in 24 hours by a boiler with 30 square metres of surface containing water at a temperature of 114 deg., and exposed to an exterior temperature of 8.5 deg., corresponded to 133 kilos. of coal if the boiler was uncovered, to 153 kilos. if there was a thin metal covering, to 130 kilos. if there was a double felt covering, to 103 kilos. in the case of a cork covering. The cooling of the boiler represented about 24 per cent. and 8.1 per cent. out of an average daily consumption of 1,164 kilos. of coal.

The Literary Digest recently had an interesting article on aluminum taken from the London Spectator, which states several facts of more than ordinary interest. A statue of a winged figure, designed by Mr. Gilbert as an ornament for a bronze fountain, is made of aluminum and has attracted a good deal of attention. Aluminum does not exist in nature in any form perceptible to the senses, but is extracted by great heat with the aid of an electric furnace, from clay. This metal unites the properties of lightness and strength, which have supposed to be incompatible. When once obtained from the clay, its peculiar properties are more obvious and striking than those of any other material. It is beautiful to the eye, whiter than silver, and indestructible by contact with the air. It neither rusts nor tarnishes; is strong, elastic, and so light that the imagination almost refuses to conceive it as a metal. The weight is little more than one-third of the corresponding bulk of iron, and of course far less than that in the proportionate amount of silver, gold or lead. The cost has hitherto prevented its use in manufactures, except to a very limited extent, but as it is so widely diffused in nature, when the methods of extraction are improved and become cheaper, its extensive use is certain to take place. It is at sea, where lightness is such an important element that it will be most highly appreciated.

The "penny-in-the-slot" system of gas supply is now being extended to gas fires. The question of fires in hotel charges is a vexed one, and the solution of the difficulty which has been made in the case of a Liverpool hotel will no doubt meet with the approval of those frequenting it. The hotel in question has had a penny-in-the-slot gas fire on trial in one of its bedrooms for about twelve months, and has now, it is stated, decided to fit up the whole of its bedrooms in the same way, so that the occupant of the room can have a fire whenever he wishes by placing in the meter a number of pennies equal to the number of hours he wishes to have the fire burning.—Industries and Iron, London.

The three oldest known pieces of wrought iron in existence are the sickle blades that was found by Belzoni under the base of a sphinx in Karnac, near Thebes; the blade found by Col. Vyse imbedded in the mortar of one of the pyramids, and a portion of a cross-cut saw, which Mr. Layard exhumed at Nimrod—all of which are now in the British museum. Another piece of iron, an account of which might not be inappropriate in this connection, is the wrought bar of Damascus steel which King Porus presented to Alexander the Great. This bar, which is of unknown antiquity is still carefully preserved in the National Turkish Museum at Constantinople.

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THE FINLAYSON WATER TUBE MARINE BOILER.

The accompanying illustrations and description of the Finlayson water tube marine boiler were supplied to us by Messrs. Doty Bros. & Co., Toronto, who are the Canadian manufacturers of it.

During the last few years water-tube boilers (the reverse of the old style, wherein the water surrounded the tubes, and the heat passed through them) have come prominently to the front. Experience has proved them to be economical of fuel, rapid steam generators, lighter in weight, smaller for equal capacity, and non-explosive under the highest pressure.

The movement of heated particles in any liquid is in an upward direction, and to permit of ready escape in the form of vapor or steam this movement should always be free and spontaneous. The special feature of the Finlayson boiler, therefore, is the placing of all steam-generating pipes in a perpendicular position. The only other boiler in which this requirement has been recognized, is the so-called drop-tube boiler, with sealed ends, suspended from a crown-sheet over the fire. As, however, in this type the downward movement of the water and the upward movement of the steam is accomplished in one and the same tube, the special advantage of the Finlayson boiler, in bringing the water supply into the pipes from the bottom, is fully apparent.

The Finlayson boiler is to all intents and purposes a drop-tube boiler with the ends of tubes connected and arranged in sections, each section being connected at the bottom with a sideflow water pipe, and at the top with the steam-drum. It is generally conceded that drop-tube boilers generate steam much more rapidly than any other type; but have been found objectionable on account of imperfect circulation, permitting rapid burning out of the sealed ends of the tubes in direct contact with the fire, necessitating frequent renewal. By connecting the ends perfect circulation is secured, and by the very connections used considerable heating surface is gained over the simple drop-tubes. By dividing the steam generating sections across the boiler the expansion of pipes and connections is equalized. The objectionable feature of sagging common to the horizontal pipes is also obviated.

In all horizontal pipe boilers the pipes run back and forth several times, one directly above the other, over the furnace. Most of the steam is generated in the lower tier of tubes that are in direct contact with the fire. To find escape the steam must make its way through thirty or forty feet of pipe, returned on itself horizontally and filled with water. In the Finlayson boiler it is required to travel only two or two and one-half feet and in its natural upward

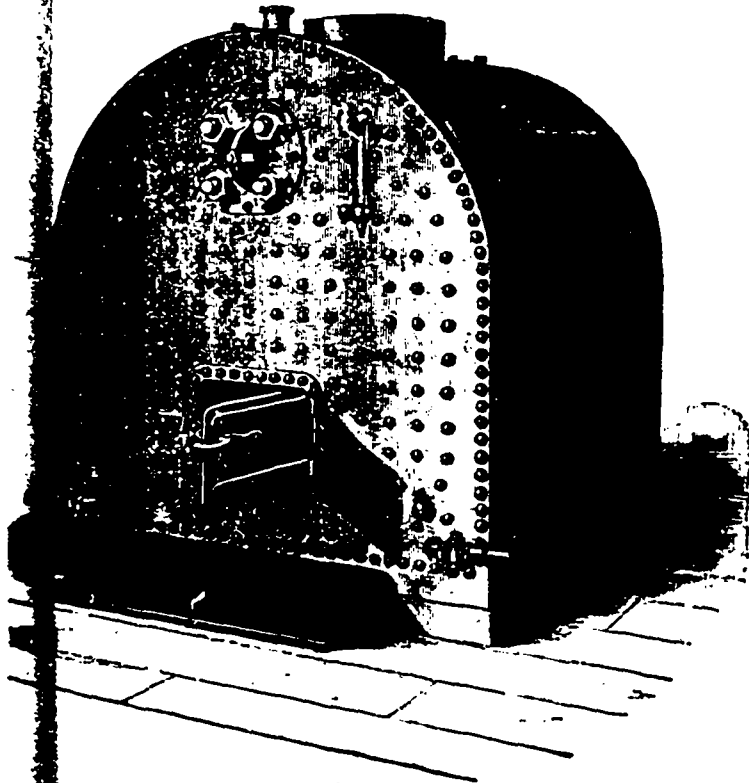


FIG. 1.
Finlayson Upright Water-Tube Boiler, complete, showing Feed-Water Connection and Blow-Off Pipes on side. Portable and ready for Steam and Water Connections in condition as represented.

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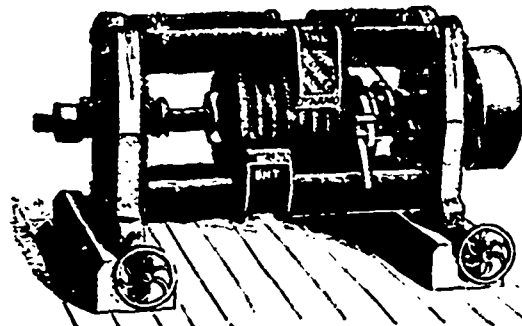
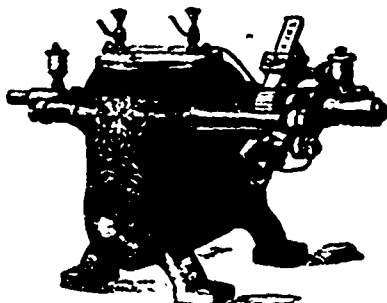
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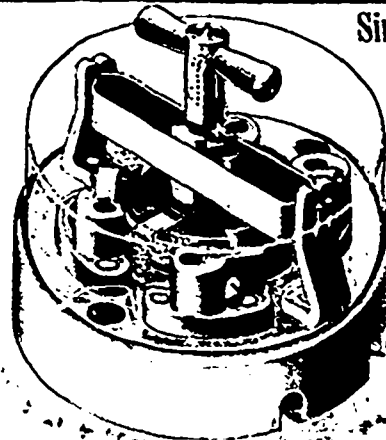
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direction, when it finds ready escape into the steam space in the steam-drum. By the Finlayson disposition of the steam-generating pipes the greatest efficiency from the fuel is obtained, as the heat follows the pipes from the lower to the upper extremity, causing steam to be rapidly formed along the tubes throughout their entire length. In the horizontal-pipe boilers the lower tiers shield those lying directly above, and while those through which the steam passes last before reaching the steam-drum should be the hottest, they are in fact acted upon by the furnace heat in the least degree. Note that all steam-generating pipes in the Finlayson boiler receive an equal amount of heat, which the horizontal tubes in other boilers do not.

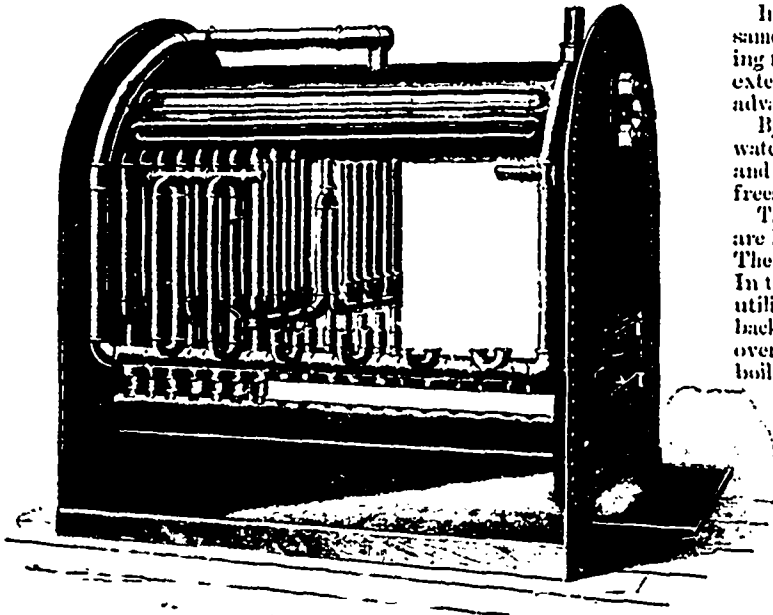


FIG. 2.

Finlayson Boiler in Process of Construction, with only part of the Steam-generating Loops and Superheating Pipes in position, showing particularly the arrangement over the fire.

to fire. There are recent instances where this accident has occurred.

The Finlayson boiler is complete as it leaves the shop, and is portable in its complete state, which is not the case with other pipe boilers. It does not require a mason to set up, nor to assist in taking down and relaying bricks when repairs are necessary.

In the arrangement of the Finlayson boiler it is possible in the same space to place a greater number of feet of piping, thus affording more efficient heating surface and dividing the water to a greater extent than is accomplished in horizontal tube boilers. The great advantage thus derived is manifest.

By connecting each section of upright pipes with the side-flow water pipe, forcing the heated feed water into it from the bottom, and having the upper end connected with the steam-drum, the freest possible circulation of water and escape for steam is assured.

The fronts and backs of water-tube boilers, as generally used, are laid up with firebrick to three-quarters the height of the boiler. The heat taken up by these firebrick walls is absolutely wasted. In the Finlayson boiler the heat striking the ends of the boiler is utilized to produce steam. By the use of a water-front and water-back alone, twelve per cent. of effective heating surface is gained over other styles of pipe boilers. In the case of a fifty horse-power boiler, for instance, by this feature sixty square feet more heating surface is had than can be obtained with any other type of pipe boiler. As the principal requirement of a steam boiler is to generate steam, the absurdity of heating firebrick instead of water is apparent. The Finlayson boiler utilizes every available unit of heat to produce steam.

Further, firebrick walls are necessarily just so much dead weight, amounting in some cases to tons, and no argument is needed to show the additional objection of carrying this dead weight, especially in a vessel where weight and space form important considerations. By the substitution of a water-front and water-back for firebrick, a reduction in weight of about fifteen per cent. is accomplished over pipe boilers using firebrick.

In case a steam vessel receives a shock, as against a pier in landing, in being struck by heavy seas, or otherwise, the firebrick walls are likely to tumble into the furnace and thus cause great liability. Such a result is not possible with the Finlayson boiler.

taking down and relaying bricks when repairs are necessary.

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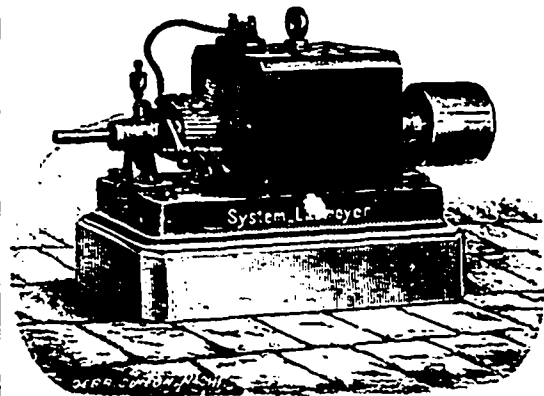
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By the capacity and arrangement of the steam-drum and superheating coils, priming is absolutely prevented. The steam-drum is capacious, and has lying in it along the upper inside surface a dry-pipe, perforated with holes opening only upwards (being intact along the bottom), thus taking over only the dry steam, and not drawing with it water from the surface. The superheating coils are two sets of upright pipes, standing along the entire length of boiler on the sides, the lower halves lying close to the fire. The steam passes from the steam drum into the dry-pipe, thence to the superheating coils. Entering the latter at one end it fills the upright pipes, where it receives additional heat, and escapes at the opposite upper corner of the section into the steam supply pipe of engine. Should by any possibility, as rolling in a sea, any water pass over into the superheating coils, it will naturally remain in the lower ends of the upright pipes, where, without the slightest danger of being drawn into the engine, it will at once be generated into steam. In the continuous one-pipe superheating coils, as used on other boilers, any water passing over is of necessity quickly drawn or forced into the engine, consequently all are bound to prime. The superheating coils of the Finlayson boiler can be carried half full of water, and it will still be impossible to get any into the engine. But inasmuch as the lower ends of the upright tubes are in contact with the fire, any water that may pass over into them will rapidly be transformed into steam.

The feed-water coils lie horizontally above the perpendicular steam-generating pipes, and utilize all heat not taken up by the latter. The feed-water, which is thus heated to very near the boiling point, passes from the coils through pipes lying between the walls of the water-front, into the side-flow pipes, and thence into the different sections of steam-generating pipes. The upward movement of the heated water is thus assisted, and complete circulation insured. As the water-front and water-back are connected with the steam-drum (which is carried half full of water), and as well with the side-flow pipes, the circulation in these parts is also perfect.

The entire ground space occupied by the boiler can be utilized for grate surface, and this, combined with the additional amount of heating surface afforded in piping and water-front and water-back, results in the greatest utility of fuel used, and the rapid conversion of water into steam.

All pipes and connections are put together with right and left threads. Any portion of boiler can be readily exposed, in case repairs are necessary, by simply removing one of the sections of

the side covering. Any particular section of pipes can be removed without disturbing any other portion of boiler. The side covering consists of a double shell of heavy sheet iron, having between the inner and outer shells a two-inch layer of fire-felt (asbestos), which prevents any radiation of heat. The smoke-stack need not be removed for repairs; this is usually the first operation when repairing other boilers; it is supported independently, and the whole boiler can be taken apart without disturbing the stack.

On account of the large quantity of water consumed in the boiler, by use of water front and back, and the capacity and arrangement of the steam-drum and superheaters, an absolute water-level can be maintained. While similar claims are made for other pipe boilers, an examination will show why experience has not established them as well based.

No soot can adhere to the upright pipes, and therefore full benefit from heat produced in the furnace is secured at all times. Horizontal tubes form a resting place for soot and ashes.

Only extra heavy pipe and special steel fittings are used in the construction of this boiler. Water-front and water-back are stayed according to pressure desired. Any pressure, from 200 to 400 lbs. per square inch can be carried with perfect safety.

By means of blow-off pipes inserted opposite the side-flow pipes,

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all accumulation of mud, scale, or other substance is prevented. By injecting water from nose through the hand-hole plates opposite the side-flow pipes the latter can be readily washed out.

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New Victoria Blue is fast to fulling, that is to say, in milling though it loses a little color, white wool or cotton milled alongside is not stained. As it is perfectly fast to alkali, the shade is not affected even when subjected to strong alkali milling.

A noteworthy feature of the New Victoria Blue is the fact that it does not rub off to any great extent. Dyeing in a neutral bath this new blue is very useful for topping logwood navy blues.

The Dominion Dyewood & Chemical Co., Toronto, are sole agents for the manufacturers, The Farhenfabriken of Elberfeld.

Celestine Blue.—This new color surpasses all other blues known as dyeing wool on a chrome mordant as it is of very remarkable brightness. It can be dyed with bichrome and oxalic acid or better with fluoride of chrome and oxalic acid. This blue when dyed with the fluor chrome mordant is fast to light, air and alkali. It is very useful to brighten alizarine blues or any chrome dyestuff.

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Sulphon Brown R. and Sulphon Dark-Brown.—These new browns dye wool without the application of chrome or other mordant shades which are perfectly fast to milling. Sulphon Brown R has a reddish brown, and sulphon dark brown, a dark brown tone. The shades produced besides being fast to fulling are comparatively fast to light (but not equal to anthracene brown in this respect), and quite fast to acids.

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Alizarine Cyanines.—These new Alizarine blues are only imported by the Dominion Dyewood & Chemical Co., and are fast replacing

the ordinary Alizarine blue, being cheaper and quite as fast. Very good results are obtained with fluoride of chrome mordant.

For dyed patterns and full particulars, address The Dominion Dyewood & Chemical Co., Toronto.

STEAM BOILER TESTS AS A MEANS OF DETERMINING THE CALORIFIC VALUE OF FUELS.

By D. W. Rom.

It will be recognized by those who use large quantities of fuel, especially of bituminous coals, that they differ very greatly in value, even coals which are taken from adjoining areas giving very different results; so that it is sometimes puzzling to the customer, and difficult to decide upon the merits and proportionate values of the various fuels within his reach. It is likewise difficult to determine when the greatest practicable amount of work is being obtained from the fuel; and consumers are frequently subjected to great loss from the want of this knowledge. There are three recognized methods of determining the calorific value of coal, viz: by chemical analysis, by the use of a calorimeter, and by actual measurement of the water evaporated by a definite amount of fuel in a steam generator.

By the first method it is possible to ascertain the constituents of the fuel in their various proportions, and to determine the theoretical heat value when combined with a definite proportion of pure oxygen, and approximately to compute the amount of heat which would be converted into work when combined with ordinary air, and consumed under usual conditions. But this becomes a complicated problem, as will be seen when it is considered that the heat absorbed and wasted in heating the non-combustible constituents of both the air and fuel must be taken into account, and that these wastes vary with the amount of superfluous air admitted through the grate, and with the proportion of non-combustible matter in the fuel; therefore, any estimate of the practical value of a fuel deduced from chemical analysis can only be approximate.

In testing fuels by a calorimeter a sample of the fuel mixed with chlorate of potassium is placed in an open-mouthed copper vessel, which is submerged open mouth downward, like a diving bell, in a vessel containing a measured quantity of water. Combustion of the fuel takes place and the heat produced is absorbed by the water—

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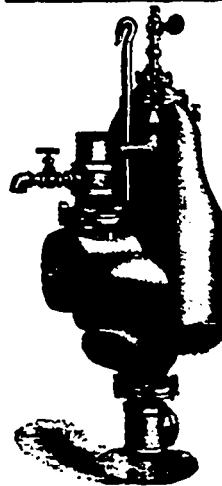
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the total quantity of heat being determined by the rise in temperature of the water. This method has some advantages over an analysis, and if care is exercised in the selection of samples to be tested—or if a large number of samples be tested—this is perhaps the best means of establishing a theoretical calorific standard value of a fuel. But the quantity thus tested is necessarily small, and may not fairly represent the fuel. It also leaves out the heat absorbed by the non-combustible portions of the air and fuel, which is an important factor in the combustion of fuel under ordinary conditions.

The method, by which the fuel is consumed under actual conditions and in large quantities in evaporating water in a steam boiler is generally regarded as a test of the efficiency of the generator, rather than as a test of the value of the fuel; but somewhat extended observations of the performance of various steam generators, using similar grades of coal, has convinced the writer that the steam boiler test, when properly conducted, is quite as valuable as a means of determining the calorific value of fuel, and of comparing various fuels, as for finding the efficiency of the generator. In fact, the latter is the more uncertain of the two, because, unless a boiler is tested with fuel of a known calorific value, it is impossible to arrive at its actual efficiency, or to compare it fairly with any other form of generator.

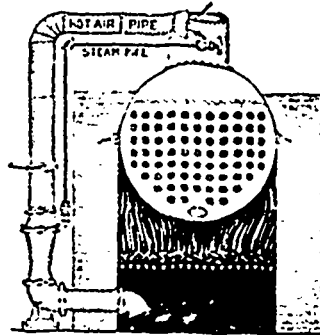
In testing the heat of fuel in an ordinary steam boiler, two elements of uncertainty are introduced, viz: loss through imperfect combustion of the fuel, and the escape of gases at a higher temperature than the atmosphere; but as these losses, as well as the heat absorbed by the non-combustible portions of the air and fuel, are unavoidable in the present state of science, they should not be taken into account in making a practical test of fuel, and strict accuracy only requires that the loss be uniform and minimum in result. Practical experience teaches that almost perfect combustion may be attained in any of the common forms of steam generator by careful and regular stoking, with a properly regulated air supply; and that this skill is possessed by many ordinary stokers, who have no knowledge of the laws which govern the combustion of fuels, will doubtless be admitted by many persons who have observed locomotive firemen or others who are compelled to get a high rate of steam production. It is, of course, impossible to transfer all the heat produced in combustion to the water in a generator, because the gases cannot be reduced below the temperature of the water or steam within the generator, and a certain temperature above the atmosphere is necessary to produce draught in the chimney; but it is quite possible to so proportion the grate surface to the heating surface of the boiler that the gases will be reduced to a certain minimum temperature and maintained at that temperature during a test. The temperature may be indicated by a pyrometer or high registering thermometer at the base of the chimney, and the rate of flow of the gases may be ascertained by the use of a draught-gauge. Frequently an attempt is made to analyse the waste gases. This

gives an uncertain result on account of the difficulty of getting representative samples of the gases, but, from observation and examination of many tests, the writer believes it unimportant, if the stoking and air regulation receive proper attention. The surface of the grate should be so proportioned to the heating, or heat absorbing surface of the generator that the gases will, when they reach the uptake, be reduced to, say, 400 Far. Skillful firing and air regulation will produce practically perfect combustion and uniform temperature.

Steam boiler tests, although attended with some difficulty, are quite within the reach of ordinary consumers, and deserve to be better understood and used more than they are. In addition to their value as a method of determining the heating properties of fuel, they furnish the best possible means of ascertaining the condition and efficiency of the generator, and of checking, and if necessary correcting, waste on the part of the stoker. It is desirable that such tests should be made frequently, because steam boilers are very liable to deteriorate and become wasteful, especially when set in brick, through the cracking of the brick walls, as well as by the coating of heating surfaces with scale or other deposit on the inner, and soot or ashes on the outer, surfaces. It is quite practicable for steam users to have tests made by their engineers and ordinary assistants, but it is preferable to have an occasional test made by a professional engineer who has had experience in making such tests, as he will have gained special knowledge which will enable him to detect and locate imperfections in the generator more readily than those unaccustomed to such work.

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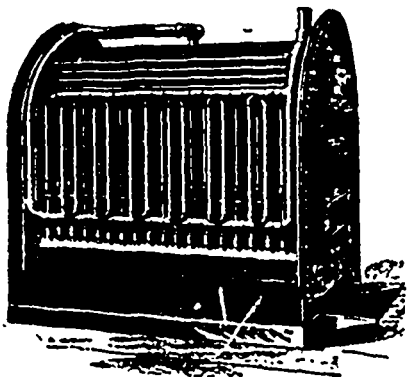
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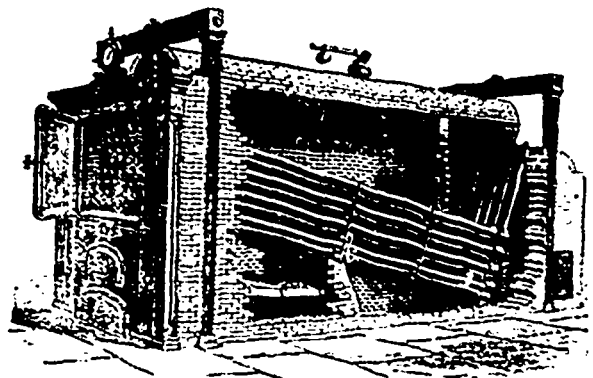
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Send for book "STEAM" free on application.

The writer would suggest to steam users the following practice; that one or more tests be made by an expert to determine the efficiency of the generator, and that he may direct any necessary repairs or corrections in the generator. After this has been done and a standard of efficiency established, a good water meter should be inserted in the water supply pipe, so that a record of the water used may be continuously kept, and the stoker or engineer should keep a log and make daily reports of the coal consumed and water evaporated. The meter readings will need correction if absolute accuracy is desired, but for practicable purposes this may not be necessary. It may seem like unnecessary labor and expense to weigh all the coal used, but a short trial will undoubtedly prove its value, as it will not only indicate constantly the condition of the generator, but to a certain extent be a check upon the working of the engine and the amount of power used by the establishment; and it will furnish a constant incentive to the engineer, stoker, and those in charge of the steam machinery, to improve its working and reduce the rate of fuel consumption to its lowest limits. A general practice of this kind would induce a rivalry in the saving of fuel parallel to that found in marine practice, where it is claimed a horse power is produced by from one and a half to two pounds of fuel per hour, instead of four to ten pounds, the last named quantity being not uncommon in ordinary steam plants, and would in the course of a few years result in an enormous saving to the country as well as to individual consumers.

Rules governing the standard system of boiler trials, adopted by the American Society of Mechanical Engineers, may be found in the transactions of that Society, Vol. VI, 1884. The following simple instructions will enable any steam user to conduct a test of his boilers for the purpose of comparing the values of fuels, etc., after the efficiency of the generator has been established by a complete test by an expert. (Observations of the quality of steam, strength of chimney draught and analysis of gases are omitted as they require special instruments and skilled manipulation.)

INSTRUCTIONS FOR CONSUMERS' TEST.

A test to be of any value should be continued for not less than ten hours, and will require the constant attention of not less than four persons besides the regular attendants, appointed as follows: one or two men to weigh the coal, and one or two to attend to and weigh the water, one clerk to keep the log of the coal and water weighed, and one clerk to record the pressure of steam, temperature of feed water, temperature of chimney gases, and to keep a gross account of the coal and water as a check to the regular log. These should be careful men, well posted as to their duties. Three good platform scales will be required, and two tanks, or clean tight casks, to weigh water in. Preparation should be made so that the water

can all be delivered into two tanks, which are placed upon two platform scales, and the water pumped alternately from the tanks to the boiler. A piece of hose attached to the suction pipe of the pump or injector will be convenient to transfer from one tank to the other. It will be advisable to procure from reliable instrument makers, one or two accurate thermometers for the purpose of taking the temperature of the feed-water and chimney gases. The temperature of the feed-water should be taken by inserting a brass or copper cup in the feed pipe near its connection with the boiler. This cup may be filled with oil and the thermometer set in the oil. The temperature of the cold water before it enters the injector or feed water heater should also be taken. Great care should be exercised that all scales, steam gauges, etc., are correct, and that there are no leaks about the pumps, pipes or boiler, by which any water may escape without being evaporated. Steam leaks are not material except as misrepresenting the consumption of the engine. The temperature of escaping gases may be taken by inserting a brass or copper pipe with closed end in the smoke connection where it leaves the boiler. This cup, which should reach the centre of the escaping gases, may be filled with oil and a high registering thermometer placed in it.

Previous to the hour of starting, say at 6.30 o'clock, steam should be up to the working pressure, and the tubes and all surfaces and flues should be swept clean. The ash pit should be cleaned and the first charge of kindling and coal, or the fuel to be used, should be weighed; every man should be at his post: those who are to note the various readings provided with ruled forms for recording the gross, tare and net weights of fuel and water, and others for the pressure of steam temperatures of feed-water and escaping gases, which should be noted every quarter hour. At the hour for starting, the height of water in the boiler should be marked on the gauge-glass, so that it may be brought to the same place at the close of the test, and the fire should be drawn quickly and replaced with the weighed kindlings and fuel, (wood kindlings are generally taken at 4-10 the value of coal by weight.) The working of the boiler may be conducted as usual in every way, the stoking should be done carefully, so that no waste may occur through dead spots or holes in the fire, or uneven distribution of fuel. If the fire be too thick, some of the gas will pass off unconsumed for want of air, and if the fire be too thin, too much air will be admitted. The

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draught or air supply should be regulated by the ash pit doors or registers, and an even fire and steady pressure of steam maintained throughout the test. If work is to be suspended at mid-day, or any time during the test, the draughts may be closed, the fire banked, and an attendant left in charge who will regulate the fire if necessary, so as to keep the pressure constant. At the close of the test the water should be brought to the same level in the boiler as at the beginning, and the fire withdrawn and deadened quickly with water. The remaining coal should be weighed and deducted from the quantity charged to the boiler, and the ashes may also be weighed. The net weights of coal and water may then be summed up and the result of the test ascertained and recorded in the following manner:

Test of boiler at	day of	18
Kind of Boiler		
Dimensions		
No. tubes		
Size of fire-box		
Grate surface	sq. ft.	
Heating surface	"	
Height of chimney		
Size of "		
Duration of test	hours.	
Kind of fuel		
Boiler pressure (by gauge)	lbs.	
Temperature of feed-water entering boiler	deg. Far.	
" " entering pump or injector.....	"	
" " escaping gases	"	
Total fuel consumed.....	lbs.	
Percentage of moisture in fuel.....	per cent.	
Equivalent dry fuel.....	lbs.	
Total weight of ash.....	"	
Equivalent combustible.....	"	
Total water evaporated.....	"	
Water evaporated per hour.....	"	
" " per lb of dry fuel.	lbs.	
" " " " from and at 212°	"	
" " " " combustible " " "	"	
Horse power developed.....		

The above particulars are determined in the following manner: The pressure of steam and temperatures of feed-water and gases are taken from the average readings of the same.

The total quantities of fuel, ash and water, are taken from the net summing of log, great care being taken that no error is made. The percentage of moisture in fuel is determined by drying a sample of the fuel for 2 hours and getting the differences between the wet and dry weights, which difference is multiplied by 100 and divided by the weight of sample before drying.

The equivalent dry fuel is found by multiplying the total quantity of fuel by the percentage of moisture and dividing by 100, which is deducted from the total quantity of fuel. The equivalent combustible is found by deducting the total amount of ash from the total quantity of fuel.

The water evaporated per hour is the total quantity of water divided by the number of hours duration of test.

The water evaporated per pound of dry fuel is the total quantity of water divided by the total quantity of dry fuel.

The water evaporated per pound of fuel from and at 212° is found by multiplying the water evaporated per pound of fuel by the temperature, or heat units, of one pound of steam at the average pressure, less the total heat of one pound of feed-water before entering the boiler, or injector if one be used, and dividing the product by 966 which is the total heat, in units, of one pound of steam at 212°.

The horse power is determined by deducting the total heat units of one pound of feed-water at the average temperature before entering boiler, or injector if one be used, from the total heat units of one pound of steam at the average pressure, and multiplying the product by the quantity of water evaporated per hour and divided by 1110, (which are the heat units required to raise one pound of water from 100° and evaporate it at 70 lbs. pressure). The quotient should be divided by 30, which will give the horse power according to the American standard. The following is an example of this method of finding the horse power.

Total quantity of water evaporated = 2000 lbs.
 Steam pressure (by gauge), 60 lbs.
 Temperature of feed-water before entering boiler or injector, 40°.

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Inventions.

CANADIAN PATENTS.

The following patents have been issued from the Canadian Patent Office, from November 20 to December 4, 1893, inclusive.

Information in regard to any of these patents may be had free on application to THE CANADIAN MANUFACTURER, or copies of American patents corresponding to these, where the American patent has been previously granted, can be procured through us for the sum of twenty five cents.

- 44,735 Multiplex glass tube, P. J. McElroy, Cambridge, Mass., November 20 h.
- 44,736 Projectile, D. B. Wesson, Springfield, Mass., November 20th.
- 44,737 Rope grip, A. K. Evans, Toronto, Ont., November 20th.
- 44,738 Tag holder, C. E. Stowe, McAdenville, N.C., November 20th.
- 44,739 Stove pipe damper, C. T. Redfield, Glen Haven, N.Y., November 20th.
- 44,740 Glove, J. Hamburger, Berlin, Ger., November 20th.
- 44,741 Presser foot or bar for moulding machine, F. L. Creighton and J. C. Foster, Boston, Mass., November 21st.
- 44,742 Lawn mower, W. A. Schofield and T. S. Linscott, Brantford, Ont., November 21st.
- 44,743 Drying attachment for scrubbing, J. S. McGuire, et al, East Tawas, Mich., November 21st.
- 44,744 Pneumatic tire, W. Sherbondy, Akron, Ohio, November 21st.
- 44,745 Production of protoxide of copper from ores and other materials, C. Hoepfner, Giessen, Germany, November 22nd.
- 44,746 Harvester, G. W. Scott, Belton, Mo., November 22nd.
- 44,747 Secondary battery, W. Main, Brooklyn, N.Y., November 22nd.
- 44,748 Road making sleigh, J. C. West, Simcoe, Ont., November 22nd.
- 44,749 Treating bast and wood for obtaining therefrom fibre suitable for being spun or woven, A. Torngren, Taamersfors, Finland, November 22nd.
- 44,750 Combined water tower and fire escape, F. M. Hughes, Milford, Mass., November 22nd.
- 44,751 Metal driving belt, H. Sewery, Barrie, Ont., November 22nd.
- 44,752 Car brake and coupling, F. V. Isoire, dit Provincial, Black Lake, Que.
- 44,753 Harvester elevator, A. Stark, Chicago, Ill., November 22nd.
- 44,754 Combined shaft support and anti rattler, W. Cavers, Owen Sound, Ont., November 22nd.
- 44,755 Making butter and condensed milk, W. B. Walters, Dumelin, N.J., November 22nd.
- 44,756 Engine governors or speed regulators, J. Prentice, Lanark, Scotland, November 22nd.
- 44,757 Process of treating gold and silver ores and a composition of matter for said process, E. D. Kendall, Brooklyn, N.Y., November 22nd.

- 44,758 Classing pulverized ores by air currents, G. Henoch and E. M. C. Exelmans, Paris, France, November 22nd.
- 44,759 Ore crusher, J. F. Crawford, Warton, Ont., November 24th.
- 44,760 Car coupling, E. B. Hyre, Elk Fork, W.V., November 24th.
- 44,761 Cultivator, W. L. Nieman and W. Hieronymus, Mount Olive, Ill., November 24th.
- 44,762 Valve attachment for pumps, O. E. Beardsley, Trempleau, Wis., November 24th.
- 44,763 Stump puller, A. C. French, Seattle, Wash., November 24th.
- 44,764 Thrust bearing for shafts, S. Ingersoll, Glenbrook, Conn., November 24th.
- 44,765 Door check, T. S. Doblin, Trenton, N.J., November 24th.
- 44,766 Automatic slack adjusters for railway car brakes, H. Hinckley, Trenton, N.J., November 24th.
- 44,767 Pea thrashing machine, C. E. Paterson, Tooradin, Victoria, November 24th.
- 44,768 Rotary brush, H. G. Rockwell, Washington, D.C., November 24th.
- 44,769 Car coupler, W. H. Crickel, et al., Saginaw, Mich., November 25th.
- 44,770 Furnace or heater, G. R. Scales and E. S. Rogers, Knoxville, Tenn., November 25th.
- 44,771 Method of extracting metal from ores, S. Calhoun, et al., Hot Springs, Ark., U.S., November 25th.
- 44,772 Uniting the soles and uppers of boots and shoes, W. Carey, Montreal, Que., November 25th.
- 44,773 Animal trap, N. J. Tanner and J. H. Lee, Oveido, Fla., U.S., November 25th.
- 44,774 Reels for wire working machines, The Dominion Wire Manufacturing Co., Montreal, Que., November 25th.
- 44,775 Cabinet, The Williams Manufacturing Co. (Ltd.), Montreal, Que., November 25th.
- 44,776 Thrust bearing for propeller shafts, L. J. Doty, Toronto, Ont., November 25th.
- 44,777 Box or drawer, J. S. Bennett, Winnipeg, Man., November 25th.
- 44,778 Milking machine, R. Ferguson, et al. T. Danks, Melbourne, Victoria, November 25th.
- 44,779 Cure of gonorrhoea, W. H. Greer, Brandon, Man., November 25th.
- 44,780 Explosive, F. C. Du Pont and P. S. Du Pont, Wilmington, Delaware, November 27th.
- 44,781 Explosive, F. C. Du Pont and P. S. Du Pont, Wilmington, Delaware, November 27th.
- 44,782 Pressure brake system, W. T. Bothwell, Jersey City, N.J., November 27th.
- 44,783 Engineer's brake valve, W. T. Bothwell, Jersey City, N.J., November 27th.
- 44,784 Pressure regulator, E. E. Gold, New York, U.S., November 27th.
- 44,785 Wire braiding machine, J. B. Cleaveland, Indianapolis, Ind., November 27th.
- 44,786 Braided fence wire, J. B. Cleaveland, Indianapolis, Ind., November 27th.
- 44,787 Shifting device for elevators, J. F. Cumming, Buffalo, N.Y., November 28th.
- 44,788 Carriage axle, J. Ledoux, Montreal, Que., November 28th.
- 44,789 Swinging churn, T. G. Hood and W. G. Smith, Huffman, Alabama, November 28th.
- 44,790 Spring bed bottom, G. G. Baker and J. N. Wanich, Bloomsburg, Pa., November 28th.
- 44,791 Attachment for the brake of bicycles, W. S. Porter, Washington, Pa., November 28th.
- 44,792 Brake for children's carriage, F. O. Boes, New York, U.S., November 28th.

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- 44,793 Nut Lock, J. W. Hester, Citronville, Alabama, November 28th.
- 44,794 Ice velocipede, E. E. Gould, Belvidere, Ill., November 28th.
- 44,795 Coupling for rods, F. G. Blackwell, Emiskillen, Ont., November 28th.
- 44,796 Telephone attachment, J. A. Hertel, Toronto, Ont., November 28th.
- 44,797 Automatic flushing apparatus for urinals, W. Clark, et al., North Sydney, New South Wales, November 28th.
- 44,798 Obtaining commercially pure sulphide of nickel for use in the manufacture of nickel and other commercial purposes, Oxford Copper Co., New York, U.S. November 28th.
- 44,799 Floor mop, W. T. Triphagen and G. W. Baker, Winnipeg, Man., November 28th.
- 44,800 Garden cultivator, R. C. Buckley, Peoria, Ill., December 1st.
- 44,801 Grain storage warehouse, D. R. Bowker, Brooklyn, N.Y., December 1st.
- 44,802 Tedder fork, G. M. Baker, Drayton, Ohio, December 1st.
- 44,803 Support for bicycle saddle, E. M. Staples, Elizabeth, N.J., December 1st.
- 44,804 Sleigh attachment for wheeled vehicles, G. P. Askin, Detroit, Mich., December 1st.
- 44,805 Amalgamating ores, H. and St. L. Gregory, Rockland, Maine, December 1st.
- 44,806 Railway car truck, The Sheppard Manufacturing Co., Louisville, Ky., December 4th.
- 44,807 Obtaining commercially sulphate of nickel for use in the manufacture of nickel, Oxford Copper Co., New York, U.S., December 4th.
- 44,808 Guard or safety attachment for cars, T. J. McMalken and C. F. Thomson, Boston, Mass., December 4th.
- 44,809 Shingle bunch and binder, W. J. Munro, et al., Sedro, Wash., U.S., December 4th.
- 44,810 Wall plaster, J. Q. Chase, Grand Rapids, Mich., December 4th.
- 44,811 Catch basin water closet, H. C. Buddenberg, Cincinnati, Ohio, December 4th.
- 44,812 Hydro carbon burner, E. B. Raymond, St. Louis, Mo., December 4th.
- 44,813 Electric smelting of refractory ores, T. L. Willson, Leaks ville, N.C., December 4th.
- 44,814 Steam generator, P. Dubian, Marseilles, France, December 4th.
- 44,815 Insulator for telegraph wires, J. F. Wright, Colorado Springs, Col., U.S., December 4th.
- 44,816 Fender for electric cars, C. H. Stainton, Toronto, Ont., December 4th.
- 44,817 Underground conduit for electric wires, P. McCullough, Toronto, Ont., December 4th.
- 44,818 Locomotive boiler, R. Rushton, St. Thomas, Ont., December 4th.
- 44,819 Manufacture of yeast from unmalted starch bearing material, J. Blumer, et al., New York, U.S., December 4th.
- 44,820 Trunk lock, W. J. Henry, Portland, Maine, December 4th.

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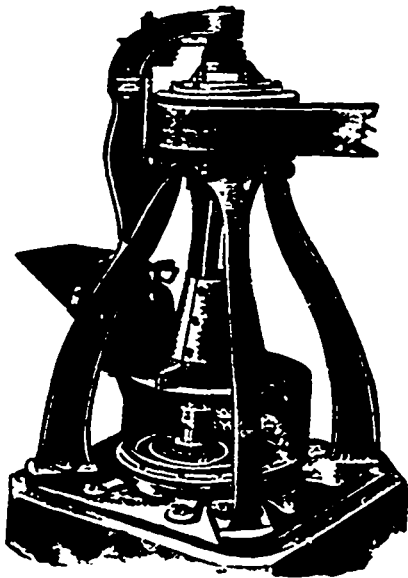
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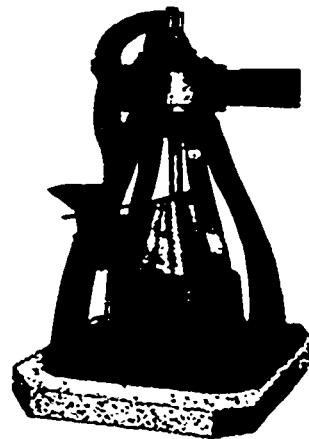
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A Dominion charter has been granted to the St. Lawrence Cotton Company, with a capital stock of \$250,000, with head office at Montreal. The incorporators are William Hobbs and Henry M. Penfold, of Montreal, William H. Hobbs, of Brooklyn, N.Y., Alec F. Hobbs, calico printer, of Lowell, Mass., and F. S. Hobbs, of Alberta, N.W.T., the object being to manufacture, bleach, dye and print cotton and cotton fabrics, etc.

The keel has been laid at the yards of William Denny & Sons, Dumbarton, Scotland, of a new steamer to be delivered at Vancouver within ten months for the Canadian Pacific Railway Co., to be placed upon the Victoria-Vancouver run. The new steamer is to be thoroughly modern in every respect, a side wheel paddle boat, upwards of 200 feet long, and capable of maintaining with ease a speed of 18 knots per hour, which will make her the fastest craft in British Columbia waters.—Victoria, B.C., Colonist.

The Toronto Radiator Manufacturing Company, whose works are in Toronto and branch houses in Montreal, Quebec, St. John, Hamilton, Winnipeg and Victoria, have sent us a copy of a beautiful souvenir card which they are sending out to architects and heating engineers, wishing them a merry Christmas and a happy and prosperous New Year. In alluding to the business of the company we are told that their plant has been enlarged in many respects and that before many months they will have such extension made that will enable them to lay claim to owning one of the very largest foundry plants in Canada.

Mr. Henry J. Bird, proprietor of the Bracebridge Woolen Mills, Bracebridge, Ont., informs us that his works are being run to their full capacity, and that the demand for his products is such that he will, during the coming summer, considerably enlarge his mill and add new machinery. His specialties are tweeds, blankets, flannels and yarns.

The Edmonton Electric Light Co., Edmonton, N.W.T., are installing an alternating 1,500 light dynamo, built by the Royal Electric Co., Montreal. This is said to be the largest alternating dynamo west of Port Arthur.

A local company has been formed at Oxford, N.S., for the purpose of supplying the town with electric lights. A building has been erected near the grist mill and the necessary machinery has been purchased. The poles are up and outside wiring has been done and Mr. C. F. Hill, of Amherst, has been engaged by the company to go to Oxford to do the inside wiring. The company has orders for 150 lamps now. —Moncton, N.B. Times.

The last car load of machinery has been delivered at Glenboro for the new flour mill. Mr. Cochrane anticipates that three weeks will see his mill running. The machinery, it is said, is as complete of its kind as could be procured, comprising cleaners, smutters and cockle-separators of the latest improved design. The engine is one hundred horse power, with a ten-foot fly-wheel, and it is calculated to put in later on, a dynamo, which will light the mill with electricity. The building will be heated by steam from the engine. —Winnipeg Commercial.

The Dominion Blanket and Fibre Company, Montreal, have had their factory equipped with an Eno Magneto watchman's clock, supplied by the Montreal Electric Company. This clock is invaluable as a self-recording time-keeper in factories and all establishments where large numbers of hands are employed.

Messrs. C. R. Whitehead, Thomas Pringle, Alexander Pringle and L. G. Craig, of Montreal, and H. M. Price, of Quebec, have formed a company and are now building a factory at Montmorency Falls, Que., for the manufacture of hosiery yarns. The mill will be run by water power obtained from the falls, and will contain 750 spindles. The principal machinery has already been ordered from England. Mr. Whitehead will be manager and Mr. Craig secretary.

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During the past season Mason & Sons' saw mill at Ottawa cut about 10,000,000 feet of dimension lumber, besides large quantities of shingles and laths.

The Gilmour chain works at Coaticook, Que., are being removed to Waterloo, Que.

The John Abell Engine and Machine Works, Toronto, is being incorporated with a capital stock of \$500,000, to take over the business heretofore conducted by John Abell, and build engines, boilers, mills, machinery, agricultural implements, bridges, yachts, etc. John Abell, Christian Abell and Henry Abell are to be the first directors.

Tenders are being called for the construction of the Nicola Valley Railway from Spence's Bridge to Nicola Lake, B.C.

The construction of the Kingston, Smith's Falls and Ottawa railway will be commenced next spring.

Messrs. Buell & Hurdman's sawmill at Ottawa will undergo extensive improvements. Several new water wheels are embraced in the scheme.

A new glass factory is to be erected in Windsor, Ont., for the business of Messrs. Iram, Ives & Co.

It is contemplated by the Masons of Kingston to build a new hall in that city next summer, to cost \$70,000.

Mr. F. Lingland, of Belleville, and Mr. McLaren, of Perth, Ont., are to erect a large cold storage warehouse at either Winnipeg or Calgary, in connection with a scheme of shipping meat to England.

Messrs. Clarke, Skilling & Co., of New Glasgow, N.S., and Boston, Mass., have purchased a site on the Miramichi river near Newcastle, N.B., and propose erecting a mill to cut spool wood.

The Keewatin Power Co. have commenced operations on their new water power improvements. Dams are to be constructed on the Winnipeg river, near the Lake of the Woods. Mr. W. Kennedy is engineer in charge.

The Port Credit Pressed Brick and Terra Cotta Company, with headquarters at Toronto, is being incorporated with a capital stock of \$50,000, to manufacture brick, drain, floor and roofing tiles, sewer pipe, etc. Warwick Wrench, Alex. Stewart and A. B. Armstrong are to be the first directors.

The Montreal Electric Company, Montreal, have been appointed agents for the province of Quebec for the Eco Magneto Clock Company, of Boston, Mass., of which Mr. Charles A. White is president and general manager.

Mr. J. A. Curtis, of New South Wales, who is now in Canada, has been in the lumber business for 30 years. During 1892, not one of the best years, about 22,000,000 feet of lumber was imported into New South Wales from Puget Sound and other United States ports. The object of Mr. Curtis' visit is to endeavor to arrange with British Columbia mills to supply Australia with lumber.

Rock emery millstones are rapidly coming into use. They are wonderful grinders. It would be strange if blocks of rock emery did not cut faster and last longer than anything else.

The Canada Machinery Agency, Montreal, of which Mr. W. H. Nolan is manager, has just installed the third Robb-Armstrong engine in the new Board of Trade Building in that city. This is a 60 horse power automatic, high-speed engine, and drives one of the dynamos for lighting the building.

Mr. W. H. Nolan informs us that the Canada Machinery Agency, of Montreal, of which he is manager, has just installed a 60 horse power Robb-Armstrong, high-speed engine and a Monarch economic boiler in the electric light station at Montreal Junction, and also a 25 horse power Robb-Armstrong engine in the furniture factory of Pelletier, Pruneau & Co., Montreal.

The Fenelon Falls Electric Light Co., Fenelon Falls, Ont., have given an order to the Royal Electric Co., Montreal, for a 500 light alternating dynamo and plant complete.

The Stayner Electric Light Co., Stayner, Ont., are installing a 500 light dynamo and plant, built for them by the Royal Electric Co., Montreal.

Jacob Steimmeller, Walkerton, Ont., who received first prize at the World's Fair for his exhibit of flour, will light his mill by electricity. The Royal Electric Co. have been awarded the contract for the necessary machinery.

The Gould Bicycle Co., Brantford, Ont., are moving their Toronto-warehouse to 99 Yonge street.

The Montreal Electric Company, Montreal, have just installed an Eco Magneto watchman's clock in the large silk factory of Messrs. Belding, Paul & Co., that city.

*Ingot Copper and Tin
Zinc and Brass Spelter
Antimony and Babbet Metal*

M. & L. SAMUEL, BENJAMIN and CO.

30 Front Street West, Toronto

ENGLISH HOUSE:
SAMUEL SONS & BENJAMIN
164 FENCHURCH ST., LONDON, E.C.

SHIPPING OFFICE
1 RUMFORD PLACE, LIVERPOOL

Machinists' Fine Tools

Drills, Chucks, Reamers, Etc.

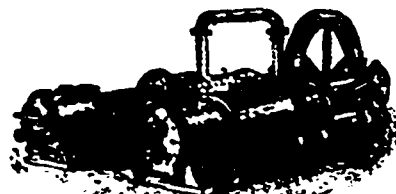
WILEY & RUSSELL
Screw Cutting

TOOLS

RICE LEWIS & SON, Ltd.

TORONTO

The Canadian Rand Drill Co., SHERBROOKE, QUE.



Duplex Compound Steam Air Compressor with Halsey's Mechanical Valves.

AIR COMPRESSORS

Of the Most Efficient and Economic:
Type—Straight Line,
Duplex, Compound, and Con-
densing.

THE RAND "SLUGGER" and "GIANT" AIR DRILLS

For Mines and Quarry Work.

SEND FOR CATALOGUE.

632 CORDOVA STREET, VICTORIA, B.C.

AGENCIES:

16 VICTORIA SQUARE, MONTREAL;
HALIFAX HOTEL, HALIFAX, N.S.

If contemplating transmission of power any considerable distance
write to us for estimates

The corporation of the city of London, Ont., will apply to the next legislature for authority to issue debentures to raise money to pay for the renewal of bridges, trestles and culverts on the line of the London and Port Stanley Railway; to issue debentures to raise money to purchase additional hydraulic and steam pumping machinery, and for authority to exempt from taxation for a period of ten years a cold storage warehouse which is to be erected in that city.

The Toronto Suburban Railway Company are applying for incorporation with a capital stock of \$250,000, to purchase and take over The City and Suburban Electric Railway Company and The Davenport Street Railway Company, and to operate the roads authorized to be constructed by the said company.

Improvements at the Shugsbury blanket mills at Brantford, at the new machinery being placed there, will, we are informed, make that factory probably the largest producer of blankets in Canada.

The B. Greening Wire Company, Hamilton, Ont., have published a calendar for 1894 very similar to that issued by them a year ago, which was so unique in appearance and useful to those who were favored with it. The characters upon it, printed with bold, large type, may readily be read from any part of a large office.

The Dennis Wire and Iron Works, London, Ont., call attention to the tubular steel bars manufactured by them for handling coal and dirt and pig iron, and for foundry and rolling mill use. We are informed that for hard wear, strength and durability they are simply unequalled; and though extra strong they are not heavy to handle.

The Briggs Manufacturing Company has been formed with a capital stock of \$1,000,000, with headquarters at Niagara Falls, Ont., to manufacture in Canada the Briggs patent printing press feeder. Mr. Eugene J. Barney, of Dayton, O., is president, Mr. James L. Morrison, of Toronto, vice-president, and Mr. Samuel J. Moore, of Toronto, secretary-treasurer. Of course the organization of this company in Canada, and the erection of works at Niagara Falls to manufacture the machine, is a direct result of the National Policy.

Mr. Alexander Gilson, who owns a large cotton factory at Marysville, N.B., has arranged to ship his manufactured cotton in bales direct from his mill over the Canadian Pacific railway on through bills of lading to Hong-Kong and the Chinese markets.

Fire in the tannery of Messrs. Spooner & Co., Montreal, on December 14 did damage to the extent of about \$5,000.

The Markham Weighing Truck Company, Markham, Ont., has been incorporated with a capital stock of \$3,000, to manufacture weighing trucks, etc.

Fire in the works of the Gananoque Spring and Axle Company, Gananoque, Ont., on December 15, did damage to the extent of about \$2,000.

The Ames-Holden Company, Montreal, is being incorporated with a capital stock of \$600,000, to take over the business of the old and long established boot and shoe manufacturing concern of the same name.

The Dominion Bag Company, Montreal, has been incorporated with a capital stock of \$125,000, to manufacture bags of every description. H. J. Rutherford, V.E. Mitchell, and W. F. Robinson are the directors.

The Citizens Gas Control Company is being incorporated at Montreal with a capital stock of \$125,000 to manufacture governors and other appliances for regulating the pressure of gas, etc.

The Pneumatic Horse Collar Company is being incorporated at Montreal with a capital stock of \$100,000 to manufacture pneumatic horse collars and all kinds of harness, saddlery, etc.

The Tavistock Flour Mill Company's flour mill, at Tavistock, Ont., was destroyed by fire December 21st, together with 8,000 bushels of wheat contained therein. The mill cost \$23,000.

During the last season of navigation the Ottawa and New York Lumber Company carried 46,500,000 feet of lumber to American ports from the saw mills at and near Ottawa.

Fire in the factory of the Dominion Straw Goods Manufacturing Company, Montreal, on December 23, did damage to the extent of about \$5,000.

The Toronto Bakers' Supply and Manufacturing Company, Toronto, is being incorporated with a capital stock of \$15,000, to manufacture the Hubbard patent portable bakers' oven, etc. Horace Thorne, C. M. Thorne and J. J. Warren are to be the first directors.

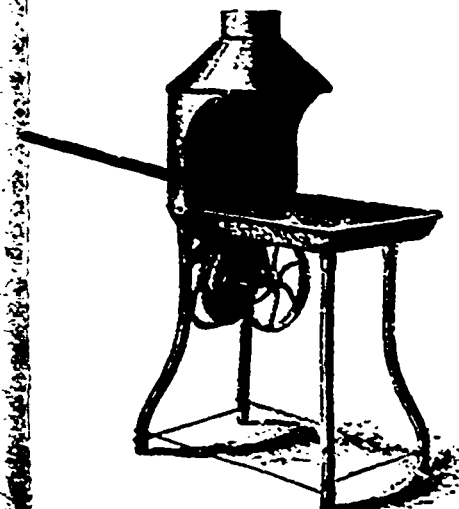
The French River Boom Company, with a capital of \$40,000, is applying to the Ontario legislature for a charter for the purpose of facilitating the transmission of lumber down the French River.

The Sturtevant IMPROVED PORTABLE FORGES

TWENTY-FIVE SIZES AND STYLES

HAND POWER AND BELT POWER **Hand Blowers**

For FORGES



The Sturtevant STEAM FANS

FOR

Boiler Fires

FORCED OR INDUCED DRAUGHT

THE STURTEVANT Blowers and Exhausting

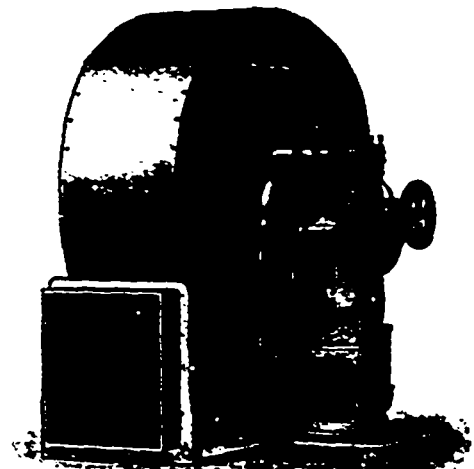
FANS

Known as the Monogram Pattern. For Blowing Boilers and Fires, Exhausting Dust and Gases.

SEND FOR CATALOGUES

B. F. STURTEVANT CO.

BOSTON, MASS., U.S.A.



The Peterborough Navigation Company, now being incorporated at Peterborough, Ont., with a capital stock of \$40,000, will build a fine steamer to ply to and from that town on the Ontonabee river, with capacity to carry 500 passengers. Mr. R. S. Davidson is secretary of the company.

Many of our readers know that at Chambly Canton, Que., is a large woolen factory that produces most excellent lines of staple and fancy fabrics. Many of the woolen manufacturers of Canada know that Mr. Mende, herein alluded to, is a manufacturer of most reliable dyes, and therefore it is appropriate to publish what the dyer of the Chambly Canton factory says about the Mende dyes. He says: "I have been using lately an article prepared by A. P. Mende, 14 Water street, N.Y., which in my experience in the business has been long looked for by dyers in Canada and elsewhere, namely, a one dip, fast, clean and cheap black on loose cotton. It gives me great satisfaction; is clean in mixes, and good in solid colors; also stands long fulling very well, and I have no trouble with it whatever on our fancy goods, and any one trying it will, I think, find it a great help to them."

Toronto Carpet Mfg. Co., Ltd.

TORONTO

Were awarded Gold Medals at the WORLD'S COLUMBIAN EXHIBITION, CHICAGO, for their **INGRAIN** and **"IMPERATRIX" AXMINSTER**

CARPETS

SEVEN QUALITIES OF INGRAINS
KENSINGTON ART SQUARES

Axminster Mats, Rugs, Squares, Body
Border and Stairs.

Esplanade and Jarvis Sts., - Toronto

**THE CANADIAN
COLORED COTTON MILLS CO.**

FALL, 1893

Ginghams, Zephyrs, Cheviot Suitings, Flannel-ettes, Dress Goods, Skirtings, Oxfords, Shirtings, Cottonades, Awnings, Tickings, Etc.

NOW READY : See samples in Wholesale Houses

D. MORRICE, SONS & CO., Agents
MONTREAL AND TORONTO

The Toronto Fringe and Tassel Co.
19 FRONT ST. WEST, TORONTO
Manufacturers of
SUSPENDERS & SUSPENDER WEB

FRINGES, TASSELS, CORDS
Upholstery Trimmings and
UNDERTAKERS' TRIMMINGS

Mr. A. C. Neff, Toronto, a chartered accountant of long experience and well and favorably known among the business men of this city, is offering his services to any needing the assistance of an accountant, auditor or trustee. If his help is needed, write him to that effect.

Messrs. Menzie, Turner & Co., have taken over the business of Messrs. A. R. McKinlay & Co., Toronto, and will continue the manufacture of window shades, etc.

The woolen mill at Innisville, Ont., recently operated by Messrs. J. I. Fairgreive & Son, has been taken over by Mr. J. B. Ferguson, who is confining his production chiefly to clothes for farmer-use.

It is rumored that the McLaren-Ross mill near New Westminster are passing, with many of the valuable accompanying timber limits, into the hands of a syndicate of British and American capitalists. It is generally hoped that the news may prove correct, as the mills are amongst the most valuable and best appointed in the Province, although they have been sadly long unused.

Fawcett's foundry at Sackville, N.B., was destroyed by fire December 24. Loss about \$75,000. Forty men are thrown out of work.

Application is being made for the incorporation of the Woolstock (Ont.) Street Railway Company, the intention being to build an electric street railway in that town. Mr. D. W. Karn is one of the provisional directors

A. W. Hepburn's saw mill and sash and blind factory at Pieton, Ont., were destroyed by fire December 15. Loss about \$15,000.

The corporation of the town of Listowel, Ont., will apply to the forthcoming legislature for authority to pay a bonus of \$2,500 to the Morris-Field-Rogers Company, piano manufacturers, and to Messrs. Gillies & Martin, iron founders, a bonus of \$2,000, in aid of their respective manufacturing industries located in that town.

GUELPH WOOLEN MILL CO., Ltd.

GUELPH, - - ONTARIO
MANUFACTURERS OF

**Hosiery, Fingering and Worsted Yarns,
EIDERDOWN FLANNEL, Etc.**

FERGUSON & PATTINSON

PRESTON, - - ONTARIO

MANUFACTURERS OF

FINE AND MEDIUM TWEEDS

BRODIE & CO.

HESPELER, ONT.

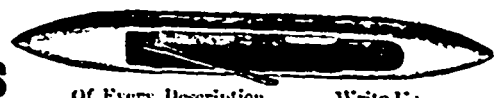
Manufacturers of **Flannels, Tweeds and Serges**

Selling Agents, MILLICHAMP, COYLE & CO., Montreal and Toronto

WOONSOCKET SHUTTLE CO., 157 North Main Street, WOONSOCKET, R.I.

MANUFACTURERS OF

Power and
Hand Loom
SHUTTLES



Of Every Description. Write Us.

**WE MANUFACTURE
FANS FOR NOTHING**

but hard work, and having had twenty years experience we know how to get steam out of **Dye Houses** and the largest possible product from **Dry Rooms**

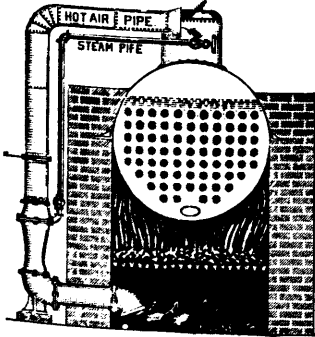
Our Compound Wheel is the most powerful in the world, and if we can't be of actual value to you we don't want your money. No CUSTOMS DUTIES on our Fans. Send for Circular and Information **BARNEY VENTILATING FAN CO., 70 Pearl St., Boston, Mass., U.S.A.**

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art paper
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3-4

Messrs. Ritchie & Ramsay, New Toronto, have sent us a very attractive souvenir consisting of a book of samples of the duplex art and cover papers manufactured by them. These papers are made in a great variety of colors and in sizes to meet the requirements of the trade. Their specialties include porcelain enamel book in rose, cream and white shades; coated book and half tone art papers in cream, white and tinted; coated chromo papers in white and cream shades to stand from four to twelve printings; tinted and duplex coated cover and art papers; tinted and duplex translucent Bristols, etc. These goods are all of superior quality, equal to any made in any other country.

EARLE'S STEAM AND AIR INJECTORS.

The accompanying illustration is of S. R. Earle's combined air injector and exhauster, showing an upright machine applied at the side of a brick set tubular boiler, but which can be applied at the front of the boiler or batteries of boilers by cutting a round hole through the front iron plate or in the corner of the brick work.



The readiness with which steam and air mix, and the absorption of one by the other makes them an economical agent for creating a forced draft when a properly constructed machine is employed to control them. A device to fill the wants in almost all industries, when the fact is understood, that chimney draft under the most favorable conditions and with every assistance that altitude an

temperature can supply, the power of the draught will not exceed two inches on a water column, therefore it becomes essential to have a blast for the following reasons:—

Chimney draught is uncertain for certain kinds of fuel, in fact at times for any fuel. Sometimes the chimney will draw well, then again when the wind shifts it is impossible to fire without great

waste; to overcome this difficulty it is necessary to have a properly constructed blower, and for convenience and economy, nothing equals a first class steam and air under grate blast, as it is easily controlled and is produced with the least expenditure of steam.

The principle which recommends the blast is the greater heat which can be maintained in the furnace, and the consequent greater rapidity with which the heat is absorbed due to the difference between the temperature in the furnace and the temperature of the body to be heated.

It is well known that with a forced draught an equal amount of coal may be burned on the grates, but the greater the draught and consequent increase in combustion, the greater must be the rarefaction above the fire to maintain the same.

The effect of this is the expansion of the gases, and as expansion always creates cold, or in other words transforms a certain amount of heat into speed, this amount is lost from doing useful work, with a blower this rarefaction above the fire is avoided by a judicious regulation of the damper in the stack, while the amount of air for combustion is regulated or supplied independently as may be desired.

The result which therefore may be attained in a high degree by the use of the blower is economy in fuel, due to more perfect combustion, and a full utilization of the heat produced. Besides the above advantage in the combustion of fuel (which applies to any fuel), a much greater advantage results from the use of the blower, as providing a means of burning low-priced fuel which otherwise could not be used, and the consequent economy in the price of fuel.

As a matter of expedience or convenience, the blower offers a means of an increase steam supply or boiler power which may be increased 40 per cent, thereby obviating the necessity of purchasing new boilers.

For gas producers the injector is made stronger and uses more steam than for boiler service, as the steam and air requires to be forced through a bed of fuel from four to six feet deep, and deliver the gas at the points desired for combustion. The blower is under perfect control, and the amount of gas can be immediately increased or diminished as may be required.

Some of the points of excellence claimed for the Earle apparatus are: It is independent of engine and machinery; it provides a strong blast with but slight expenditure of steam; it is reliable,

Hamilton Cotton Co.

HAMILTON, - ONTARIO

DYERS, BLEACHERS

AND MANUFACTURERS OF

Warp Yarn, in Beam, Chain or Skein. White or Colored, Single and Double Yarns, Cop Yarn, Single and Double Hosiery Yarn in all Colors including genuine "Fast Black."

PAUL FRIND & CO., Toronto,

Selling Agents for Beam Warps

WRITE TO THE **Paton Manufacturing Co.**

SHERBROOKE, QUE., for

WORSTED KNITTING

AND

FINGERING YARN

NEW One Dip Black for Wool

One Dip Black for Cotton

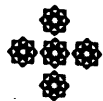
Suitable for Raw Stock, Yarn and Piece Goods.

These Blacks deepen in the atmosphere and in fulling, and dye very economically. Manufacturers and Dyers will do well to send for a sample bbl. of each.

ALEX. P. MENDE, 14 Water Street, NEW YORK

HEMOLIN

Patented



THE Cheapest Black-producing Dye for Wool on the Market. Has all the advantages of Logwood, with none of its inconveniences. Can be Dyed in one Dip, or may be employed in Wool Dyeing as a self-color, or in combinations, wherever Logwood is used, by following practically the same recipes.

MANUFACTURED BY

WM. J. MATHESON & CO., Limited, NEW YORK, U.S.A.

423-425 ST. PAUL STREET, MONTREAL

and under perfect control of the fireman, convenient to the fire; it makes but very little noise; the steam used is not lost, but is converted into hydrogen gas, a good fuel, in passing through the fire; it does not require belts, counter-shafts or pulleys; it does not require oil, and is free from the annoyance of hot boxes and slipping belts, and it will burn hard coal screenings, the waste at the mines (the most useless), soft slack, breeze, cannel coke and all classes of coal that cannot be used with chimney draught.

This apparatus is manufactured by S. R. Earle, Belleville, Ont., who will take pleasure in sending an illustrated pamphlet containing fuller particulars upon application.

Following is a list of some of the manufacturers in Canada who have adopted the Earle steam and air injector and combined air injector and exhauster:—In Toronto, The Gerhard Heintzman Piano Co., J. D. Nasmith (2), Wilson Publishing Co., J. G. Gibson, Toronto Electric Light Co., Northey Manufacturing Co., St. Lawrence Foundry Co., Consumers' Gas Co., T. Eaton Co., Grand Trunk Ry., O. Newcombe & Co., Charles Boeckh & Sons, Wm. Kidd & Co., Ellis & Keighley, Dick, Ridout & Co., Smith & Co., Kemp Manufacturing Co (2), Doty Bros. & Co., Worsted & Braid Co., Langmuir Manufacturing Co., and Upper Canada College (3). In Belleville, Ont., W. Alford, Belleville Gas Co. (2), I. S. Carman and G. & J. Brown Manufacturing Co. Brighton, Ont., A. C. Miller & Co. Galt, Ont., Goldie & McCulloch. Kingston, Ont., Kingston Hosiery Co. Picton, Ont., A. C. Miller & Co. (2). Deseronto, Ont., The Rathlum Co., and scores of others.

THE "PENBERTHY" AT THE FAIR.

Allusion has heretofore been made in these pages to the exhibit of the Penberthy Injector Company at the World's Columbian Exposition at Chicago. They also furnished a number of their injectors for use on a battery of boilers which were a part of the power plant of the Exposition. We are informed by the Penberthy Company that shortly after the opening of the Exposition, the engineer in charge began having some trouble with his pump and used the injectors to supply the boilers while the pump was undergoing repairs. The injectors worked so perfectly and required so little attention, that it was decided to use them thereafter in preference

to the pump as the regular feeder for that battery, and accordingly these injectors were in continuous service during the remainder of the Exposition, and were used in preference to the pumps during the competitive tests, as will be seen from the letters which follow this. At the close of the Exposition, when the company asked for the injectors that they might be returned with the goods comprising their exhibit, they were met with a very urgent request to allow at least part of them to remain in use until the final removal of Machinery Hall. The request was complied with, and four of these injectors will be in continuous use in their present location for at least six months to come. This machine, which was used steadily throughout the Fair as a boiler feeder, is the only one, we are informed, which was left in operation after the close of the Fair by special request of the authorities.

The following letter regarding this matter explains itself:

World's Columbian Commission, Office of Director General.

Chicago, Nov. 4th, 1893.

Penberthy Injector Co., Gentlemen:—We, the undersigned, having been employed by the World's Columbian Exposition in their large boiler rooms in our various capacities at work connected with the Heine boilers which are connected up with Penberthy Automatic Injectors and one Knowlcs and one Blake pump, both pumps taking from hot wells and working through heaters while the injectors work with the normal temperature.

We have given both styles of boiler feeders a thorough test and we do unhesitatingly testify in favor of the Penberthy Injector as a superior boiler feeder to the above pumps as to economy and utility, and as a proof of the same, that during the last two months of the exposition we have used the injectors almost exclusively in feeding the eight Heine boilers we were looking after.

We also used the injectors to feed the boilers while making the competitive test of said boilers. These injectors have never given us a moment's trouble or annoyance, nor have they refused to work when called upon, and we do consider them superior to any boiler feeder that we have ever used in simplicity of construction, ease of operating, promptness of work and general efficiency. F. D. FARR, chief engineer, 2937 Wentworth ave., Chicago; E. E. MOSS, 5714 La Salle street, Chicago; Samuel H. McEwen, 4047 State street, Chicago; M. J. Durkan, 8558 Superior street, S. Chicago.

Crescent



Brand

Brunner, Mond & Co., Ltd.

NORTHWICH, ENG.

PURE ALKALI

Guaranteed 35 Degrees.

Equal to 98 per cent. Carbonate of Soda. The Strongest and Purest form of Soda Ash in the Market

And therefore the most economical for the use of

Printers, Bleachers, Wool Scourers, Dyers,
Glass, Paper and Soap Makers

CONCENTRATED CRYSTAL SODA

Purest and Cheapest Form of
WASHING SODA

WINN & HOLLAND, Montreal

Sole Agents for the Dominion of Canada

Jas. A. Cantlie & Co.

General Merchants and Manufacturers' Agents

ESTABLISHED 22 YEARS.

COTTONS—Grey Sheetings, Checked Shirtings, Denhams, Cottonades, Tickings, Bags, Yarn, Twine, etc.

TWEEDS—Fine, Medium and Low Priced Tweeds, Serges, Cassimeres, Doe-kins, Etoiles, Kerseys, etc.

FLANNELS—Plain and Fancy Flannels, Overcoat Linings, Plain and Fancy Dress Goods, etc.

KNITTED GOODS—Shirts, Drawers, Hosiery, etc.

BLANKETS—White, Grey and Colored Blankets.

Wholesale Trade only Supplied.

Albert Building, 290 ST. JAMES ST., MONTREAL

20 WELLINGTON ST. WEST, TORONTO

Advances made on Consignments. Correspondence Solicited.



S. Lennard & Sons

DUNDAS, - - - ONT.

Patentee of "ELYSIAN" SEAMLESS HOSIERY.

And LADIES' NURSING VESTS

MANUFACTURERS OF

Plain and Fancy Hosiery

CAPS, TOQUES, SASHES,

And Ladies' Natural Wool and Summer Underwear.

Represented in Eastern Ontario, Quebec, Nova Scotia, and New Brunswick.

By **ANDREW BELL, Montreal**

THE HAWORTH BELTING CO.

MANUFACTURERS

OFFICE AND FACTORY: 9 AND 11 JORDAN STREET

TORONTO

THE LONDONDERRY IRON CO., Ltd.

A. T. PATERSON,
President and Man. Dir.

JAS. PHYMISTER
Secretary.

MANUFACTURERS OF

**PIG IRON, PUDDLED BARS,
BAR IRON, NAIL PLATES,
WATER PIPES, ETC.**

OFFICE, **MONTREAL,** WORKS, **LONDONDERRY, NOVA SCOTIA**

PICTOU CHARCOAL IRON CO., Ltd.

BRIDGEVILLE, NOVA SCOTIA

WORKS: **Bridgeville, N.S.** HEAD OFFICE: **New Glasgow, N.S.**

Manufacturers of all grades of

CHARCOAL PIG IRON

SUITABLE FOR

CAR WHEELS, CYLINDERS, Etc.

NOVA SCOTIA STEEL AND FORGE CO. Offer Polished Steel Shafting as per Following List

PRICE LIST. POLISHED STEEL SHAFTING. Every Bar Guaranteed Straight and True to size, within $\frac{1}{16}$ of an inch.

Nominal Size of Shaft.	Actual Size of Shaft.	Weight per ft.	Price per lb.	Nominal Size of Shaft.	Actual Size of Shaft.	Weight per ft.	Price per lb.
1½	1½	4.13	4½ cts.	2½	2½	18.01	4 cts.
1½	1½	5.01	"	3	2½	22.59	"
1½	1½	5.04	"	3½	3½	26.00	"
1½	1½	7.40	"	3½	3½	30.04	"
2	1½	9.83	4 cts.	4	4	42.33	5 cts.
2½	2½	12.53	"	4½	4½	53.57	"
2½	2½	15.55	"	5	5	66.13	"

BOXING EXTRA AT COST

Shafts of our Standard Sizes up to 3 inches in diameter we keep in stock, in lengths from 12 to 18 feet, varying by 2 feet. On orders from stock cut to other lengths, we charge for length from which we cut. Prices for Special Sizes, varying from list of actual sizes given above, will be furnished upon application. All orders filled as per Actual Size column unless otherwise specified.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

This is not Hot Polished or Cold Rolled Steel, and will not spring when keyseated. If your Wholesale Hardware Firm cannot supply you, write direct to the Works, New Glasgow, Nova Scotia.

A. & E. LOIGNON

Civil Engineers

And Builders of

BRIDGES AND IRON BUILDINGS

FOR MANUFACTURING PURPOSES

Structural Iron Material Kept in Stock

DESIGNS, ESTIMATES and SPECIFICATIONS - -

7 Place d'Armes, MONTREAL

FOR ▶ ▶ ▶

Railway and Contractors

SUPPLIES

SEND TO **C. & J. BROWN MFG. CO. (Ltd.)**

BELLEVILLE, ONT.

Bridge Builders, Engineers, Boiler Makers, Machinists, and Foundrymen

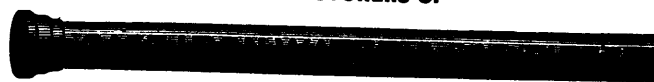
MANUFACTURERS OF

Frogs, Diamond Crossings, Switches, Hand Cars, Lorries, Velocipede Cars, Jim Crows, Track Drills, Semaphores, Rail Cars, Double and Single Drum Hoists, Etc.

DRUMMOND-McCALL PIPE FOUNDRY CO.

LIMITED

MANUFACTURERS OF



"SPECIALS," HYDRANTS, VALVES, Etc.

Offices, - New York Life Building, Montreal
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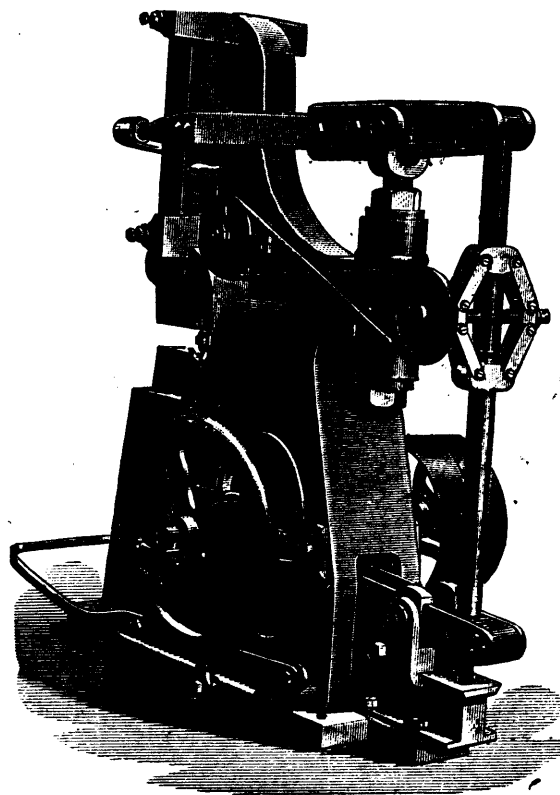
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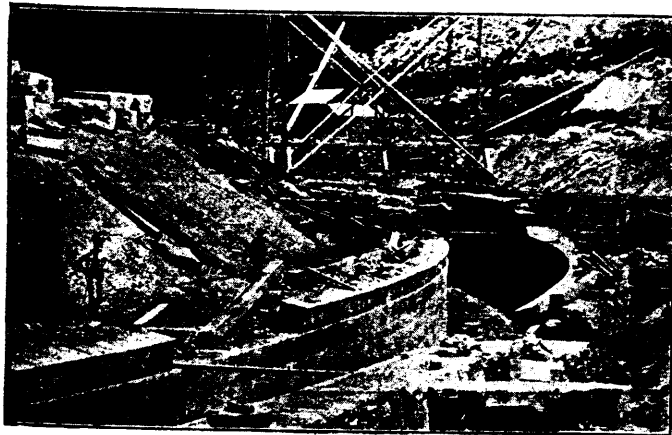
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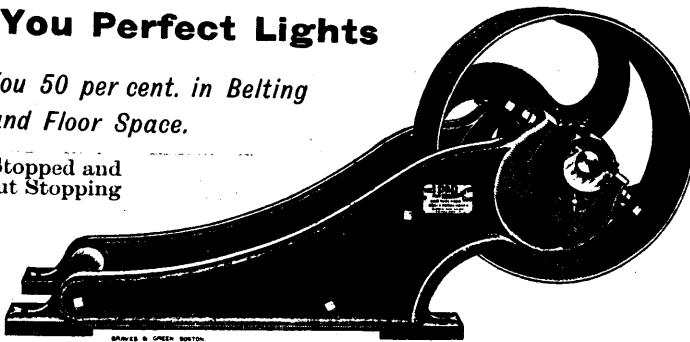
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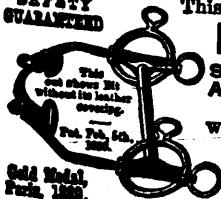
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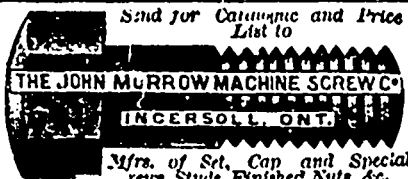
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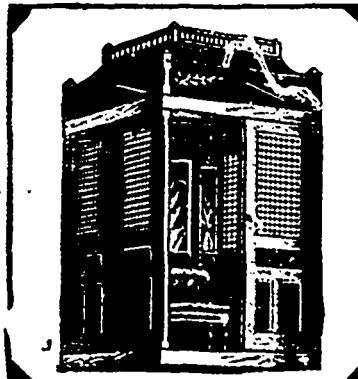
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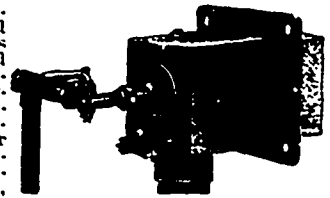
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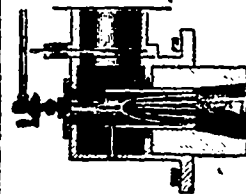
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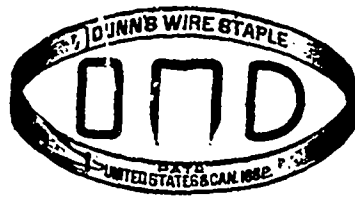
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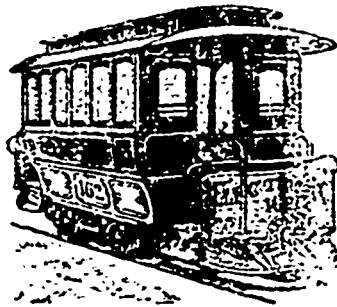
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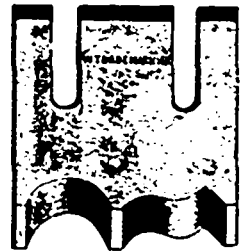
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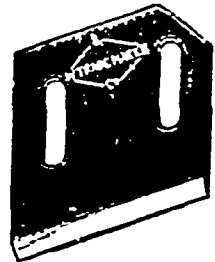
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The report was adopted and the retiring Directors unanimously re-elected. The Board of Directors are now constituted as follows:— James Goldie, Guelph, pres., W. H. Howland, Toronto, vice-pres., H. N. Baird, Toronto, Wm. Bell, Guelph, Hugh McCulloch, Galt; S. Neelon, St. Catharines, George Pattinson, Preston, W. H. Story, Acton, J. L. Spink, Toronto, A. Watts, Brantford, W. Wilson, Toronto.

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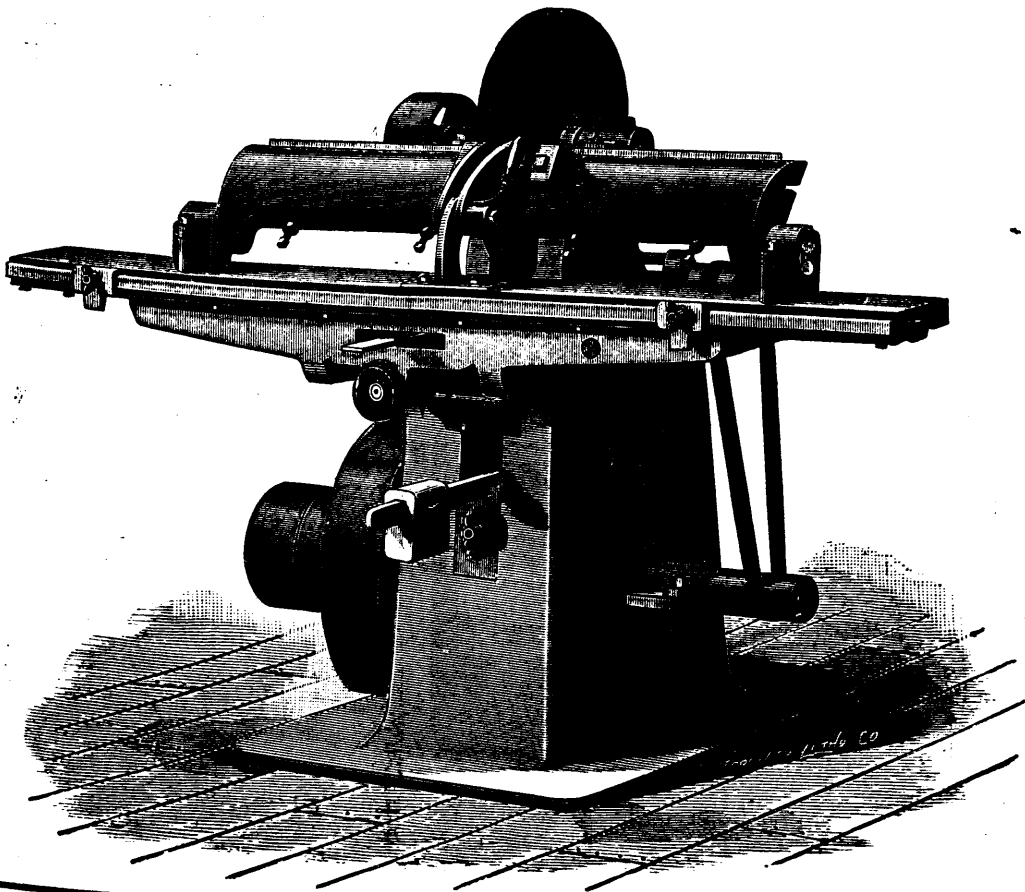
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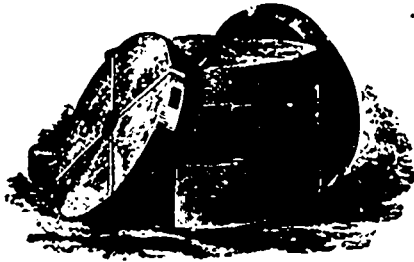
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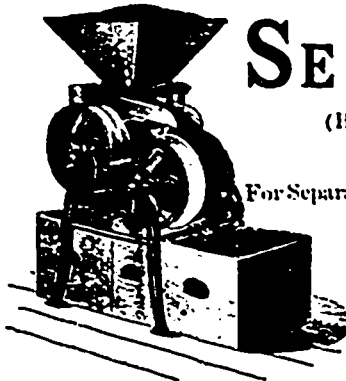
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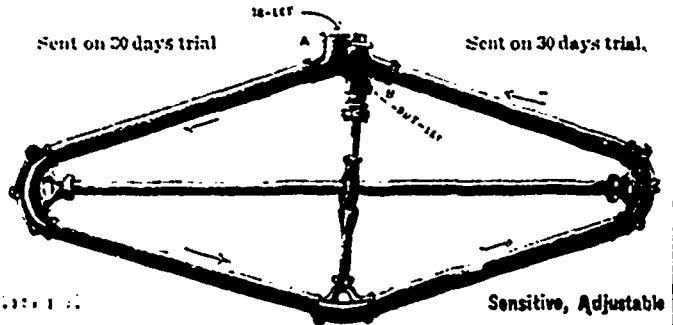
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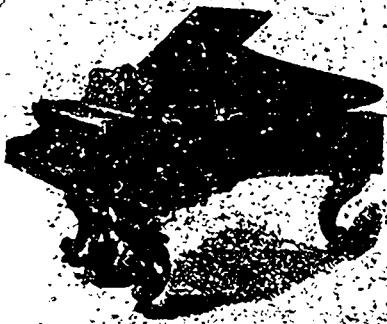
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