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No. 3.

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THE TORONTO EXHIBITION.

The Toronto Industrial Exhibition Association have assigned the Canadian Manufacturers' Association their accustomed office room in the Press Building on the Fair Grounds, and I take pleasure in announcing that it will be thus occupied during the two weeks of the forthcoming Fair beginning on September 3. All members of the Manufacturers' Association will make this their head-

quarters during the Fair; and all Canadian manufacturers, and American manufacturers, and all other manufacturers, and all their friends—their sisters and their cousins and their aunts are invited to make use of the accommodations which will be there provided. As usual, the latch string will hang on the outside of the door; and on the inside will be found conveniences which will be appreciated under the circumstances. The Fair promises to be exceedingly interesting to all concerned, and particularly so to manufacturers. The management are doing all within their power to make it thus, and they will undoubtedly succeed, as they always do. The Toronto Fair is always of great pecuniary advantage to exhibiting manufacturers.

J. J. CASSIDEY, Secretary,  
 Canadian Manufacturers' Association.

SPECIFIC DUTIES.

Now that the Tariff Act has been passed and the Parliament adjourned, many of the enemies of protection are pointing to items in the tariff wherein the duties are as high or higher than in the old tariff, denouncing the Government for not having made a nearer approach to free trade, and declaring that the legislation was not in the best interests of the country.

It is a fact that the tariff bill, brought down to the House of Commons by Finance Minister Foster on March 29, showed a very considerable and important departure from the old tariff in that ad valorem duties were substituted for specific in many instances; and it is also true that in the final arrangement, as shown in the new tariff, this unwise change was amended, and the system of specific duties reinstated as far as possible; but this shows that although the Government may have been led astray by the clamor of enemies for an abandonment of the specific system, sober second thought and better councils prevailed before the arrival of the supreme hour, and that it was thought best to cling to the spirit of the National Policy. In doing this the Government have proved themselves true to the trust imposed upon them by the people; and they are to be thanked and congratulated upon what they have done. We are aware that some features of the new tariff are yet incongruous and not at all calculated to encourage the manufacturing industries of the country affected by them; but we have no doubt that upon proper representation being made they will be rectified.

The great difference of opinion regarding the tariff question between the Government and their supporters on the one side, and the Opposition upon the other, was and is whether the proper system for levying duties should be specific or ad valorem. We are free to confess that in theory the ad valorem system seems the more equitable, but experience has proved that the enforcement of that system is impracticable and impossible. It would not be impossible if as regards any particular article the circumstances of production were identical in all countries from which it might be imported, and if all men were honest; but as such conditions never prevail, the idea is Utopian. The prime requisite in any tariff system is that it shall be possible that the duties imposed may be collectible. If all

imports are to bear an equal proportion of the burden the natural way to ascertain this proposition would be by the ad valorem system; but experience teaches that the ascertainment of the value of the articles imported is usually attended with much difficulty, and is practically impossible. It is impossible to adhere rigidly to any fixed rule in levying duties; and certainly that which invites perjury and facilitates fraud is the least desirable one.

One of the staunchest and most influential Democratic journals in the United States, the Philadelphia Record, discussing this question, says:—

In all the tariffs of the world the specific system of duties has been adopted because there is less opportunity for fraud and more certainty in the collection of the revenues under it than under the ad valorem plan. This is the result of long experience in commercial nations that collect large revenues from customs. To such perfection has the system of specific duties been brought by France, Germany, and other governments of Europe that ad valorem rates are scarcely known in their tariffs.

It is possible that our statesmen have so high a degree of confidence in the official integrity and mercantile honor prevailing in this country that they do not apprehend any frauds upon the customs by evasions of ad valorem duties. Unhappily there is small warrant for so cheerful an assumption. It is probable that more frauds have been committed upon the customs of the United States within the last twenty-five years than upon the customs of the whole of Continental Europe, excepting Spain and Russia, within the same period. Nearly all these frauds have been committed in undervaluations of imports by connivance of custom-house officials and importers under the ad valorem system. Under specific duties, on the other hand, frauds can be committed only in false weighing or counting, of which the effects on the revenues are very trivial. But the practice of fraudulent undervaluations has caused great loss to the Government as well as to honest merchants.

It is not charged or intimated here that the standards of official and mercantile integrity are lower in this country than in Europe. But the temptations and opportunities to commit frauds upon the revenue are far greater under the ad valorem system than under the specific plan which exists in most other governments. Besides this, the specific system is less costly in dispensing with many highly salaried boards of custom-house appraisers. On the other hand, with more appraisers, there are no fewer weighers under the ad valorem system. But it would be unwise to arbitrarily push either of these methods of collecting revenues from customs to an extreme. There are some classes of imports that fall easily and conveniently under the specific plan, and there are others that fall properly under the ad valorem plan. That is the best revenue tariff which most judiciously discriminates in the application of these two forms of custom-house taxation.

#### **STRIKERS AND SYMPATHISERS.**

Many long days after the ruction caused by Mr. Debs and the American Railway Union had subsided, and business had resumed its customary channels, the Toronto

Trades and Labor Council passed a resolution sympathizing with the strikers and pledging to them all the moral support they happened to have on hand at the time. Sympathy is a good thing, and moral support is a good thing, and no doubt that which the Toronto Council proffered their Chicago friends did quite as much good, even at the late hour at which it was tendered, as it would have had at the time when anarchy reigned in Chicago and all law set at defiance. During that eventful epoch, labor unions all over the country considered it the correct thing to pass resolutions of sympathy and moral support; and while we might have differed somewhat with those who passed them as to the propriety of doing so, when such action might be viewed in the light of adding fuel to an already too hot fire, allowances were to be made for enthusiasm in upholding what the participants honestly believed was a just cause. We are of the opinion that could it have been possible for the labor organizations of the country, excepting, perhaps, those in Chicago, to have foreseen the consequences that followed the unfortunate excitement, and to have known the character of the men who engineered it, they would not have been so ready to offer their sympathy and moral support, without which Mr. Debs could never have achieved the notoriety that he gained. This being so it is somewhat remarkable that a body of sensible men such as compose the Toronto Trades and Labor Council should have showed up at such a late day with their sympathetic resolution.

In a newspaper interview with Mr. Debs in Chicago on July 4, among other unwise statements attributed to him he was reported as saying that the first shot fired by the United States troops at the mobs then holding high carnival in Chicago and other places in the West, would be the signal for a civil war; that bloodshed would follow, and that 90 per cent. of the people of the United States would be arrayed against the other 10 per cent.; that in his opinion there was a probability that the trouble might be averted—that it rested solely with others than him and his organization to bring it about, and that "the general managers must and shall succumb." Up to the breaking out of the trouble caused by Mr. Debs and his A. R. U., he was an unknown person to all but a small fraction of the American people, and, considering the diversity and extent of the railway interest of that country, he could not possibly have been known, except by name to more than one in a hundred of those who were members of the organization of which he was president. Without consultation—that is, without that degree of consultation that in ordinary repress. 'ive forms of government would be considered necessary, he, in effect, issued a declaration of war, and asked his subordinates to give him their support. He put himself and his cause against the railroad managers, who had declared that they could not, at his direction, cease using the cars of the Pullman Company, thus transferring, at his own volition, the contest from the originating cause, and he it was who stated that there could be no end to the war except in the defeat of those against whom he was waging his contest; and that if there was any interference on the part of the United States officials, whose sworn legal duty it was to preserve the public peace, a civil war would be started which would drench the contin-

ent in blood. He did not propose to retreat himself. He had, as he said, burned his bridges, and if he could not secure the ends he wished by those engaged in the strike, he obviously intended to extend its limits, while, no matter what the provocation might be, the least forcible act on the part of the United States officials while seeking to maintain the public peace would, if Mr. Debs was capable of making the change, transform the strike into an insurrection.

Mr. Debs, as we all know, went up like a rocket in public notoriety, followed by an equally sudden plunge into obscurity; but in the brief period of his ascendancy he accomplished more injury to the cause he misrepresents than can be made good by years of well directed effort.

The labor organizations, like any other associations that from time to time find it necessary to adopt an aggressive policy, and that have vigilant and powerful opponents to meet, need to be controlled by men of remarkably good sense and foresight. Organizations are formed, such, for example, as the Knights of Labor, that have an immense membership, and, as experience proves, a powerful influence, and yet, after a little while, these combinations are weakened and disintegrated simply because those in charge of them disgust their followers by their obvious incapacity and by the loss and suffering caused by their blunders.

After such great strikes such as this here alluded to; that of the Missouri Pacific in which that now unknown person, Martin Irons; and the freight handlers' strike in New York city, it is found impossible for the labor leaders to soon again enter into another contest simply because their followers cannot be depended upon to obey their orders. These followers have found that the orders are not based upon any well considered policy; that they are more likely to lead to defeat than success, and that defeat means to the followers exceedingly serious consequences. After a great strike there is frequently a cessation of labor efforts for months, and some times for years, not because of exhaustion of resources, but simply on account of the frittering away, until it is completely gone, of the influence of the labor leaders.

In England the labor organizations are far more advanced in the quality and character of those who formulate and execute their respective policies, and, although strikes on a large scale now and then occur in Great Britain, the contests are carried on with much more discipline and determination than in the United States, and are, on the whole, more frequently attended with success, so far as the labor organizations are concerned, because of the shrewdness and general ability of those in control. The loyalty of the rank and file to those who have been put in charge of their affairs is no greater there than it is on this side, perhaps not so great, but the leaders there do not, to the extent that they do here, lead their followers into the misery of defeat, with its results of terrible personal loss and privation. The labor leaders are much more dreaded by the representatives of the capitalist element in England than the American labor leaders are dreaded by the great employers in the United States, for the reason that the former realize that they are contending with men of ability, while the latter appreciate that the

heads of labor organizations on this side are too often merely blatant agitators, with knowledge neither of present conditions nor future possibilities.

#### THE EMPIRE'S MISCONCEPTION.

Commenting upon the American tariff bill while it was pending in the Senate, The Toronto Empire said:—

The American press has roundly denounced the British House of Lords as not representative of the people, and inimical to the public welfare, but the House of Lords was never guilty of the disreputable disregard of the needs of the people which can be laid at the door of the American Senate. The members of the House of Representatives are elected by the popular vote, and they, of all men in Congress, should have a thorough knowledge of the wants of the people whom they represent. When the tariff reform measure was presented to them they passed it, feeling assured that it was such legislation as would restore business activity and relieve the depression under which the country languished, but the Senate, an unrepresentative body so far as the people are concerned, for it is an appointive body set about undoing what the people's representatives in the House had done with the approval of the whole country. They have not only mutilated the measure beyond recognition almost, but have systematically delayed its passage until public patience is well-nigh worn out. But the worst scandal of all was revealed when the sugar schedules were under discussion. It was then shown that many of the Senators, trading upon the knowledge they gained in committee on the bill, speculated in sugar on the New York Stock Exchange, and they managed it so that the market went up and down at their will, they pocketing the profit. And not one of the culprits has been punished for this gross breach of privilege.

The "disreputable disregard" of the needs of the American people with which The Empire charges the Senators who attempted to defeat the free trade features of the tariff bill consisted in their endeavouring to prevent the utter destruction of that system of tariff protection to American manufacturing enterprises which had prevailed for so many years under Republican rule, and which had lifted the United States to a degree of prosperity that was the envy of the world. Under the American system the Senate is a co-ordinate branch of the government, and has rights and privileges that cannot be curtailed, and it is noticeable that The Empire, that never has a word to say against the British House of Lords, or against the Canadian Senate, which possess almost identical powers, should denounce the American Senate for endeavouring to maintain and preserve a fiscal system which was the pattern upon which our own National Policy was constructed. How then can it be disreputable for the American Senate to do what they had a perfect right to do? And how can it be disregarding of the needs of the people when performing duties which the members were chosen to perform? In framing their constitution the people of the United States provided for a Senate the members of which were to be chosen in an entirely different manner from the members of the House of Representatives, and for the purpose of meeting precisely such emergencies as those which now environ the Congress. That particular form of government seems to suit the American people very well; and it certainly seems to prevent extravagant and ill-advised legislation that might otherwise be sprung upon the country.

It is noticeable, too, that The Empire should be so ready



to defend and uphold the free trade party in the United States Congress, denouncing those who uphold protection, while it is equally vehement in upholding the protectionist party in the Canadian Parliament, and in denouncing the Opposition. Surely consistency is a jewel.

We are told, too, by The Empire, that when the tariff reform measure, meaning the Wilson Tariff Bill, was presented to the House of Representatives, who had but recently been elected by the popular vote, "it was passed with an assured feeling that it was such legislation as would restore business activity and relieve the depression under which the country languished; but that the Senate, an unrepresentative body so far as the people are concerned, for it is an appointive body, set about undoing what the people's representatives in the House had done with the approval of the whole country." This is nonsensical, and betrays great ignorance both of the facts and also of the spirit of the American constitution. The Empire should know that the depression under which the United States has been languishing was brought about by the distrust of the future occasioned by the accession of Mr. Cleveland to the presidency, and by his official declaration that he would do all in his power to smash protection and establish as near an approach to free trade as possible. This declaration, backed by the action of the dominant party in the House, as exemplified by the Wilson Bill, did more to precipitate the financial and industrial depression in the United States than all other causes combined, if, indeed, they were not the sole cause. It was this that stopped the wheels of commerce, finance and manufacturing industry. It was this that applied the torch of discontent that has resulted in the violence and bloodshed that is even now afflicting that unhappy country. Certainly Mr. Cleveland and his free trade, protection-smashing Congressional backers, so recently elected by the popular vote, are chargeable with the deplorable state of affairs now distracting their country. They are the ones who sowed the seeds of the whirlwind that now distresses them.

The Empire volunteers the information that the American Senate is an unrepresentative body and an appointive body. This is not true. Each state of the Union is represented in the Senate by two members, it being the intention that in this manner the rights of the smaller states should not be ignored by the larger, the representation of Rhode Island, the smallest state, being equal to that of New York, the most populous. These Senators, however, are not appointed, as The Empire says, but elected by the legislatures of the States which they represent.

There is no excuse to be made for any corruption that may exist in the Senate growing out of the sugar question, and there is no necessity for The Empire to befool the issue by alluding to it. This journal is no friend to the sugar trust or to any other monopoly; and The Empire should remember that if American sugar lords have close friends in the United States Senate, at least one such lord is a Canadian Senator. Those who live in glass houses should not throw stones.

#### CANADIAN CANALS.

It was in view of the early opening of the Sault Ste. Marie Canal that Sir Charles Tupper, at the Dominion Day cele-

bration in London, made allusion in his speech to the completion of a system which enables Canada to have unbroken water communication from the Atlantic Ocean to the western shores of Lake Superior. This long chain of river ways, lake navigation and canals, was not realized without much engineering skill, enterprise and expenditure. The amount expended on the canals of the Dominion down to the 30th of June, 1893, formed a total of \$71,310,793.46, the total revenue received being \$9,850,578.56. The collection of this revenue, formerly in the hands of the Inland Revenue department, was by order-in-council of June 4, 1889, assumed by the Department of Railways and Canals. It is noteworthy that although in time, as in place, the Sault Sainte Marie canal, as now constructed, is the last link in the long chain, the attempt to establish communication between Lakes Huron and Superior was made before the close of last century, and, therefore, at a very early stage in the development of canalization in Canada. We gave an outline of the circumstances to which that attempt was due and of the consequences to which it led a couple of years ago, an interesting account of the undertaking having appeared in one of the Reports of the Dominion Archivist. In his paper, already referred to, on "The Canals of Canada," presented to the Royal Society in May, 1893, and published in the Transactions of that learned body, Mr. F. C. Keefer, C. M. G., C. E., returns to the subject. One of the North-West fur trading companies of Montreal cut a roadway, he tells us, 45 feet wide across the portage on the Canadian side of the Sault, and opened a canal upward of 300 feet in length, with a lock that raised the water 9 feet. This lock, 38 feet long and 8 $\frac{1}{4}$  feet wide, was built like a flume, the posts of which, at the lower end, were high enough to permit boats to pass under their caps. A windlass raised the lower gates, but the upper ones were folding, with sluices therein to fill the lock. Into this lock the boats were conducted by a planked flume 300 feet long and 6 feet high, and just the width of the lock itself. A round log cribbing extended the length of the canal, 12 feet wide, forming a towpath for the oxen that drew the boats up stream. As the lock dealt with only half the height (18 feet) of the fall, the surface inclination above was three feet in the thousand. This canal was completed in 1798, but in July, 1814, the adjoining post was pillaged and burned by Major Holmes and a band of Americans, and the lock (with the wooden banks of the canal) was, it is supposed, burned to the water's edge. Between the building of this primitive Sault canal and the construction of the work of the same name to which Sir Charles Tupper referred in his Dominion Day speech, more than ninety years intervened. Those who are fond of reflective retrospects have ample scope in contemplating the changes that came over the face of Canada during that long interval. It was, singularly enough, the same series of events that caused the destruction of the old Sault Sainte Marie canal and gave the impulse to the canal movement in this province and Ontario. In 1815 the Legislature of Lower Canada voted a grant of money to build a Lachine canal, and in 1816 a joint committee of the two Houses of the Upper Canadian Legislature was appointed to report on inland navigation. Although Adam Lymburner had advocated its construction in 1791 and

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indeed, it had been thought of nearly a century earlier by Dollier de Casson—Catalogne taking up in 1717 the scheme of which his death had prevented the accomplishment—it was not until 1821 that commissioners were appointed and in 1825 the work was completed. Meanwhile a company had been formed to build the Welland canal—the conception of which is associated with the name of the Hon. W. H. Merritt—and in 1824 first ground was broken. In 1834 the St. Lawrence system was commenced. Meanwhile the Rideau had been started as a military work, so that, when the union regime began, the united provinces were well advanced on the path to the goal now in view. The British North America Act enlarged the sphere of canal enterprise, both as to area and accommodation, and how the country's increasing needs were met both in the main and branch lines Mr. Keefer's paper brings out with clearness and accuracy.

It was contemplated from the first that the system should have its western terminus on Lake Superior. Even before the canal was begun on the Michigan side, surveys and estimates were ordered by the province of Canada. It was not, however, until 1889 that the first contracts were entered into. Owing to representations of persons concerned, a supplemental agreement was made in the summer of 1891, and further changes were ordered in April, 1892. By this final contract it was determined that the length of the chamber should be 900 feet, the width 60 feet, throughout, the depth 20 feet 3 inches on the sills at the lowest recorded stage of the water in the river below the lock. The canal passes through St. Mary's island, on the north side of the rapids of River St. Mary. The length across the island will be 3,500 feet; with the approaches, the total length will be about 18,100 feet. It was at first agreed that the work should be completed on the 31st of December of the present year, but subsequently it was deemed desirable that an earlier date should be fixed upon and by the final agreement with the contractors, the 1st of July, 1894, was the term chosen for the execution of all the works. By the modified scheme accommodation will be afforded to three vessels lying in dock one behind the other—one of the lake type, 320 feet long, and two of the Welland Canal type, 255 feet long, with ready means of entrance and exit on a course through gates and lock straight with the line of the canal. The latter will have a low water width of 152 feet, a bottom width of 145 feet—the low water depth suiting vessels drawing 20 feet. The total expenditure down to 31st December last was \$2,243,890.75.

#### THE CURSE OF CHEAPNESS.

One cannot but be impressed in reading the advertisements in the daily papers where all kinds of merchandise is offered for sale at astonishingly low prices, that those who manufacture such goods must be in painful financial straits and that the employes whose labor produced it must have been paid no more than starvation wages. This must be the true condition or else the goods must be of a quality very inferior to what they are represented in the advertisements. Discussing this matter of low prices and poor quality, the Iron Age says that many of the complaints that are made by both buyers and consumers arise from the captious

spirit of buyers who have bought for long delivery on a falling market. The soreness growing out of having made a bad bargain is often aggravated by sellers representing rival concerns, who, knowing that they have lost the business, maliciously quote very low prices in order to make the relations of the buyer with the successful seller as uncomfortable as possible.

Still it must be acknowledged that it is often the manufacturer who is at fault. Prices have been forced so low on almost every character of manufactured product that skimping and adulteration are to be expected as a matter of course. When there is little or no profit in the production of an article on an honest basis, not only will less care be taken in the process, but inferior materials are likely to be used, and perhaps short weight or scanty measure will be risked in the chance of escaping detection. The apparently great bargains which are being offered on every side are not always bargains, but the buyer needs to employ keener wits than ever before in his experience to detect actual bargains from the host of dishonest productions seeking his favor. Matters have come to such a pass that time-honored terms which once had all the force of a trade mark constituting a sort of commercial currency in business nomenclature, no longer mean anything so far as quality is concerned. Values have dropped too rapidly, and profits have disappeared too completely for many manufacturers, and merchants as well, to adhere strictly to customs which were in vogue when times were good and a fair business venture secured a fair business reward.

No particular line need be singled out for censure in this regard. The poor wight who spends his last dollar for a pair of shoes "marked down from \$4," and finds the soles wearing out in a week, is not tricked any worse than the sturdy smith who thinks he has struck a wonderful bargain on bar iron and gets something that must be handled as tenderly as china. From clothing to sheet iron and from so-called jewelry to wire goods, evil practices have either crept or been forced into the factories, and the result has been serious deterioration from accepted standards of quality. Wire nails have been sold with less than 100 pounds in the keg, and made of unusually heavy wire, to reduce the number of nails per keg still lower. Other goods of wire or round iron are made with varying gauges from the standard, thinner when sold by count, and thicker when sold by weight. Pig iron has been found to run very unevenly, and No. 2 foundry quite often presents characteristic features of No. 3. Boiler makers selling ridiculously cheap boilers seem to have suddenly found that tank steel possesses all the desirable qualities of safety ordinarily imputed to flange or fire box.

#### EDITORIAL NOTES.

It is most sincerely to be hoped that the brains and the patriotism of the people of the United States will successfully solve the pressing political and social problems that now confront them. Both brains and patriotism are needed—brains to devise ways to meet the most complicated questions that could ever beset society; patriotism to restrain the hasty, to uphold the law, to inaugurate reform and to punish by political ignoring those who prove faithless to the charges committed to them. Oliver Wendell



Holmes, in the following words, seems to have foreseen the existing situation in making a prayer for men to meet it:—

God give us men! A time like this demands  
Great hearts, strong minds, true faith and willing hands,  
Men whom the lust of office does not kill;  
Men whom the spoils of office cannot buy;  
Men who possess opinions and a will;  
Men who have honor, men who will not lie;  
For while the rabble, with their thumb-worn creeds,  
Their large professions and their little deeds,  
Wrangle in selfish strife—lo! Freedom weeps,  
Wrong rules the land and waiting justice sleeps.

Mr. S. R. Earle, Belleville, Ont., manufacturer of combined air injectors, exhausters, etc., for stationary, locomotive and marine boilers in a recent letter to this journal says: "I like the CANADIAN MANUFACTURER for it is one of the best advertising mediums I have ever found."

An interesting statement lately issued by the United States Department of State collates reports lately gathered by United States consuls throughout the world in reference to American lumber in foreign markets. These reports disclose the fact that the United States sends lumber to every country on the globe, and that, while in many lands the market is virtually controlled by the shippers of that country, there are still great possibilities of increased sales. It appears that nearly all the building lumber imported by Africa comes from the United States; that Japan buys it, and that no other lumber enters South American ports. Hawaii, by letting American lumber in free of duty and charging 10 per cent. ad valorem duty on Canadian lumber, virtually prohibits the importation of the latter. Consul Mills, at Honolulu, reports that all the timber used there comes from the United States, and that it amounts to 15,000,000 feet annually. Even the island of New Caledonia prefers pine from Washington. All the lumber used in Madeira comes from Maine, North Carolina and Nova Scotia, while Mexico and the West Indies rely wholly upon the United States. Austria buys \$1,000,000 worth every year, and would take as much more if it could be bought readily. The main difficulty seems to be in procuring the transport of the American wood, little being carried by American ships. The principal rivals of the United States in the world's lumber trade are Canada and Norway, except in England, where Russia and Germany are competitors, and in Austria, which is supplied by countries on the Mediterranean.

A few days ago the daily papers contained a press telegram from St. Louis stating that a gasoline stove in that city had exploded, causing a fire by which several persons lost their lives. We are not inclined to believe that there was any explosion of a gasoline stove, and we offer a reward of a silver dollar for sufficient evidence to convict. Who wants the dollar?

Both houses of the Dominion parliament have passed the bill giving a charter to the Lake St. Clair and Lake Erie Ship Canal Company, which, as its name indicates, proposes to construct a canal between Lake St. Clair and Lake Erie, paralleling the present waterway between these lakes. It is difficult to understand why the Canadian parliament

should give up its time to such schemes.—Cleveland, O., Marine Review.

Not at all difficult to understand. Having about completed our own Sault Ste. Marie canal, giving us an independent connection with Lake Superior, when the St. Clair-Erie canal shall have been built, shipping may sail from Port Arthur in the very heart of the American continent to the Atlantic Ocean entirely through exclusively Canadian waters. It will be rather rough on Detroit to be thus side-tracked as it were. It is not at all difficult to understand why the Canadian Parliament and the Canadian people take so much interest in this scheme.

Travellers who can forego fine cabins and main saloon attractions, can now take ship at New York, have the benefits of sea air all the way to Liverpool, and at the same time be snugly housed and well fed for \$8. There's a cheap trip for the summer tourist.—The Empire.

Somewhat remarkable, too, that just at a time when a person crossing the Atlantic, can do so, snugly housed and well fed, for \$8, the Dominion Government are voting \$750,000 per year as subsidy to a line of Atlantic steamers. This bonus is equivalent to a capitalization of \$25,000,000 paying 3 per cent. interest.

Five trains of 30 cars each will be required to convey the Ferris wheel from Chicago to New York. It will take ten weeks to take the wheel to pieces. The car that was used for carrying the Krupp gun will be used for the 70-ton axle. There are 3,000 tons of metal in the wheel, and 500,000 feet of timber are needed for the false work. The expense of taking down, moving and rebuilding the wheel will be \$150,000. In New York it is to be placed at Thirty-seventh street and Broadway. Old Vienna will be produced around it. In Chicago the wheel had 3,000 electric lights; in New York the number will be doubled.

An American agricultural journal publishes a letter from a Minnesota farmer in which it is shown that although wheat may sell for only fifty cents per bushel the farmer growing it may be better off than in the "good old times" of higher prices. He says:

If wheat cannot be raised at a profit at 50c now, then we did not raise it at a profit when it was above \$1.50 a bushel. I can buy as many pounds of groceries with a bushel of wheat as I could in the sixties. I can buy ten or twelve pounds of sugar with a bushel of wheat; we used to get eight or ten pounds when wheat was above \$1.15. I can buy twenty pounds of fence wire with a bushel of wheat now; in 1878 it took nearly two bushels to buy twenty pounds. In those good times when wheat was above the \$1.25 mark a bushel would buy from three to six yards of sheeting, now it will buy from three to ten yards. In 1880 a mower and binder would have cost me 300 bushels of wheat, now I can get both for 300 bushels. I can get as many pounds, yards or bushels of anything as I did when all things were from three to four times as high. The assumption that price is the measure of profit falls to the ground.

We have been dealing with falling markets with one exception, and that exception is labor. We are paying greater wages than ever before. In 1859 and 1860 my father paid \$15 a month by the season to a hired man or twelve bushels of wheat a month. From 1863 to 1876 the rate changed slowly from twelve to fifteen bushels a month. In 1876 farm labor cost me sixteen bushels a month; in 1877, eighteen bushels; in 1883 it was twenty bushels; in 1890, twenty-six bushels; in 1893 forty to fifty bushels.

Farm labor cost my father twenty-eight pounds of wool a month; it would cost me now one hundred and eighty pounds. It used to take three months' wages of a hired man to get a suit of clothes; he can get the suit now for half a month's wages.

The Imperial Bank, of Toronto, is about establishing a branch at Vancouver, B. C., for the greater accommodation of customers on the Pacific Coast.

The London Times reminds the public, in connection with what was said and done at the intercolonial conference, that just at present, with the United Kingdom so much more populous and having so much greater interests than the colonies, the commercial conditions that are best for her must be best for the greatest number in the Empire, and so best for the Empire. That, it must be confessed, is the obstacle in the way of carrying out the most extensive and far-reaching of the colonial suggestions. Before we get preferential trade within the Empire, we will have to grow a little, or England will have to change her policy.—Montreal Gazette.

We have an enquiry from a manufacturer who, being in need of such goods, desires to know the address of any concern in Canada who make nickel steel castings. If there are any such they hide the fact from the public—they certainly do not advertise it. There are such concerns in the United States, however, as will be seen by reference to our advertising pages.

The revenue of Canada for the fiscal year ending June 30 amounted to \$35,382,000, as against \$37,183,000 the previous year. The customs yielded \$19,119,000 of this, as against \$20,707,000 the previous year. The revenue by services was :

	1893.	1894.
Customs .....	\$20,707,970	\$19,119,620
Excise .....	8,284,982	8,223,923
Postoffices .....	2,818,453	2,813,789
Public works, including railways	3,741,143	3,661,951
Miscellaneous .....	1,630,706	1,563,606
Total .....	\$37,183,255	\$35,382,899

The expenditure for the year, while showing an increase, is not yet fully made up, so that it is not yet known whether there will be a surplus or a deficit. The expenditure or capital account amounted to \$4,738,000 against \$3,584,000 the previous year. The total net debt on June 30, 1894, was \$240,528,000. The main fact shown by the statement in the Canada Gazette is that, while the revenue has declined, the expenditure has increased.

In Pullman workmen were charged \$18.71 a month for five-roomed houses without conveniences. No matter how wages fell, rates kept up. Men could get the same kind of houses adjacent to Pullman for \$10 and \$12, but were told that only those who lived in the place would get work. Mr. Pullman contracted for a supply of water at four cents a thousand gallons and charged his tenants 10c. For gas he charged \$2.25 a thousand. If a man broke a pane of glass in his house he was not allowed to repair it. The company restored the pane and charged double for the work. Shutters on houses cost 50 cents a month extra, and to drive a nail in any of the houses cost 50 cents. This is the kind of paradise Mr. Pullman erected for his

workmen. Six per cent. is what he is said to have charged for his philanthropy.—The Empire.

Previous to the publication of the above paragraph by The Empire, a press telegram was published in all the daily papers, including The Empire, embodying a statement to the public by Mr. Pullman in which facts relating to this matter were set forth. We are no defender of Mr. Pullman, but we fail to see why a reputable journal should give currency to incorrect facts intended to stir up animosity and ill feeling unnecessarily. In Mr. Pullman's statement as published in The Empire we find as follows :—

A few words are pertinent as to some industriously spread charges against the company. One of these charges is that rents are exorbitant, and it is implied that the Pullman employes have no choice but to submit. The answer is simple : The average rental of tenements at Pullman is at the rate of \$3 per room per month, and the renting of houses at Pullman has no relation to the work in the shops. Employes may, and many do, own or rent their houses outside of the town, and the buildings and business places in the town are rented to employes or to others in competition with neighboring properties. In short, the renting business of the Pullman company is governed by the same conditions which govern any other large owner of real estate, except that the company itself does directly some things which in Chicago are assumed by the city. If, therefore, it is not admitted that the rents of any landlord are to be fixed by arbitration, and that those of the adjoining towns of Kensington and Roseland should also be so fixed, it can hardly be asked that the Pullman company alone should abandon the ordinary rules which govern persons in that relation.

As to charges for water, the company until lately had a contract with the village of Hyde Park, under which it paid 4 cents per 1,000 gallons and pumped the water itself. The gross amount paid the village per month for the water consumed by the tenants was almost exactly the gross sum paid by the tenant therefor. Since the inclusion of Hyde Park and Pullman within the city of Chicago the company pays the city about 7 cents per 1,000 gallons, and not having increased the charge to the tenants, is paying for the water consumed by them about \$500 per month more than is charged to them.

The importation of waifs from the slums of British cities should engage a wider share of public attention than Canadians seem inclined to bestow on it. It is natural that the results of such deportations should be regarded with a hopefulness not warranted by experience. A generation ago natural conditions confronted us and it was an easy matter to win a living. We know that such conditions have transformed the convicts sent from England to Australia into a superior class of citizens. In all countries and at all times the natural goodness of human nature seems only to require nature's freedom and nature's opportunities to triumph over lower instincts. A generation ago both Canada and the United States absorbed and Americanized all foreigners, transforming them into good and self-respecting citizens. But the conditions which were favorable to this transformation have to some extent passed away. If the European yielded to the temptation to turn against his fellows in his own country, he will be most liable to do so here.—Toronto Globe.

The lesson of the Chicago trouble should teach Canada that haste should be made very slowly in encouraging the

immigration of Barnardo waifs and other objectionable characters into Canada.

The Democrats have a strong leader in the House of Representatives. In his speech on the report of the conferees Mr. Wilson said:—"If it be true that the great American Sugar Trust has grown so strong and so powerful that it says that no tariff bill can pass the American Congress in which its interests are not adequately guarded; if, I say, that be true, I hope this House will never consent to adjournment. I hope, I say, that whatever the fate of the general tariff bill may be, this House will not consent to an adjournment until it has passed a single bill putting refined sugar on the free list." This spirited declaration was received with tumultuous cheering by the Democrats.—Toronto Globe.

It is somewhat remarkable that the sugar tariff question in the United States excites almost as much interest in Canada as it does in that country. The general character of the tariffs of the two countries is almost identical, the only difference being that while the American duty upon refined sugar is only \$10 per ton, the Canadian duty was, until quite recently, 60 per cent. higher, and is now at the rate of \$12.80 per ton. Refined sugar can be manufactured in Canada quite as cheaply as in the United States, yet with a lower rate of duty the American refiners are making more than \$30,000,000 a year above a fair profit. It is a grand thing to be a sugar refiner in either the United States or Canada.

Some time in September, probably during the latter part, the Canadian Electrical Association will hold its regular annual meeting in Montreal. Among the papers to be read are the following:—"The possibility of securing better regulation at central light and power stations by means of fly-wheel accumulators of improved construction," by Mr. John Galt, C. E. and M. E., of Toronto; "A method of distribution with equalization of potential difference," by Mr. D.H. Keeley, of the Government telegraph service, Ottawa; paper by Mr. E. C. Breithaupt, Berlin, Ontario. "The application of electricity for medical and kindred purposes, from light and power circuits," by Mr. W. B. Shaw, Montreal; paper by Mr. T. R. Roseburgh, lecturer in electricity, School of Practical Science, Toronto; "Electrolysis," by Mr. J. A. Baylis, of the Bell Telephone Company, Toronto; "Telephone cables, their construction and maintenance," by Mr. F.J.F. Schwartz, also connected with the Bell Telephone Company, Montreal; "Alternating moters," by Mr. L.M. Pinolet, Montreal; paper by Mr. John Langton, Toronto.

Following is the resolution introduced by Finance Minister Foster and passed by the House of Commons regarding bounties for iron made from Canadian ore:—

1. That it is expedient to provide that the Governor-in-Council may authorize the payment of a bounty of \$2 per ton on all pig iron made in Canada from Canadian ore, a bounty of \$2 per ton on all iron-puddled bars made in Canada from Canadian pig iron manufactured from Canadian ore and a bounty of \$2 per ton on all steel billets manufactured in Canada from pig iron, made in Canada from Canadian ore and such other ingredients as are necessary

and usual in the manufacture of such steel billets, the proportion of such ingredients to be regulated by order of the Governor-in-Council.

2. That it is expedient to provide that in the case of products of furnaces in operation the said bounties shall be applicable only to such products manufactured therein between March 27, 1894, and March 26, 1899, both days included; and that in the case of the products of any furnace which commences operations hereafter, but prior to March 27, 1899, the said bounties shall be applicable to such products manufactured therein during a period of five years from the date of commencing operations.

The action of the United States Senate in passing a resolution to the effect that the reciprocity treaties shall not be abrogated except in cases where the specific provisions of the tariff bill so provide, was a species of bluff which will deceive nobody. The bottom of the treaties is knocked out when a duty is levied on sugar. Free sugar was the main consideration which gave that country special favors in the markets of Germany, Austria and Cuba. As the Gorman bill imposes a heavy duty on sugar its passage will practically abrogate every reciprocity treaty which President Harrison's administration made. It would be absurd to suppose that nations which have given specially favorable tariff rates for American products, because of the boon of a free entry of American markets with their raw sugar and with low duties on refined sugar, will continue their low rates on American goods after the quid pro quo has been taken away. If the United States puts up its tariff on sugar it must expect a corresponding raise of their tariff. Secretary Graham answers congressional inquiry by saying that he has not yet been officially informed of repeal of the reciprocity treaties. But that signifies nothing. They will await American action which has not yet been taken. Some of the advocates of the Democratic tariff on sugar who admit that the imposition of a sugar duty is likely to result in the overthrow of reciprocity justify the action by saying that the reciprocity treaties have accomplished nothing. But such an assertion flies in the face of all the facts. The official statistics show that while in the German markets last year British merchants suffered a decreased trade of 56,000,000 marks and the French merchants barely held their own, there was \$13,000,000 increase in the sale of American products. The same was true of France. While British sales in that country fell off 59,000,000 francs and German sales 30,000,000 francs, the sale of American products increased 48,000,000 francs. In the other reciprocity countries the movement has been in the same direction. In Austria, Cuba and Brazil while British trade decreased, the sales of American products materially increased. The sacrifice of this increased trade American farmers and manufacturers will be likely to resent. To sacrifice it through the imposition of a duty which will enhance the cost of sugar to American consumers is a foolish stroke of policy indeed. And yet this is what the Democrats are proposing to do. Every member of Congress who votes for the democratic tariff bill must reckon with his constituents for his share in cutting off American exports, and in heightening the cost of sugar.

Scribner's Magazine for August is a Fiction Number. It contains six complete short stories, by H. C. Bunner, T. R. Sullivan, William H. Shelton, W. Graily Hewitt, Octave Uzanne, and Harrison Robertson. All these stories are distinguished by an individuality that make them of unusual quality. The fiction is beautifully illustrated by Castaigne, Sterner, Hatherell and the distinguished French artist, Robida. In addition to the short fiction there is an amusing instalment of George W. Cable's serial story, "John March, Southerner." "Newport" is the subject of an elaborately illustrated article written by W. C. Brownell. He describes not only the social pageant of the Newport of to-day, but also the quaint features of the old town, and the natural beauties of its wonderful coast. The illustrations are by W. S. Vanderbilt Allen, who is also familiar with the life of the place. A literary feature of great interest is a batch of letters from James Russell Lowell to Poe, written when the former was about 25 years of age and was editing the Pioneer. The number contains only one poem, a ballad by C. G. D. Roberts, with four very graceful illustrations by Kaemmerer.

In the opening article of The Popular Science Monthly for August Prof. John Dewey, of Michigan, attacks one of the educational problems of the day, under the title "The Chaos in Moral Training." The recollections of a class in ethics as to the moral teaching received from their parents furnish the material upon which he comments in this essay. An especially timely paper is one on "Human Aggregation and Crime," by M. G. Tarde, which is a general study of the phenomena of mob violence. Prof. E. S. Morse gives some suggestions upon "The Distribution of Government Publications." There are two articles of especial interest to engineers—one being an illustrated description of the tunnel under the St. Clair River, by J. Jones Bell, which he entitles "The Story of a Great Work," while the other is "A Proposition for an Artificial Isthmus between Scotland and Ireland," which is set forth by E. A. Le Sueur. The absurd pretensions with regard to "Rainmaking" that have been made by various cranks are thoroughly riddled by Prof. Fernando Sanford, of Stanford University. Frank M. Chapman contributes a descriptive article on "The Nocturnal Migration of Birds;" and there is another by Prof. C. M. Weed describing, with illustrations, "A Family of Water Kings." Mrs. Louise E. Hogan gives some advice concerning "Milk for Babies," a matter that can not have too much care during the summer months. M. Lazare Weiller describes a recent triumph in "The Photography of Colors." George Iles writes on "Nature as Drama and Engineering;" Prof. D. W. Hering gives some "Modern Views and Problems of Physics;" M. Georges Pouchet has an essay on "Form and Life;" H. Littlewood, F. R. C. S., treats of "Accuracy in Observation," with especial reference to young physicians; and there are a biographical sketch and a portrait of W. Matthew Williams, author of "The Chemistry of Cookery, Science in Short Chapters," and other popular books. In the Editor's Table, "Man and Woman" and "The Meaning of Dynamite," are the subjects discussed. New York: D. Appleton & Company. Fifty cents a number, \$5 a year.

Outing for August is an interesting, richly illustrated number. Hunting, shooting, yachting, camping, fishing, and every seasonable sport and pastime, finds place in this excellent magazine. The contents are: "The Chain of Destiny," by Edith Robinson; "Gipsy Camping in Arkansas," by Lora S. La Mance; "A Maiden Lake," by A. M. R. Gordon; "Elk Hunting With Dogs," by Eugene D. White; "Coon Hunting in Maryland," by H. M. Howard; "An Ascent of Mount Hood," by Earl Morse Wilbur; "The Land of the Bread-fruit," by F. M. Turner; "Lenz's World Tour Awheel;" "Trolling Among the Thousand Islands," by A. R. Carman; "Touring Europe on Next to Nothing," by J. P. Worden; "Sound Smugglers Again," by Kenneth Cranford; "A Blue Glass Cycling Tour," by J. B. Carrington; "Pin-tailed Grouse Shooting," by Jas. S. Crane; "The New York Yacht Club," by A. J. Kenealy, and the usual editorials, poems and records.

How girls were courted in the old Puritan days, and the difficulties, now unknown, to marriage are delightfully described by Alice Morse Earle in the August Ladies' Home Journal, which article is put next to story by Max O'Rell, which he calls "My First Snake." Julia Band Valentine's story, "The Whistling Girl," is the subject of two illustrations by Irving R. Wiles. Sketches with portraits, of "Four Famous Young Authors," Richard Harding Davis, Rudyard Kipling, John Kendrick Bangs and Jerome K. Jerome, comprise the biography of the number. Mr. Howell's literary biography, "My Literary Passions," continues to grow in interest. John Gilmer Speed writes of "Mud-Imprisoned Women," making a strong plea, in behalf of women, for the improvement of country roads. Frank R. Stockton continues to amuse with Ponona's letters to her old mistress, as does Mr. A. B. Frost, the original "Rudd-Grange" artist, with his clever illustrations. Edward W. Bok writes of "The Boy in the Office," and Grace Ellery Channing of "Politeness in Two Countries." The clever and funny Brownies are at Newport, and their escapades at that fashionable resort are exceedingly amusing. Florence Morse writes of the advantages and disadvantages of "Suburban Life for Women," and Mrs. Garrett Webster gives a very novel idea for a summer fair under the title "The New Athletic Carnival." Altogether this August issue, with its pretty summer cover, is a particularly dainty issue, and no woman can afford to be without it. The Curtis

Publishing Company, of Philadelphia, for ten cents per number and one dollar per year.

Allgemeine Electricitats Gesellschaft (German General Electric Co.), Berlin, Germany, manufacturers of electric lighting and power apparatus, have sent us their English edition of their new Export Catalogue and Manual for preparing estimates for electric lighting and transmission of power plants. The subjects alluded to in the book are very carefully classified under appropriate sections and sub-heads, which, with the aid of a well digested index, renders it very easy to find any information desired. Thus under Section 1, Electric Light Projects, is full information as to the kind and degree of illumination required for domestic purposes, halls, public buildings, streets, depots, parks, railway yards, etc. This Section gives scheme for primary station, showing the requisite horse power of steam engine necessary to drive dynamo, and size and character of dynamic required for any given number of lights. Sec. 2 has reference to Transmission of Power, showing whatever may be necessary in installing electric lighting and power plants in factories, this information alone being of the utmost value to manufacturers and users of machinery. Sec. B includes directions for preparing approximate estimates of size, efficiency, etc., of steam boilers and engines, portable engines, gas engines, dynamos, motors, accumulators, of complete lighting installations, working expenses, with pro forma sketch for plans, etc. Another section has reference to dynamos, continuous current machines and accessories, giving exhaustive tables of capacities, regulating apparatus, sketches of different types of dynamos, etc. Another section is descriptive of switchboards and instruments, including measuring instruments, ammeters and voltmeters, cell switches, accumulator apparatus, ground detectors, lightning protectors, etc. Part C has reference to cables, twin wires, copper wires, flexible cords and other conductors, a tabulated calculation of section of conductors being given. Part D gives valuable information regarding safety fuses, safety plugs, etc., for all purposes. Part E is devoted to switches, telling how the lighting and extinguishing of single lamps or entire groups may be done according to requirement, and the methods adopted in the manufacture of them by this concern. Installation and Insulation Material is the subject of Part F; Arc Lamps and Accessories, Part G; Glow Lamp Fittings and Electroliers, Part H; A. E. G. Glow Lamps, Part J; Electric Motors, Part K, in which it is shown many of the various uses to which motors may be advantageously used in driving pumps, ventilators, drilling machines, lathes, hoists, cranes, etc. The catalogue is a beautiful specimen of book work, such as is not usually bestowed upon trade publications. The cover is of celluloid, beveled and elegantly ornamented.

Our valued Boston contemporary, the Textile World, has made a new departure, having abandoned its previous style, the July number appearing in magazine form containing with cover 132 pages. This change is in great contrast to its former shape, and very much to be approved. The change enables the publishers to carry into effect a feature which will add very much to the value of the publication, viz.: a directory of the textile mills, dyeing, bleaching and finishing establishments of the United States. This directory will be published in sections in several issues of the Textile World. Heretofore the subscription price of the Textile World has been \$1 per year, but in consideration of the improvements here alluded to, and of the fact that the quantity of reading matter has been greatly increased, the price has been advanced to \$2.

#### EMERY AND OTHER ABRASIVES.

At the meeting of the Franklin Institute, of Philadelphia, in February last, Mr. T. Dunkin Paret, president of the Tanite Company, Stroudsburg, Penn., read an exceedingly interesting paper on Emery and other Abrasives, which was printed in the Journal of the Institute in May and June, 1893, and we have pleasure in here reproducing some of the valuable information contained therein.

Emery is a mineral, of such rare occurrence and such mysterious origin, as to excite the interest of geologist and mineralogist. At some time in the past and by some means, both at present unknown, its special value as a grinding material was discovered, and it became an object of steadily growing importance in the industrial world.

We know of no facts bearing on the use of emery by the ancients. Archaeologists have tried to prove that the ancients cut out their huge blocks of hard stone by the use of saws studded with corundum, but the evidence is of a negative character and purely fallacious. It seems to rest on the assumption that, as the diamond cannot be used for rock work, corundum must have been so used. It is a general belief, shared equally by workers and by scientific men, that carbon, or black diamond, is the only form of diamond which can be used to work stone, and there is no evidence that carbon, or black diamond was known to the ancients. As a general rule, carbon possesses a toughness which renders it a specially fit tool wherewith to drill rock or turn down solid emery wheels; while the gem diamond is so brittle that it breaks off quickly under the same work; and bort so crystallized as to shiver easily into small pieces. But this general rule has so many proved exceptions that it is unsafe to connect definite qualities with the three species of minerals.

Until about fifteen years ago my personal experience confirmed the general belief. The diamond gem, always proved too brittle for

use, its points being broken off almost as soon as it touched a revolving emery wheel. Bort, of all varieties, proved far worse, and shivered to pieces. Carbon, or black diamond, seemed to be the only mineral hard enough and tough enough to cut down a revolving solid emery wheel, without being itself either broken or rapidly worn. Nevertheless, the very great variability in the quality of carbon ought to have suggested at an earlier date an equal variability in diamond and bort. The variation in quality of carbon is very great, some stones having very great lasting power, while others wear off so rapidly as to be absolutely useless. Carbon though they are, any common stone would do as well. As to their real value there seems to be no index. In the trade, unbroken crystals are considered more valuable than fractured stones, and the glossy black is preferred to gray.

My first experience of the unreliability of the general rule as to bort occurred to me probably ten or fifteen years ago, when two or three pieces were sent to me from Canada, with the statement that a friend at the Cape of Good Hope had sent them on as samples of a bort adapted to take the place of carbon. Thorough trial proved the correctness of this statement, but before any arrangement could be made the original sender had gone to India, and was lost sight of, and inquiry failed to discover the identity of the mine.

After the lapse of many years, in 1893, bort again came into notice for use instead of carbon, being offered at \$2.50 per carat as against \$16.50 for carbon. This bort has now had over six months' trial, and answers as well as carbon for all except the very hardest use, though its shape is not quite so satisfactory. Thus far I have been unable to find out where this bort came from, or how its quality is ascertained.

Emery is essentially a modern commercial product, its use being dependant, firstly, on the enormously increased use of iron in very recent times; secondly, on those metallurgical processes which have produced steels, phosphor-bronzes, chilled iron and other specially tempered metals; and thirdly, on that development of steam-power which has led to the use of high-speed rotary grinding tools.

Among the earlier uses of emery is its application to the lapidary's wheel. Its use on paper and cloth is also probably an early one. To this succeeded the wooden wheel, banded with leather, which was coated with glue and rolled in emery. This was followed by the solid emery wheel. A still later production is the emery millstone. Glass, granite and the metals are the principal substances on which emery is used. The purposes for which it is used are roughly and rapidly to remove material—to shape and form and to smooth or polish.

Excessive hardness is not the only requisite in a material used for cutting other substances. The most nearly perfect carbon will, if used for turning emery wheels, lose every point and corner and become a rounded mass, useless for further turning unless it is broken so as to present new angles.

Very little commercial corundum comes from sapphire-streaked seams, and scarcely any from massive rock; a small portion is produced from separate large crystals, which occur in some formations, scattered through a softer rock. The greater part, however, is found in large, decomposed and broken-down seams. In the case of the large crystals purity would depend on the care with which all traces of the matrix were removed. In the case of corundum sand, washed out of broken-down seams and beds, purity would depend on the separation of the corundum granules from the mixed mass of which they form a part.

The maximum purity of which we can find record is exhibited by the sapphire referred to by Professor Lesley as containing 98.5 per cent. of alumina. In reference to our assertion that, if crystallized in the form of a gem, corundum would be too fine and too hard to serve as a grinding material, it will be safe to qualify it by the statement that there might be some lower point at which purity had a real value. The practical question, therefore, is: how does corundum lately produced on a commercial scale compare with emery so produced?

In 1833, Dr. T. M. Chatard analyzed three samples of American corundum, purchased of three different mills. In these the average of alumina was 64.65 per cent. At the same time he analyzed three samples of emery from three different sources. The average of these was 60.94 per cent. of alumina, a difference of only 3.71 per cent. in favor of corundum. Of the three emery samples one was of that American ore which the combination of American emery mills has declared to be spurious and worthless. This American emery contained only 53.59 per cent. alumina, and if this sample were omitted the analysis would stand as follows: Corundum, 64.65 per cent. of alumina; emery, 64.62 per cent., a difference of three-one-hundredths of one per cent. in favor of corundum.

Of the three corundum samples, one contained only 37.31 per cent. of alumina, which is 16.28 per cent. less than the American emery contained. This corundum was of such color and general appearance that it might easily deceive the ordinary commercial user, and we are forced to believe either that it did deceive its producers and sellers, or that they knowingly deceived the public. On going further into these analyses, we find that the American emery contained only 0.26 per cent. of silica, while the corundum just referred to contained 44.64 per cent. Going still further, we find that the corundum contained only 14.60 per cent. of ferric oxide, while the American emery contained 41.31 per cent.

In these facts we find a simple explanation of the popular delusion as to the superiority of corundum over emery. It is a question of

color. The sapphire ranks next in hardness to the diamond, and is assumed to be a typically perfect grinding material. Corundum is a form of sapphire, occasionally containing traces of transparent blue sapphire, but characterized as a general thing by a yellow-toned whiteness. The 44.64 per cent. of silica in the so-called corundum furnish that light color which characterizes corundum, while the 41.31 per cent. of ferric oxide in the American emery so darken it as to disguise its higher proportion of alumina. It does not require a chemical analyses to find this alumina in the emery. It is not obscured or hidden away in subtle chemical combinations. It is present often and freely as pure, blue, transparent sapphire, visible sometimes to the naked eye and easily discovered by a pocket magnifying glass. It can be seen at times, bright and blue, in the mass of a solid emery wheel, the general color of which is black, and if some of the dirty gray emery is sprinkled on a sheet of white paper and examined with a good glass in a good light, many grains will be found which are composed entirely of transparent, blue sapphire. If the unsightly ore is fractured at the ore heap it will often be found studded with the shining gem. It is not claimed that all emery is thus characterized, but the occurrence is so frequent as to prove that alumina in one of its highest forms of crystallization is a striking feature of old world emery.

If the commercial values of corundum and emery are based on their relative purity (a high percentage of alumina being considered the criterion), then these analyses show only a trifling superiority in the corundum. It may be suggested that these late analyses of Dr. Chatard are based on unusually poor samples of corundum and unusually good ones of emery. To show that this is not the case we cite nine analyses of corundum quoted by Professor Lesley, the average of which is 83.15 per cent. of alumina. So far as we can judge, none of these refer to American corundum, and none to commercial corundum, all of them relating to actual gems or cabinet specimens. We cite, also, ten analyses of Dr. J. Lawrence Smith. These relate to samples of emery from four localities in Turkey and Greece, and the average of the ten is 67.98 per cent. alumina, or 7.03 per cent. more alumina than is shown by Dr. Chatard's analyses.

As popular belief assumes hardness to be the prime requisite in a grinding material, the question now arises as to whether hardness is definitely proportioned to the percentage of alumina. The ten analyses of Dr. Smith just cited give a striking answer. They show that the gradation of effective hardness does not correspond with the gradation of alumina. Assuming the effective hardness of east Indian sapphire as 100, the highest standard reached by any of Dr. Smith's samples was 57. This sample contained only 63.50 per cent. of alumina, while that which contained 77.82 per cent. (the highest percentage of alumina shown) ranked only 47 in the scale of hardness, or 10 less than did that sample which contained 14.32 per cent. less alumina.

These analyses throw a strong light on the popular delusion as to the injurious effect of iron as a constituent of emery. It is not an uncommon thing for buyers to say that some particular commercial brand of emery contains so much iron that they cannot use it. As a rule, no defect in use is set forth, and the inference is probably made from weight, from color, or from the action of a magnet. In the ten samples of emery analyzed by Dr. Smith, the lowest percentage of iron was 8.62, and the hardness 47; while the highest percentage of iron was 33.25, and the hardness 57. In this case quadrupling the amount of iron increased the hardness 10 per cent. While the gradations of hardness do not vary uniformly with the percentage of iron, it is a striking fact that in this one case the highest percentage of iron is accompanied by the greatest hardness.

While Dr. Smith's analyses show that a high percentage of iron does not imply a diminished hardness, Dr. Chatard's analyses show that a low percentage of iron does not imply a large percentage of alumina. That sample of corundum which contained only 2.90 per cent. iron contained only 72.26 per cent. of alumina, while that which contained 9.70 per cent. of iron had 84.38 per cent. of alumina.

It is not only the superficial user who is particular as to the amount of iron in his emery, for in 1892, an enquiry for emery was sent out from one of our United States arsenals, which stipulated that the emery must not contain over 15.00 per cent. iron, and that it would be tested by the magnet. Of the ten samples analyzed by Dr. Smith only two had so small a percentage as 15, so that it is doubtful if any commercial emery is to be found of the standard demanded in this case by the United States Government. It has already been shown that the maximum hardness of these samples was 57, and that the sample which had 8.62 per cent. of iron ranked only 47. The only other sample low in iron contained 13.05 per cent., and ranked only 46.

Certain general impressions as to the relative value of different varieties of emery have long influenced the public. A great superiority has been claimed for Naxos emery and a high price is asked for it, but even those skilled in the industry do not seem convinced of the superiority, or, if they admit it, do not consider it a reason for much higher price. Turkey emery is accepted by the general user without any stipulation, except that it be Turkish, though emery mills attach special values to different mines. It appears, however, that no distinctive character really attaches either to Greek or Turkish emery, the quality ranging from first-class to worthless. Good ore is a matter of selection.

Notwithstanding these variations, the average quality of Greek and Turkish emery is such that it finds a steadily increasing sale in the



United States, although this country has, for the last five years, furnished an important product.

Our average annual imports of emery ore were :

	Pounds.
For the decade ending with 1878.....	2,376,743
For the decade ending with 1888.....	7,315,165
For the five years ending with 1893.....	10,795,949

Our average annual imports of emery in grains, ground, pulverized and refined, were :

	Pounds.
For the decade ending with 1878.....	621,807
For the decade ending with 1888.....	589,954
For the five years ending with 1893.....	569,019

The total average annual imports of ore and grain were :

	Tons.
For the decade ending with 1878.....	1,338
For the decade ending with 1888.....	3,521
For the five years ending with 1893.....	5,637

These figures are necessarily incomplete as to 1893, but probably bring down the facts to November.

Side by side with this largely increased importation, is a largely increased native product ; for corundum, the average annual output of which, from 1881 to 1888 (both inclusive), was 573 tons (2,000 pounds each), has been supplemented by emery, and the average annual product of the two for the four years ending with 1892, was 2,058 tons. This gives a total of about 7,700 tons.

The growing importance of abrasives is such as to suggest inquiry concerning our future supply. At present, we depend, for the larger part of this, on remote foreign lands. Practically on one land, for the emery-bearing Greek islands lie so close to the coast of Asia Minor that they are geographically Turkish and only politically Greek. The ore all passes through a few ports, and the ever-unsettled Eastern question might at any time precipitate a war, and the blockade of these ports. The Encyclopædia Britannica mentions the occurrence of emery in Sweden, Spain, Saxony and Greenland, but Turkey and Greece are, apparently, the only foreign countries which afford a commercial supply. Thus far our supply of native emery has come from New York and Massachusetts, while the corundum has come from Pennsylvania, North Carolina and Georgia. Some hope of new sources is suggested by the humorist already quoted, who says that emery is "scattered over more or less all the earth," and also by the stream of letters, which, for years past, has flowed in upon wheel and emery makers, offering corundum mines from Washington, on our northwest coast, to South Carolina, on the southeast.

While small specimens of corundum, in the form of imperfect sapphires, have come from Montana, where the existence of this mineral has long been known, no other locality has yielded corundum, except that well-known belt which reaches from Massachusetts to Georgia, and which seems to have its centre in the corner where North and South Carolina, Georgia and Tennessee come together. In this belt the localities where corundum occurs are innumerable, but the prevalence of the mineral is a poor indication of its quantity. Corundum occurs in pockets, seams, sand veins, narrow streaks and detached crystals, seldom in large mass. Chester County, Pa., is, apparently, the only locality where large solid masses have been found. The largest annual product of American corundum has been 645 tons, and, though corundum mining companies have multiplied rapidly during the last few years, the commercial supply has never been more precarious.

Unlike corundum, emery consolidates in large masses. It does not, indeed, form continuous beds of great extent, like coal or iron, but its discontinuous masses and veins sometimes contain hundreds of tons. The emery-bearing locality in Westchester County, N. Y., is a strip from one-half to three-fourths of a mile in width and from five to six miles in length. The geology of this district and the occurrence of emery in it might be described in almost the same language as that which Dr. Smith applies to the celebrated emery district near Ephesus in Asia Minor.

The opinion of Dr. J. P. Kimball is worth consideration. It deserves additional weight because his investigation had no reference whatever to the use of this ore as an abrasive. It was solely with the view of its use in iron metallurgy that his study was made. The analyses he refers to were made by Dr. C. F. Chandler and Mr. F. A. Curas. Dr. Kimball says, "The above analyses, together with the physical and mineralogical features of this material, serve to identify its character as a mixture of corundum with magnetite, slightly antiferous, as usual, when thus associated, analogous to the emery of Chester, Mass., and its proportions bearing a still closer resemblance to specimens obtained by Dr. Genth, from the Goldboro' ore belt of North Carolina in 1871, and analyzed by that chemist." Dr. Kimball's article is entitled "Emery and its Uses in Iron Metallurgy," and throughout this lengthened essay he always refers to the Westchester ores as emery. It is an admitted fact that the percentage of alumina in these ores is less than that in the Greek and Turkish samples analyzed by Dr. Smith, but I have already shown that the effective hardness of Dr. Smith's samples was not proportioned to the percentage of alumina. I have also shown that American corundum has been sold at the highest price commanded by a genuine article, though its percentage of alumina was much less than that

contained in the Westchester ores, and though it contained no insoluble corundum at all. In fact, Dr. Chatard says of it that "the sample contained in all probability no corundum at all, being only an ordinary silicate." It was so much of a silicate that it contained 44.64 per cent. of silica, while the largest percentage in any sample of emery analyzed by Drs. Smith and Chatard was only 9.63 per cent.

Having shown that the chemical proportions of emery and corundum bear no direct ratio to price or effective hardness, we have now to consider whether there is a direct relation between effective hardness and abrasive value. In his article on "Mineralogy" in the Encyclopædia Britannica, Prof. M. F. Heddle distinguishes two forms of hardness. He explains the established scale of hardness which culminates in the diamond, and shows how the file test is applied. But he then goes on to show that minerals may appear soft under the file test while they scratch other minerals on which the file has no effect. This he says is because the particles are hard but loosely aggregated. Dr. Smith, also, dwells upon this point. He says that his glass and agate test for abrasive effect does not furnish the mineralogical hardness, "two minerals possessing the same hardness but differing in structure, one being friable, and the other resisting, will be found very different in their abrasive effects." The inference which Dr. Smith draws is against the friable and in favor of the resisting material. This inference is perfectly correct so far as it relates to the exact method by which Dr. Smith secured his result, or in so far as it may relate to practical processes which reproduce Dr. Smith's conditions. It is utterly inaccurate and misleading so far as it refers to the larger proportion of modern processes in which abrasives are used. I am inclined to think that Dr. Smith's test for effective hardness by use of glass and agate is responsible for the almost hopeless confusion which exists to-day regarding the requisites of a good abrasive. The general inference is that hardness is the prime requisite.

Practical operations in emery mining prove that this inference is a mistaken one. It is no uncommon thing to find the rock overlying an emery vein harder than the emery. That is to say, it is more resisting to the action of a drill, dulling the tool more rapidly and demanding more time to drill an equal distance. If the class of hardness shown by this rock were the right kind, it ought to make a good abrasive, but actual trial shows that it does not do so. Its hardness is probably due to its compact aggregation.

The practical question, however, is, how many modern processes reproduced Dr. Smith's test conditions. Emery is principally used on wood and leather wheels, in solid wheels and in the form of emery cloth or paper. It is also used on the lapidary's wheel. If the latter is a lead wheel the emery becomes embedded in the lead, the lead being selected because it is soft enough to allow of the emery grains sinking into it, and so being supported and backed up. When used on the wood and leather wheel emery is attached to the leather band by a coat of the strongest, toughest glue. The emery is forced into the hot, plastic glue, which fills all interstices in the grain, adapts itself to every peculiarity of shape, and then hardens into a perfectly fitted bed or backing which supports and braces the grain. When used in solid wheels emery is still more thoroughly braced and backed up, for it is first mixed with a base and then united with such base by gums, glues or cements, aided by the processes of slow drying, baking heat, vitrification, tamping and hydraulic pressure. When emery is used to make emery cloth and paper it is also bedded in and backed up by glue.

In not one of these cases do the emery grains have any free motion of their own. They do not change place in relation to each other, and are not worn-out by the friction of emery with emery. They do not break down and crush to pieces, for they are not only backed but surrounded by their protecting matrix, and so cannot flatten, spread and squeeze apart as does a free, unsupported grain of which only a small part comes in contact with the opposing surfaces. Still another vital condition of Dr. Smith's test is lacking in the cases of the lead wheel, the leather-covered wheel, and the emery cloth and paper. In these cases the emery is not rubbed between two unyielding surfaces, such as glass and agate, but between one yielding and one unyielding. Before the grain can crush, the leather, generally chosen for its sponginess and compressibility, will yield—the lead will allow the grain to sink deeper in its surface, the cloth and paper will do the same. These latter, so thin as to possess little compressibility, are often backed up by the human hand, which affords the same cushion as does the spongy walrus or sea horse.

While I consider the facts thus far stated unquestionable and the inferences from them correct, I have to avow regarding emery and other abrasives, what I avowed as to emery wheels some four years ago, before the members of this Institute, namely, that there are few exact data to demonstrate my inferences. The greater the consumption of abrasives and the more varied their use, the greater is the divergence of opinions—the more hopeless the confusion—the deeper the distrust as to any scientific basis in the grinding industry. The men who employ licensed firemen to run a steam boiler, and still further protect themselves by the periodical test of their boilers, give no thought to the latent explosibility of solid emery wheels in charge of common laborers. The railroad, which sends in to the founder its own chemical formula for car brasses, pays no heed to the inherent safety of a vulcanized emery wheel or the inherent danger of a vitrified one. The manufacturer who insists on having the candle-power of his electric light guaranteed, and the horse-power of his turbine or engine measured by a dynamometer, buys the lowest-priced emery



wheel he can find, but never discovers the cost of that wheel's product.

This degradation of the grinding industry is due in part to that criterion of hardness in abrasive material which has made weight and strength the criterion of the human grinder. It is due in part to the fact that grinding problems are so obscure and difficult to the skilled mechanic that he remits them unsolved to the unlearned workman. This degradation of the grinding industry goes back to early times. In the Royal Museum at Berlin is a painting by Gerard Ter Borch, of Deventer, probably executed about 1650, which is marked by all that detail which generally characterizes painting of the Holland school. This picture represents "The Grinder's Family." The work-room is a tumble-down, wretched shed, attached to the dwelling-house. Only one member of the family is at work, unless that operation can be called work in which the mother is engaged. She seems to be searching in the hair of her young daughter for something that ought not to be there. The grown son, with almost a simpleton's face, and with tattered garments, leans idly against a post. The old father has a wide shelf, just level with the top of the grindstone, and lies upon it at full length upon his stomach, while he presses a scythe upon the grindstone. The other scythes lie out of reach on the floor. The mandrel of the stone revolves in an uncovered groove in a beam, and a notch in that beam holds a wooden wedge to keep the mandrel in its place. Everything indicates that activity is at a big discount—art at a low ebb and wages lower still.

It is unfair, you will say, to steal this two hundred and forty-four year old example from a pastoral country like Holland. Why not go to a manufacturing country in modern times? Why not visit Sheffield, for instance? I did visit Sheffield in 1892. I asked a master cutler to show me the latest thing in grinding. He said there was no late thing. I asked him about abrasives and he said each individual grinder supplied his own, buying a few pennysworth of emery at the nearest chemist's and having it chalked up against him just as he had his beer chalked up at the tavern. He said the grinders could generally be found at work when they had no money to spend, always providing there wasn't a football match on hand. He told me to visit Rodgers' and see what they did and then he would take me outside the town to mills hundreds of years old and that I would find the tools, the processes, the conditions identical. The factory building he called "a wheel," and the vaulted dungeons, whose windows had all their glass shattered to let in the light which the splash and slop of the wet stone obscured, he called "troughs." A strap (belt), a stone, a razor and a grinder were what constituted the grinding industry. I ignorantly spoke of the grinders as "men," but he said it was a common Sheffield saying, "he's not a man; he's only a grinder." I did go to the main establishment of Rodgers and then to a "wheel" in a valley some miles out of the city. The "wheel" was a long, dull building of cut stone. The newer part was about 100 or 150 years old, while one wing was much older—too old for the date of its founding to be remembered. The grinder was a man over sixty, and he assured me that his father and his father's father had also ground razors there. As I talked with him two younger men examined a pile of apparently worn-out grindstones, which they said were bought second-hand, when too small for other use, and, selecting one of the quality desired, split it in two pieces because it was too thick. From this dilapidated building, from these scant tools and crude processes, were evolved by grinders not thought worthy to be called men, those blades which have made the name of Rodgers famous. Inherited skill and restriction to one narrow branch of work take the place of modern improvements. As I remember this initiation into the art of Sheffield, I smile at the London merchant who wrote to America that he could get a big order for Japan if I could supply a complete plant for razor grinding.

In our own freer and more versatile country the tyranny of the trades-union has not gone so far as to insist that only the sons and grandsons of razor grinders shall learn to grind razors. Instead of old processes, perpetuated unchanged for hundreds of years, we have all the newest wrinkles. We have automatic grinding machines, almost human in their complication, and which render brains almost unnecessary to the workman; and others which look beautifully on paper, and either go to the waste pile or swell the maker's account of "returned goods." We have the newest wrinkles, but no rules—the most ingenious devices, but no accepted standards—the most varied opinions, but no authorities. While grinding processes are complicated and solid emery wheels high-class tools, and while economical grinding demands conditions based on the careful study of educated mechanics, no one establishment uses enough to enlist the interest of the educated man. Abrasives are committed to the lowest class of labor, and reports as to results drift through circuitous channels to the buyer, whose next purchase is based on the latest and most distorted report. The name "Wellington" is so potent that often the grinder will use no other brand of emery, though he will take any and all kinds of material without discovering any difference, provided they are poured out of a "Wellington" keg and have a color not found in the original material.

Some of the causes which lead to variable and contradictory results with abrasives are those common to shop practice, but which produce far greater effects with the emery wheel than with the lathe or planer. The effective work of the emery wheel is based on its speed of a mile a minute. The correct speed is less likely to be

maintained, because the pressure against the wheel is heavier and more variable than that in a lathe. The lathe tool presses with a sharp point only against the revolving work, and is so set that, after the first cut, the pressure scarcely changes.

The grinder, however, forces his work against the wheel with greatly varying strength, and sometimes adds to direct pressure a heavy leverage. I have often seen wheels slowed down till they almost stopped. Pulleys of too small diameters are used, and belts which are too narrow. Slip of belt and diminution of speed are potent factors in the problem.

Another equally potent one is discontinuity of contact. A wheel may run a mile a minute and yet be so out of round or mounted on such a light machine or shaky floor that vibration and chatter interfere with continuous contact. Instead of the mile long file passing over the work in a minute, it is sometimes only an eighth or a quarter-mile file. I have examined wheels whose continuous stream of sparks suggested continuous contact, and found that only two or three inches of the surface had come in contact with the metal. The custom of imputing all variability of result to defect in the wheel and the overlooking of variability in the metal operated on is another cause of contradictory result. A class of wheels which had long suited a plow manufacturer was at last repeatedly condemned and the wheel declared worthless. After a very long interval it appeared that the plows had been changed from one homogeneous thickness to three sheets of varying temper. A class of wheels was condemned which had long suited for car brasses, and only after long delay was it made known that the first metal was yellow brass and the last phosphor-bronze. I have lately discovered by use of an improved testing machine that the quality of the test bars of cast iron is more variable than the quality of tannic wheels.

What, then, is needed, to clear up this confusion?

It seems to me that the thing most needed is a practical testing machine, which shall take the place of the laboratory test made popular by Dr. J. Lawrence Smith. Such a machine should be run by an independent engine to secure uniform speed. Pulleys and belts should be so proportioned that no slip shall occur. Floor and machine should be so solid as to do away with vibration. Test bars should be employed of the most uniform quality. And then a series of experiments should be carried out so as to establish definite standards. It should be ascertained what is the least pressure per square inch at which a cubic inch of test metal can be ground off in the least time with the least consumption of wheel material. In other words, the final economy of the process should be demonstrated, taking into strict account the consumption of wheel material, the amount of metal ground, the time occupied, the speed employed, the horse-power expended and the pressure exerted. Thus will gradually arise a fixed standard as to what constitutes a good emery wheel, and the buyer will demand an article of known and certified productive effect whose cost of product is also known. Thus will arise on the grinder's side a demand for those wheels and those abrasives which entail the least bodily fatigue. Thus will arise a public opinion which shall hold to strict account those reckless buyers who put wheels of known dangerous quality in the hands of their employees. For this machine should not only be used to ascertain the economic value of abrasives, but also to demonstrate the relative safety of solid emery wheels.

In closing this lecture, I desire to point out that it is not so much a statement of what is known about abrasives as a confession of how little is known. This confession imputes no special ignorance to the user, but pleads the great obscurity of the problem. I believe the difference between the poorest and the best of the abrasives in common use is so moderate that great expertness is required to discover it.

Commercial extracts are frequently adulterated with tannin matter. This admixture may be admissible for cotton blacks, and where it incidentally introduces the amount of yellow required for a good jet. The source of the tannin would stamp it as more or less suitable for that special purpose; chestnut extract, yielding a yellow-gray color with coppers, would, for instance, surpass sumach or quebracho extracts, giving reddish lakes. Wool dyed with logwood so adulterated will at least suffer much in feel. Extracts intended for the production of indigo shades should always be quite pure. Cotton yarns impregnated with logwood liquor come up grayer and lighter in sulphate of copper the more tannic acid is contained in the extract. The fact seems due entirely to the acidity of the adulterant, for exactly the same thing may be brought about by giving a little acetic acid to a pure logwood decoction. Careful neutralization with carbonate of soda, just to the point where the bath turns blue, may correct this fault as far as the shade is concerned. An overdose of alkali would do more harm than good. In any case this means simply counteracting the visible effects of the tannic acid; the tinctorial value of the bath remains unchanged, and will be the lower the higher the percentage of tannic acid. Alkaline logwood liquors also turn rapidly thick and sour in warm weather, and are then quite unfit for clear indigo shades. Seeing that the commercial value of tannin extracts is so much lower than that of logwood extract, the dyer, whatever purpose he may pursue, would, in all cases, do much better to purchase pure preparations of either kind, and make his own mixing as he thinks fit.—Lehne's Farberzeitung.

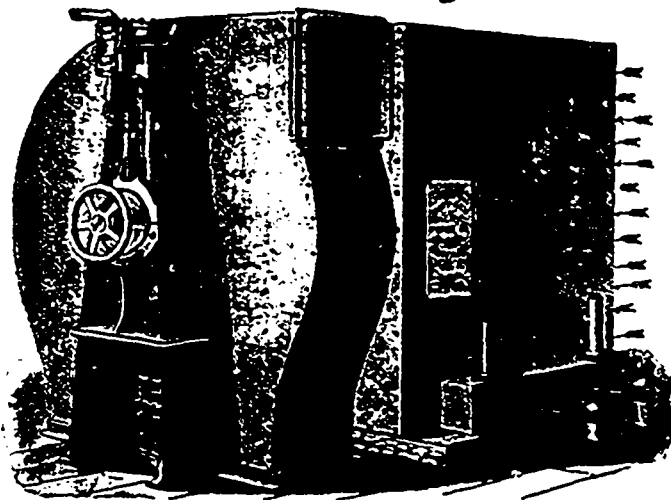
**CAPTAINS OF INDUSTRY.**

*This department of the Canadian Manufacturer is considered of special value to our readers because of the information contained therein. With a view to sustaining its interesting features, friends are invited to contribute any items of information coming to their knowledge regarding any Canadian manufacturing enterprises. Be concise and explicit. State facts clearly, giving correct name and address of person or firm alluded to, and nature of business.*

The plant of the Nanaimo, B. C., Gas Co., will be increased.  
 The Brooks Co. are building a fish canning factory at Deer Lake Sas.  
 The Crossen Car Mfg. Co., Coburg, Ont., are building new workshops at a cost of about \$20,000.  
 Messrs. Sutherland, Innes & Co.'s lumber mills at Renwick, Ont., were destroyed by fire July 20. Loss about \$15,000.  
 The Watrous Engine Works Co., Brantford, Ont., have recently supplied a battery of boilers to the Winnipeg Water Works.  
 The capital stock of the Federation Brand Salmon Canning Co., Victoria, B. C., has been increased from \$50,000 to \$200,000.  
 The Toronto Feather & Down Co., Toronto, Ont., is being incorporated with a capital stock of \$25,000 to manufacture beds, bedding, etc.  
 The St. George Electric Co., St. George, N.B., is being incorporated with a capital stock of \$5,000 to supply electricity for mechanical and commercial purposes.  
 The Ontario Wind Engine and Pump Co., Toronto, are being incorporated with a capital stock of \$40,000 to manufacture wind mills, pumps, hand fire engines, grain crushers, haying tools, etc.  
 The City Council of London, Ont., have accepted the tender of the Canadian General Electric Co., Toronto, for a five years' contract to light the streets of that city at 25 cents per light per night.  
 Contracts for the electric lighting of the forthcoming Toronto Fair have been let to the Toronto Electric Light Co., the Royal Electric Co., of Montreal, and the Johnson Electrical Co., of Toronto.  
 The Cataract Construction Company, Niagara Falls, N.Y., has received official notice that the preliminary plans of the power development on the Canada side have been approved of by the commission and by the Ontario Government. This leaves the way open for continuing the work of preparation for constructing the power tunnel, pits, etc., on the Canadian side.

The capital stock of the Brunette Saw Mill Co., New Westminster, B. C., has been increased from \$200,000 to \$300,000.  
 The Sydenham Glass Co., Wallaceburg, Ont., is being incorporated with a capital stock of \$50,000 to manufacture glassware.  
 The Vancouver Sash and Door Co., Vancouver, B.C., is being incorporated with a capital stock of \$25,000 to manufacture sashes, doors, etc.  
 The Mattawa Electric Light and Power Co., Mattawa, Ont., is being incorporated with a capital stock of \$10,000 to supply electricity for mechanical purposes.  
 The Dodge Wood Split Pulley Co., Toronto, have supplied the new Pail and Tub Works of the E. B. Eddy Co., Hull, Que., with Dodge patent wood split pulleys throughout.  
 The Ontario Wind Engine and Pump Co., Toronto, Ont., is being incorporated with a capital stock of \$40,000 to manufacture wind-mills, pumps, hand fire engines, agricultural implements, etc.  
 The Seaforth Electric Light, Heat and Power Co., Seaforth, Ont., is being incorporated with a capital stock of \$25,000 to supply electricity for mechanical purposes. We understand that the plant which has heretofore been operated by the corporation of Seaforth has been sold out to the above company.  
 Messrs. Darling Bros., Montreal, inform us that they have just shipped 12 Morse valve reseating machines, manufactured by them, to London, England, in which country they are working up a most gratifying trade. This most excellent article has heretofore been fully illustrated and described in this journal.  
 On the 10th instant, Vidal, Fils & Cie, mechanics of this city, tested at Cyrille Beaudoin's, at St. Evariste de Forsyth, a hydraulic motor or water wheel of their own invention. It is a double wheel of ten inches in diameter; there was 31 feet of charge in the flume above, with an additional charge of 5 feet in the draft flume blow, making in all a heading of 36 feet; the quantity of water was 100 feet cubic. The motor with the water only on one of the two wheels, has given an effective power of 12 horse power; it is easily running a single machine at the rate of 8,000 per 10 hours; one pair of grinding stones can be run with the usual accessories. When there will be double the amount of water per minute, or 200 feet, the motor will give a motive power of 30 horse power. This hydraulic wheel is greatly superior to the Volcan or the Eiffel wheel; with the same quantity of water and the same heading, it will give 50% more power, it is a perfect wheel for high falls and small quantity of water, which is very important, because there are now hundreds of water powers lost in our Province, and which can render immense services by using the water wheel invented and constructed by Vidal, Fils & Cie.—Quebec Daily Telegraph.

**Buffalo Lumber Dry Kilns**



The Largest Drier in America is equipped with a "BUFFALO" Hot Blast Apparatus.

THE OWNERS ARE ENTHUSIASTIC

All Users of Buffalo Kilns write letters similar to this one "The Kiln answers every purpose to perfection: the Dry Rooms are run with 7½-horse-power at mere nothing in the way of cost, compared with the old way. Your arrangement is very simple and easily managed, besides being a money saver in operation. We are able, with the Kiln you sent us, to dry soft woods in three days, and hard woods in five days. That's good enough for anyone."—SWIFT BROS., Sayre, Penn.

Send for Catalogue.

**BUFFALO FORCE CO., Buffalo, N.Y., U.S.**

W. N. PETRIE, Toronto Representative, Toronto, Ont.  
 CANADIAN MACHINERY & SUPPLY CO., Brantford,  
 Chicago Office:—22 & 24 Randolph St. Brantford representative.

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**SUPERIOR CHILLED IRON ROLLS..**

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 Hard, Tough, Durable,  
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.....FOR.....

Iron Rolling Mills,  
 Rubber Works,  
 Paper Mills,  
 Flour Mills, Etc.

FOR ROLLING.....

Iron, Steel, Cold,  
 Silver, Brass,  
 Copper, Wire,  
 Lead,  
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Extensive plant  
 for Grinding and  
 Corrugating Rolls

**Wm. & J. G. Greey,**

2 Church St., TORONTO.

The House of Refuge to be built at Brockville, Ont., will cost \$16,000.

The new planing mill of Wm. Rankin, Dundas St., Toronto, has been equipped with Dodge patent wood split pulleys throughout.

An amalgamation of the Standard, the Chaudiere and the Ottawa Electric Light companies was effected in Ottawa last week under the name of the Ottawa Electric Company, with a capital stock of \$1,000,000. Mr. T. Ahearn is president and manager of the new company.

The Cant Bros. Co., of Galt, have recently shipped the following woodworking machines to various points of the Dominion:—A complete set of machinery, as also a 36-inch sander and polisher to Fitch Bay, Que.; a 30-inch sander, and a hollow square chisel morticer to Toronto; a large planer and matcher to Mitchell; a re-sawing machine to Charlotte Town, Prince Edward Island; and three 24-inch sanders to Brantford, Tilbury Centre and Nova Scotia.

The Fire and Light Committee of the Toronto City Council are advertising for tenders for an electric plant for the city, separate tenders to be received for engine equipment, counter shaft and pulleys, belting, boilers, pumps and steam piping, economizers, dynamos, belt-station electrical apparatus, arc lamps, poles and overhead circuits, and mast arms and lamp attachments. Tenders will be received up to September 1. Tenders are also invited for lighting the streets of Toronto with electricity and gas for a period of five years from January 1, 1899.

R. J. Graham has just returned from different towns west of Toronto, where he has been establishing fruit evaporators. He will put out seven dryers in the west in a few weeks. Chas. Graham, his brother, has already left for Norwich, Oxford County, where two dryers will be put in. He took all the fixtures, which were manufactured here, with him. He will send a man to Kingsville, Essex county, in a few days with two more dryers to pick up the crop of that section. He will also establish a one dryer evaporator at Ayton, County Grey. At North Branch, Mich., he is running an evaporator in connection with a jelly business, which will take all the skins and cores for their business. The product of this concern will be sold exclusively to the American trade. Mr. Graham's manufacturing capacity in this city and Prince Edward will be increased by the addition of a dryer to both concerns, making three here and two across the bay. He expects to have a big season's work, and is making preparation to receive the fruit as soon as it is fit. There is an abundant crop of fruit in California this year, and the prices for evaporated will run very low this coming fall and winter—Belleville Intelligencer.

The Veneer cheese box and basket factory of Messrs. Armstrong Bros. at Markdale, Ont., was destroyed by fire July 28, loss about \$10,000.

The Galt and Preston Street Railway, the new electric road some five miles long connecting those enterprising Ontario towns, was formally opened for traffic July 26. All the electric machinery and apparatus was supplied by Messrs. Ahearn & Soper, Ottawa, the steam plant being furnished by the Goldie & McCulloch Co., Galt.

The Londonderry Iron Works have closed for a few weeks, in order to make necessary repairs to the furnaces. The furnaces have been in constant use for 3½ years. It is customary to close down every two years in order to make repairs, which takes about from six weeks to two months. The immense furnaces require to be without fire for nearly four weeks, in order to cool off, so that men can work about them.—Halifax, N. S., Colliery Guardian.

John Moodie, Jr., of the Eagle Knitting Company, is arranging for the purchase in England of an electric road carriage, capable of carrying six or eight persons, and he expects to have it out here in a few weeks. The carriage is similar to an ordinary phaeton, except that it has smaller wheels with pneumatic tires about eight inches in diameter. It will run twenty miles an hour and stores electricity for eighty miles. The cost is expected to be about \$500 or \$600. Mr. Moodie has an electric plant in his factory from which he will get electricity to store the batteries. Mr. Moodie was the first person to introduce a bicycle to the Hamilton public, having brought one here in 1877, the year after the Centennial, and he expects to be the first to introduce the electric road carriages.—Hamilton Spectator.

Mr. Horace R. Ridout, Montreal, informs us that his agent, now in Toronto, is meeting with grand success in selling his "Stickfast" belt preservative. This article prevents slipping, increases power, affords regular and steady motion, keeps belts pliable, and is a preservative against dampness. Of course all who use belts for transmission of power are interested in Ridout's "Stickfast."

This article is something new, and possesses a remarkably sticky quality. Immediately upon its application to the pulley, slipping of the belt is practically impossible. Its character is such that when expended it leaves no trace whatever upon either belt or pulleys, wearing entirely away; and for this reason it is valuable in dusty places, where it can be used continually without accumulating any dust. We have been shown letters from many of the more prominent manufacturers and machinery users in Toronto, Montreal and other cities in Canada, many of them advertisers in this journal, testifying to the merits of this article. It will be shown on a number of belts that will be in operation at the forthcoming Toronto Fair.

## EXCELLING ALL OTHERS

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H. J. HILL, Manager, Toronto

Sills' roller flour mills at Meyrsburg, Ont., was destroyed by fire July 21. Loss about \$17,000.

The works of the Owen Sound Portland Cement Co., at Shallow Lake, near Owen Sound, Ont., were destroyed by fire July 22. Loss about \$50,000, of which \$11,000 was in stock on hand.

Mr. F. J. Drake, Belleville, Ont., has just shipped a shingle mill, and lath making machinery to Messrs. Marston & Brock, Hawkesbury, Ont., and a complete outfit for Mr. James Morrison's new shingle mill at Gooderham, Ont.

A paper factory is to be established in Winnipeg. The project has been on foot for some time, and the promoters say they have finally decided to go on with the enterprise. It is stated that machinery to the value of \$20,000 has been ordered and the work of erecting the necessary buildings will be commenced at once. The Factory will be located on the bank of the Red river, in the northern part of the city. -Winnipeg Commercial.

It is now a generally conceded point that the seasoning of lumber by the progressive fan systems of dry kilns is the most efficient and economical manner. Very large kilns of this sort are no longer uncommon. It is seldom in very large dryers that anything but a  $\frac{1}{2}$  housing fan is employed. With this style of fan the horizontal type of engine is used for driving, and is readily accessible for oiling and repairs on account of the lower scroll of the fan being underground, bringing the engine down low. The Menasha Wooden Ware Co., Menasha, Wis., who employ in their plant over a dozen dryers, find it impossible to install a  $\frac{1}{2}$  housing fan for the reason that their kilns, for the most part, are located on spiles driven into low, marshy ground; in fact, close to the water's edge, in order to facilitate handling the green timber. The largest full housing fan ever employed for a lumber dry kiln was purchased by them of the Buffalo Forge Co., Buffalo, N. Y., about three months ago. The fan stands 150 inches in height, and is supplied with a direct acting double 10x10 inch cylinder engine, the working parts being entirely enclosed. A heater containing 14,000 lineal feet of 1 inch pipe is used in conjunction with the fan. Although this engine runs continuously, and upon a foundation anything but solid, highly satisfactory results are obtained. The Menasha Wooden Ware Co., have just ordered of the Buffalo Forge Co., a duplicate of the above plant, in which they state as follows: "From the fact of our giving you a further order, you can imagine that we are pretty well pleased with the apparatus that we now have, taking into consideration the special inducements which have been offered us by your competitors." The apparatus referred to is the first Buffalo Kiln installed into their immense works, although they have been using the fan system for a number of years

The furniture factory of Messrs. G. H. Labbe & Co., at Montreal, was destroyed by fire July 25; loss about \$80,000.

A new House of Refuge is about being built in Hamilton, Ont., to cost some \$15,000, and tenders are to be called for immediately.

The Chamblay Manufacturing Co., of Montreal, which controls the water power at the Chamblay Rapids of the Richelieu River, is calling for tenders for the erection of a dam and the furnishing of water wheels and electrical machinery for the development of the power and its transmission electrically to Montreal, a distance of about 17 miles in a direct line. The Richelieu River is the outlet of Lake Champlain, and the rapids are four miles long with a total descent of 62 feet. The surroundings are favorable for the erection of dams, as the banks of the river are high and its bed is rock. To utilize the power fully, a series of dams would have to be built across the river at the rapids, but at present it is proposed to erect one only, which, according to the calculations of the engineers who have been consulted, would give a head of from 26 to 27 ft. and yield about 27,000 h. p. at low water. For the present, the delivery of about 15,000 h. p. in Montreal is contemplated, of which some 3,000 h. p. would be used for arc lighting, 6,000 h. p. for incandescent lighting and 6,000 h. p. for motor power.

## Second-Hand ENGINES

In Good Condition, for sale low.

50 H.P. Corliss.

50 H.P. Automatic Ball (American.)

60 H.P. Automatic Leonard-Bull.

50 H.P. Automatic Armington & Sims.

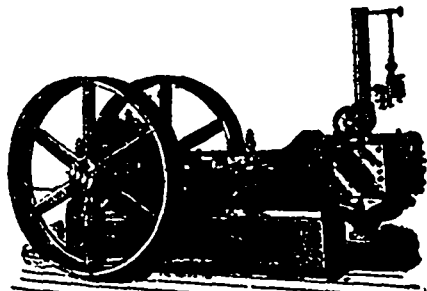
25 H.P. Automatic Westinghouse.

Replaced by Robb-Armstrong Engines

Robb Engineering Co., Ltd., Amherst, N. S.

## Armington & Sims

AUTOMATIC HIGH SPEED ENGINES



—FOR—  
ELECTRIC LIGHTING

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GENERAL FACTORY PURPOSES

Perfect Regulation and Highest Economy.

—AND—  
Steam Pumps  
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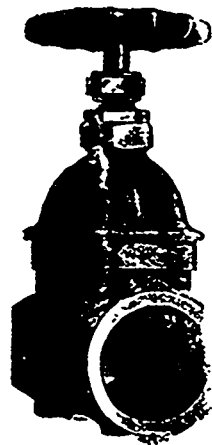
STEAM ENGINES, STEAM BOILERS,  
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Safety Elevators and Hoists for Warehouses, Etc.

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Highest Economy, Regulation Perfect. Send for Circular. Interviews Desired.

THOS NOPPER, - - - Sales Agent

79 YORK STREET, TORONTO, ONT.

A talc mine near Sharlot Lake, Ont., has been opened by the School Supply Co., of Berlin, Ont. The talc is manufactured into crayons for school purposes.

The Robb Engineering Co., Amherst, N. S., call attention in their advertisement to a number of second hand steam engines in good condition which they will sell at low prices.

The John Abell Engine and Machine Works Co., Toronto, have an attractive ad. on front cover in which they call attention to the grate bars, boilers, vertical engines, etc., manufactured by them.

The natural gas main from the gas region at and near Kingsville, Ont., has been completed to Walkerville, and consumers at that place are being supplied. It is expected that in a few weeks the gas will be supplied to whoever may desire it at Windsor, Ont.

The increasing popularity of the Edison three wire system, and the scarcity of efficient and satisfactory circuit breakers especially adapted to it, has led the Perkins Electric Switch Mfg. Co., of Hartford, Conn., to produce the "Gibbs three-wire switch." This is a neat and simple device, designed especially to meet the latest requirements of the Board of Fire Underwriters, and is made to break the circuit of each one of the three wires simultaneously in two places. It is well made, in the well known workmanlike style of the Perkins company, and is said to be meeting with great success everywhere.

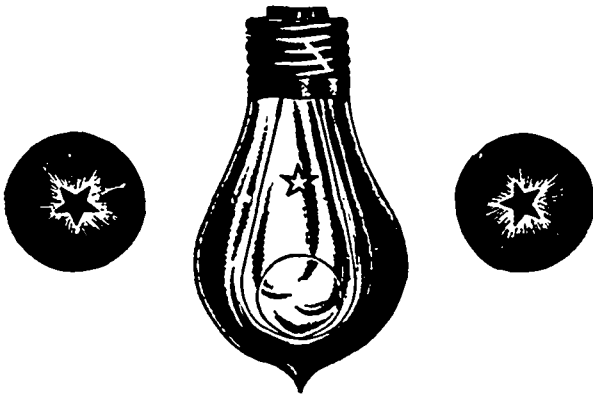
The Packard Mogul Lamp seems to have found still another field of usefulness—this time in connection with electric railway work. It has come to be quite the proper thing for the enterprising electric street railway company to furnish some kind of summer attraction at some point along its line and thus increase the passenger traffic. The point selected is usually a park, if such a place is available, and special attractions such as concerts and extra illuminations are furnished. It is here that the Packard Mogul Lamp is available, and a large number of roads are already using them for just this work. Special illumination of the park is advertised for certain evenings in the week, and the companies are reported to be netting a handsome profit from a largely increased business. The Mogul Lamp is particularly adapted for this work, as the cost of installing is very slight compared with arc lamps, whereas the result is fully as effective; and an incandescent lamp is so large in size, being a comparatively new thing, is an attraction in itself. The lamps as generally used are burned four or five in series direct from the railway circuit, and can thus be operated at a comparatively slight expense. The Electric Appliance Company have supplied a number of such outfits and will be pleased to furnish information or submit estimates.—Electrical Engineer.

The Jas. Robertson Co.'s new plant has been equipped with Dodge patent wood split pulleys.

The Dodge Wood Split Pulley Co., Toronto, are offering a very ingenious and handy device in shape of an electrical tell tale, for use in connection with rope drives. In case of a strand of the rope becoming loose it almost immediately strikes the bar of the tell tale, completing the electric circuit and ringing an alarm bell until the drive is stopped and further damage avoided. Users of rope drive should see this.

The new and extensive pail works of the E. B. Eddy Co. at Hull are not completed, and one very interesting feature in connection with this last big extension to the company's already enormous plant is the manner in which power is obtained. The company have for the past five years been strong believers in the Dodge patent system of rope transmission of power (having in use some 2,600 horse power), therefore had no hesitation in erecting their new buildings without making any provision whatever for either steam or water power, and in due time the line shafting was put in place and power conveyed to same by means of the Dodge system of rope drive, 150 horse-power being transmitted from a water-wheel located at the Eddy sawmill, 180 feet distant. The Eddy Co. are delighted with the job, as full power without loss of speed is conveyed in an almost noiseless manner and with no attention whatever necessary, more than turning on and off the water at water-wheel when work stops and starts. The power at driven or pail works end is under constant control through the medium of a Dodge Patent Friction Clutch, upon which the driven pulley runs, and by simply throwing in or out the clutch by means of a lever the whole shafting throughout the works is stopped and started at will. The saving to the E. B. Eddy Co. in insurance, fuel, engineer's wages, as well as the safety of the system, can readily be appreciated by those posted on such matters. The pulleys used in connection with this drive are all cast iron, grooved according to the Dodge principle, the tension carriage and tightener has a run of some thirty feet, and the Dodge Co.'s special "Firmus" brand of pure manilla rope is used, some 1,600 feet being required. A very ingenious device in connection with the drive is the Dodge patent electrical tell-tale, which is so arranged that should the least particle of strand become loose from the splice the tell-tale is first to feel it, and give warning by the sharp ring of electric bell located in superintendent's office, thus preventing any possible delay through breaking of ropes. This system is owned and controlled in Canada by the Dodge Wood Split Pulley Company of Toronto, who lay out and build, complete, rope drives of any power, at any angle, to any distance, and guarantee satisfaction.

## "STARR" Incandescent Lamps . .



**Full Candle Power. Long Life. Low Price.**

Made of any Candle-Power and Voltage, and with bases to suit the different sockets in use.

**Unrivalled Quality. :- High Efficiency.**

Write for Quotations, stating Voltage and Base used.

# JOHN STARR, SON & CO.

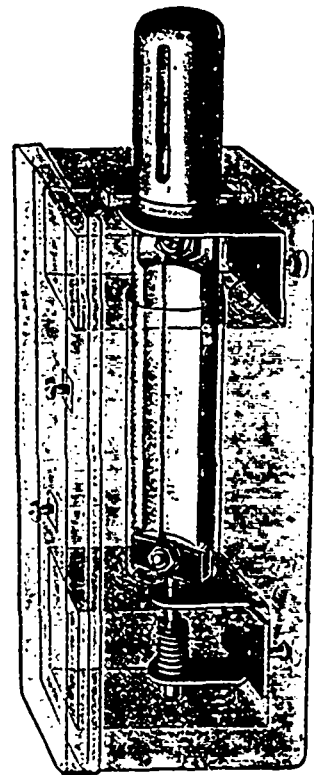
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... Halifax, N. S. . .

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## The Packard Transformer

The Transformer can be cut out of circuit and a burned out fuse replaced without the use of any tool whatever.



Packard Transformer Fuse Box Complete  
(4 Sizes)

Packard Lamp Co., Ltd. :- Montreal  
Makers of Packard Lamp and Transformers.

**PUBLIC WORKS.**

Following are the items included in the vote of the House of Commons for public works in Canada, the expenditures to be made during the current fiscal year. The list cannot but be of great interest to manufacturers, contractors and dealers in supplies:

<b>PUBLIC BUILDINGS. - NORTH-WEST TERRITORIES.</b>	
Wolsley Court House.....	\$ 4,000 00
Court-house, lock-up and police accommodation.....	2,000 00
Red Deer Industrial School.....	4,000 00
Lieutenant-Governor's residence, Regina, including conservatory, water supply and fire protection.....	2,500 00
Lethbridge Custom-house Safe.....	600 00
Moosomin Court-house Addition.....	3,700 00
Prince Albert Crown Lands and Timber Agents' Offices Edmonton Registry Office and Crown Lands and Timber Agents' Offices.....	2,779 00
Regina Court-house, Land Office and Registry Office..	8,000 00
Lieutenant-Governor's residence, Regina.....	2,879 46
<b>BRITISH COLUMBIA.</b>	
Victoria Drill Hall and accessory buildings.....	\$ 5,000 00
Victoria new Post Office.....	54,000 00
Williams Head quarantine station.....	10,000 00
British Columbia Penitentiary, New Westminster retaining wall.....	600 00
Cattle quarantine station.....	2,000 00
Parliament buildings, Ottawa—Renewal of boilers....	5,000 00
<b>HARBORS AND RIVERS. -NOVA SCOTIA.</b>	
Nyanza—Wharf.....	\$ 600 00
Whitehaven Channel.....	1,500 00
South Ingonish—Closing up breach.....	1,000 00
D'Escousse Wharf.....	1,000 00
Cow Bay—Urgent repairs to breakwater.....	4,000 00
Boularderie Island—Wharf on south side.....	3,000 00

Broad Cove—Repairs to breakwater.....	500 00
Port Mouton Repairs to breakwater.....	850 00
Louis Head.....	1,002 00
Church Point.....	350 00
Margaretville Repairs to pier.....	500 00
Port George—Urgent repairs.....	1,400 00
Parrsboro' Wharf Repairs.....	1,500 00
Bass River Pile wharf.....	3,200 00
Great Village Repairs to wharf.....	450 00
Arisaig—Repairs to wharf.....	1,000 00
Margaree—Repairs to breakwater.....	500 00
Seaside Wharf.....	2,000 00
Blanche Harbor.....	100 00
To cut a channel at Monk's Head from the lake to Antigonish Harbor.....	500 00
McNair's Cove.....	400 00
Georgetown Repairs to wharf.....	2,000 00

**PRINCE EDWARD ISLAND.**

Campbell's Cove Breakwater.....	2,000 00
Kier's Shore—Extension to wharf.....	3,000 00

**NEW BRUNSWICK.**

River St. John—Protection of banks.....	\$ 2,220 00
Hopewell Cape—Repairs to wharf.....	600 00
Buctouche Wharf—Repairs.....	1,500 00
West Quaco—Repairs to dam.....	400 00
Burnt Church—Wharf.....	2,000 00

**QUEBEC.**

Port Daniel—Repairs to pier.....	\$ 1,000 00
New Carlisle—General repairs to wharf.....	500 00
Lower St. Lawrence—To provide for the establishment of safe landing places for fishing boats along the south coast of the Gulf of St. Lawrence below Matane.....	2,000 00
Rimouski—Extension of wharf.....	10,000 00
Matane—Repairs to pier.....	1,000 00

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Write for Latest Prices.

## RICE LEWIS AND SON (LIMITED)

Cor. King and Victoria Sts. - TORONTO.

Galvanized Iron, "Gordon Crown."  
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Soldier,  $\frac{1}{2}$  &  $\frac{1}{3}$ , "M. L. S. Guaranteed."

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# PROTECT YOUR MOTORS

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## HILL PATENT Self-Locking Starting Switch

22 No possible chance for an accident as the Switch cannot be closed until the resistance is all in.

CHEAP • COMPACT • DURABLE

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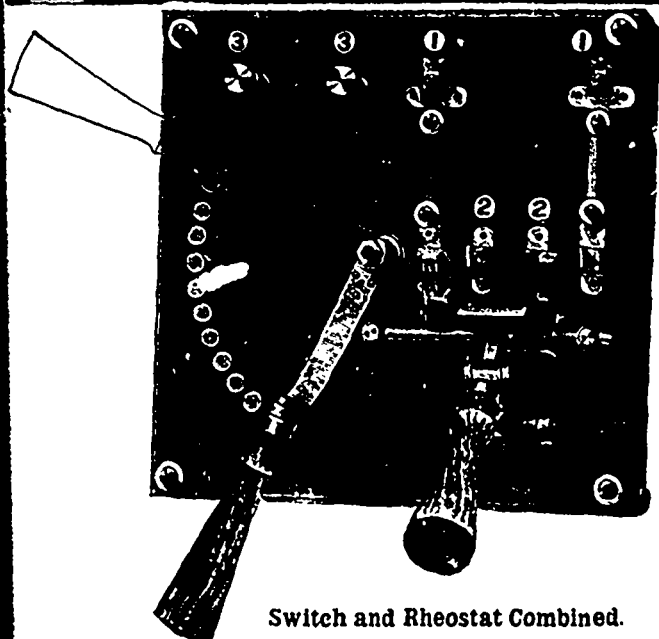
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Elson & Brewster, 143 Liberty St.

CHICAGO  
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Switch and Rheostat Combined.



Pointe aux Esquimaux Wharf.....	5,000 00
Lake St. John District Wharves.....	2,000 00
Cacouna Pier Extension.....	2,000 00
Isle Verte Pier—Repairs.....	1,000 00
Trois Pistoles—Repairs.....	1,000 00
Baie St. Paul To complete wharf at Point aux Corbeaux.....	8,700 00
Baie St. Paul—Repairs.....	1,500 00
St. Irene Addition to pier.....	2,000 00
St. Michel de Bellechasse Repairs to pier.....	800 00
Cap de la Magdeleine Addition to wharf.....	2,800 00
River Richelieu Belœil channel guide piers.....	3,000 00
Lacolle—Repairs to wharf.....	800 00
Pointe Claire—Repairs to wharf.....	2,500 00
Baie des Peres, Lake Temiscaming Repairs to wharf.....	1,000 00
Phillipsburg—Towards the construction of a pier.....	4,000 00
Magog Wharf.....	2,500 00
River Ste. Anne (La Perade).....	10,000 00

ONTARIO.

River Beaudette—To continue improvement of river .. \$	3,000 00
Nation River, North Branch—Removal of a dam.....	2,500 00
Trenton Harbour—Dredging.....	2,000 00
Toronto Harbour—Works at eastern entrance, etc.; the city of Toronto having contributed \$100,000.....	50,000 00
Port Arthur—Dredging.....	1,500 00
Owen Sound—Harbour improvements.....	10,000 00
Thessalon—New wharf.....	5,000 00
Removal of Robertson's Rocks in main passage between Clapperton and Croker's Island, Georgian Bay.....	2,000 00
Lakes Simcoe and Couchiching—Regulation of waters.....	5,500 00
Port Dover—Dredging.....	5,000 00
Port Stanley.....	5,000 00

MANITOBA.

Wharf on Lake Winnipeg..... \$	2,500 00
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BRITISH COLUMBIA.

Protection of river banks at Golden, on the Kicking Horse River.....	\$ 500 00
Kootenay (East) River Improvements.....	5,000 00
Columbia River Protection of bank at Revelstoke and vicinity to prevent erosion.....	5,000 00
Fraser River Survey .....	5,000 00
Saguenay District For piers at the Decharge from Lake St. John.....	2,000 00
Bridges across the Saskatchewan at Edmonton, N.W.T.....	25,000 00
Swing bridge over the Burlington channel.....	5,000 00
Des Joachims bridge over the Ottawa—Repairs.....	1,250 00
Portage du Fort bridge over the Ottawa.....	1,250 00
Bridge over Pond Creek.....	5,000 00

INDIANS—EASTERN PROVINCES.

Caughnawaga, P. Q., building school-houses, repairing roads and bridges, evicting trespassers; and surveys.....	3,500 00
To assist in building Bonnechere bridge, foot of Golden Lake Reserve.....	200 00
To assist in the erection of a school-house for the Micmacs of Ste. Anne de Restigouche, P. Q. ....	1,000 00

BRITISH COLUMBIA.

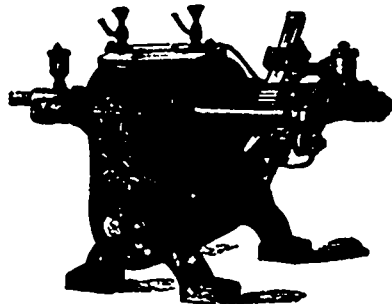
To assist in the erection of a new building for girls at the Indian school, Alberni.....	1,500 00
To provide for the erection of an industrial school at Lytton.....	5,000 00
To provide for the erection of a new building for the industrial school at Williams Lake.....	2,000 00

ELECTRIC LIGHT INSPECTION.

To provide for the purchase of standard instruments, etc., and payment for expert services, and for other purposes under the Act .....	5,000 00
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# Kay Electric Co'y

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# CARBON & PORCELAIN CO.

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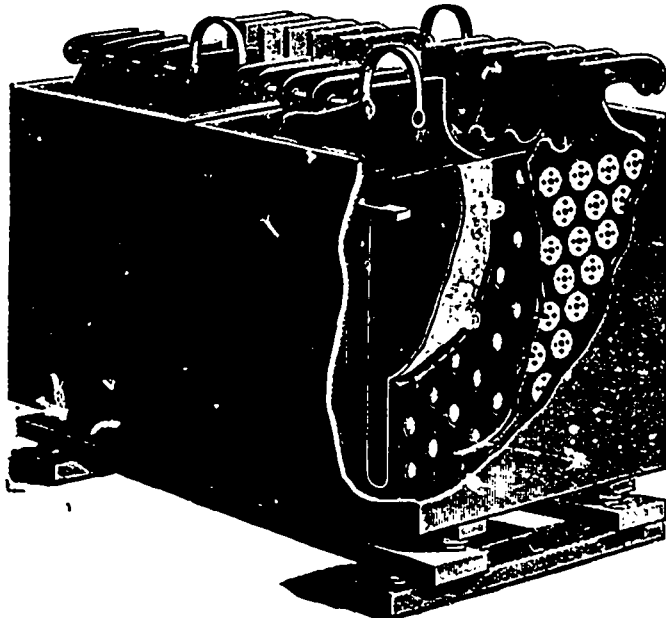
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THE CHLORIDE ACCUMULATOR

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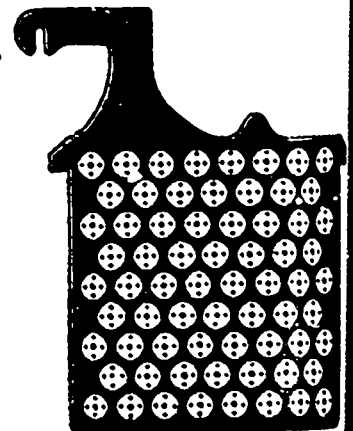
## The Chloride Accumulator

Elements of all sizes, from 100 to 1,000 Watt-hours capacity each.

Traction Cells a Specialty

Electric Launch Equipment, Telegraph Phonograph, Surgical and all Special Cells.

Drexel Building - Philadelphia



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CANALS.

Rapide Plat Canal—Enlargement.....	\$130,000 00	To repair new lock No. 15.....	1,500 00
Lachine Canal—Enlargement.....	50,000 00	To provide telephone line.....	2,000 00
Trent Valley Canal.....	130,000 00	To extend the Cornwall sewer.....	10,000 00
Rideau Canal—		Williamsburg Canal To build new lock gates at lock No. 23.....	4,000 00
To complete sheet piling at Deep Cut.....	10,000 00	Welland Canal—	
To build ice-breaker at Hog's Back.....	600 00	To clean and deepen back ditch north side of feeder...	2,800 00
Towards assuming control and rebuilding Lorne bridge.....	6,500 00	To construct drain on John Charlston's property.....	200 00
To rebuild lock walls at lock 4.....	2,000 00	To provide for rebuilding 1,300 feet of masonry wall along prism of canal on the level above lock No. 24	14,500 00
To rebuild bridge, lot 16, con. 4, Green Bay Road ...	600 00	Towards building the east pier at Port Dalhousie.....	2,000 00
To build swing bridge at Jones' Lock, Smith's Falls ...	1,800 00	Beauharnois Canal	
Cornwall Canal—		To build coffer-dam and repair sills and platforms, lock 14, Valleyfield.....	2,500 00
To repair old locks Nos. 15 and 19.....	7,500 00		

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Mentioning this paper.

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**Alternating Current Indicators**

Are now ready. Before purchasing elsewhere send for our New Catalogue, which contains the prices and description of the above instruments, and also a list and prices of other new instruments of our manufacture.

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New Railway Generators and Station Equipments. Complete Railway Car Equipments. Direct Current Lighting Dynamos. Direct Current Power Motors.

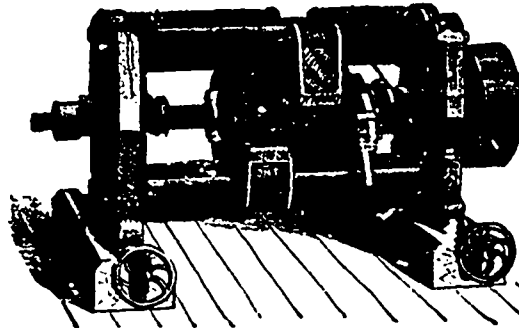
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STEAM LAUNCHES to carry six persons, from \$175 up.

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To renew foundations of swing bridge at guard lock Drain at Grand Isle, Valley-field.....	1,000 00
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To rebuild bridge at Lost Channel, St. T motly.....	3,000 00
Chambly Canal—Towards re-building lock walls.....	3,500 00
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Trent Valley Canal—To complete cut at mouth of Seugog River.....	1,200 00
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	1,200 00

**FOUNDRY**    :-  
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*Core Compound, Ceylon Plumbago  
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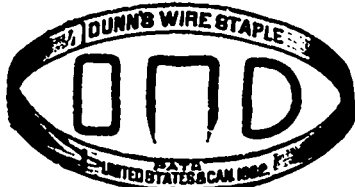
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**HAMILTON - - - Ontario**

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NOTICE IS HEREBY GIVEN to all persons who may desire to manufacture an improvement in Car Brakes, for which certain letters patent of the Dominion of Canada were granted to me, on July 15th, 1892; to wit., patent numbers 39,365, that I am prepared to grant licenses upon reasonable terms under the said patent, and to otherwise place the said patent invention in possession of the public in accordance with law. **J. J. Cassiday,** Canada Life Building, Toronto.



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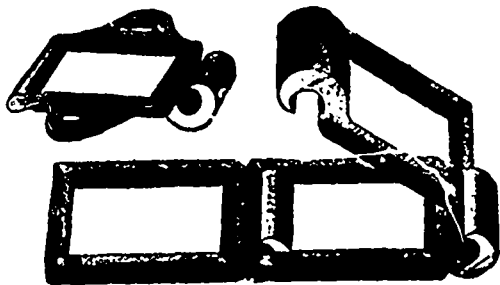
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To pay for building swing bridge at Trent Narrows..	8,500 00
To assist in rebuilding Rosa's bridge over Otonabee River .....	1,700 00
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Lunenburg Post Office, Custom-house, &c.—To complete.....	6,600 00
Halifax Quarantine Station on Lawlor's Island.....	5,000 00
Sydney Quarantine Station at Keating Point.....	3,000 00
NEW BRUNSWICK.	
Chatham Post Office, Custom-house, &c.....	5,000 00
Partridge Island Quarantine Station—St. John harbour..	2,000 00
Marysville Public Building.....	5,000 00
QUEBEC.	
Montreal Post Office—Alterations, improvements, repair elevators, fittings, &c.....	20,000 00

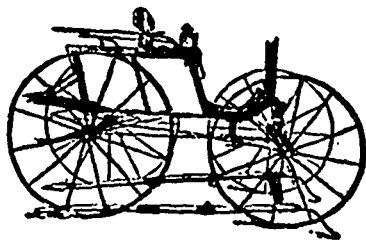
Montreal Dominion Public Buildings—Improvements, alterations, renewals, repairs, &c.....	10,000 00
Quebec Post Office—New wing, including alterations to old buildings, furniture, &c.....	6,000 00
Quebec Immigrant buildings on Queen's wharf, Louise embankment and breakwater.....	3,500 00
St. Hyacinthe Post Office, Custom-house, &c.....	3,742 95
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Toronto Custom-house, Examining Warehouse, Savings Bank and Assistant Receiver General's Offices—Recovering roofs, renewing floors, electric clocks, vaults, repairs, &c.....	5,000 00
Toronto Drill Hall, to complete.....	20,000 00
Rideau Hall—Heating apparatus, electric lighting, new dairy, &c.....	13,000 00
Stratford Public Building—To make good damage done by fire of 21st April, 1894.....	10,000 00
Port Arthur Public Building—To complete payments to contractors on overdue amounts and to provide for further fittings and furniture required, &c.....	4,605 00

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Attachments and Sprocket Wheels. Large stock always on hand  
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Every Carriage Maker should show one.....  
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A SURE SELLER : SO STYLISH : SO LIGHT RUNNING  
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- 46,055 Apparatus for supplying storage heaters with hot water, The Consolidated Car Heating Co., Albany, N.Y., May 15.
- 46,056 Coupler for cars and air brakes, George R. J. Newman, Washington, D.C., May 15.
- 46,057 Mould oiler, Charles J. Lewis, Grimsby, Ont., May 15.
- 46,058 Art of and apparatus for coating paper, Frank P. Buffington and John T. Sutphew, Middleton, O., May 15.
- 46,059 Harvesting machine, Gerard Beekman, New York, N. Y., May 15.
- 46,060 Rotary ash sifter, George P. Harrison, Windsor, Ont., May 16.
- 46,061 Process of and apparatus for treating textile fibres, Emile Martens, Providence, R.I., May 16.
- 46,062 Panelling for ceilings and walls, George Dietrich, Toronto, Ont., May 16.
- 46,063 Electric propulsion of vehicles and boats, Mark W. Dewey, Syracuse, N.Y., May 16.
- 46,064 Pea harvester, James Whiteman, Amulree, Ont., May 16.
- 46,065 Railway-frog, James Neafie, N.J., May 16.
- 46,066 Whip, M.O. Felker, Springfield, O., May 16.
- 46,067 Dumping wagon, Frederick S. Higbee, Pataskala, O., May 16.
- 46,068 Lawn sprinkler, Charles Anderson, Detroit, Mich., May 16.
- 46,069 Combination rubber and steel horse-shoe, Elmer C. Scribner, Neversink, N.Y., May 16.

- 46,070 Binding attachment for baling presses, Andrew Wickey, Chicago, Ill., May 16.
- 46,071 Ink bottle attachment, Burt Ramsey, New York, N. Y., May 16.
- 46,072 Automatic closing device for tap holes, John C. Steele, Thornhill Post Office, Ont., May 16.
- 46,073 Wood rim for cycles, John Banker, Buffalo, N.Y., May 16.
- 46,074 Wrench, Abram S. King, and Roswell Beardsley, Ashby, Minn., May 17.
- 46,075 Combined match box and cigar tip cutter, John W. Maillon, North Attleborough, Mass., May 17.
- 46,076 Screw propeller, Alfred W. Chase, Highland Park, Conn., May 17.
- 46,077 Lamp burner, John J. Donovan, Boston, Mass., May 17.
- 46,078 Roof framing rule, August G. Dahmer, Alameda, Cal., May 17.
- 46,079 Club and dumb bell, Abiel W. Nelson, New London, Conn., May 17.
- 46,080 Type machine, James G. Pavyer, St. Louis, Mo., May 17.
- 46,081 Mitre box, Frank W. Loveall, and Derk J. Rocks, Cleveland, O., May 17.
- 46,082 Machine for making clothes pins, David Howells, et al, Kane, Pa., May 17.
- 46,083 Mucilage holder, James Chase, Rochester, N.Y., May 17.

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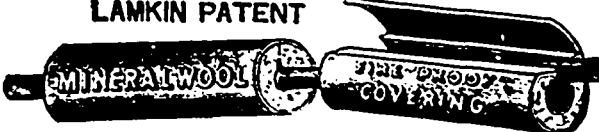
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- 46,084 Railroad signal system, The Hasell Perfected Railway Signal Co., New York, N.Y., May 17.
- 46,085 Railway signal system, The Hasell Perfected Railway Signal Co., New York, N.Y., May 17.
- 46,086 Exhibitor for goods, Daniel B. English and Calvin S. Parker, Way Cross, Ga., May 17.
- 46,087 Hydraulic motor, Oliver F. Teed, John A. Comstock and Henry D. Capitan, Chicago, Ill., May 17.
- 46,088 Armature for motors and generators, The Canadian General Electric Co., Toronto, Ont., May 17.
- 46,089 Power hammer, The Laird and Sweeney Mfg. Co., Ltd., Johnsbury, Vt., May 17.
- 46,090 Turning machine, Charles M. Davis, and Asher A. White, Boston, Mass., May 17.
- 46,091 Steel founding, James G. McRoberts, St. Louis, Mo., May 17.
- 46,092 Hydraulic air compressing apparatus, Charles H. Taylor, et al, Montreal, Que., May 17.
- 46,093 Stock for hinge-joints of pins or brooches, Barton A. Ballou, Providence, R.I., May 18.
- 46,094 Dental articulator, Charles F. Garretson, Knoxville, Ia., May 18.
- 46,095 Journal box, Isbon Metzger, Louisa County, Ia., May 18.
- 46,096 Journal box, Isbon Metzger, Louisa County, Ia., May 18.
- 46,097 Pneumatic tire, The Derby Cycle Co., Chicago, Ill., May 18.
- 46,098 Cloth measuring machine, William H. Holloway, Brazil, Ind., May 18.
- 46,099 Grain Binder, The Warden, Bushnell and Glessner Co., Springfield, Ia., May 18.
- 46,100 Travelling case, Florence I. Leonard, Arlington, Ga., May 18.
- 46,101 Process of boiling soap, D. John Grondin, Yamachiche, Que., May 18.
- 46,102 Burner for saw-dust, Russel H. Nogar and Albert Cooke, Toledo, O., May 19.
- 46,103 Combined anti-rattler and shaft support, Demus A. Barrackman, Decatur, Ill., May 19.
- 46,104 Electric selecting device, The Electric Selector and Signal Co., New York, N. Y., May 19.

- 46,105 Life boat, John A. Aniello and Toussaint P. Boscher, New Orleans, La., May 19.
- 46,106 Trunk, William H. S. Westlake, Lock No. 4., Pa. May 19.
- 46,107 Work ticket and method of and apparatus for manufacturing work tickets, William B. Hamilton, Toronto, Ont., May 19.
- 46,108 Device for providing hot air for furnaces, Archibald P. Campbell, Portage la Prairie, Man., May 19.
- 46,109 Apparatus for bunging beer and other casks, etc., Louis Wagner and John Marr, Baltimore, Md., May 19.
- 46,110 Bridge, Narcisse P. Massicotte, Ste. Genevieve de Batiscan, Que., May 19.
- 46,111 Electric switch, The Consolidated Car Heating Co., Albany, N. Y., May 21.
- 46,112 Printing press, Eugene S. Bradford, St. Louis, Mo., May 21.
- 46,113 Faucet, Alexander Hurst and Jesse I. Boyer, Reading, Pa., May 21.
- 46,114 Veterinary tooth cutter, Hiram C. Stanbridge, New Bedford, Mass., May 21.

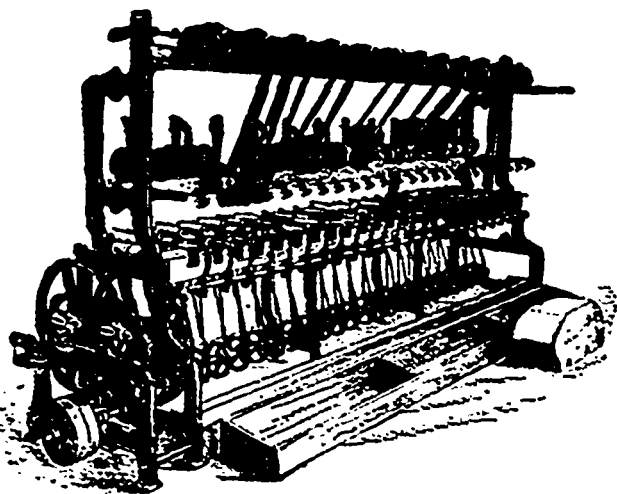
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- 46,115 Rotary hair brush, Charles M. Wilson, Dungannon, Tyrone, Ireland, May 21.
- 46,116 Automatic railway gate, Charles H. Sherwood, Utica, and Henry C. Lyman, Sherburne, N. Y. May 21.
- 46,117 Spirit stove, Max Drake, Schoeneberg, Germany, May 21.
- 46,118 Machine for scarfing the ends of cane strips for splicing, Henry B. Morris, Michigan City, Ind., May 21.
- 46,119 Harness bail for looms, Angus Park and Albert Thornton, Sherbrooke, Que., May 21.
- 46,120 Sewing machine attachment, Mary Tobener, Gold Hill, N. C. May 21.
- 46,121 Ointment, Thomas Shea, Clyde, Ont., May 21.
- 46,122 Cover for manuscript, George H. Kent, Cambridge, Mass., May 21.
- 46,123 Horse collar, Joseph E. Lortie, Montreal, Que., May 21.
- 46,124 Card cutting machine, Joseph A. Gosselin, Drummondville, Que., May 21.
- 46,125 Fish spear, John D. Dreese, Halstead, Kan., May 22.
- 46,126 Vessel steering gear, Daniel M. Maxon, and Walter H. Whittemore, Bay City, Mich., May 22.
- 46,127 Lee wing for vessels, Nathan C. Jessup, Southampton, N. Y., May 22.
- 46,128 Price and cost tag, James D. Parrott, Litchfield, Ill., May 22.
- 46,129 Winding engine, Henry L. Reynolds and Henry W. Ketchum, Seattle, Wash., May 22.
- 46,130 Refrigerator, Moise Anvin, Montreal, Que., May 22.
- 46,131 Combined seed planter and fertilizer dropper, Samuel L. Allen, Cinnaminson, N. J., May 22.
- 46,132 Ash sifter, Elijah W. Benjamin, Napanee, Ont., May 22.
- 46,133 Mail bag fastener, Levis Williams, Belleville, Ill., May 22.
- 46,134 Soda fount, Jonathan Nelson, Toronto, Ont., May 22.

- 46,135 Umbrella, parasol, etc., John Forbes, No. 11 Harrington Square, Middlesex, England, May 22.
- 46,136 Folding snow-shoe, Herman Bremer, Halberstadt, Kingdom of Prussia and Germany, May 22.
- 46,137 Kneading board, Mary M. Everhard, St. Joseph, Mich., May 22.
- 46,138 Car coupler, Charles J. Hall, Quebec, Que., May 22.
- 46,139 Plough, Gustav Paasche, Gardelegen, German Empire, May 22.
- 46,140 Article holding tables for polishing machines, The Mose Carving Machine Co., Minneapolis, Minn., May 23.
- 46,141 Traveling lawn sprinkler, The Portland Lawn Sprinkler Co., Portland, Me., May 23.
- 46,142 Solder for jewelry, Samuel Breadner, Parry Sound, Ont., May 23.
- 46,143 Lamp fixture, Edward D. Cook, Chicago, Ill., May 23.
- 46,144 Process of manufacturing blotting paper, Gustave L. Jaeger, Maywood, N. J., May 23.
- 46,145 Book for stamps, Arthur F. Purdy, Lawrence, Cal., May 23.
- 46,146 Wheel rim for pneumatic tires, The Raleigh Cycle Co., Nottingham, England, May 23.
- 46,147 Machine for packaging seeds in envelopes, Samuel W. Blach, Yonkers, N. Y., May 23.
- 46,148 Furnace, George M. Conway and Harold G. Underwood, Milwaukee, Wis., May 23.

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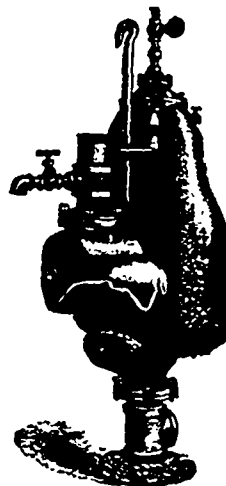
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- 46,149 Log Kicker, George A. Kelly, Minneapolis, Minn., May 23.
- 46,150 Roofing tile, Karl Thomann, Merseburger Strasse, of Halle-  
ander Saale, Saxony, Prussia, Germany, May 25.
- 46,151 Hay loading machine, Joseph H. Chartier, Coaticook, Que.,  
May 25.
- 46,152 Fuse for projectiles, Felicien Maubeuge, Termonde, Belgium,  
May 25.
- 46,153 Method of and apparatus for arresting the motion of electri-  
cally propelled mechanisms, Elmer A. Sperry, Cleveland,  
O., May 25.
- 46,154 Composition for producing artificial emery wheels, Justin  
Dutrey, New Orleans, La., May 25.
- 46,155 Paper box, Edward J. Major, Montreal, Que., May 25.
- 46,156 Ticket, Lynn T. Leet, Montreal, Que., May, 25.
- 46,157 Gas engine, Henry T. Dawson, Salcomb, Devon, England,  
May 25.
- 46,158 Harvester motor, James H. Birks and Samuel Birks, Chicago,  
Ill., May 25.
- 46,159 Washing machines, John Tipp, Prince Albert, Ont., May 25.
- 46,160 Extensible tool carrying bracket, for power actuated devices,  
Horace Hobbs and Augustus W. Friese, Milwaukee, Wis.  
May 25.
- 46,161 Multicolour printing press, Emma L. Forbes, Boston, Mass.,  
May 25.
- 46,162 Multicolour printing press, Emma L. Forbes, Boston, Mass.,  
May 25.
- 46,163 Rotary meat cutter, Levi F. Snow, New Haven, and Oliver  
D. Woodruff, Southampton, Conn., May 25.
- 46,164 Hatchet, John C. Seales, Chicago, Ill., May 26.
- 46,165 Lamp wick oil tube filter, Samuel Jones, Newtonwards, County  
Down, Ireland, May 26.
- 46,166 Fastener for artificial teeth, Hugo Kalbe, Berlin, Germany,  
May 26.
- 46,167 Game apparatus, Clement C. Clawson, Newark, N.J., May  
26.
- 46,168 Vent bung, Louis Wagner, Baltimore, Md., May 26.
- 46,169 Feed mechanism for Saw-mill carriages, George M. Soule,  
Meridian, Miss., May 26.
- 46,170 Ventilator, Theophile Lesserd, Montreal, Que., May 26.

- 46,171 Platforms and gates for cars, Erastus W. Appleman, Clermont  
la., May 29.
- 46,172 Door stop, Hiram M. Freeman, Napoli, N.Y., May 29.
- 46,173 Track cleaning apparatus, Robert L. Mason, Butte City, Mont.,  
May 29.
- 46,174 Sponge rack, William R. House, Whitby, Ont., May 29.
- 46,175 Pipe cover, Henry W. Gerhardt, Neepawa, Man., May 29.
- 46,176 Stove pipe shelf, Charles N. Johnson, San Francisco, Cal.,  
May 29.
- 46,177 Blotting sheet holder, William Millar, New Hamburg, Ont.,  
May 29.
- 46,178 Hitching device, John G. Engburg, Menomine, Mich., May  
29.
- 46,179 Baling press, Andrew Wickey, Chicago Ill., May 29.
- 46,180 Earth boring machine, Walter E. Everitt, Buffalo, N.Y., May  
29.
- 46,181 Stove pipe thimble, Archibald Fairgrieve, Toronto, Ont., May  
29.



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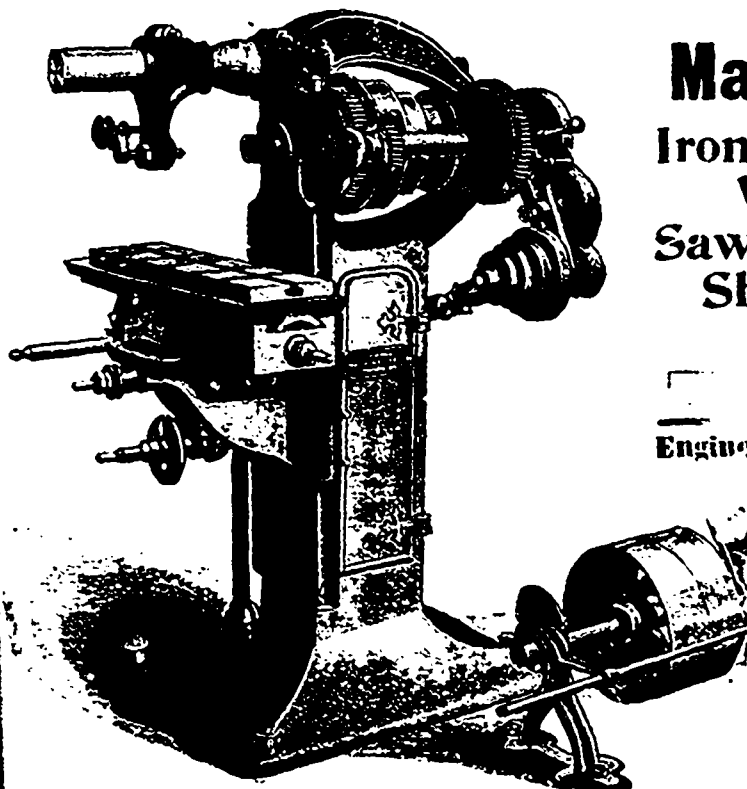
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- 46,182 Transportable circular saw-mill, Jeremiah H. Matthews, South Bend, Ind., May 29.
- 46,183 Sash holder and fastener, James Robertson, et al, Perth, Ont., May 29.
- 46,184 Dynamo and motor, The Waddell-Entz Co., New York, N.Y., May 29.
- 46,185 Mitre box, Thomas Harold and John McColl, Vancouver, B. C., May 29.
- 46,186 Furnace grate, Teile H. Muller, Philadelphia, Pa., May 29.
- 46,187 Apparatus for sorting cards and compiling statistics, John K. Gore, Newark, N.J., May 29.
- 46,188 Hose coupler, William Martin, Dundalk, N.Y., May 29.
- 46,189 Bottle, Emil Klahn, West Hoboken, N.J., May 29.
- 46,190 Ice creeper, Joseph Carr, Saginaw, Mich., May 29.
- 46,191 Car wheel, Leonard Roll, Wilkesbarre, Pa., May 29.
- 46,192 Extension table, William Mayer, New York, N.Y., May 29.
- 46,193 Shoe and stocking protector, Herbert L. Phelps and Frank E. Jack, Chicago, Ill., May 29.

**UNITED STATES PATENTS.**

GRANTED TO CANADIAN INVENTORS.

The following patents were issued from the United States Patent Office, on July 17, 1894, and reported especially for the CANADIAN MANUFACTURER by Glascock & Co., patent attorneys, Washington, D. C. Printed copies of these patents can be obtained from them for 25 cents each.

Robert S. Anderson, Toronto, pneumatic tire.  
 Job Dudley and R. E. Gibson, Toronto, ticket punch.  
 James R. Gordon, Ottawa, ore crusher.  
 James C. McNabb, Montreal, stop cock for air brake system.  
 Thomas Parker, Wingham, pump.  
 George N. Pearson, Hantsport, thill-coupling.  
 Henry Sewrey, Barrie, metal driving belt.  
 William E. Stafford, Shedden, riding attachment for plows.  
 William Taylor, Carman, band cutter and feeder for thrashing machines.  
 Oliver W. Ketchum, Toronto, design sheet metal pulley.

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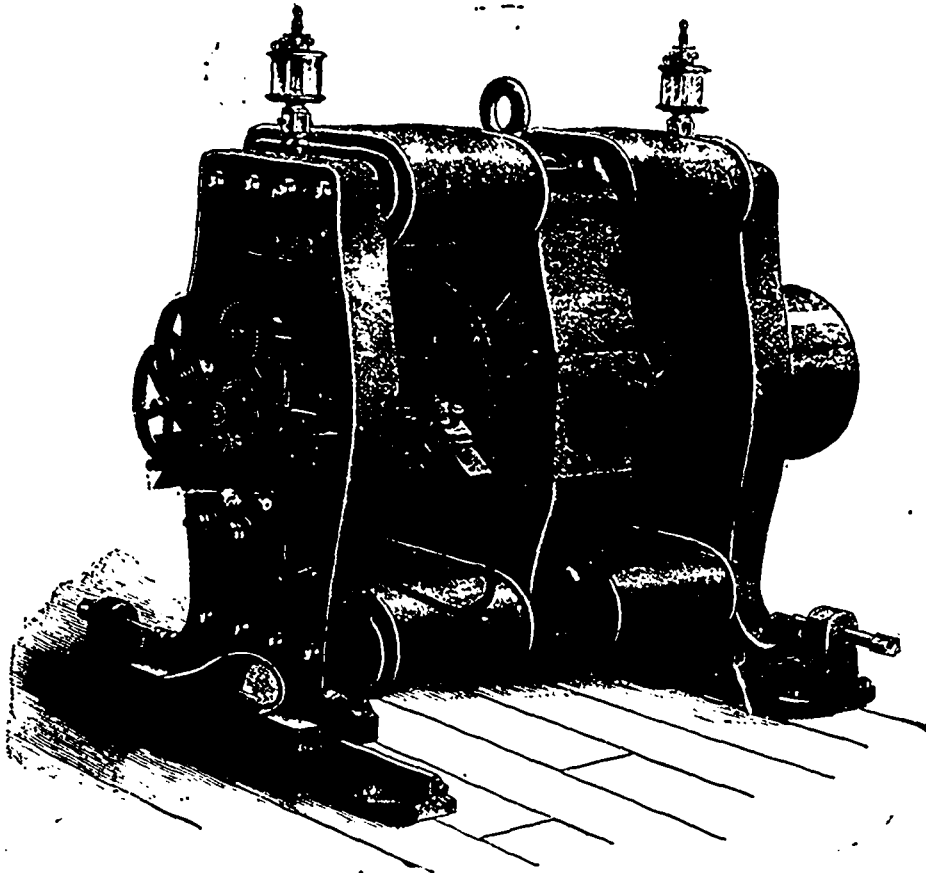
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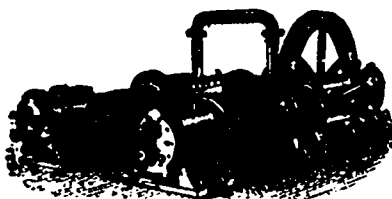
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1⅜	1⅜	5.01	"	3	2⅞	22.59	"
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2	1⅞	9.83	4 cts.	4	4	42.33	5 cts.
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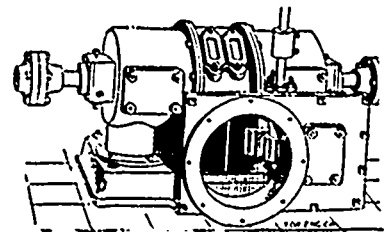
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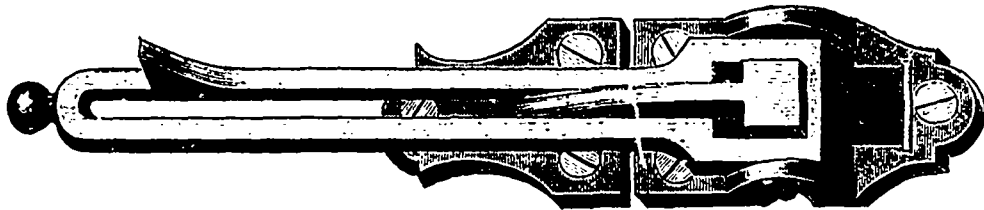
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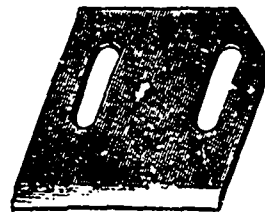
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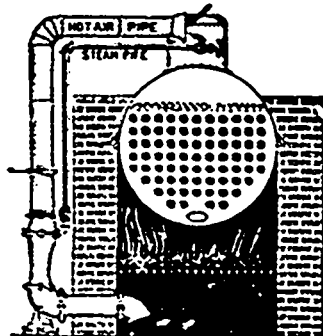
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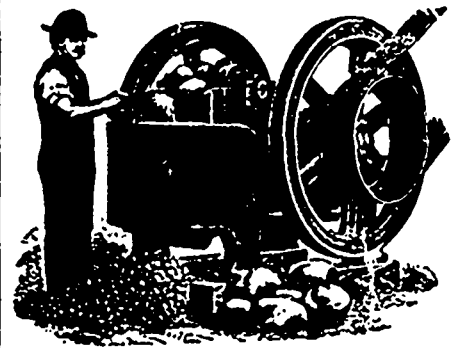
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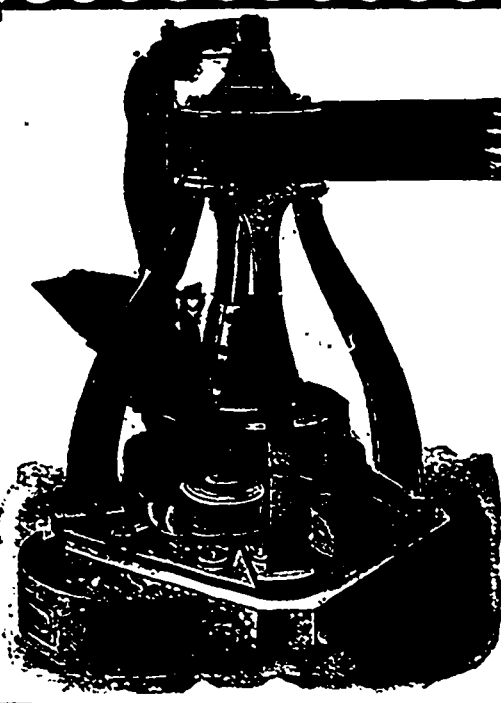
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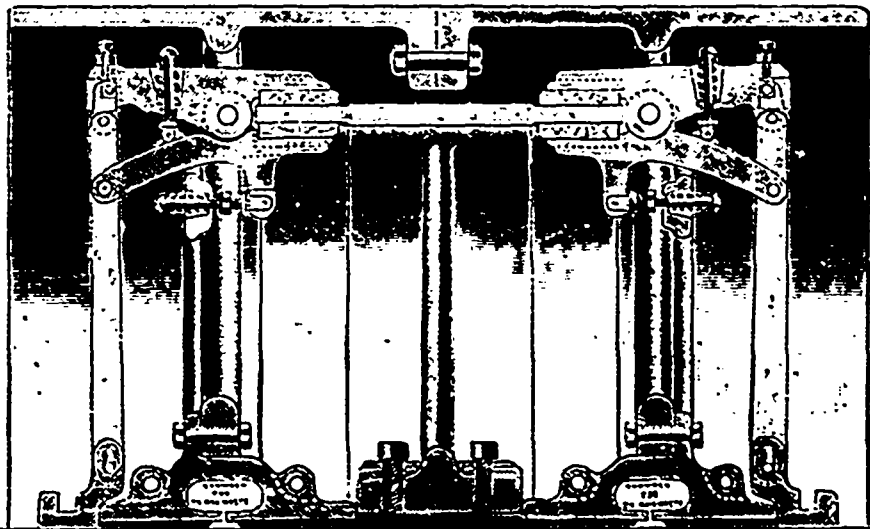
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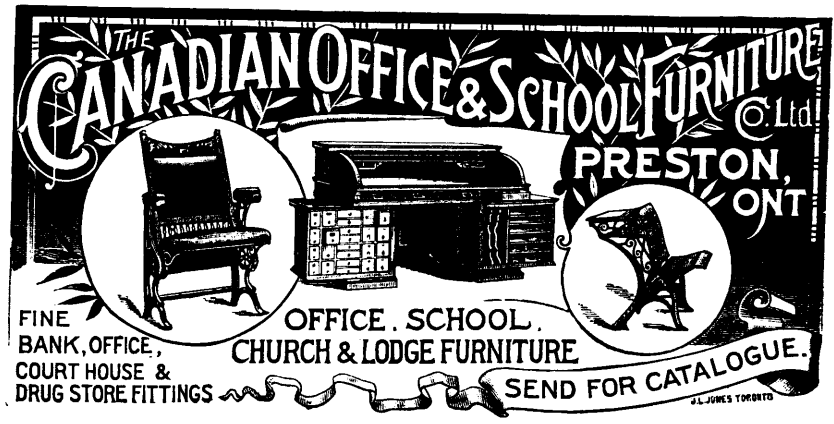
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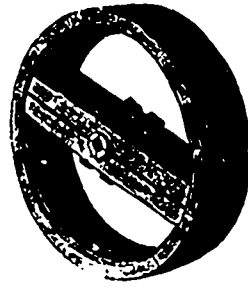
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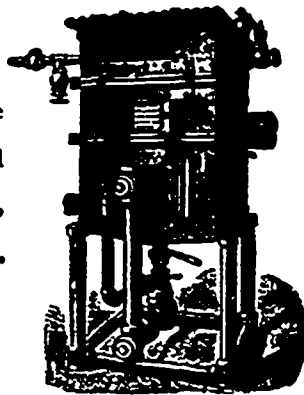
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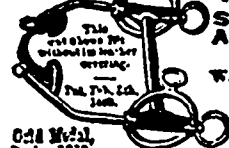
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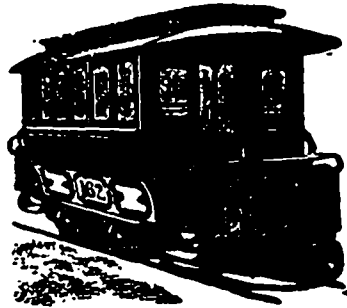
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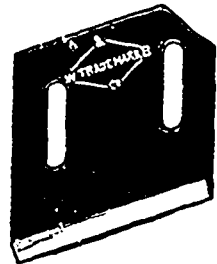
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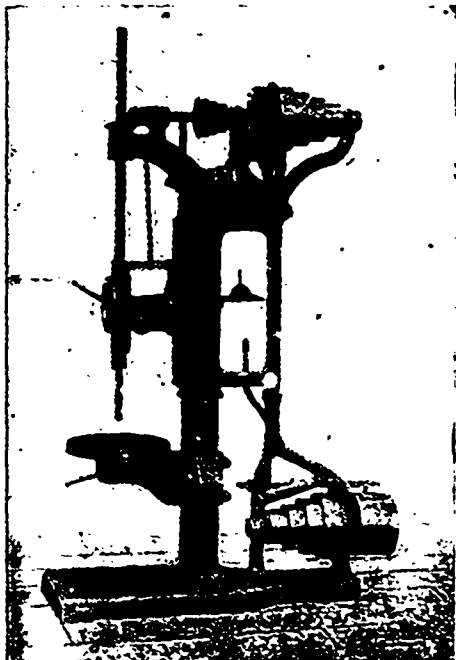
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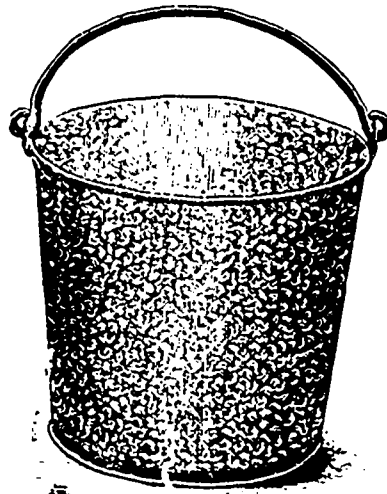
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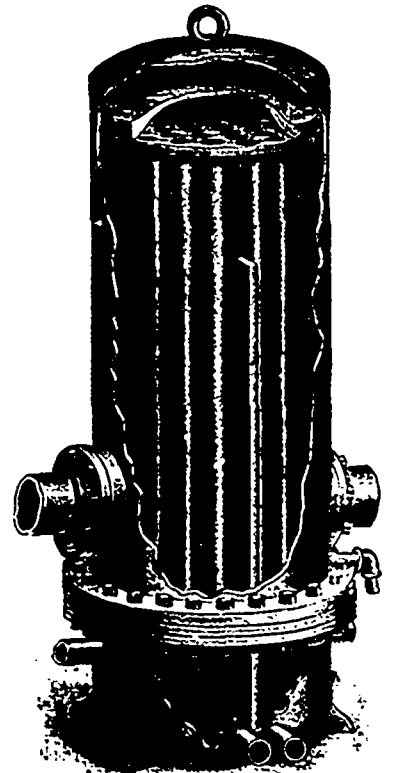
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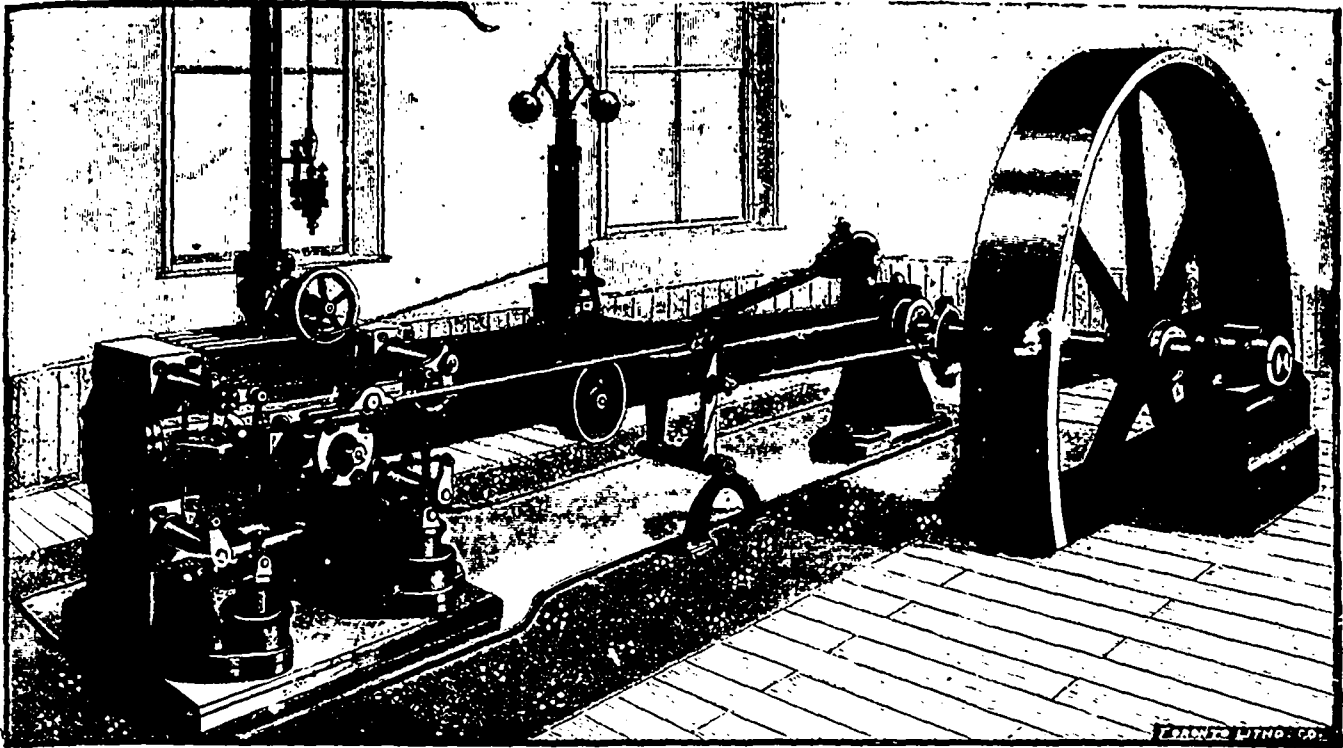
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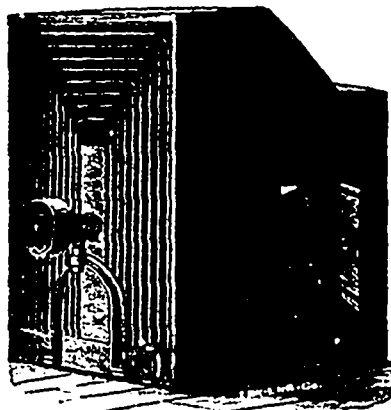




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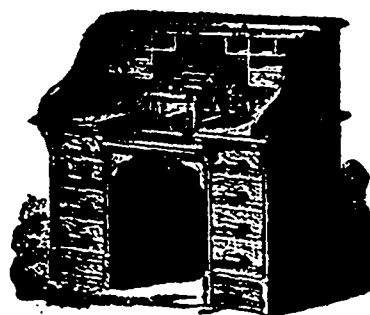
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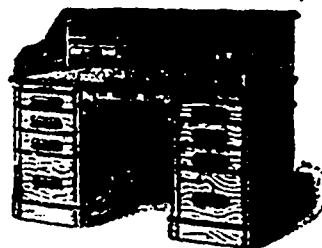
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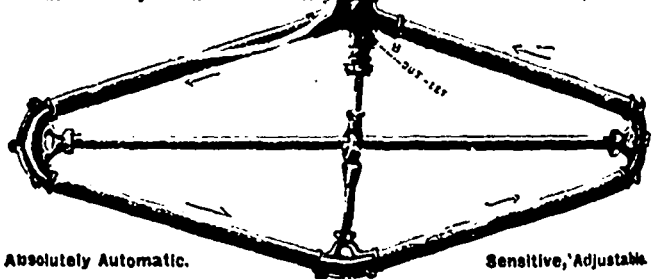
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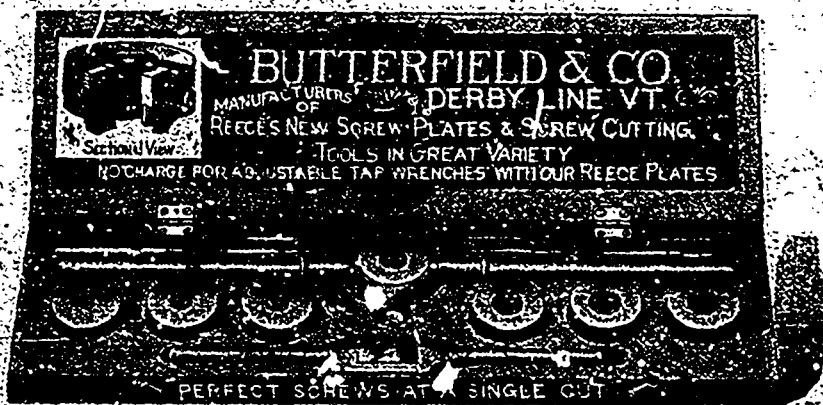
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