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DOMINION MECHANICAL & MILLING NEWS

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THE NEW CANTILEVER BRIDGE OVER THE NIAGARA RIVER.

THE successful completion of this fine structure marked a new era in bridge construction, and we take pleasure in transcribing, from data furnished by C. C. Schneider, chief engineer of the structure, the following details of the progress of its building and the dimensions of the great work. As of undoubted interest to the majority of our readers we also present engravings which accurately show the progress of the work at different times on both sides of the river, also of the completed structure.

The bridge is a double-track railroad bridge, and designed to connect the N. Y. Central and Michigan Central railways. It is located about 300 feet above the present railroad suspension bridge, where the width of the opening to be spanned, from bluff to bluff, is 800 feet. The general dimensions are as follows:—Length of bridge proper, from center of end piers, 910 ft. 1 1/2 in.; divided into two cantilevers of 395 ft. 2 1/4 in. each, and one intermediate span of 119 feet 9 inches. The towers are braced wrought-iron structures, 130 feet 6 1/4 inches high, resting on masonry piers 39 feet high; the foundations under the towers are of beton, 8 feet thick, directly

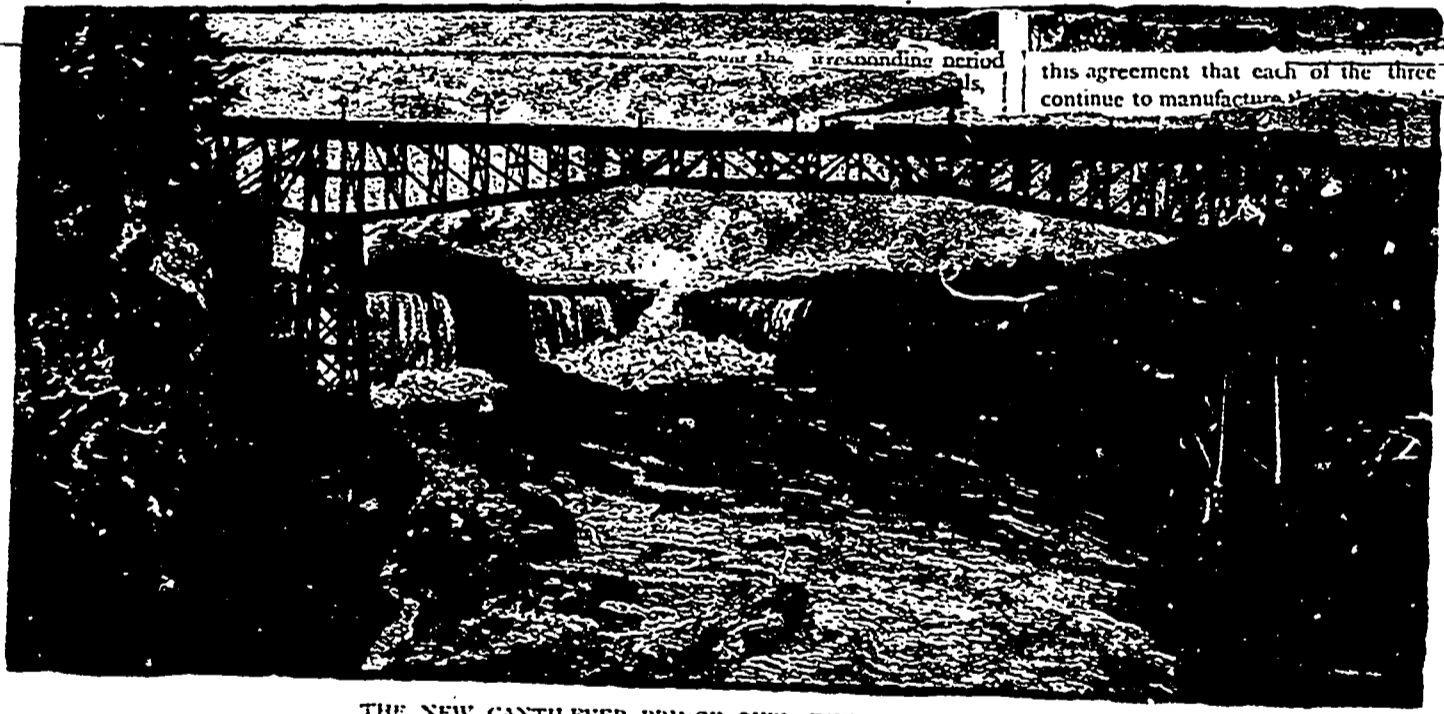
whole of the superstructure is pin-connected. The towers contain 4 columns each, and each column is made up of plates and angles in sections of about 25 feet in length, braced with horizontal struts, and with tie-rods. The batter of columns at right angles and the center line of the bridge is one in eight. In the cantilever trusses the lower chords and center posts are made of plates and angles latticed, the intermediate posts are made of 12 inch and 15 inch channels latticed. The upper chords of the cantilevers are 8 inch eye-bars, the shore-arm having a compression member 18 inches deep, composed of plates and angles packed between the chord-bars.

The shore ends of the cantilevers are attached to short links, revolving on pins anchored to the masonry; these links serve as rockers and allow for the expansion and contraction of the shore ends of the cantilevers. Expansion joints are also provided for at the connection of the intermediate span with the river ends of the two cantilevers; the intermediate span being suspended from the extreme ends of the river-arms. The floor beams are four feet deep, and are made of plates and angles; they are riveted to the posts. There are 4 lines of longitudinal stringers, resting on top of the floor-beams; these stringers are plate girders 2 feet 6 inches deep. The ties are white oak 9x9 inches, spaced 18 in-

been erected on false works in the usual manner, and after their completion the river-arms were built out panel by panel, by means of a "traveller" (shown in Figs 5 and 6) an ingenious and practical auxiliary projecting over the completed portion, and advancing as each panel was in place and its bracing adjusted. The center, or intermediate span of 120 feet, is of a design which allowed its being built out from the river arm of the cantilever until reaching the middle panel, which was accurately fitted to close the gap between the two sides, as shown in the fine large engraving of the completed structure.

The near approaches to the main structure, on both sides, are substantial iron trestles (shown in large engraving) resting on masonry foundations erected upon solid rock.

The building of this bridge, the first of the kind ever completed, presents one of the most wonderful feats of bridge engineering, both as to the character of the undertaking and the energy and efficiency with which it has been so successfully carried out, on record. On the 11th day of April, 1883, a contract was entered into with the Central Bridge Works of Buffalo, of which Gen. Geo. S. Field is president, C. V. N. Kittredge treasurer, and Edmund Hayes, engineer. General plans were prepared by them, and after a very critical and thorough



THE NEW CANTILEVER BRIDGE OVER THE NIAGARA RIVER.

on the rock, forming a uniform, solid and enduring mass.

There are two trusses, 28 feet apart between centers; the panels are 25 feet long, excepting those of the intermediate span, which are 24 feet, and the end panels of the shore-arms of the cantilevers, which are 20 feet 2 1/4 inches long. The depth of the cantilever trusses over the towers is 56 feet, and at the ends 21 feet for shore ends, and 26 feet at the river ends.

The structure has been proportioned to carry, in addition to its own weight, a freight train on each track at the same time, weighing one ton per lineal foot, with each train headed by two 76-ton consolidation engines. The factor of safety is 5. Wind bracing has been proportioned for a pressure of 30 lbs. per square foot, or a surface twice the area of one face of the truss, plus the area of face of train taken at 10 feet vertical height.

The material used in the superstructure is open hearth steel and wrought iron. Towers and heavy compression members, such as lower chords and center posts, are of steel, as are all the pins. All tension members are wrought iron. The only use made of cast iron is in the pedestals on the masonry and in filling-rings; the castings at the top of the towers are all steel. The

ches between centers; every other tie projects to support a plank walk and hand-raising, which latter is made of cast iron posts 6 feet apart, and 4 longitudinal lines of 1 1/4 inch gas piping. The guard timbers are of white oak 8x8 inches.

All masonry is built of Queenstown limestone, in courses of 2 feet rise. The piers for the towers are 12 feet square under the coping, and have a batter of 6 inches to the foot; each pair of piers is connected by a wall 3 feet 9 inches thick at the top, and battering the same as the piers.

The anchorage piers are 11 by 37 1/2 feet under coping, with a batter of six in. to the foot. They rest on a platform consisting of 12 iron-plate girders, 2 1/2 ft. deep and 36 ft. long; under these plate girders are 18 15-inch I beams, through which the anchorage-bars pass, in such a manner as to distribute the pressure over the entire mass of masonry. Each anchorage pier contains 460 cubic yards of masonry, weighing 2,000,000 lbs.; as the maximum uplifting force from the cantilevers, under the most unfavourable position of load, is only 678,000 lbs., it will be seen that this upward force is amply counter-balanced.

The shore-arms of the cantilevers, as will be noticed by reference to the small cuts (Figs. 1, 2 and 3) have

this agreement that each of the three companies will continue to manufacture

examination of two weeks' duration, were referred to C. C. Schneider, appointed chief engineer of the Bridge Company, April 26, who gave his approval May 3d. The task of working out the detailed plans was then entered upon by himself and Mr. Hayes, and was continued by unremitting energy and careful attention from that period on, their progress necessarily keeping pace with the construction.

Work on foundations began April 15th, and the introduction of the "beton coignet" began June 6th, and was completed June 20th on the American side, and seven days later on the Canada side. The first stone for the piers on the American side was laid June 26th, and on the Canada side July 13th. The American piers were capped Aug. 20th, and the Canadian Sept. 3d. August 29th, the first column of steel for the tower was lowered on the American side, and on the Canada side Sept. 10th. The last section of the American tower was laid Sept. 15th, as shown in Fig. 1, while the progress on the Canada tower to same date is shown in Fig. 2, which was completed Sept. 18th. Sept. 24th, the first iron for the cantilever was run out, and both cantilevers were completed on Nov. 17th. The small engravings show the progress of the work on either side, at different dates.

Temporary scaffolds of timber were built from the bluff on either side out to the edge of the water, on a level with the top of the tower. Upon these the short arms of the cantilevers were erected, one end resting on the steel towers and the other upon masonry on the bluff. The shore end was firmly anchored to this masonry, so that it will take an uplifting force of 1,000

on the overhanging arm, and project 40 feet beyond any support. It is the only bridge of any magnitude completed on this principle. The Firth of Forth bridge in Scotland, with a clear span of 1,600 feet, is to be built upon this plan, and also in this country the Fraser River bridge, 315 feet clear span, on the Canadian Pacific. These are the only examples of this design yet under

the bridge, practically completed. The weather during this performance was very bad, but a large crowd of spectators, which included ladies, railroad officials, and bridge experts, stood patiently in the midst of a heavy rain storm, and interestedly watched the operation.

The total length of the bridge is 910 feet. It has a double track and is built strong enough to carry upon each track at the same time a freight train of the heaviest kind, extending the entire length of the bridge, headed by two "consolidation" engines, and under a side pressure of 30 pounds to the square foot, which pressure is produced by a wind having a velocity of 75 miles per hour, and will even then be strained to only one fifth of its ultimate strength.

The erection of this substantial and elegant structure, over the most dangerous, turbulent and furious rapids in the known world, without a jar, serious accident or loss of life, and in less than 7½ months from the awarding of the contract, ranks as one of the most splendid achievements of engineering skill, bordering the domain of the marvelous. Our large engraving furnishes a splendid view of the completed structure, which presents a new and desirable combination of principles, and as before stated, is the first of any magnitude ever completed upon this plan.

PATENT LAWS IN EUROPE.

H. Palm, in *Der Oesterreichisch-Ungarische Mueller* writes very sensibly as follows: Within a few years some of the European countries have adopted new laws for the protection of inventors; Germany in 1877, and England in 1878. Whoever compares the history of Germany in 1877, with that of to-day, must be surprised at the immense industrial progress made during these seven years. The hard, but just sentence of Prof. Reulaux, at the Philadelphia Exhibition in 1876, about the exhibits of Germany: "Cheap, but poor," seems to mark the turning point in German industry. In spite of many apparent faults, the German patent laws have aided more than anything else, to bring about a change in the manufacturing systems of Germany. It induced specialization, and with it improved methods, and it is fair to state that all improvements in the industries of the country, are at present protected by patents. German capitalists become more and more disposed to invest in new inventions, and this tendency will, undoubtedly, increase as soon as the patent laws cover chemical products as well as others, which is simply a question of time.

England, above all other countries, has enjoyed the benefit of patent laws longest, it can be traced back as far as 1623, and the pre-eminence of English manufacturing interests is due largely to these laws. Strange to say, the new patent laws of 1878 show very little improvement upon the old ones, and restrict the privileges of the inventor, by allowing third persons to make use of such invention, on a payment of a license to be fixed by the board of trade.

In Austria, the necessity for new patent laws becomes more and more apparent, and the tendency there is to increase the privileges of the inventor, and protect his interests to the fullest extent.

All mechanisms of to-day have been invented at some time or other; all are more or less the sum of a varying number of inventions and improvements.

The inventor is the pioneer of industry, the mental path-finder in the realms of industrial progress; therefore let us protect the inventor, for the soundest protection of industry rests with him. This should be understood, for almost everywhere industry and invention are looked upon as two opposing factions. Of course this does not apply to the true, intelligent industry, which strives to accomplish its work economically, quick and good, and is glad to avail itself of all improvements; but it applies to that mongrel industry which looks upon an inventor as an enemy, and because it lacks the conjunction of an intelligent mental property, does not hesitate to live upon intellectual robbery.

ZINC FOR PREVENTING BOILER CORROSION.

The use of zinc for preventing boiler corrosion in steam-boilers has formed the subject of several patents, and recently Mr. J. B. Hannay, of Glasgow, has obtained a patent for further improvements on his invention of 1881. According to the present invention, the zinc masses of spherical or spheroidal, or polyhedral, or cubical form, or other form having small difference of thickness in different directions are rendered more durable and efficient by being brought into the condition known as malleable, instead of being used in the condition they have when simply cast. For this purpose the masses are hammered or forcibly pressed or rolled, the operation being by



FIG. 1. SEPT. 13TH. AMERICAN SIDE.

tons at each end to displace it. This constitutes the counter-weight to balance the unequal loading on the river-arm. As this, under the most unfavourable conditions, can never exceed 3,0 tons, the provision is ample.

There will be none of that wavy motion noticed on a suspension bridge as a tram moves over it. Remember-

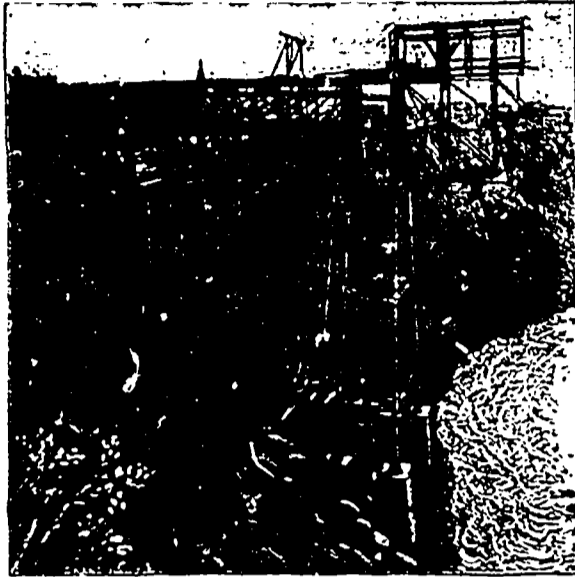


FIG. 4. NOV. 4TH. AMERICAN SIDE.

taken, but the principle especially recommends itself to long span bridges that must be erected without false work.

The total weight of the iron and steel entering into the composition of this massive structure is about 3,000 tons. The excavations for the masonry work of the towers, upon

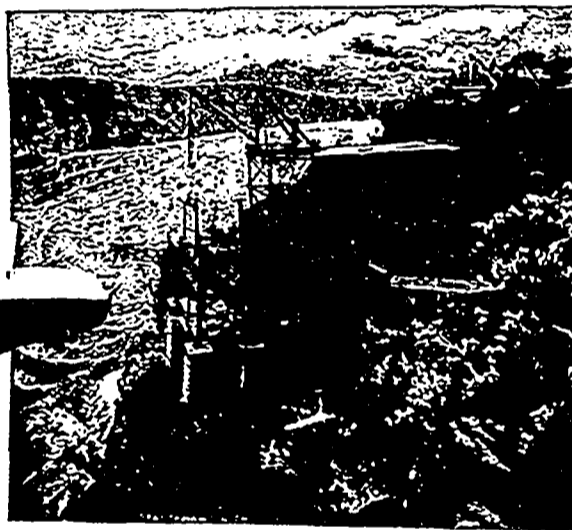


FIG. 2. SEPT. 15TH. CANADA SIDE.

ing that it took over three years to build the present suspension bridge for a single track, that this bridge for a double track not only had to be finished within seven and a half months from the execution of the contract, but has been actually completed with eight days to spare, it reflects great credit upon the advancement of American

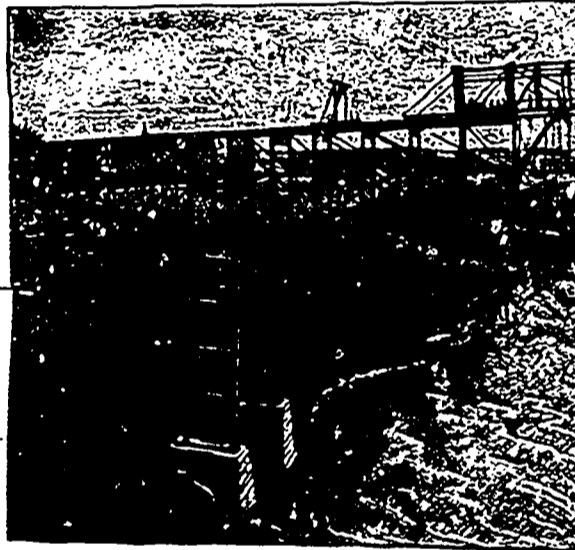


FIG. 5. NOV. 14TH. AMERICAN SIDE.

which stand the steel towers supporting the cantilevers, were carried down until solid rock was reached. The total weight resting on each of the towers under a maximum condition of strain is in round numbers, 3,200 tons. Each ingot of steel was submitted to a chemical analysis, and samples to a mechanical test. The stan-



FIG. 3. OCT. 3RD. CANADA SIDE.

engineering skill as exemplified by the ability, capacity and skill of all who have been associated with the project in positions of responsibility. 400,000 feet of timber and 15 tons of bolts were consumed in the false work. The piers contain 1,100 cubic yards of "beton coignet," and the abutments of the approaches 1,000 yards of masonry. The travelling derricks are the largest yet built. They are calculated to sustain a weight of 32 tons

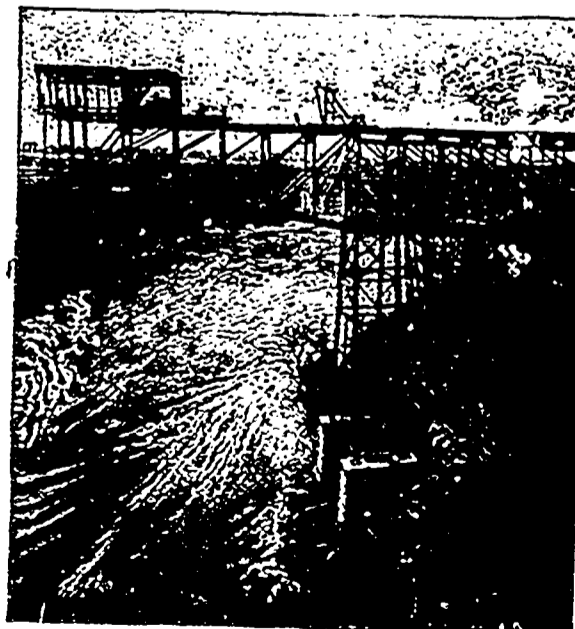


FIG. 6. NOV. 17TH. CANADA SIDE.

dard of excellence adopted was more severe and exacting than usual, and all steel that failed to meet the requirements was rejected.

On the morning of November 21, 1883, the work of putting in the fixed span began, and when the hour of noon had arrived the sections had been connected, and

preference effected suddenly. Thus, a convenient and satisfactory means for the purpose consists in a powerful screw-press fitted with a heavy fly-wheel or heavily weighted arms and provided with suitably shaped dies. By a further improvement the zinc is made more susceptible of being rendered malleable by being alloyed with a small portion, say, not more than 10 per cent. of lead, tin or copper. Another improvement consists in carrying each of the zinc masses in the boiler in an iron ladle of suitable size, such being clamped to some of the tubes or fixed inside the boiler in any convenient way, and not required to be removed when supplying new blocks or balls of zinc, as such blocks or balls have simply to be placed in the ladles after these have been cleaned out. The patentee claims as novel and original: 1. The use of zinc blocks or masses of a spherical, or spheroidal, or polyhedral, or cubical or other similar form for preventing corrosion in steam boilers, such blocks or masses having been subjected to compression after having been cast. 2. The forming of the blocks or masses of zinc alloyed with 10 per cent. or less of lead, tin or copper, and subjected to compression after having been cast. — *Engineering Review.*

ELECTRICITY UTILIZED IN MILLING.

LIKE other industries milling profits by the latest discoveries in electrical science. By its application several improvements have been introduced which brings the milling industry to a high degree of perfection, while at the same time they make the management of complicated milling machinery considerably easier and also more accurate. I mention here in the first place the different electric bells and signal apparatuses which afford communication between proprietors and employees, which communication they simplify to a great extent. At the same time a certain signal language is invented by the use of which the necessary orders are distributed over the entire establishment. The electric bell shows the miller which stones or rolls are running too hot, while through the "temperature contact" the so-called metallic thermometer, which is placed near every stone or set of rolls, the miller is warned and can do what is necessary in the matter. In large milling establishments a complete system of bells is introduced which, like the communicators in hotels, is connected with a board on which the different apartments are represented by numbers, and the whole is arranged in such a manner that when any stone or roll runs hot, at once the corresponding number on the board in the engine room drops down. In America successful attempts have been made to separate the bran from the middlings by means of electricity. They have also succeeded by means of an electro-magnet to eliminate metallic particles which may be found with the grain. The grain runs over a surface which is shaken in different directions before the poles of a powerful electro-magnet. The magnetic force works in this way as well on the grain as on the particles of iron found with it. By the attractive force of the electro-magnet these particles of iron are taken out and adhere to the magnet, and are removed from this by suitable devices.

Without doubt the transmission of power by means of electricity will find its application in the milling industry at no distant date. Although we are already able, by means of electric transmission, to utilize large forces at great distances with a fair degree of success, still this application has up to the present time been made only in a few instances. The problem of the transmission of power by means of electricity has, however, been solved only in a very few instances in a way that would be of general application, as for instance to the steam engine, water wheel and the wind motor, and these two last named forces are the ones which some day, perhaps in the near future, will be destined to furnish the motor power for machine shops and also for mills, with the help of electricity. Even if, as has been said, the transmission of greater forces has not been put to practice as yet, the reason for this is by no means that the transmission of power by means of electricity is at its present stage still too incomplete to solve satisfactorily the problem assigned to it, but the reason lies in the newness of the thing, and in fact, that the persons interested have thus far had no sufficient opportunities to convince themselves of the advantages of this transmission of force. To meet this want the "Electric Exposition of Vienna" is called together, where an opportunity is offered to the interested public to become acquainted with the electric transmission of power.

The electric transmission of power for milling purposes is shown here by the firm of Ganz & Co., Budapest, who have on exhibition a machine expressly constructed for this purpose, by which about twelve horse-power is transmitted by electricity. To accomplish this two primary engines in the machinery hall are set in motion by a locomobile, and the electric current

originated in these primary engines is conducted by a thin wire to a secondary motor, which is set into motion by the electricity supplied by the primary engines. This wire, before reaching the secondary motor, is passed through an ingeniously constructed regulator, the purpose of which is to secure a uniform number of revolutions to the motor. Since it is a well-known fact that in a mill the pressure frequently changes, so that in proportion as the feeder lets in more or less grain, in the same proportion more or less force is required, we can readily perceive that the velocity of the secondary motor would continually change. This changing is prohibited by the regulator, which by an automatic introduction of resistance keeps the velocity of the machine uniform.

Another application of electricity which is very important for mills, as well as for other establishments, is the well known fire telegraph, which should not be wanting in any establishment. However, this telegraph can only indicate a fire that has already broken out, and enable men to prevent its further spreading. Electricity, however, offers a much more effective preventive against fire. For electricity has made it possible to establish for places which are in great danger of fire a method of illumination which, when properly used, completely excludes all danger of fire and explosion. It is the so-called "incandescent illumination," i. e. the illumination with glow lamps, which since their invention have made considerable headway. The principle of the glow light rests on the incandescence of a bad conductor of electricity. The history of this invention reaches back to the first ten years of this century. The first impulse to practical experiments with electric lamps was given by Prof. Jobard, of Brussels, who in 1828 advanced the theory that carbon, used as a conductor in a vacuum, would give a beautiful and intense light. DeCinangy, a Belgian engineer, took up this theory and experimented for a long time with glow lamps, while he first used pieces of carbon and afterwards platinum as glowing substances, without being able to bring forth practical results. The American, Starr, was somewhat more successful, who in the year 1844 made in England very interesting experiments with the glow lamps constructed by himself. But the sudden death of Starr hindered the further perfection of these first experiments, and his invention was soon forgotten, but which his partner, King, had patented in the year 1845. Then followed a number of experimenters, who with different materials, as platinum, iridium, and mixtures of these two metals, and later also with carbon, made experiments with glow lamps, without any great success however.

Thus far I have spoken of electric illumination in general as it can be applied in every industrial establishment, and especially in mills. Allow me now to go a little more into details concerning such application and the cost of such electric light as has already been introduced by Ganz & Co. into several flour mills and other establishments with the best results. This should be the more welcome to the milling interests, as to the best of my knowledge and belief, this topic has not been discussed in any of the periodicals with the clearness desirable for millers and manufacturers who wish to introduce electric light. I will, therefore, suppose you wish to do away with your present manner of lighting and introduce electric light in its place into your mill. Hitherto you have had in use a certain number of coal oil or gas lights. A coal oil flame in mills has an illuminating power of from five to eight candles, and a gas flame in a mill has no more as a rule; in other localities the illuminating power increases to from ten to twelve candles. All will be ready to admit that the manner of illumination in mills at the present time leaves much to be wished for, and especially is the degree of brightness in most cases extremely small. The proprietors of mills are forced to economize on account of the expense of illumination. Here electricity lends a helping hand to the proprietors to beautify and better the light without additional expense. In Hungary the Swan lamps have been extensively introduced of late; especially two kinds are used, those of twelve and those of twenty candle power. For mills the former would be sufficient. We shall now replace every coal oil or gas flame by an electric lamp, and the miller can determine the number of new lamps by the number formerly in use. In small establishments, especially in those in which water-power is used, it is preferable for the sake of economy to use the motor power of the mill for a generator of the electric light. In larger institutions, however, it is better to use the motor power of the mill for the generator and to erect besides a special engine, and to arrange the combination in such a way that the generator for the light is ordinarily supplied by the special engine, and only, in case that for some reason or another this engine should get out of repair, the large motor power would be called into action by means of friction couplings, in order that the illumination might

continue without interruption. The boiler for both engines can under all circumstances be a common one, so that there is no necessity for double heating apparatus. It is the most appropriate to place the electric motor in the engine house, in order that it may be under direct supervision of the engineer. From this motor go the conducting wires, properly speaking, the main cable to the different places which are to be lighted. From the main cable the wires which lead to the separate rooms branch off, and from these wires the thinner wires to the individual lamps. The whole system has much similarity with the system of pipes in gas illumination, with the difference that by the latter only one line is necessary, while with electric light, conductor, back and forth are necessary, and consequently a double main cable has to be laid. As in gas works, so is here also the diameter of the main conductor in direct ratio with the number of flames and the distance, while for the branching off into separate localities there as well as here small conductors are used. As with gas so it is also possible with electric light, to let the individual lamps go out or to light them, as may be necessary, and in electric light it is easily accomplished in a much simpler and more appropriate way, and I would especially call attention to the fact that the lighting of the several lamps is accomplished without the aid of combustible material—only by a simple movement of the hand. For the sake of economy as well as for other reasons, it is often desirable to increase the illuminating power of the lamps or to decrease it. For this purpose there is near the engine a resisting apparatus, with which it is possible to regulate the light. This apparatus can be compared with the valve of a gas tube which regulates the amount of gas and thus regulates the brightness of the several lights. This apparatus also serves to reduce the current in case a large number of lights are extinguished, and to increase it if more lights are in use. The firm of Ganz & Co. have constructed apparatus which are self-regulating. As this apparatus is rather expensive for smaller establishments, an ingenious apparatus has been constructed which warns the engineer when too much or too little current is generated.—*Translated from the German of Carl Ziperovsky.*

IS IT GOOD TASTE?

in the fashion of ornamenting
this agreement that each of the three companies will continue to manufacture their distinct line of goods.
ing, Dr. Elliot Coues, of Washington, one of the most ornithologists of America, makes the following caustic remarks: "The style used to be to wear plumes selected either for their beauty or colouration, or their gracefulness of shape; but the itch of savagery has broken out with aggravated symptoms, to be appeased by nothing short of an ornithological museum. I once counted the feathers of no less than fifteen different birds on the dress of an Indian squaw; but then her alleged husband had one necklace of grizzly bear claws and another of human finger-tips, and circumstances alter cases, you know. It seemed to me less singular than the case of another woman whom I examined with some care shortly afterwards, on whose bosom rested a gilt tipped tiger's claw, from whose ears depended two claws of the same animal, in whose hair nestled the greater part of the external anatomy of a bird and to whose loins a live poodle dog was tied with a blue string. Such a toilet, I think, would be still more effective with the rouge and lily white in streaks instead of layers, and a fish bone through the nose."

TO CENTER AN ENGINE.

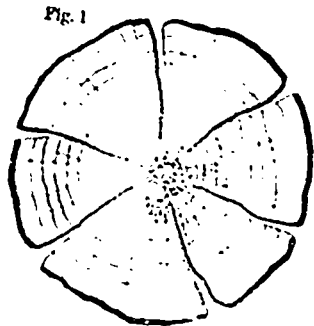
Move the engine by the fly wheel towards the end on which you wish to center it, till the cross-head is near the end of its travel, and mark the slide even with the end of the cross-head, and then with the surface gauge, or any fixed point, make a mark on the fly-wheel rim, crank disc, shaft or any finished revolving part, pry the engine past the center and till the cross-head passes the mark on the slide, then pry back again till the cross-head agrees exactly with the mark on the slide. This last, in order to have all lost motion in connecting rod taken in same direction both times. With engine in present position make another mark on the revolving part first selected. With a pair of dividers bisect the distance between these marks and prick-punch the spot. Pry the engine around until this point coincides with the points of your surface gauge and the crank is absolutely on the dead center, if the axis of the piston rod and axis of shaft are in the same plane, as they should be.—*"Amos K." in Steam.*

The box-huckleberry, *Vaccinium brachycerum*, is stated to be a species in the process of extinction. A small patch of a few acres in Perry county, Pa., and another in Delaware are singularly isolated.

HOW LUMBER SHRINKS.

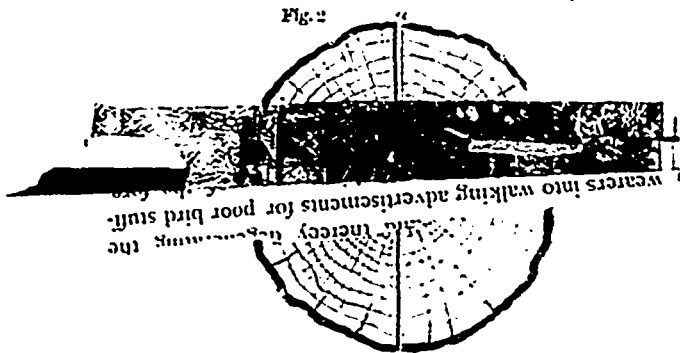
A STORY is told by the "Arkansaw Traveller," about the manner in which lumber was "hailed" across the mountains down in his country. "Why," said he, "they saw it green, leave it in the sun, and off it starts. I have seen a board turn three summersaults in less than a minute, and get to the other side of the mountain before sunset." "What," asked a by-stander, "would be the result if it was attacked in its wild career by a shower of rain, would it come back?" Here was a poser, but the traveller was equal to the occasion and replied: "No, it would turn on the other side and continue its course."

The subject of the contraction of lumber is an interesting one to wood-workers, and the doors and shutters



in many of our mushroom cities are said to come off the hinges in retaliation of the persistent disobedience of the natural law of shrinkage. An examination of the end of an oak or beech tree will show the arrangement of its structure. It consists of a mass of longitudinal fibrous tubes, arranged in irregular circles that are bound together by means of radial strings or shoots, which have been variously named: they are the "silver grains" of the carpenter, or the "medullary rays" of the botanist, and are in reality, the same as end wood, and have to be considered as such, just as much as the longitudinal woody fibre, in order to understand its action. From this it will be seen that the lateral contraction or collapsing of the longitudinal, porous, or tubular part of the

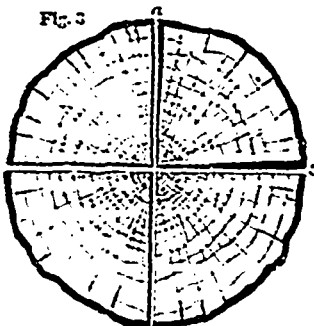
Fig. 2



structure, cannot take place without first crushing the medullary rays, hence the effect of the shrinking finds relief by splitting in another direction, namely in radial lines from the centre, parallel with the medullary rays, thereby enabling the tree to maintain its full diameter, as shown in Fig. 1.

If the entire tubular fibre composing the tree were to contract bodily, then the medullary rays would of necessity have to be crushed in the radial direction to enable it to take place, and the timber would thus be as much injured in proportion as would be the case in crushing the wood in the longitudinal direction. If such an oak or beech tree is cut into four quarters, by passing the saw twice through the centre at right angles, before the contracting and splitting have commenced, the lines *a c*, and *c b*, in Fig. 2 would be of the same length, and at right angles to each other, or, in the technical language of the workshop, they would be square, but, after being

Fig. 3

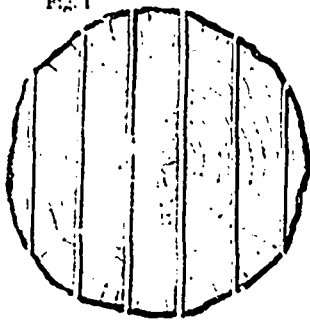


stored in a dry place, say for a year, it would then be seen that a great change had taken place both in the form and in some of the dimensions, the lines *a c*, *c b*, would be the same length as before but it would have contracted from *a* to *b* very considerably, and the two *a c*, and *c b*, would not be at right angles to each other by the portion here shown in black in Fig. 3. The medullary rays are thus brought closer by the collapsing of the vertical fibre.

But supposing that six parallel saw cuts are passed

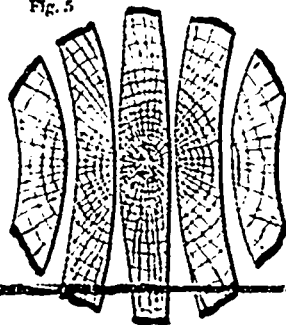
through the tree so as to form it into seven planks, as shown in Fig. 4, let us see what would be the behaviour of the several planks. Take the centre plank first. After due seasoning and contracting, it would then be found that the middle of the board would still retain the original thickness, from the resistance of the medullary rays, while it would be gradually reduced in thickness toward the edges for want of support, and the entire

Fig. 4



breadth of the plank would be the same as it was at first, for the foregoing reasons, and as shown in Fig. 5. Then, taking the planks at each side of the center, by the same law their change and behaviour would be quite different; they would still retain their original thickness at the centre, but would be a little reduced on each edge throughout, but the side next to the heart of the tree would be the reverse, or hollow, and the plank would be considerably narrower throughout its entire length, more especially on the face of the hollow side, all due to the want of support. Selecting the next two planks, they would be found to have lost none of their thickness at the centre, and very little of their thickness at the edges, but very much of their breadth as planks, and would be

Fig. 5



curved round on the heart side, and made hollow on the outside.

Supposing some of these planks to be cut up into squares when in the green state, the shape that these squares would assume, after a period of seasoning, would entirely depend on the part of the tree to which they belonged; the greatest alteration would be parallel with the medullary rays. Thus if the square was near the outside the effect would be as shown in Fig. 6, namely, to contract in the direction from *a* to *b*, and after a year or two it would be thus, as seen in Fig. 7, the distance between *c* and *a* being nearly the same as they were before, but the other two are brought by the amount of their contraction closer together. By understanding this natural law, it is comparatively easy to know the future behaviour of a board or plank by carefully ex-

Fig. 6



Fig. 7



amining the end of the wood, in order to ascertain the part of the log from which it has been cut, as the angle of the ring grows and the medullary rays will show as in Fig. 8.

A plank that has it will evidently show to have been cut from the outside, and for many years it will gradually shrink all to the breadth. While the next plank shown in Fig. 9, clearly points to the centre or heart of the tree, where it will not shrink to the breadth, but to the varying thickness with the full dimensions in the middle, but tapering to the edges, and the planks on the right and left will give a mean, but with the centre sides curved round, and the outside still more hollow. These remarks apply more especially to the stronger exogenous woods, such as beech, oak, and the stronger firs. The softer woods, such as yellow pine, are governed by the same law, but in virtue of their softness another law comes into force, which to some degree affects their behaviour, as the contracting power of the tubular wood has sufficient strength to crush the softer medullary rays to some extent, and hence the primary law is so far modified. But even with the softer woods, such as are commonly used in the construction of houses, if the law is carefully obeyed, the greater part of the shrinking, which we are all too familiar with, would be obviated,

as the following anecdote will serve to show: It was resolved to build four houses, all of the best class, but one of the four to be pre-eminently good, as the future residence of the proprietor. The timber was purchased for the entire lot, and the best portions were selected for house No. 1, but by one who did not know the law, and to make certain of success this portion of the wood had an extra twelve months' seasoning after it was cut up. The remainder of the wood was then handed over to a contractor for the other three houses, who had an intelligent young foreman, who knew the structure of wood as well as how to obey the law, and who, there-

Fig. 8



fore, had the wood for the three houses cut up in accordance therewith. The fourth house was built the following year by another man; but long before ten years had passed to the great surprise and annoyance of the proprietor it was found that his extra good house had gone in the usual manner, while the other three houses were without a shrinkage from top to bottom.

A similar want of correct knowledge of the natural figure and properties of the structure of wood, such as the oak, is constantly shown by the imperfect painting to resemble that wood, as exhibited on doors and shutters of many houses. If we can afford to have genuine wainscot doors, as in France and other countries, but

Fig. 9



yet desire to have an imitation, it would surely be worth the trouble to have a block cut from the quarter of an oak tree, and to have each of its six sides planed and polished, in order to make plain their several features. The house painter would then see who nature really is, and thus save us from the ridicule of other nations, when we mix up "silver grains" and all the other natural features upon one side of a board or panel. This is a subject that should interest all wood-workers and builders and a great deal of attention should be given to the structure of the various woods. It is almost as necessary for a wood-worker to understand the anatomy of his tree, so to speak, as a surgeon to understand the anatomy before he commences to operate. The importance of the subject is therefore obvious.

A SCALE OF HARDNESS FOR METALS.

The author describes a scale of hardness in use in the laboratory of the Technical High School at Prague, composed of the following eighteen metallic substances, arranged in ascending order, from the softest to the hardest:

1. Pure soft lead.
2. Pure tin.
3. Pure hard lead.
4. Pure annealed copper.
5. Cast fine copper.
6. Soft bearing copper (copper, 85; tin, 10; zinc, 5).
7. Cast iron annealed.
8. Fibrous wrought iron.
9. Fine-grained light-grey cast iron.
10. Strengthened cast iron (melted with 10 per cent. of wrought turnings).
11. Soft ingot iron, with 15.00 per cent. carbon (will not harden).
12. Steel, with 0.56 per cent. carbon (not hardened).
13. Steel, with 0.96 per cent. carbon (not hardened).
14. Crucible cast-steel, hardened and tempered blue.
15. Crucible steel, hardened and tempered, violet to orange yellow.
16. Crucible steel, hardened and tempered straw yellow.
17. Hard-bearing metal, copper, 23; zinc, 17.
18. Crucible steel, glass hard.

The test is made by drawing a cylindrical piece with a conical point along a polished surface of the metal to be tested. In the case described, that of a bronze used for the crosshead guide of a locomotive, the point, when with 5 kilograms, was drawn six times through a distance of 3 centimetres. Under these conditions the points of the number below 5 in the scale were blunted without marking the surface; with Nos. 5 and 6 neither point nor surface was abraded; but with No. 7, while being slightly worn on the point, began to scratch the surface. The hardness was, therefore, that of pure copper or soft bronze. The absolute tensile resistance was found to be 2,051.7 kilograms per square centimetre, while that of copper is 1,920 kilograms per square centimetre, and that of the bronze, No. 7, is 2,300 per square centimetre, thus showing an intimate relation between the strength and hardness of similar metallic compounds,

SKETCHES OF THE TRADE.

No. IV.

THE PROMINENT MANUFACTURES OF LONDON, ONT.

LONDON, in the county of Middlesex, Ont., the "Forest City," as it has been named, is situated about midway between Niagara Falls and Detroit, on the Great Western Division of the Grand Trunk Railway, and has an enviable position as a commercial and manufacturing centre, having easy access, both east and west, to all points of importance either in Canada or the United States. On the west it has direct communication with such important towns as Glencoe, Chatham and Windsor, whilst, to the east, Ingersoll, Woodstock, Paris and other places are situated on the direct line. By the Sarnia branch of the G. T. R., which has its eastern terminus here, another important section, the fine county of Lambton, is brought in contact with the Forest City. We find on this line the rising and important towns of Strathroy, Watford, Sarnia and Wyoming, from the latter place runs a short line of railway to Petrolia, the centre of the most important oil producing section of Canada. The north is reached via the London, Huron & Bruce Railway (also under the G. T. R. system), which runs through the magnificent counties of Middlesex and Huron to the outskirts of Bruce county, thus passing through two of the finest counties in the Dominion, and touching the third, communication through which can be had by means of the Wellington, Grey & Bruce from Wingham. To the south we find the London and Port Stanley line, about twenty-four miles in length, which wends its way through Middlesex and Elgin. About sixteen miles from London, in the latter county, is the enterprising and growing city of St. Thomas, with a population of about 10,000. Eight miles further south, on the banks of Lake Erie, is located Port Stanley, London's favourite pleasure resort in the summer time. From St. Thomas, by means of the Air Line, G. W. Division, London connects directly with Aylmer, Tilsonburg, Simcoe, and other important points. Then, again, by the old Grand Trunk system, communication to the north, east and west is to be had with those pushing towns of St. Mary's, Stratford, Mitchell, Dublin, Seaford, Clinton, Goderich, Lucan, Parkhill, Ailsa Craig, Forest, Arkona, etc. The city may accordingly, thanks to the natural advantages of its location and the enterprise of its citizens, be justly termed the commercial metropolis of Western Canada, and has attained the position of a prominent manufacturing centre.

The first survey of the town plot was made in 1826, and the year following the town was constituted by Parliament the capital of the Western district, and a frame Court House was immediately erected. In the succeeding year this was replaced by the present brick structure, which a few years ago was greatly enlarged and embellished. The first merchant in London, and indeed of Middlesex county, was Mr. Geo. J. Goodhue, he having kept a store and carried on a distillery in Westminster for some time previous to the first settlement of the city. Among other business men at this very early period may be mentioned Mr. Lawrence Lawrason, a partner of Mr. Goodhue, Mr. John Jennings and Mr. Dennis O'Brien. In 1835 the town had attained a population of over 1000 souls. During the ravages of the cholera in 1832 a large number of the inhabitants had been swept away and the village became largely depopulated through these deaths and the flight of many of the citizens to escape the plague. Notwithstanding this the town two or three years later had become a place of considerable importance and had outstripped the rival villages of Delaware, St. Thomas and Port Stanley, all of which were older places than London. In 1840 London was incorporated as a village, with a population of almost 2000. In 1847 the village became a town. During the intermediate period the place was visited by two large fires, one in 1844, which swept over a great part of Dundas street, then, as now, the principal business street, and the other in the spring of the year 1845, which consumed the principal part of the village, rendering many families homeless and ruining many business men. Nearly nine years elapsed before these disasters had been retrieved, at which period the assessed value of real estate amounted to \$228,000. In 1855 the town had attained a population of 10,000 and was incorporated as a city. Owing to the demand for produce of all kinds, occasioned by the Crimean war, money was plentiful and an era of prosperity set in. Here as elsewhere throughout Canada considerable fortunes were realized in a short time by reason of the rise in the value of real estate, but in 1859 this boom suddenly came to a dead stop, when the value of real property shrank fully 80 per cent. and "hard times" were the order of the day. As an illustration of this may be mentioned, that th

assessment of the city, exclusive of personal property, in 1858 amounted to \$426,966 and in 1859 had fallen to \$234,976. One of the principal causes of the enormous rise in the value of real estate had been the construction of the Great Western and the London & Port Stanley railways, the former of which was opened in 1853 and the latter three years later. Previous to the opening of these roads all produce had to be teamed to Port Stanley, receiving merchandise from this point or from Hamilton by that same medium. Whilst these railways were being built, people formed very largely exaggerated ideas of the benefits that would accrue to the city and, as a consequence, embarked in the wildest speculations in city lots, not realizing that new markets would spring up along the lines of these railways and claim their share of the trade. It finally turned out that the contemplated advantages of the railroads were not so large as had been imagined, and these too sanguine speculators found themselves considerably out of pocket. However there is no doubt that the building of these railways was the foundation of the rising prosperity and growth of the city. The first Provincial fair held in London was in 1854, and in 1868 the Western Fair was organized, which is held here annually, except in the years the Provincial takes place.

The present population of the city, including the suburbs, London East, West and South, amounts to about 28,000. Among the fine structures of the city may be mentioned the Custom House, Post Office, Federal Bank, Bank of British North America, Masonic Temple, Merchants' Bank, Bank of Montreal, Oddfellows' Hall, &c., all of which are imposing buildings. The water-works system, which was completed several years ago at a cost of about \$350,000, is one of the finest in America. The water is obtained from springs on the banks of the river Thames, at a distance of about 3½ miles from the city.

The duties collected at the port of London for the fiscal year ending June 30th, 1883, amounted to \$629,963.60, an increase of \$17,256.93 over the previous year. The Inland Revenue collections for the year ending June 30th, 1883, were \$305,812.98, and the value of declared exports from the consular district of London to the United States during the four quarters of the year ending June 30th, 1883, amounted to \$567,862.40, a decrease of \$290,291.58 over the corresponding period in 1882.

At the present time the manufacturing industries of the city, of which to speak is the purport of this sketch, are labouring somewhat under a depression, at least some of them, and manufacturers generally are experiencing dull times. It is a well-known fact that there is over-production all over the country and London manufacturers have to bear the bad results of this just like their brethren at other prominent manufacturing points. Another reason for the dullness of business is the deficiency in the crop. The city being situated in the centre of one of the in general most fertile agricultural districts in the Dominion, the unfavourable influences of the short crop on the large local trade are of course all the more keenly felt. Agricultural machinery and implements of all kinds are among the most prominent products of the London industries, and also in this line the bad effects of over-production have just now become strongly apparent, some of the hitherto most prominent concerns having had, as a consequence, largely to reduce their capacity. With these few introductory remarks on the origin and building up of this now thriving manufacturing and commercial centre, we will now pass on to a brief review of the more prominent manufacturing establishments in the city.

AGRICULTURAL MACHINERY.

At the head of the manufacturing establishments of this class stands the PHOENIX FOUNDRY of the well-known firm of Messrs. JOHN ELLIOTT & SONS. This business was started in 1850 by the present senior partner upon a limited scale and has gradually developed to its present very extensive proportions. The works, which consist of large and fine brick structures, are located on the corner of Wellington and Bathurst streets. The firm manufacture a large line of machinery, prominent among which is the celebrated McCormick Twine Binder. Other machines made by this firm are the Warrior Mower, Triumph Reaper, Champion Hay Rake, Meadow Lark Single Reaper, Single Mower and Combined Reaper and Mower. A short review of the arrangement of the extensive factory buildings will prove of interest to the reader. On the ground floor the tool-room is located, in which all the tools used in the different departments of the establishment are manufactured. This tool-room is a feature which very few manufacturing firms in the Dominion possess. In this department all washers, set-screws and like articles for the machinery are also made. Another department of the works is the large room, fitted with all the latest conveniences and

appliances, where all the castings are moulded. From here they are taken to another room, where they are thoroughly cleaned and prepared for use. All the iron work is here dipped into a large vat, which process imparts a fine polish to the surface. The blacksmith shop is fitted up with all the necessary machinery, including a trip hammer and steam punch, and in the machine shop we find the latest and most improved appliances for doing the work to be performed here. Just the same must be said of the department where all the wood-work is done. Among the features of this department is noteworthy, that all the canvas for use on the self-binder is here stretched upon a frame by a machine that causes the same tension as when it is in practical operation, so that when the slats are placed upon it and the canvas belt is completed, it is in perfect order with no danger of proving not right. In another separate room the knotting of the binder is thoroughly tested. Besides the departments mentioned in the foregoing, there are separate paint, finishing, packing and erecting shops, besides large store-rooms and an extensive show-room. In the yards are stored over a half-million of feet of well-seasoned lumber.

The firm operate also the JACKSON PLOW WORKS in connection with their establishment. The principal articles of manufacture at these works are the Moline plows, land-breakers, harrows, sleighs, etc.

The business carried on by the firm has now acquired very large dimensions and their products have an excellent reputation all over the Dominion. Besides large sales throughout the country, from the west to the east, a very considerable export trade to foreign countries has been built up. During the last season 500 self-binders, 500 mowers, 400 reapers, besides a large quantity of other agricultural machinery of all kinds, were turned out by the firm. In the busy season about 250 men are employed, of whom about forty are on the pay-roll of the Plow works.

Under the name of

THE NORTH AMERICAN AGRICULTURAL IMPLEMENT AND GENERAL MANUFACTURING COMPANY

an amalgamation is about to be consummated of the STEVENS, TURNER & BURNS MFG CO., the GLOBE AGRICULTURAL WORKS, and the PLUMMER WAGGON AND GENERAL MFG CO. It is, however, stipulated in this agreement that each of the three companies will continue to manufacture their distinct line of goods.

The STEVENS, TURNER & BURNS MFG CO. was established in 1871 and are makers of all kinds of engines, saw-mill machinery, threshers and a general assortment of agricultural implements. Their premises, consisting of a new three-story brick building, 200x50 feet, are located on the corner of Richmond and Bathurst streets, and were newly erected three years ago and occupy 1¼ acres, together with the foundry, storehouses and the blacksmith shop. Among the specialties manufactured by this company should be mentioned: the "Western Empire" Portable Engine, the J. I. C. Separator, the Woodbury horse-power, and portable or stationary Saw Mills. Besides this they are general iron and brass founders and finishers, and water-works contractors. During the last year the company employed about 150 hands.

The second company constituting the above-named consolidation are THE GLOBE AGRICULTURAL WORKS, who own extensive works on the corner of Adelaide and Dundas streets. This concern was established in 1870 by Mr. Sam Crawford, who is still the manager at the present time. The factory buildings are of brick, occupying a large space of ground, and are fitted up throughout with the most improved machinery. The principal owners of the works are Sam. Crawford, B. Cronin, Dr. Woodruff and other capitalists. The specialties of manufacture are the Thomas Patent Smoothing Harrow, the new Model Mower, the Imperial Reaper, the "Farmer's Friend" Grain Drill, the North American Harvester and Twine Binder, the Deere Sulky Plow, the Prairie Farm Plow, and Hay Rakes. During the last season the company employed from 150 to 200 hands.

The PLUMMER WAGGON CO. likewise forming a part of the new amalgamation, principally manufacture what is called the Light-Running Moline Waggon. Their works are located on the corner of Ridout and Fullerton streets.

ENGINES AND BOILERS.

The manufacture of engines and boilers is carried on in an extensive way by the old established firm of E. LEONARD & SONS. This establishment is located on East York street, between Waterloo and Colborne streets. The business was established as early as 1834, then, of course, on a small scale, and has in the lapse of years acquired such proportions that the sales reach all over the country from British Columbia to Halifax. The

specialty of the firm is the Leonard Farm Engine, which has become celebrated all through the country for its many superior qualities and prominent features pertaining to safety. Besides this stationary steam engines with standard stationary boilers for brickwork, semi-portable engines with locomotive boilers, engines with upright boilers, adjustable force pumps, duplex injectors, Crosby's pop safety valves, etc., are manufactured. The factory buildings are extensive and fitted up throughout with the most improved appliances. About 100 men are employed by this firm.

At the FOREST CITY MACHINE WORKS, operated by MR. GLO. WHITE, and located on King street west, the manufacture of steam engines and boilers is likewise extensively carried on, threshing engines forming the specialty. The works have been established about 27 years and now turn out from 60 to 100 threshing engines every season. Mr. White claims his engine to be the most durable and easiest handled engine in the Dominion, and is backed in this by a large number of very flattering testimonials. His sales reach all over Ontario and also to Manitoba and Nova Scotia. The factory is contained in a fine brick building, 31x70 feet, newly erected last fall and fitted up throughout with the latest improved machinery. About 40 hands are employed at these works.

Another establishment devoted to boiler making is the NEW YORK BOILER WORKS of Messrs. EDWARD WINNETT & SONS, on Adelaide street, London East. This firm manufacture all kinds of steam boilers, stills, agitators, and are also licensed to manufacture the Baragwanath Steam Jacket Feed-Water Heater and Purifier. The trade done by this establishment is considerable, principally local. All of Messrs. Winnett's products have the reputation of being first-class. During the busy season about 15 hands are employed.

THE BREWING INDUSTRY.

The Brewing industry is prominently represented in London by the widely-known and extensive establishments of the CARLING BREWING AND MALTING CO., and JOHN LABATT. The buildings of both firms are an ornament to the city, and rank, without doubt, amongst the most perfectly arranged and well-equipped breweries in the Dominion.

The CARLING BREWERY is now operated by a joint company, of sound commercial integrity and extensive financial means. The building, which is of imposing dimensions, has been fitted up throughout with special attention to the purposes for which it is employed. The basement, which is 13 feet high, contains the working cellar, stock cellar, bottling cellar, and the vaults. The malting room extends throughout a series of floors, the drying kilns used are "Hughes Patent." The boiling is done in a large copper of 9,000 gallons capacity, the fermenting is done in eight tubs, of 5,500 gallons capacity each. A distinct feature of this brewery is the manufacture of lager, of which about 60,000 kegs are turned out annually. This department is excellently equipped in every particular and Carling's lager will compare very favourably with the best American. Mr. Ludwig, employed for a number of years in the extensive and widely-known breweries of the Phillip Best Brewing Co., at Milwaukee, Wis., and a first-class practical brewer, acts as special "brew-master" in this department, whilst Mr. McBeth is the courteous general manager. The capacity of the brewery is about 56,000 barrels and there is a storage capacity for 6,000 barrels. The malt-house has a capacity for about 80,000 bushels annually. The product of the Carling brewery, ale, porter, as well as their lager, ranks A No. 1, and has made for the manufacturers an enviable reputation among all friends of malt and hop liquors.

MR. JOHN LABATT'S well-known brewery has been established about 40 years, Mr. L.'s father having been the founder. Ale and porter are exclusively brewed, and the fame of the products of the Labatt brewery extends far over the borders of the Dominion. The capacity of the brewery is 35,000 barrels per year, whilst the malt-houses have a capacity of 80,000 bushels annually. The business was begun on a small scale and has steadily increased until in the course of years it has attained its present extensive proportions. The sales of the famous Labatt's ales and porter now reach from Winnipeg to Quebec, and there is not a town or village in this vast area of space where the product of the brewery is not found. Mr. Labatt has been awarded medals for his ales and porter at the Centennial exposition in Philadelphia in 1876, at the Australian exhibition in 1877, and the Paris exposition in 1878. About 50 hands are on an average constantly employed in the establishment. The buildings are all of brick, very substantially erected and making an imposing appearance. They consist of four separate large buildings, covering an area of from 5 to 6 acres of land, whilst the whole premises embrace about 10 acres.

CONFECTIONERY AND BISCUITS.

The manufacture of confectionery and biscuits is represented in London by a couple of the largest and most prominent establishments in this line in the Dominion. At the head of them, and we think we are justified in saying, at the head of this business in Canada, stands the widely and favourably known firm of D. L. PERRIN & CO. This establishment should not only be classed among the first in this line of industry in Canada, but holds a foremost rank among all kindred factories on the American continent. In the manufacture of sugar toys, ornamented flowers, hearts, etc., etc., the products of this firm are certainly not surpassed in America. In the biscuit line they manufacture everything, from the plain soda cracker to the finest table and wine biscuit, and their catalogue of lozenges, medicated lozenges, pan goods, boiled goods, acidulated drops, caramels, gum goods, cream goods, chocolate goods, marshmallow goods, grained goods, cordial goods, jelly goods, etc., embraces everything in these various lines, and new departments are constantly being added. The establishment is located on Dundas street, running through to Carling street, a depth of 185 feet, and having a frontage of 70 feet on the first-named street, and of 120 feet on the latter. On the other side of Carling street are located the box factory, the boiler and engine house, the stables, etc. The whole establishment is very extensive, covering a large area of ground. Owing to the continued increase of business the proprietors have constantly had to add to their premises and to provide more room, and have not done yet, as a further enlargement is contemplated for the near future. As it is now, the works make an imposing appearance, and the visitor is at once impressed that nothing has been left undone by the proprietors to meet the pressing demands of their vast and continually increasing business. The baking capacity of the factory, in two ovens, is over 150 bags of flour per day, whilst in the confectionery department the capacity is over 30 barrels of sugar per day. The main building is three stories high and admirably arranged for the purposes for which it is used. A brief stroll through the different departments and floors will without doubt prove interesting to the reader. The basement, which extends through the entire length of the building, is high and well ventilated, and here you see hundreds of barrels of sugar and flour, besides innumerable boxes of raisins and the other varied stock used in the manufacture of the firm's goods, you at once see that you find yourself in that part of the premises that has been set apart for general storage purposes. On the ground floor, to the front on Dundas street, are located the business offices, fitted up very nicely throughout, and the room containing the samples of the different products of the firm. A visit to this room is of special interest, and among the various exhibits there you can find many articles in the sugar line, which are true pieces of art, and that you cannot see more artistic and tasteful in the largest confectionery establishments of Germany or France. To the rear of the office the packing and shipping is done, and in this department a large number of hands are constantly busy. On the first floor is the department where the sorting and packing into boxes of the different candies is performed by a large number of young women. On this same flat are also located a number of machines, all operated by steam, amongst which may be mentioned one for the manufacture of lozenges, capable of making 1000 pounds of plain and 600 pounds of printed lozenges per day, with the assistance of but four hands. Three revolving pans, heated and driven by steam, are further located on this floor, and used for manufacturing sugared almonds and that class of sweets. These pans are able to turn out about 3000 pounds per week. Other machines on this floor are a Japanese mixer, used for the manufacture of Japanese coconut, and a sugar-bolting machine, the only one of the kind in Canada. By means of this sugar can be ground from the coarsest sample to the finest flour, and it is capable to run off from 25 to 30 barrels of sugar per day. Another department on this floor is the caramel department, where 200 to 300 pounds of this favourite confectionery are turned out daily. A drying room, capable of drying about 6000 pounds of lozenges at a time, and fitted up with the latest and most approved appliances, is also located on this floor. On the second floor we find the departments where cream, gum and chocolate drops are manufactured, and here about 1000 pounds of these different varieties are turned out daily. Then there is another drying room on this flat, in every respect similar to the one below, and the northern part of the floor is devoted to the manufacture of stick candy, drops, bulls' eyes, etc., having a capacity of making 2000 pounds per day of these goods. On the top floor is located the room of the artistic designer of the firm, a German gentleman who has learned his trade in the largest confectionery establishments of Germany,

France, England, Denmark, &c., and has made splendid use of the opportunities afforded him, which the artistic work done by him amply proves. He is constantly introducing something new, and is already now again at work on new designs and goods for next Christmas. Messrs. Perrin & Co. are fully recognized as the leaders in ornamented goods throughout Canada, and are the sole manufacturers of a large variety of this class of goods in the Dominion. As they are constantly adding new styles and designs they seem determined to maintain their place at the head of this particular line of manufacture, as well as of everything else made by them. The motive power for the whole establishment is furnished by a 30-horse power engine and a 70-horse power boiler, which are located in a separate building on the other side of Carling street, where is also the box factory, in which about half a million feet of basswood lumber is annually worked into packing boxes. The number of hands at present employed in the various departments of the establishment is 150, in charge of Mr. James Henderson, the practical superintendent of the works and a very courteous gentleman.

A second prominent establishment in the confectionery line is that of the McCORMICK MANUFACTURING CO., whose commodious premises are located on the corner of Dundas and Wellington streets. This business was established in 1858 and has now attained such extensive proportions that its products are well and favourably known throughout Canada and also many points throughout the United States. The firm manufacture confectionery, biscuits, and candied peel, jams, jellies and preserves. The basement of the fine and large factory building is divided into two apartments, in one of which is a large set of sugar pounders, the other being used for storage purposes. On the ground floor are the elegant offices, vault, sample room, sales room, shipping room and the bake shop, the latter being fitted out with large kiln-ovens, and all the latest machinery for the manufacture of biscuits and soft cake is to be found in this department, likewise an expensive machine for cutting and printing lozenges, etc. On the floor above are the boiling and packing rooms, the former being fitted out with seven furnaces. On the third floor are the cream, jam and pan room, the fancy goods department, the peel and preserving room, and the drying room. Above these are located the storage rooms for empty preserve bottles, pots, jars, etc., and two dining rooms for the hands employed in the establishment, one for the females and another for the males, the number of employees averaging about 125. The officers of the company are: T. McCormick, President, A. W. Porte, Managing Director, and Geo. G. McCormick, Treas. The McCormick Company was awarded high honours for their exhibit at the Paris exposition in 1878.

IMPERIAL OIL COMPANY.

The extensive works of the IMPERIAL OIL COMPANY, located in London East, are not only the largest oil works in Canada, but hold a foremost rank among all kindred establishments on the American continent. The works are operated by a joint stock company, with a paid up capital of half a million of dollars. The establishment owned by this company, of which the London works only form a part, embraces an area of 16 acres in London and 22 acres in Petrolia, Ont., not including the wells. The company employ about 500 workmen at both places of manufacture. They are refiners of petroleum and manufacture illuminating oils, lubricating, machine and wool oils, paraffine oils, paraffine wax and candles, axle grease, refined naphtha, benzine, etc. Their sales reach all over the Dominion, and their wax and paraffine oils are largely exported to England, Germany and France. The paraffine works were totally destroyed by fire in July last, but have since been re-built and fitted out with the very latest and most improved machinery. In addition to their old goods the company have lately introduced a new line of goods, which have previously never been manufactured in Canada, and amongst which are noteworthy: Mineral Colza illuminating oil, for railways, 300° test; hand lamp oil, for railways; Palm cylinder oil, 600° test; Sweet Artic Zero oil; and Imperial axle grease, of all of which they are exclusive manufacturers. The company have now engaged the services of an expert chemist, Mr. Hermann Frasch, late of Cleveland, O., under whose supervision all their goods are manufactured. The head office of the company is at London East, and is presided over by Mr. W. M. Spencer, the secretary and treasurer, a very courteous and genial gentleman. President of the company is Mr. F. A. Fitzgerald.

STOVE WORKS.

The stove works of the McCLEARY MANUFACTURING CO., located on Wellington, King and York streets, are among the most prominent in Canada. The company manufacture stoves, stamped, japanned and piece tinware, and are dealers in metals and tinsmiths' trimmings.

They have wholesale branches at Toronto and Winnipeg. In the busy season about 300 hands are employed. The sales of the firm extend from the Rocky Mountains to Halifax, besides this a considerable export trade to England, Scotland, Australia and the West Indies, has been built up. Their sales reach about \$500,000 annually. The annual production of stoves is about 15,000.

A LARGE FLOUR MILL.

The largest flouring mill in London--of an aggregate of three, with several more in the immediate vicinity--are the BLACKFRIARS MILLS, of which Mr. J. D. SAUNBY is proprietor. The capacity of these mills is 300 barrels per day of 24 hours. The mill has recently been completely remodelled on the gradual reduction plan, and the machinery put in by the well-known mill furnishers, Goldie & McCulloch, of Galt. The building is 85 feet high to the eaves, and 5½ story. On the basement floor are three water-wheels, one 5½ feet, and two 4½ feet, under a head of 8 feet. These wheels all connect with one shaft on the flat above. Nearly all the conveyors are in the first story, and, passing into the next flat, we find the stone gearing, the cleaning machinery, 2 purifiers, scalp reels and roller shaft. On the next floor, 9 double set of rolls, 3 pair of stones, 3 purifiers, and 3 packers. Ascending one more flight, 2 bran dusters, wheat bins, middlings bins, 16 reels, storage for bran and packer bins. On the top floor, continuation of the bolting machinery, centrifugal bolt, bran bolt, wheat grader, etc. The storage for wheat is under the grinding floor, the bins being about 32 feet deep. There are 32 sets of elevators. There is a splendid water power, which is available for about 11 months in the year. During this time water power is wholly used, but for steam purposes the mill is furnished with one of Goldie & McCulloch's Wheelock engines, of 150-horse power, and two boilers. In some years it is not necessary to use steam at all. Mr. Saunby's "Ruby" patent flour, and his "Tecumseh" brand are known all over and have acquired an enviable reputation. The mill is in charge of Mr. Wm. Hagey, well-known to the milling community.

CARRIAGE WORKS.

London has a number of carriage and waggon shops, prominent among which are the works of ex-Mayor JOHN CAMPBELL, on King street west. Mr. C. manufactures carriages of all descriptions, including landau coaches, hacks, sleighs, cutters, and buck-boards and carts for use in the Northwest Territories. This business is the oldest of its class in London, having been established about 30 years. The sales extend all over the Dominion, and a good many carriages manufactured by the firm find their way to Australia. Mr. C. also does a large business with Toronto, principally in hacks. The works are only running at about half their capacity at present, employing about 30 hands. As a general rule Mr. C. carries off about nine-twelfths of all prizes at the fairs wherever he exhibits his goods, and was awarded about a dozen at the last Western Fair.

MACHINE TOOLS.

The LONDON MACHINE TOOL CO. has been established since 1880 and have their premises, consisting of fine newly erected buildings, on York street west. The works are sub-divided into the machine shop, the pattern shop and the foundry, the whole being in charge of Mr. Wm. Yates as mechanical superintendent, who, together with Mr. Gibson, constitutes the company owning the works. The firm manufacture tools of all descriptions, including every tool used in their own establishment. Their goods have made for themselves an enviable reputation and are acknowledged to be first-class in every particular. They have a wide sale and the firm have always a large quantity of orders ahead. Mr. L. A. Morrison, of Toronto, is the agent for the sale of these goods. Among the varied line of goods manufactured we note: plows, shapers, slotters, hammers, milling machines, cutting-off machines, engine lathes, gap lathes, turret lathes, chucking lathes, polishing lathes, upright drills, suspension drills and radial drills. About 30 hands are constantly employed in the works.

FENCING AND WIRE WORK.

Mr. R. DENNIS' establishment, at 211 King street, for the manufacture of all kinds of fencing and wire articles generally is worthy of a notice among the more prominent industries of the "Forest City." Mr. Dennis manufactures wire-wove goods of all kinds, such as wire-rope, steel and iron smoke-stack webs, fanning mill webs, mosquito blind webs, etc., and further a special line of fancy wire goods, such as window guards, bank railings, flower stands, baskets, etc. Fencing, railings, cemetery fencing, stable fixtures, crestings and finials form another specialty of these works. Mr. D. turns out only first-class work, and this being generally recognized, has so many orders ahead that he sees himself forced to enlarge his works, which will be done

this spring. The capacity of the factory will then be nearly doubled, and a line of new goods added to the already large and extensive catalogue.

CAR, CAR WHEEL, AND STEEL WORKS.

The extensive works of the ONTARIO CAR AND FOUNDRY COMPANY, under the general management of Mr. THOS. MUIR, although situate in London East may be reckoned as among the manufacturing industries of London, the wages and other large disbursements by the company being largely received by the city merchants and traders. This organization now embraces the Ontario Car Co. and London Car Wheel Co., which were separately chartered in 1871, and worked in combination for the construction of railway and street cars. The foundry, for general castings, has a capacity for 12 tons of castings daily, and the wheel foundry ordinarily turns out 45 car, locomotive and tender wheels daily, but has cupola, floor and annealing capacity for 65 such wheels, representing an aggregate melting of 19 tons. In ordinary working 20 to 25 tons iron are used daily in this establishment. A great deal of casting work outside of the Car Co.'s requirements is done at these foundries, including heating furnaces, machinery fittings, contractor's plant, chilled rolls, gear wheels, furnace fronts, grate bars and brass castings. Mr. Peter Watson, a thoroughly practical moulder and metal worker is in charge of this department.

The cars of the Ontario Car Co. are to be found upon almost every railway within the Dominion--Western counties of Nova Scotia, Halifax and Cape Breton, Intercolonial, Quebec Central, International, North Shore, Grand Trunk, Quebec & Lake St. John, St. John, St. Lawrence & Ottawa, Canada Atlantic, Central Ontario, Grand Junction, Whitby & Port Perry, Toronto, Grey & Bruce, Northern & Hamilton North Western, Credit Valley, Canadian Pacific, Great Western, Canada Southern, Port Dover & Lake Huron, and Manitoba & North Western. The present capacity of the Ontario Car Works is eight freight cars per day, besides passenger car work; and having always a large stock of seasoned oak, ash, walnut, whitewood and other lumber on hand, together with the facilities under their own control for getting out castings, wheels, bar-iron and springs, they are always ready to put urgent orders promptly in hand. Mr. Alex. Willis is superintendent of the Car Works and the iron, wood and painting departments being under the immediate direction of experienced foremen, the workmanship and material in the railway and street cars built by this Company are not surpassed by any other establishment in the Dominion. They are now completing a large order for handsome second-class and smoking coaches for the Dominion Government.

THE LONDON STEEL WORKS are a new industry, and also situated in London East, under the same general management as the Car and Car Wheel Works, Mr. THOMAS MUIR being managing director, with Mr. THOMAS KIRKLAND as Superintendent. The building is of corrugated sheet iron, of large capacity, and contains the most improved melting and heating furnaces, cupola, rolling mill, hammers, &c., for making crucible steel, and working both steel and iron. It is the first, and at present, the only steel works and steel rolling mill in the Dominion. The products of the works are crucible steel for railway and carriage springs, rake teeth, files and tools, machinery and fire steel, crucible steel castings of all sizes and for all purposes, railway and machinery coil springs, files, picks, and bar iron of the best grades from "Refined" to genuine "Norway," all of which are daily growing in favor with the trade and consumers. The Rolling Mill department has several months work ahead. The steel workers and rolling mill men employed by the company are from Sheffield and Pittsburgh, and are giving to the Company the benefit of much practical knowledge and many years experience. The stock for making the crucible steel is imported direct from Europe, and the entire process is most interesting. With this establishment so centrally situated, and having a capacity for producing 8 tons steel, and 10 to 12 tons bar iron daily, our Ontario trade should be well provided for without having to import and carry such heavy stocks, involving a considerable charge for interest, and the sending of a large amount of money annually out of the country to benefit foreign labor. The enterprise of the London Steel Works Company deserves and should receive the generous support and patronage of our manufacturing firms and the trade generally.

CIGAR FACTORIES.

The cigar manufacturing industry is one of the most prominent industries of London, and perhaps there is no other town in Canada where this industry has become so largely developed. Besides a number of smaller fac-

ories, there are no less than seven cigar factories in the city employing each from 65 down to 25 hands. The names of these firms are McKay & Co., employing 65 hands; Kelly & Sons, employing about the same number; Albert Smith & Co., and T. L. Rutherford & Co., with about 50 hands each; Jos. Smith & Co., 30 hands; and Brenner and H. Lawson & Co., with about 25 hands each. This industry, therefore, gives employment to a large number of working hands, about one half of the hands employed being females. The writer of this sketch had only time to visit one of these factories, that of Messrs. McKay & Co., where he was shown around by the courteous superintendent, Mr. Adolph Meyersahm, a gentleman who has gained his wide experience in some of the largest American cigar factories.

THE IMPROVED PRINZ DUST COLLECTOR.

If from no other standpoint than that of safety from fire, the dust collector is a necessity in any flour mill. The stove room is a poor apology for a dust collector, yet it is clung to as a make-shift by many millers simply because a few feet of pine flooring will make one; and when made, it should be named the waste room. Numerous devices have been tried for giving relief from the dust generated by millstones, rolls, purifiers, and grain cleaning machinery, many of them being bulky in their arrangements, and requiring undue attention to keep them in working order, and which for these reasons, if for no other, unfit them for use by any but the most careful and skillful workmen. Compactness and concentration are of the greatest importance in any machine intended for the flour mill, and in these requisites a dust collector must find some of its strongest points.

Though it is true that many enlightened millers have continued in the use of their dust rooms, as first constructed, it is just as true that a goodly number of fine mills have been destroyed by fire, and in many cases these fires could be traced to no more definite origin than the ignition of mill dust in the vicinity of the dust room. Leaving out of the account entirely the risks of any such accident, the proper receptacle for the dust arising in the production of flour, is evidently such a contrivance as will save all the dust and permit the free escape of the air after it has deposited its load.

endure the constant strain exerted upon it by the will only too often hasten to an early grave. Indulgence in these machines are another great factor to shor- to remove moisture as well as dust, its province is of course immeasurably enlarged, and it then exerts its influence on every machine where moisture will be harmful. These two properties are claimed as being fulfilled by the Prinz Dust Collector, manufactured by the Milwaukee Dust Collector Manufacturing Company, Milwaukee, Wis., U. S. A.

The leading feature of this machine is Simplicity. The dead air chamber which has been a source of much trouble in other machines, by wearing out and allowing the air to get in, thereby injuring the power of the cleaning mechanism on the cloth, which results in the cloth filling up, is entirely overcome in this machine, as it has no dead air chamber.

The cloth is cleaned by successive jarring (without moving the portion of the cloth thus being cleaned until the jarring ceases), combined with the air, which is reversed on that portion of the cloth, and the draught comes through the opposite way from which it cuts through into the fan, and by this action all the dust is retained in the machine. Less power is used with this machine than any other, as there is no back pressure on the fan.

It does away completely with those long spouts leading from purifiers to dust rooms, which give so much trouble by filling up.

It does away with the cumbersome, dusty, dirty, old fashioned dust-room entirely, and the numerous spouts leading to them, which fill up the mill, leaving no room to get around.

It does away with the liability of dust explosions, as the air coming from this machine is entirely free from dust, which is not the case with the air coming from any other Dust Collector offered to the milling public heretofore.

It retains all the dust in the mill, thus allowing no waste of stock by being blown out into the air, as is the case with the old fashioned dust-room.

Any other information will be gladly furnished by the manufacturers, who have now completed arrangements to manufacture the machine also at Stratford, Ont., and supply it from there free on board cars to Canadian millers, thereby saving them the heavy duty on American machinery.

STEAM "NIGGER."

THIS machine, which the accompanying cut illustrates, is one of those improvements in saw mill machinery suggested by practice in the mill, and has been found quite valuable, as it saves time, is durable, being made entirely of iron, steel and brass, and is quickly and easily controlled. The machine, being worked by direct steam, is elastic in its movements, (thereby obviating liability to breakage), which is a very desirable point in any machine. The toothed stock is made of forged Swede iron, with hinged, receding, forged steel teeth, so constructed that when their points come in contact with a flat surface, they recede back into the stock, and the teeth below said flat surface take hold of the round part of the cant or log and turn it without tearing or marring it. The lever by which it is operated is so constructed that it will work either cylinder, singly or together, in the same direction or in opposite directions. In rolling a log from the log-way to the mill-carriage the lever is moved in the direction which it is intended to move the toothed stock in order to get it back of the log; steam is then applied to the bottom of the large cylinder, using the same lever, and this causes the log to be rolled on to the carriage.

This machine has a strong power side movement, and when the log is turned with the flat side toward knees, it can be pressed up tight against them simply by moving the lever in the direction you wish to press the log or cant. By using this machine the circular mill, it is claimed, will saw from five to seven thousand feet more per each eleven hours, according to cutting capacity of mill.

The manufacturers make two sizes of this machine and say that it has given entire satisfaction to every one using it. In the standard machine the large cylinder is ten inches in diameter by six feet long, and the small one six inches in diameter by six feet long. Both cylinders have journals on lower heads, and oscillate. They are very cheaply set up in mill, requiring only a base for the cylinders on lower floor, and no bridge-trees, shafting, boxes, pulleys, belts or chains. Both cylinders are supplied with steam by a 1 1/4-inch steam pipe. It requires less steam to work it than it takes to overcome the friction on the old style friction turn-

ing means. The building, which is of imposing dimensions, has been fitted up throughout with special attention to the purposes for which it is employed. The matter from which the machine is constructed is such a substance as will stand a great deal of wear and tear; and by so doing, all defects are discovered and adjusted. Another important use is in springing and straightening long timbers; for long timber mills two machines are placed to one carriage, so as to turn long logs nicely and straighten long timber quickly.

Further information may be obtained from the manufacturers, Wm. E. Hill & Co., Kalamazoo, Mich., U. S. A.

WOOD-WORKING FACTORIES.

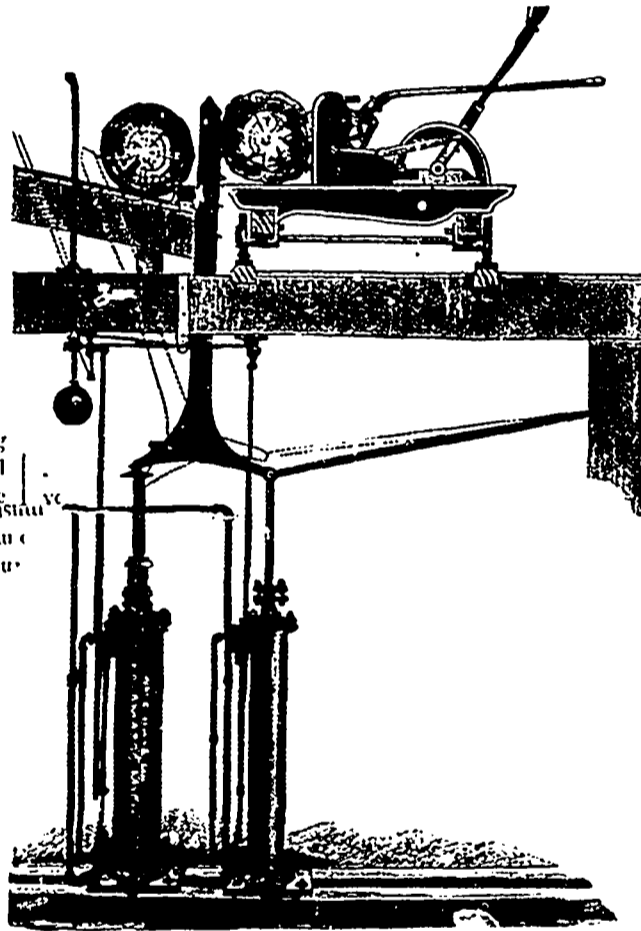
Keeping tools in their place and keeping them in good condition to do their work good and easy, are two very different things, although it would seem that a person that was nice and orderly about one thing would be so in others, and would take pride in the work of his hands.

We will go into a mill, however, and look around, and we come to a saw bench and see a saw with one large tooth and one small one and one long and one short one, and one filed very fleaming and another almost square and looking at some sawn stuff, it looks as if a thousand demons had gone through it with a hurricane. More than is likely as not, this abused servant had three or four black spots on it, showing how terribly it had been handled.

This is a specimen of the rest of the tools in the mill. A pair of side cutters on a bench near by confirms the statement. One is filed short and the other a long bevel, and the grooving bit of one stands out one-eighth of an inch further than the other, and one is filed standing and another the opposite, and every individual bit is sharpened at a different bevel. We look for stuff that has come from the mill with tools in this shape and we find the last production and, oh! horror of horrors, the demons have been here surely and have been recruited. Do we wonder that carpenters complain of the bad work done by planing and matching machines? But there is a relief to this picture, and a little turn of our magic picture maker brings it to us in an instant.

We see a man just stopping his saw, and before he shuts off he takes a piece of broken grindstone, and

carefully holding it up to the saw, just brushes it over. Noticing this we ask "Do you joint a saw every time you take it out to sharpen?" He tells us "No," not always, but as often as once a day he just goes over it to keep the teeth of an even length which helps to keep the out corners full and makes the saw run enough better to pay for the trouble. When he takes the saw out he holds it up to you, and you see every tooth is so near alike that the eye cannot see any difference in their size or shape, and the saw shines like a piece of burnished silver. This draws out the remark that he has not got any black spots on his saw. Pleasantly he tells you, there is no need of any if you use the saw right. If you keep a saw round, and the outside corners full, and a good fair set in it, and don't crowd it if it binds in the cut, which it will do sometimes, there is no need of making black spots in a saw. He shows us some of the sawing, and you are surprised that a saw can do so nice work, but when he comes to put in another and you hear it make that fine, clean, clear cut so peculiar to a saw in perfect order, that you do not wonder that his sawed stuff looks so nice. He tells us that they have one man to look after the saws and no other man ever has anything to do about filing or setting, which makes the saws all come from the filer uniform in set and shape of tooth, and if there is hard wood to saw, there is always something ready for the work. We now go to see the man sharpening the knives of a matching mill, and we see him taking pains that the knife is straight, and he gives it a good bevel so that there will be a good



STEAM "NIGGER."

clearance in the cut, so as not to go pounding through stuff instead of making a clean, easy cut, which old planing mill men can tell by that peculiar sound given by a mill when it is in good nice working trim. The side cutters are now looked after, and we see that each bit has done an equal share of the work and are all done alike; and in filing them to use again, pains is taken that every bit is the same bevel and they are set out alike, and if for working two sides they are set perfectly square and filed, so that they will make a tight joint on the surface. We see the work coming from this mill as near perfect as can be. The work comes just right, and the matching is neither too loose nor too tight.—J. T. Langdon, in *Builder and Wood-worker*.

A SIMPLE MILL ARRANGEMENT.

BY AN OLD MILLWRIGHT.

JUST now the information most sought by millers who have not up to the present had the means to adopt the gradual reduction system by putting in a new plant is how to arrange a mill with a capacity of say from 25 bbls. to one of 100 bbls. Of course it will be next to an impossibility to give precise information on this topic for the well-known reason that the circumstances are not alike in any two mills, so that information can only be given in a general way, to be applied by each to suit his peculiar circumstances. The improvements which have been made in milling methods

within the past ten years or so have generally given good results wherever introduced. There can be no longer any doubt as to the success of gradual reduction by rolls, but there are many mills in which it would be very much better and safer to introduce gradual reduction gradually. The war which has been waging for some time between rolls and stones has ceased to be heard, except in a few isolated cases in out of the way places, where it is very hard for improvements to find a votary of any kind. The war started by M. Tonailon from the quarries of *La ferte sous Jonarve* was to say the least perfect looking enough. The Germans introduced the roller process in Europe, and outside of the fact that the French had the monopoly of the burr stone trade, this and the fact of rolls having been introduced by Germans was too much for the French people to stand. The French millers said: "Rollers are old; we tried them fifty years ago and found them wanting." German millers kept on improving, and to-day the roller-made flour from Austro-Hungary brings the highest price in the European markets. The war has ceased, but no one system has been completely able to drive the other out of the field. The progressive miller improves, but there is a large majority who make very little improvement. Our object in this article is to point out a possible method of making improvements in small mills by a combined roller and stone system. It matters very little what system of gradual reduction will gain the ascendant, there is one thing very certain, and that is, we are beyond the flat grinding system as far as it was beyond the pestle and mortar of the aborigines. There are hundreds of millers who have spared no expense in the last decade to keep in the van of improvement. The past ten years have been a transitional era in milling. Systems and methods have been adopted, tested and abandoned in favour of the system of gradual reduction by rolls, which system is admitted as being correct by almost every one who has given it a trial. It behooves the Canadian miller who will very soon have a large supply of spring wheat from the Northwest Territory, which is admittedly a great wheat country, to be prepared to profitably convert it into flour. The wheat coming from there is noted for its excellent quality. The development of this territory will no doubt add millions of bushels to the yearly wheat crop, so that it is time for millers to bestir themselves in making such improvements as may be necessary to make a flour out of this wheat that will hold its own in any market. All this fine wheat should be milled in accordance with a system which has demonstrated its excellence in mills all over the world, and thus render it possible for Canadian mill-owners to place their output on the Canadian markets in competition with that of establishments where the old system is in use, and thus convince them of its superiority. It takes but little to locate a popular demand for a better grade of any staple article, and when the demand is once created it will continue to demand its supplies. There are a great many who, of course, are not able to meet the expense of an entire roller plant, and to those the advice can be given, that they can exchange gradually by putting in a few sets of break-rolls and a few sets for finishing up on, and the result will astonish them, provided their bolting system is all right. No change should be made except it would be under the supervision of some one who is competent to make it and who understands his business thoroughly. The object of the change is to make as much middlings as possible and then purify them. In case the miller decides on not putting in rollers—which is a very bad decision for him to come to—and he desires to make middlings on his burrs, he must have about twice as much furrow as land surface. The burrs must not be run too fast, and there must be a separate stone for the middlings. We will suppose that there are three runs of burrs. The stones must be dressed in the manner already mentioned, except that the furrows in the middlings stone should not be quite as deep as in the wheat stone. The bolts must be changed to suit and plenty of bolting capacity given. There must be a dusting reel covered with No. 15 cloth for dusting the middlings, but if a couple of sets of rollers be added they will be found a considerable help. The chop should be sent to the bolts in the usual way, and the reel should be clothed with Nos. 11 and 12, and the return reel with Nos. 15, 7 and 0 cloths. In the middlings chest one reel should be clothed with Nos. 12 and 15 cloth, and the return reel with 14 and 7. After being dusted the middlings are passed to two purifiers. The writer changed a few years ago an old process flat grinding mill in the following manner. He would have put in rolls but the owner would not hear of it, so he had to do the best he could by making changes in the mill as he found it. The miller was content, and said that it gave complete satisfaction, but if he knew anything about rolls he would not

be so well satisfied. There was only an old rolling screen and wheat separator used. There were two runs of 52-inch burrs for wheat and one for corn. The bolts consisted of four reels in one chest, two on each side. There was a bran duster, and this summed up the entire machinery. The first thing done was to ord 30-inch run of burrs for middlings, a good smutter a brush machine, new bolting cloths, and a smutter, a purifier. I then went to work and laid a first-class by running in a narrow furrow by out the stones. When everything was ready the between the leaders. I sent the wheat through the mill worked as follows: did not disturb, to the old rolling screen, which I smutter and scour the separator, from there to the brush machine, and finally to the brush machine; revolutions passed to the burrs, which made about 140 revolutions per minute. The chop from the burrs was carried to the upper reel of the chest, on one side, covered with 6 feet of No. 10 cloth and the balance No. 11, the reels being 20 feet long. After the flour was cut off all went to the reel below, covered with six feet of No. 12, ten feet of No. 13, and the balance No. 1. Flour was also taken from this reel, and the remainder, with the exception of the bran, which went over the end of the reel, was passed to the upper reel on the other side, together with the chop from the middlings stone. This reel was covered with six feet of No. 12, ten feet of No. 14, and the balance No. 2 cloth. Flour was taken from this reel also, and the returns were returned to this reel. The middlings from No. 2 cloth went to the reel below, covered with No. 12 x throughout, the dust being returned to the reel above, and the middlings going over the end of the reel to a first-class purifier, covered generally with Nos. 9, 6, 5, 3 and 1 cloth. The middlings all run together, except No. 1, to the 30-inch stone to be re-ground, and then to the bolt covered with No. 12 and 14 cloth. This flour gives satisfaction, but we could make better flour with a few sets of rolls additional.

OATMEAL AND OATS.

OATS are generally considered somewhat less nutritious than wheat. But from Boussingault's ultimate analysis the quantity of nitrogen yielded by them is nearly equal to that obtained from wheat, and accordingly the nutritive equivalent for oats, according to this celebrated chemist, differs but little from wheat.

Oatmeal, says Dr. Cullen, "is especially the food of the people of Scotland, and was formerly that of the northern parts of England; counties which have always produced as healthy and vigorous a race of men as any in Europe."

This grain cannot be cultivated with advantage in the lower latitudes of the temperate zone, hence it is held to have its origin in a more northern climate than other of the cereal plants. It grows upon soils and in situations where neither barley nor wheat can be raised, and is unquestionably the hardest of all the cereal grains. It differs from wheat and barley in the form of its ear which is not a spike, with a single rachis, but a panicle, resembling somewhat the stem of and branch of a pine tree; while young and light these branches arrange themselves around the centre of the stems, but as they advance towards maturity and acquire weight, they generally bend over on one side. The air and light are enabled to visit, and the rain to wash each individual grain so that any lodgment of the larval of insects, or the seeds of parasitical plants is prevented. The grains being pendant, and having the opening extremities of the chaff towards the earth, are effectually defended from the lodgment of rain within, an advantage which does not attend the growth of wheat or barley; and the liability of these grains to diseases from which oats are exempted. This grain will not grow in hot or dry climates, and if it does it will be small, husky, and tasteless, and containing no farinaceous matter.

The most remarkable of the common varieties are the black or long bearded oat, the white, the red, and the naked, or pincorn oat.

The best variety of oats is that known as the potato oat. It requires to be sown in good land, and when the grains are ripening they will be found large, plentiful, and firm and bring the highest price in the market. The seed time is March and April, and the grain is scattered broadcast over the ground, in the proportion of four to six bushels to the acre, the average produce of which in Scotland and Ireland is from forty to fifty bushels. Formerly a drink called called *Mum* was made from oats, but its manufacture has been discontinued.

Oats and barley have been less perfectly examined than any of the other grains, and the nature of the gluten contained in them may be said to be totally unknown. All that can be said with certainty upon that point is confined to the observation that the gluten of

these two greater grains is mechanically separated with much by a difficulty than that of either wheat or rye, that the agency of some other substance in the flour, it is almost wholly dissolved in water. It is also probable that it contains but little fibrin. From these causes the analyses, consisting in the separation of the constituents of the flour which are hardly known even superficially, can be of no value in themselves, and are only of interest for the sake of comparison.

Four varieties of Scotch oats were examined by Messrs. Norton and Fromberg which gave exclusive of husks.

	HOPKTOWN NORTHUMBERLAND.	HOPKTOWN AVR.	HOPKTOWN AVR.	POTATO AVR.
Starch.....	65.24	64.80	64.79	65.60
Sugar.....	4.51	2.58	2.09	0.80
Gum.....	2.10	2.41	2.12	2.28
Oil.....	5.44	6.97	6.41	7.38
Avenin.....	15.76	16.26	17.72	16.29
Albumen.....	0.46	1.29	1.76	2.17
Gluten.....	2.47	1.46	1.33	1.45
Epidermis.....	1.18	2.39	2.84	2.28
Alkaline Salt.....	2.84	1.84	0.94	1.75
	100	100	100	100

From these analyses it appears that the oat is very rich in oily matters and protein compounds.

The proportion of nitrogen and protein compounds in nine specimens of oats have been determined by Norton as follows:

	HOPKTOWN OATS.	POTATO OATS.	NEW YORK, U. S., IMPERIAL OATS.
Nitrogen.....	2.19-2.35	2.76-2.82	3.00
Protein Compounds.....	14.0-14.78	17.36-17.77	18.86

It will be seen by this analysis that the New York oats was richer in the protein compounds than the Scotch oats. Oats should always be ripened before the frost sets in, because frost has a tendency to make the grains bitter, and this should be avoided by all means.

Now that the growth of oats and the manufacture of oatmeal are becoming more extensive, it is to be hoped that our chemists will pay more attention to the analysis of this excellent article of food."

GREASE YOUR SHOES.

In its issue for December the *American Tanner* gives the following advice:—A celebrated doctor, some time back, said: "If people took more care of their feet our labours would be considerably lessened," and it is well known that damp feet are a common source of ear diseases. Therefore we would urge our readers at this season to grease their shoes. Don't buy a thin, cheap shoe or boot for winter wear, but walk on a stout, heavy sole, and use good uppers. But it is little good getting a winter shoe if we do not know how to take care of it, and on this point we wish to say a few words.

When the leather is tanned, before it is finished and dried, it is thoroughly oiled by the tanner in order to make it supple and lasting, as the friction on leather in ordinary wear is constant and heavy. In preparing the upper leather for shoes and boots, the currier takes the finished and dry leather from the tanner and makes it wet again, and then completely fills the open pores with oil and grease, and this is done as long as the leather will take it in; after that it is dried in cool rooms and sold to the shoemaker. It is well, therefore, to recollect that as the leather has been living on grease for a long time it will naturally expect a regular supply, so long as any fair amount of use is expected from it.

Take for instance a pair of shoes that never get greased or oiled but are worn straight along in wet and fine weather. In course of time the leather grows hard; it won't bend to the tread of the foot, but seems harsh and stiff, and before long it cracks or tears, and we indignantly blame the store keeper for selling bad goods! Does it always so follow? No, the heat of the foot evaporates the grease of the upper leather or "top" and as this slowly disappears without renewal, like an engine without lubrication, the leather soon rot and wears away. For this reason, therefore, grease your shoes. It is an easy and simple matter, and can be done cleanly and pleasantly by taking a little care.

To make good useful "dubbin"—take of ordinary cod or fish oil a small quantity, and of common tallow about one-half of the quantity of oil you have. Melt the tallow to lukewarmness, and to the warm oil add it slowly stirring all the while, and then put away in pots to cool. You now have a homely mixture which use as follows: The only way to soften uppers of boots is to wash them quite clean from dirt and old blacking, by soaking in warm water, and as soon as the water is soaked in, which you can tell by the soft feeling of the boot, rub in a good coat of this "dubbin" and hang up in a cool place to dry. This will amalgamate with the leather, cause it to remain soft, and keep the wet out, as well as give way to the form of the foot. It is a mistake to rub "dubbin" into boots before the fire; all artificial heat to leather is injurious, it forces the grease through, in-

stead of allowing it to unite with the leather, thus causing it soon to harden instead of soften.

Grease your shoes, and the water will run off, and your feet instead of feeling damp and causing bad colds and other diseases, will keep warm and dry, and it is worth the trouble. Using fish oil solely, is bad, as the leather will only dry slowly and is liable to crack. We can strongly recommend lard as a capital waterproof for boots, either for winter snow or summer heat. Wet the boots as for "dubbin" use, and also melt the lard, so that its salt may sink to the bottom of the jar, leaving the purer oil at the top. An application of this is of great benefit, and is a favourite remedy for tough boot tops. We give here a few receipts which may prove of benefit to our readers.

Waterproofing for boots and shoes:—Linseed oil, 1 pint, yellow wax, ¼ pound, Burgundy pitch ¼ pound, and oil of turpentine ¼ pint. To be melted together with gentle heat, and poured into a handy jar or can. When required for use, to be warmed and well-rubbed into the leather before a fire.

Varnish for boots.—Take a pint of linseed oil with half a pound of mutton suet, the same quantity of beeswax, and a small piece of resin. Boil all this in a pipkin together, and use when milk-warm with a hair brush. Two applications will make them waterproof.

WHY DO WE DIE?

In looking over vital statistics we must be astonished to find how very few men really die of old age. The large majority die of disease engendered by ignorance, accident, disappointment, passions, mental or bodily toil, etc. Men of great physical strength often die young, while weak ones enjoy a longer life; but this seeming paradox finds a simple explanation when we remember that strong men only too often waste their strength, while the weak, having none to use, take care of themselves. As it is with the body, so it is with the mind. Men of genius will break down mentally, where the men who have no mind worth mentioning, will never incur such risks. The active mind, unless thoroughly trained, will only too often overstep the boundary set to it by nature in the physical strength of the body, and in the struggle between mind and matter, mental work against physical strength, the latter will, in every instance, win; and the body of such a man, unable to endure the constant strain exerted upon it by the mind, will only too often hasten to an early grave. Indulgence in the various passions are another great factor to shorten the lives of men. There is a beautiful little legend somewhere, which states that the gods endow each human being at his birth with a certain number of heart beats which he can make use of as he pleases. Every time a man allows a passion to obtain control over him his heart beats quicker and his allowance is reduced correspondingly. According to a general law of nature, animals live about five times as long as the time necessary to maturity, but man very seldom lives this average, as centenarians are found but seldom; aye, he barely attains to an average of four times his growing period, and there seems to be very good reason for this. We eat and drink, as a rule, in the most unnatural manner possible; we treat our stomachs to foods at boiling heat in one minute and to ice cream in the next; we consume astonishing quantities of indigestible food in the shape of pies, cakes, or candies, and then complain of dyspepsia.

The simple enumeration of all the sins of commission and omission, mentally and physically, would fill a volume in itself; add to this the various sins against our health through ignorance; the many dangers to life and limb due to infectious diseases and accidents, and we cannot feel surprised that most men die at a comparatively early age. As compared with other animals man is not only the most irregular and intemperate, in a general sense of the word, but also the hardest worker in all creation, and with this constant strain and friction between mind and body, the majority of men live but half of their allotted time; in spite of all modern improvements and discoveries, which have already lengthened man's life considerably, the millennium, when all men will die of old age, seems yet to be a thing of the far-far future.

The question of driving the Kabyles in Africa from the land they cultivate, to make room for French colonists, is largely discussed in France; so it seems that the Americans are not the only people capable of robbing the aborigines.

In the State of Michigan over fifty thousand men are employed in the production of lumber and salt in the various branches, at wages fully twenty-five per cent. higher than are paid for the same labour in Canada.

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ADVERTISEMENTS.
 Advertising rates sent promptly upon application. Orders for advertising should reach this office not later than the 25th day of the month immediately preceding our date of issue.
 Changes in advertisements will be made whenever desired, without cost to the advertiser, but to insure proper compliance with the instructions of the advertiser, requests for change should reach this office as early as the 25th day of the month.

EDITOR'S ANNOUNCEMENTS.
 Correspondence is invited upon all topics pertinent to the mechanical and milling industries.
 As a guarantee of good faith the real name and address of the writer should accompany all contributions.
 This paper is in no manner identified with, or controlled by, any manufacturing or mill-furnishing business, nor will a personal or refusal of patronage influence its course in any degree. It seeks recognition and support from all who are interested in the material advancement of the Dominion as a manufacturing country, and will aim to faithfully record this advancement month by month.

A DISPATCH from Ottawa says that the Ontario members of the Dominion Parliament supporting the Government, have decided not to urge the Government to reduce the duty on wheat. The Ontario members should know better than to adopt so silly a resolution. It has been conclusively shown, that with the lack of wheat in the country, and the present high duty on this commodity, the Canadian milling industry must shut down altogether. The country is already flooded with American flour, which only pays a duty of 50 cents per barrel, and against which Canadian millers cannot compete as long as the duty on wheat remains as high as it is at present. We trust the Government will, without delay, take steps to accede to the request of the Dominion Millers' Association, and to reduce the duty on foreign wheat to such a scale that it is possible for Canadian millers to use it, so long as they are short of it in their own land, even if they have to go without the support of the "wise" Ontario members.

EVERY mechanic and business man should know the journals especially intended to advocate his respective branch of industry or trade. Aside from the numerous books on the kindred arts, there are many journals published that might and ought to be of great service to the wise craftsmen who read them, for there is hardly a single issue of one of them that does not contain a greater or less number of items which would afford a better knowledge of some part of the business to which they have given their time and attention, and through which they gain their livelihoods. Even the advertisements—especially if they be of new material, new machinery, or new processes—contain information well worthy the attention of every one who would better himself, or the craft of which he is a member. Every paragraph which gives an insight into other people's modes of doing business, or which calls attention to new inventions and discoveries, or new uses of old facilities, is worthy of study and preservation. The assertion that one "cannot learn from books," is disproved by even a careless examination of any of the numerous trade journals published in America, and the mechanic—master or workman—who would keep himself abreast of the world's progress in his own branch, must give them careful attention. We hope that every manufacturer and miller who receives it, will not only read and preserve the successive issues of the DOMINION M. AND M. NEWS, but also those of all other similar journals he may be so fortunate to obtain. They will, in the years to come, be even more valuable than now, and, like new friends, and new wine, improve with age.

ACCORDING to the trade and navigation returns for the fiscal year 1882-83 just laid before the Dominion Parliament, the total value of imports into Canada during the year was \$132,254,022, and of the exports, \$98,085,804.

This gives a balance of trade against Canada for the year, of \$34,168,218, which is the largest adverse balance since 1876, and certainly does not show very gratifying results of the protective policy carried out by the Government. The imports have increased \$12,834,522 over 1881-82, whilst there has been a decrease of \$4,051,399 in the exports for the same period. The difference between the imports and exports for last year is very much larger than in any one year since the Confederation, the annual excess of the imports over the exports during this period having averaged but \$19,815,382. The exports from Canada to the United States were about seven millions less in value in 1883 than in 1882, while the imports from the States to this country increased about eight millions. This state of affairs can hardly be regarded as particularly encouraging, even by the warmest adherents of a high tariff as means for promoting and protecting Canadian manufactures.

IN accordance with a resolution adopted at a joint meeting of the patent committees of the Dominion Millers' and Manufacturers' Associations, held at Toronto Dec. 20th, a deputation recently waited on Hon. J. H. Pope, in charge of the Patent office at Ottawa, and urged on him, on behalf of the Associations above-named, that greater care be exercised in the examination and passing of patents. A large amount of money had been put into patents by Canadian capitalists, notably those connected with the new process of making flour, and the machines made by them had been extensively sold to Canadian millers, who were now being subjected to vexatious interference on the part of American manufacturing companies who claimed that they held patents which were being infringed on. Royalties and damages were now being sued for. The deputation urged that the patent office could well afford to be more strict, as since 1872 there was a surplus of receipts above expenses of \$250,000. Mr. Pope promised the matter consideration. As we have had occasion to remark before, the main trouble in the Ottawa Patent office is, that in the selection of the patent examiners not sufficient care is exercised to appoint only experts to such positions. If men were exclusively appointed who thoroughly understand the business they are called to perform, there would be less suits for infringement on patents, simply from the reason that before any patent is granted, the fact would have been fully established that the invention for which the patent is sought, is really a new and original one, and not an after-piece of something else long before patented in some other country.

THE report of U. S. Consul Taylor, at Winnipeg, gives a most favourable aspect of the trade of the United States with our North-Western provinces. The value of imports from the United States into that consular district is shown to have increased from \$834,000 in 1880, to no less than \$8,238,000 in 1883. According to the opinion of the Consul, more than one half of this importation is incidental to the construction of the Canadian Pacific Railway. Besides \$1,043,353 included in the free list as articles used in original construction of the railway, the following dutiable articles received at Winnipeg have been mostly in demand for the same object:—

Animals, living	\$230,307
Oats	81,154
Railway cars	618,052
Coal	104,343
Locomotives	249,501
Provisions	593,938
Lumber	480,361

The imports from the other Canadian provinces into Winnipeg during 1883 amounted to \$11,622,000, and at Emerson to \$2,575,000, making a total of Canadian imports of \$14,197,000, consisting principally of dry goods, groceries, machinery, hardware, leather manufactures, &c. The imports from Great Britain amounted to \$1,537,000, consisting of cottons, woollens, and iron and steel goods principally. The value of the exports from Winnipeg during 1883 was \$935,718 to Eastern Canada, \$504,935 to Great Britain, and \$402,828 to United States. More than one half of the exports to Eastern Canada was wheat and flour.

DOMINION MILLERS' ASSOCIATION.

The Dominion Millers' Association held their annual meeting in the Board of Trade rooms, Imperial Bank buildings, in this city, on January 31st. In anticipation that the meeting would be an important one, the forms of this paper were kept open beyond the regular time for going to press in order to be able to give a full report of the proceedings in the present number, but—the executive committee decided otherwise, and the representatives of the press, this paper included, were informed that the meeting would be a secret one and be open to members only; in other words, they were politely asked

"pack up their duds" and go, which they of course did. We are therefore only able to give so much of the proceedings of the meeting as we have been able to pick up, confiding in our good reportorial nose, here and there.

As specified in the call, which had been widely circulated and sent out to about 2000 millers all over the Dominion, the meeting had been called for the following purposes:— (1). The election of president and officers, and other routine business. (2). For receiving the report of the Committee appointed to interview the Government concerning customs duties on wheat and flour. (3). For receiving the report of the committee on Patents.

The document further says: "Information has been received that a large number of writs have been issued by Geo. T. Smith, against millers using purifiers infringing his claimed patents, and that a still larger number of writs are about to be issued. The writs claim heavy damages and injunctions against millers. The Association has secured the advice of Dalton McCarthy, Esq., Q. C., who has entered exhaustively into the case in all its aspects and bearings, carefully studying the whole case of Smith vs. Goldie, as well as all obtainable evidence. And this meeting is particularly called for the purposes of (1st) hearing Mr. McCarthy, who will address the meeting, stating the present aspects of the case and the best course to adopt. 2nd. Instructing the committee of the course the Association intends to pursue in the matter. As the objects of this meeting are of vital importance to every miller in the country, it is earnestly requested that the millers will make a point to attend and join the Association."

The election of officers was held with the following result:—President, C. Whitlaw, Paris; Vice-Pres., J. L. Spink, Toronto; Treas., H. N. Baird, Toronto; Sec., Edgar A. Wills, Toronto; Executive Committee—S. Neelon, St. Catharines; W. Galbraith, Toronto; David Plewes, Brantford; J. Warcup, Oakville; S. Goldie, Guelph; D. Moore, Walerton; A. Watts, Brantford.

As regards the wheat duty question, the committee appointed at the last meeting to proceed to Ottawa and lay the matter before the Government, made a report, the purport of which was, in the main, what has already been published in this paper concerning the efforts of the committee.

Mr. Whitlaw thereupon made the following motion, which was seconded by Mr. Neelon and unanimously carried:

"That a memorial be prepared for presentation to the Government seeking for cancellation of bonds given for wheat within six months upon payment of 50 cents per barrel, the same as paid by American millers, and that a delegation be named to present the same and further the objects of the Association."

It was further agreed: "That all members of this Association be such delegation." Messrs. Baird, J. L. Spink, and McLaughlin, were appointed a committee to make the necessary arrangements for the trip of the delegation to Ottawa.

The main part of the afternoon session was devoted to discussing the suits instituted by George T. Smith against a number of millers for alleged infringement on his Purifier patents, and to arrive at some decision regarding the course the Association should take in this matter. Dalton McCarthy, Q. C., whose legal services the Association has secured in the matter, and Mr. O. A. Howland, counsel for Mr. Smith, were present and both gentlemen addressed the meeting. After a lengthy and resultless discussion the whole matter was finally referred back to the patent committee for their further report.

During the meeting 22 new members had their names enrolled on the lists of the Association.

A good deal of dissatisfaction was expressed among the members present about the indolence and apparent don't-careism of the millers generally. The purifier question was one of vital importance to every individual member of the fraternity, special notice of this meeting had been sent to every miller in the Dominion, about 2000 such notices, stating the objects of the meeting, having been forwarded, and what was the result—all told, hardly 50 millers had responded. It was anticipated that the meeting would be a representative one and 50 millers present could certainly not be regarded as embodying the sentiments of the whole Canadian fraternity. In such and similar words the members gave vent to their feelings about the laxity of the millers at a time, when a matter of such grave importance should engross the attention of every individual miller.

It is estimated that Canada will want at least 10,000,000 bushels of American wheat, before harvest. One miller is taking from Chicago about 10,000 bush. weekly.

Notes from the Mills

FLOURING MILL NOTES.

—Rolls are being placed in the Marquette, Man., mill.

—James Moore's mill at Carthage, Ontario, has been burned.

—The towns of Russell and Silver Creek, Man., talk of having grist mills shortly.

—Rebolting flour is becoming popular in England, at least so says the *Mills Gazette*.

—It is stated that many grists come miles to Assinaboine Mills, Portage la Prairie, Manitoba.

—Farmers about Rapid City, Man., are forming a joint stock company to build a \$40,000 mill.

—It is estimated that nearly 100,000 pairs of rolls are now in operation in the milling countries of the globe.

—The flour trade in Liverpool is dull. American prices are too high to allow of much business being done.

—W. Gerlach, of the well-known firm of William Gerlach & Co., millers &c., Milwaukee, Wis., is dead.

—The flour used by the people of Jerusalem is all imported from Europe and Egypt. Rye flour is most largely used.

—Winnipeg, Manitoba, it is stated, will ship 3,500,000 bushels of wheat during the winter and spring.

—A large number of new mills, some of them very large ones, will be built in Manitoba and the Northwest during the coming year.

—The Dominion City, Man., flour mill, has recently had an oat and cockle separator and a set of rolls added to its equipment.

—Adam Argo, Jr., has been admitted to partnership by James Hortop, miller, of Elora, Ont. The firm name is Hortop & Argo.

—Flour is selling at Coeur D'Alene, Montana, at forty dollars per barrel. Canadians would consider these prices rather exorbitant.

—The flour trade in Glasgow and Liverpool, according to Anton Kufek's reports, still continues dull, with no prospect of an immediate improvement.

—The new mill of Whitlaw, Baird & Co., at Brant, Ont., is completed, and running night and day. The mill contains sixteen double sets of rollers.

—Farmers in the municipality of Plympton Man., have formed a joint stock company with a capital of \$12,000, divided into 6,000 shares of \$20 each, to build a grist mill.

—Machinery for the manufacture of oatmeal is now being put up in the Stonewall (Man.) mills. The kiln is already completed and all will soon be in working order.

—The oatmeal mill at Portage la Prairie, Man., is now in full working order. The product is said to be superior to anything imported. This is the first oatmeal mill built in the Province.

—The "Mammoth Flouring Mills," of Mitchell, Dak., which it is said will be the largest steam flouring mills in the United States, are well under way, and will be completed in the early spring.

—The Geo. T. Smith Purifier Co. of Jackson, Mich. and Stratford Ont., are bringing out a new centrifugal reel, which has some very ingenious features, and promises to be an excellent machine.

—The Geo. T. Smith Purifier Co. of Stratford, Ont., have closed contracts with Vanstone Bros. of Brussels, and C. Smith, of Campbellford, for the erection of complete mills, employing the most modern machinery.

—Says an Austin, Man., correspondent: "It would be well for some one contemplating the erection of a grist mill in this province, to consult the farmers here in the way of a bonus, for I think something might be done."

—The "City Mills" of St. Catharines, Ont., which have been closed for a year, have been reopened and started by Mr. Robert Kerr. Mr. Kerr, for the last three years, has had charge of the "Grantham Mills" of the same place.

—A. Amuth & Co.'s elevator, Milwaukee, Wis., was damaged by fire on Jan. 9th, to the extent of \$12,000. The damage to the stock is \$4,000, and to the machinery \$4,000. The insurance is \$16,000. Twenty thousand bushels of barley were scorched and wet.

—The new Kent Mills of Messrs. A. Campbell & Co., at Chatham, Ont., which are being built on the site of the large mill of this firm burnt a few months ago, are well under way and are being fitted up by the Geo. T. Smith Purifier Co., of Stratford, Ont.

—In the "Empire Mill" at St. Catharines, Ont., there is a miller with only one leg, and yet he takes a half-night watch right along. He lost a leg over a year ago, by getting caught in some heavy gear-

ing, and upon recovering resumed his position in the mill as purifier miller.

—J. Livergou, of Brantford, Ont., has recently sold one of his No. 2 Common Sense Millings Purifiers to Messrs. A. Watts & Co., of Norway, Man. The same firm is putting in H. J. Livergou's Ontario Combined Separator and sifter No 3, into their mill.

—Peter Sutherland has been in Manitoba arranging for the Northwestern Grain Dealers' Association, of Minneapolis, to enter a bid for the purchase of wheat. The association intends to build elevators at Winnipeg, Emerson, Portage la Prairie, Neche, and Brandon.

—The Portage Milling Company has offered to sell to the Municipality of Portage la Prairie, Man., its mill and elevator at the original cost. The mill has a capacity of 200 barrels per day and is fitted up with rollers and other recently improved machinery. The capacity of the elevator is 115,000 bushels.

—There is a good deal of talk of giving bonuses to grist mills in various parts of Manitoba and the British Northwest territories. Should the local government grant the right to municipalities to build and operate mills and elevators, there is likely to be a building boom in these institutions all over that country at no distant date.

—The Montreal Corn exchange in its annual report, advocates the abolition of canal tolls, and strongly recommends in the interests of farmers, flour millers, the grain trade, and the public generally, the abolition of all taxes on breadstuffs, untrammelled interchange of national production between Canada and the United States, and the abolition of all imposts and burdens upon shipping by the St. Lawrence route.

—Brooks Brothers' elevator, at Minneiska, Minn., eighteen miles above Winona, on the river, was burned at 2 o'clock on the morning of Jan. 6th, together with a four-story dwelling near by and a hotel across the road. The loss is estimated at \$35,000; insurance, \$19,000. The elevator contained over thirty thousand bushels of grain, chiefly wheat and barley.

—During the last year the Oriental Flour Mill of Bannister Brothers, at Clinton, Iowa, was run steadily, turning out a fine grade of flour (using the roller process). Five hands are employed at a cost in wages of \$3,500 a year, and fifty thousand bushels of wheat were converted into forty thousand barrels of flour, aside from the grinding of other grain.

—A large number of millers' agents are buying wheat throughout Manitoba and it is having the effect of stiffening the price. The Portage Milling Co. have all they can do, and wheat is pouring in from all directions to Portage la Prairie, where the best quality now commands 70 cents. The farmers are pleased over the reduction of grain rates by the Canadian Pacific.

—The *Manitoba Free Press* writes as follows: "There is a strong demand for Manitoba wheat in eastern markets, and it is not unlikely that an advance in price will follow, especially for wheat damaged by frost. The Ontario correspondent of a leading firm here reports that No. 1 frozen wheat gives good satisfaction to millers there. Many of them prefer it for grinding to the regular quality, shipped immediately after harvest."

—Thos McKay & Co., extensive flour and oatmeal manufacturers of Canada, are at present engaged in the erection of a 350 barrel roller mill at Ottawa. The mill is a fine five-story brick structure, and will be ready for operation early in the spring. Goldie & McCulloch are furnishing the machinery. McKay & Co. have two other flour mills of a combined capacity of 450 barrels—one being a roller and the other a stone mill, besides two large oat meal mills. Their principal business is in oat meal, their brands having a national reputation.

—The Winnipeg mills have been running full time and the output of flour has been large, considerable quantities being shipped to eastern markets. In the city the demand for flour has been below the average. The quotations are: Patents, \$4.80@5.30; strong makers, \$5.20@5.40; superfine, \$4.40@4.60. Bran has accumulated in large quantities at the mills, and a considerable drop has occurred in price. It is quoted at \$3 per ton in car lots on track; in sacks \$2.50 more. Shorts also dropped in sympathy with bran, being offered at \$10 in car lots. Chopped feed is in fair demand at \$22 in car lots.

—An old citizen of Toronto has been giving reminiscences of the time when that city was a village. Among his recollections is that of the first flour mill owned by Gooderham & Worts. He says: "They built a mill for grinding flour. The sails blew off during a gale and they put in steam power. The business was in a small way then. They bought wheat from the farmers, or ground it for them. They used to come to market with a large dry drawing five or six barrels of flour, and sell to customers. I have seen old Mr. Worts bring a load in the morning, go home to dinner at noon, and

return with another load. I bought many a barrel of flour from him. Afterward they bought barley and became distillers."

—In reply to a number of enquiries, we publish the following "Wheat Purchasing Table," adopted by the Waterloo (and adjacent counties) Millers' Association, together with the alterations recently made, for the information of millers generally:—

WHEAT WEIGHING PER IMPERIAL BUSHEL.	LESS THAN WHEAT WEIGHING 60 POUNDS.	Recent alterations
59 pounds.....	1 cent.	
58 ".....	2 "	
57 ".....	4 "	
56 ".....	6 "	
55 ".....	9 cts. to 12 "	
54 ".....	12 " 16 "	
53 ".....	16 " 20 "	
52 ".....	21 " 29 "	
51 ".....	26 " 40 "	
50 ".....	32 " 50 "	

Add to price one cent extra for every pound going over 60 pounds to the bushel.

—Superintendent Egan, of the Canadian Pacific Railway, in reply to a delegation of Southern Manitoba farmers, recently assured them that Messrs. Ogilvie had no monopoly of elevators on the road, and that they had a right to erect a flat warehouse at Manitou for the purpose of shipping from there frozen wheat or coarse grain; that to assist those who had their grain injured by frost, the railway company had reduced the tariff 20 per cent. to those shipping to distant points and had asked the line south also to make a reduction; that the line south had modified its previous order so that in future there would be no reason to complain of want of foreign cars for the shipment of wheat to Ontario.

—A correspondent of the *DOMINION M. AND N. NEWS* from Bloomfield, Ont., writes:—"Thinking that a few words from our little town in regard to milling might be of some interest to the milling fraternity, I take this opportunity of writing you a few lines in regard to a new roller mill started last November, and built by Messrs. James Jones & Co., of Thorold, Ont., for Burr Bros., of this town, which I must say is a credit to this well-known firm, both in workmanship and working of the mill. The capacity of the mill is fifty to sixty barrels, operated by seven rolls, and is giving good satisfaction and good results. I think Burr Bros. deserve great credit for their enterprise, not only in their new roller mill, but also in their large woollen factory and large store, and also very extensive brick-yard, which, taken as a whole, speaks business quite lively, and also gives employment to a good many residents of the town."

—Messrs. Wheeler Bros. & Brown, of Cataract, are finishing work on their new roller mill, a short description of which may prove interesting to our milling friends. The building, which is located in a deep rocky gorge, is a very substantial stone structure, fifty feet long and forty feet wide outside. There are four full stories of elevators, twelve, sixteen and eighteen feet, which with the basement and cupola, makes a total height of over seventy-five feet; this however, on account of the situation of the mill does not create the same impression it would if it were standing on level ground. The foundation walls, which are laid on the solid rock, are four feet thick; the first story three feet, second two and one-half, third two feet, and top story twenty inches. All the stone used in this structure was quarried out of the tall race within fifty feet of the building. The power is derived from one of the branches of the river Credit, which at this point takes a leap of about forty feet into the gorge below the mill, forming one of the "falls" for which the locality is famous among sportsmen and tourists. The total head realized by taking the water into a tube a short distance above the mill is a little over fifty feet. The water-wheel which drives the whole mill will be situated at the bottom of a shaft or well in the rock upon which the mill stands. This well is located inside the mill walls and communicates with the tail-race by means of a tunnel about seventy-five feet in length, five feet wide and four feet high. A twenty-one inch turbine is to be used which is intended to develop about two hundred-horse power sufficient to give twice the capacity required, and is intended to provide for future additions should they be required. The machinery will be the finest that can be procured, it being the intention of the proprietors, to make the mill first-class in every respect. They having spent some months in visiting all the largest and best roller mills now in operation have decided on a complete rollersystem, using sixteen pairs of 9x24 in. chilled iron rolls of the best known manufacture. In connection with their rolls there will be the following machines: Two wheat brush machines, two separators, one cylinder cockle extractor, two large centrifugal bolting reels, three latest improved flour packers, two large bran dusters, one Short's duster, four velocity purifiers, with dust collectors attached, one mill dust exhaust, motion indicators, etc. The contract for the whole of the machinery and supplies, except the water-wheel, has been awarded to Messrs. Wm. & J. G. Greay, of Toronto. Mr. Lawrie, their superintendent, will supply plans and programme and look after the millwright work.

the contract for which is in the hands of Mr. E. P. Cave, who will no doubt sustain his reputation in that line.

LUMBER NOTES.

—The Beaver Lumber Co., of Tamashiche, has suspended. Liabilities, \$108,000; assets almost equal.

—C. Lamereux & Co., furniture dealers of Montreal, have suspended. Liabilities, \$35,000. They offer 65 cents on the dollar.

—The value of the lumber shipments from the port of Ottawa to the United States during 1883 was \$610,108, against \$500,281 in 1882, an increase of \$100,827.

—The Bennett Furniture Manufacturing Co. of London, Ont., have temporarily suspended, and the establishment is in the Sheriff's hands. The writ was issued at the instance of Molsons Bank.

—A saw-mill belonging to the Stinson estate on the river near Camlton, Ont., was burned on the night of Jan. 25. Loss \$5,000. The fire was no doubt incendiary, as the premises have been unoccupied for some months.

—On Jan. 14th the mill belonging to the Chatham Manufacturing Company was destroyed by fire. The mill had not been running for some time past and was to recommence operations in a few days. The loss is over \$12,000, insurance only \$6,000.

—The saw mill of Kenneth McKenzie, of Glenoco, Ont., was destroyed by fire on the morning of Jan. 23. Loss about \$1,000; no insurance. The fire is supposed to have originated from a spark from a smoke-stack or fire box of the boiler, which smouldered and burst forth when the mill was left for the night.

—Mr. Wm. Mackay, of Ottawa, lumberman, will build a saw-mill either at Calalogic or Round Lake, on the K. & P. R. R. Since this line has been opened about a dozen mills have been erected, and an immense cut of lumber and timber is coming over the line, sent to the American markets.

—The partnership heretofore existing between Geo. J. Shimer, Samuel J. Shimer, and C. L. Johnston, under the firm name, Shimer & Co., Milton, Pa., manufacturers of the famous Shimer Mather Heads, an advertisement of which will be found elsewhere in this paper, has been dissolved, Samuel J. Shimer continuing the business.

—On the morning of Jan. 2nd, Thos. Avery's saw-mill, Sharbot Lake, near Kingston, Ont., was destroyed by fire. This is the second time the mill was burned within six months. The fireman went to the mill early in the morning, and went to wake up the engineer. When he returned the mill was in a blaze. The loss was large. The premises were insured for \$3,000.

—The largest single contract ever made by St. Croix lumbermen is that entered into between Messrs. F. H. Todd & Sons, of the one part, and Messrs. Tracy, Murchie, & Love, of the other part, for the cutting and yarding of 7,000,000 feet of logs during the present winter. The ground to be operated on covers a block six miles square on the Wiscataquok stream, in Piscataquis county, Maine.

—The manufacturers of straw lumber—or, as they now call it, paper lumber—have opened an office in New York for the purpose of "developing" their industry, and a correspondent who has visited the office writes: "Attention was directed to several articles of cabinetware made of the material. Two of these were ordinary parlour tables, one of which was finished in the natural grain or luster, resembling somewhat the peculiar mottled appearance seen in some choice hard woods. The surface of the table was varnished and highly polished, presenting a smoothness equal to fine plate-glass. The other table was finished in exact imitation of rosewood. A panel-door was also shown, the finish resembling mahogany. The paper board, it is claimed, is susceptible of taking the finest polish as well as any tint, shade or colour. The lumber is made principally of the pulp of wheat, rye, oat, straw, and other vegetable fibres, combined with chemical ingredients and cements. It is formed of layers about one-quarter of an inch in thickness, and these layers are pressed together by powerful machinery and thus rendered as hard as the hardest wood, besides much more dense. The boards are also rendered waterproof in varying degrees, according to the purpose for which they are to be used. The material is as durable as time, and can be sold at a good profit for almost half the price of ordinary pine lumber. It will take any finish, and in this respect alone is equal to the finest hard woods. Moreover, it can be marbleized in imitation of any kind of marble, both in respect to a high degree of polish and an exact imitation of grain. It will not warp, and can be rendered perfectly waterproof if desired, thus making it suitable for the construction of barrel caskets. It makes just as solid a surface as any wood and may be made of the hardness of stone."

Industrial Notes.

RAILWAY NOTES.

H. C. Davis has resigned the assistant general passenger agency of the Manitoba railway, and is succeeded by C. H. Warren, who has the title of general passenger and ticket agent.

The New York Central Railroad has decided to largely reduce its working force, with the object of lowering expenses. About 1,000 mechanics have already been discharged at various points along the line. It is rumored that the number of train hands will also be reduced. It is said that business is slack, and that the men will be taken back shortly. The Erie road has dismissed nearly 200 men.

Rumour has it that the Grand Trunk railway contemplates the building of another direct communication with the Rome, Watertown & Ogdensburg railroad, for the control of which it is now negotiating for some time. Bills, it is said, to authorize the construction of a cantilever bridge over the Niagara river, at or near Lewiston, are to be introduced, and to be pushed through Congress, and at the present session of the Dominion Parliament at the earliest possible moment.

Mr. Leavard, President of the Michigan Central, stated to a press representative that the report that the Canada Southern would be double-tracked was unfounded. The Welland cut-off will be brought into use for regular trains about a week. It is not yet decided whether the Buffalo trains will continue to use the International Bridge or be run over the New York Central from Niagara Bridge. Negotiations in regard to the matter are still in progress. It is quite probable, however, that the latter course will be pursued.

Mr. Lyman English, of Ottawa, gives notice of application to Parliament for an Act to incorporate a company to construct and manage a railroad from a point on the shore of Lake Ontario, in Township of Last Whitley, to connect with the Northern and Pacific Junction Railroad, at such places as may be deemed desirable, and to cross and connect with the Ontario & Quebec Railroad at some point in or near to the county of Ontario, and to connect with the waters of Lake St. George.

At the annual meeting of the stockholders of the Toronto, Hamilton & Quebec Railway Co., the following directors were elected: Alex. Henry, J. E. Hall, E. N. Benjamin, Peter Vanliven, H. R. Rathlum, Herbert Rathlum, W. R. Aylsworth, R. C. Carter, and F. S. Rathlum. The directors met and elected the following officers: Alex. Henry, President; W. R. Aylsworth, Vice-Pres.; F. W. Rathlum, General Manager; R. C. Carter, Superintendent; W. S. Williams, Secretary; F. S. Rathlum, Treasurer. Resolutions were adopted to push the work through to its completion with all possible speed.

At a meeting of the shareholders of the Ontario & Quebec and Canadian Pacific Railways, held on Jan. 30th, the lease of the Ontario and Quebec system to the Canadian Pacific has been confirmed. The lease is for 999 years, and includes the line of railway formerly known as the Toronto, Grey & Bruce and Credit Valley, besides the portion of the Ontario & Quebec now constructed, namely, from Toronto to Smith's Falls. Next spring the line from Smith's Falls to Montreal will be pushed forward. One of the heaviest pieces of work on the line will be a bridge across the St. Lawrence near the LaChine Rapids. When this is completed the C. P. R. will have control of a system of railway centering in Toronto, and extending to Montreal and Ottawa in the east, St. Thomas and London west, and Owen Sound north.

Detroit Free Press.—A Walatsh official who happened to be in the city was met by a reporter and by way of a feeler the question was put:—"What is this rumor about your people negotiating with the Credit Valley Road for an extension from St. Thomas to Detroit?" "Well, now," said he, "I think I can tell you as much about that line as anyone. The road is going to be built. It may not run from St. Thomas to Detroit, but the Credit Valley will have a line to the Detroit River. The plans have not yet assumed definite shape, and on that account there has been some delay in securing a charter from the Government. But our people have been consulted in regard to the project, and will render it material encouragement. We both need the line. By the end of the month there will be something more definite to announce. In Montreal recently I had a consultation with some of the Canadian people in regard to it. The greatest difficulty to encounter just now is the opposition St. Thomas people will offer if the road is not built from their town. They contributed handsomely to the Credit Valley Road with the understanding that they should be on the main line, or should have the western terminus of it, or secure some such substantial advantage. But I think the extension will be through London so as to cut off some of the Grand Trunk business. After passing through Drummond and Woodstock on the present line the extension will bear east, through London, and thence to the Detroit River, striking it probably at Windsor." As the reporter left he received the assurance that the line would be built, and something more definite would be known about it shortly.

IRON NOTES.

A fire in Ballender's Foundry, Montreal, on the evening of January 13th, caused \$300 or \$400 of damage, which is covered by insurance.

Baterson & Rathlum's Iron Works, Toronto, were partially destroyed by fire on the evening of January 21st. The damage amounts to about \$1,800.

The McLary Manufacturing Company, of London, whose stove works are among the most extensive in the Province, have reduced the wages of their employees 25 per cent.

—A decision has been given by Judge Riggly, in favor of the sale on behalf of the protesting application of the Company of Canadian liquidation of the St. Lawrence, the official liquidator, London, to authorize the Company's directors to carry on the business of the contracts far as might be necessary to perform the same, and existing when the winding-up order was made; as to carry on the works of the Company so far as might be necessary to a beneficial winding-up of the affairs of the said Company, and also to authorize the official liquidators to pay the wages of the employees earned prior to the 1st of December last.

—James H. Lancaster, of 36 Dey Street, New York, (President of the Lancaster Manufacturing Company), has purchased the entire plant, patterns and good-will of the business of J. H. Darlington (Harlem Railroad Depot) corner Centre and Franklin streets, New York City. This business was founded by Mr. J. H. Darlington some thirty years ago, and has been in successful operation ever since. The present plant and patterns cost Mr. Darlington upwards of \$30,000, and to this Mr. Lancaster will add considerable additional machinery, including universal milling machines, motor lathes, and a complete set of emery grinding and polishing machinery. In addition to the general work hitherto carried on at these works, Mr. Lancaster will build his new patent Colonic motors and Colonic pumping engines, drop and trip hammers, dynamo machines, steam engines and also such work of the Lancaster Manufacturing Company as this plant is suited. At present the business is being conducted solely by James H. Lancaster, but it is intended by him to organize a stock company, capitalized at \$500,000, and styled "The J. H. Lancaster Engineering Company." The directors of this concern will be men of high standing in the mechanical world. This business will be conducted distinctly from that of the Lancaster Manufacturing Company, founded by Mr. Lancaster some eighteen months ago.

GENERAL.

—During 1883 2,323 patents were issued by the Canadian Patent Office; the fees aggregated \$73,023, an increase of \$12,000 over the amount received in 1882.

The sugar refinery of the Toronto Grape Sugar Company, on the Esplanade, has been sold to Mr. R. W. Sutherland for \$54,000. It is reported that the building will be used as a lager beer brewery.

—Swartz & Co's tannery at Elmira, N. Y., was destroyed by fire January 11. The machinery was also badly injured. The stock was valued at \$20,000, and was insured for \$9,000. The building cost \$6,000, and was insured for \$2,812.

—The Collingwood Soap Factory, owned by Messrs. T. A. Brown & Son, together with contents, amounting to four hundred packages of soap and \$2,000 worth of stock, was totally destroyed by fire on Jan. 17th. The cause is unknown.

—It is reported that the glass-blowers of Mon-

tréal and a few of the glass dealers have combined to erect new glass works in that city. About thirty glass-blowers would be employed in the new manufactory, and flint bottles are to be the principal goods made. It is proposed to commence operations in the spring.

—On the night of January 1st, F. Ott's tannery, at Brantford, Ont., was burned. The building was owned by A. Watts, who has an insurance on the same for \$1,800. Mr. Ott's insurance on machinery & stock amounts to \$5,700. The fire is fiery and it is believed the work of an incendiary, supposed to have been a fire used in the building for as there had been no fire in the building for some time.

—A bill has been introduced in the American House of Representatives which provides for the construction of a ship canal around Niagara Falls, Niagara County, N. Y., to connect the navigable waters of Lakes Erie and Ontario. It provides for beginning the surveys for the work within six months from the passage of the Act. The location of the Canal is to be made by a Board of Commissioners appointed by the President.

—In 1870 there were twenty-five firms making shoes in Montreal, whose united annual production exceeded in value \$4,000,000; the number of establishments in the city and suburbs in 1871 was 117, employing 5,000 persons, with an annual wages roll of \$1,141,579, and a product valued at \$5,673,415; ten years later there were 200 establishments, 5,500 employees, \$1,466,995 paid in wages, and the product valued at \$6,880,826—figures which showed the boot and shoe trade to be the largest manufacturing industry in that city. The annual product of the Dominion was upwards of \$17,000,000, with 18,949 persons employed; the city of Quebec having an output of \$2,000,000 to \$2,500,000, Toronto, Hamilton and London, \$1,225,000, Halifax and St. John \$500,000 each. Thus it will be seen that this was the largest manufacturing interest of the whole Dominion, except those of flour and lumber.

—The duties collected at the Montreal Custom House for 1883 amounted to \$7,730,554, against \$8,375,723, for 1882, a decrease of \$605,169, of which \$451,268 is traced during the last six months. The value of imports for 1883 is estimated at \$43,718,049, compared with \$50,527,497 for 1882, showing a decrease this year of \$6,809,448. The figures for the last quarter of 1883, however, are only approximate. From the annual statement of collections in the excise branch of the Inland Revenue office of Montreal for 1883 it appears that there has been a falling off of \$60,658 during the last six months, and of \$69,975 for the whole year. This is due principally to a reduction in the excise duty on tobacco from 20c. to 12c. per pound, which took effect on the first of July, many of the manufacturers having kept their manufactured goods in bond until after that date to avoid paying the higher duty. The consumption of tobacco on the whole was quite as large as in any year previous. The figures are \$1,533,548 for 1882, against \$1,466,548 for 1883.

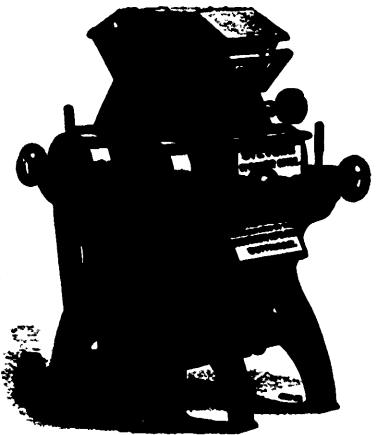


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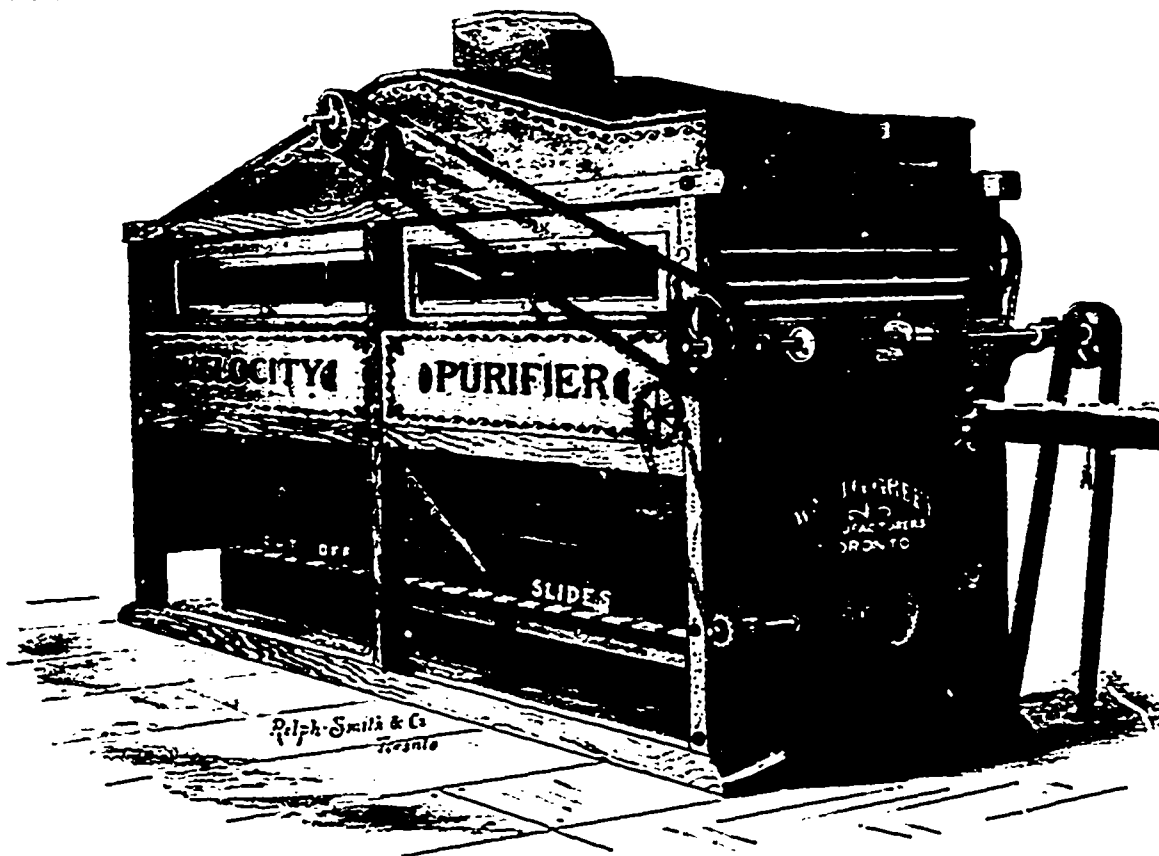
Perfect Purification without waste, is the important consideration in New Process Milling.

Greey's Newly Improved Velocity Purifier is an extraordinary success in this particular, and is acknowledged by many Millers to be a beauty to behold, and a pleasurable duty to attend.

"THE PRINCE OF PURIFIERS,"

Unrivalled in Excellence: warranted to do clean work, without waste for Millstones or Roller Mills, on Spring or Winter Wheat Middlings.

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SUPERIOR ADVANTAGES OF THE VELOCITY PURIFIER:

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Practical Notes.

FIXING COLOURS.—A paper of value to dyers has been read by M. Horace Koechlin, of the Industrial Society, Mulhouse. It relates to the fixation of colours by means of gelatine rendered insoluble by means of potassium dichromate. Mineral colours and certain aniline colours are thickened with gelatine, and printed upon cloth prepared with sodium hyposulphite and then passed through potassium dichromate. The colours bear soaping at boiling heat, and sustain the action of sunlight without alteration.

CLIMATE EFFECT OF SEEDS.—A Norwegian botanist, P. Schubeler, states that most plants in high latitudes produce larger and heavier seeds than in regions near the equator—an effect which he ascribes to the prolonged influence of sunlight during the summer days in high latitudes. In some cases the difference of seed development is astonishing. Dwarf beans taken from Christiania to Drontheim—less than four deg. further north—gained more than 60 per cent in weight; and thyme from Lyons when planted at Drontheim showed a gain of 71 per cent. The leaves also of most plants are larger and more deeply coloured in high latitudes. The same is true of flowers, and many which are white in southern climates become violet in the far north.

LENGTHENED LIFE. The curious question has been raised in England whether the recent decline in the death rate has actually added to the average length of useful life, or whether its benefits have not chiefly been spent in the relatively unimportant decrease of mortality among children and the aged. It has been answered by Mr. Noel A. Humphreys, after a new examination of the returns of mortality and the compilation of new life tables. He finds that the average rate of retention of the life of an individual with the waters of Lake Superior.

Age expect. The average of the new tables, or has been increased by two years or five per cent., and that the expectation in the case of females has been raised from 40.86 years to 43.36 years or by 2.70 years, or nearly seven per cent.

WHICH ARE THE PRIMARY COLOURS.—The accepted theory of colour has at last found a disbeliever, and from having been considered an immutable fact it is now believed to be an unsound conclusion to hold that the three primary colours are red, yellow and blue. The late Professor Maxwell has we are told, proved beyond question that the essential primaries are red, green, and violet, so that a good many essays and elaborate works, as well as more numerous volumes of advice to painters, must be wrong from the very beginning, and our experienced window dressers must believe a great part of this scientific treatment of colour to be erroneous. The admission of green into the notable trio is thus accounted for:—"The difficulties which stood in the way of an accurate determination of the primaries were largely due to an element of confusion introduced by the use of pigments for the purpose of experiment. People who were accustomed to mix blue paint and yellow paint to produce green found it difficult to believe that the green of the spectrum was anything more than a mixture of the blue and yellow by which it was bordered; but an admixture of the blue and yellow of the spectrum does not produce green, but white. The blue light being a compound of green with violet, and the yellow light being a compound of green with red, the two together afford the three primaries, which combine to form white. In the paints, on the contrary, the material which appears blue absorbs and quenches red, while the material which appears yellow absorbs and quenches violet; so that only the green, which is common to both, is reflected unchanged to the spectator from the mixture."

—The Canadian Pacific railroad has reduced rates on wheat to Port Arthur as follows:

From	New Rate per 100 lbs.	Old rate per 100 lbs.
Regina	40	44
Virton	39	44
Brandon	33	41
Boadway	37	46
Indian Head	39	48
Qu'Appelle	39	48
Winnipeg	38	48
Manitou	38	46
	30	40

From points beyond Regina the additional charge will be one cent a ton per mile. A reduction of rates is also promised to Emerson and Crema from the points mentioned.

—Putnam & Phelps, tanners, North Leominster, Mass., have assigned all their joint and separate estates for the benefit of their creditors. Liabilities \$275,000; assets \$220,000, consisting of personal property on and about the tannery, unimproved real estate and tannery buildings. It is stated that the firm also holds a large claim against H. C. Tillinghast & Co., Chicago, recently failed. Nearly all the indebtedness of Putnam & Phelps is upon notes given H. C. Tillinghast & Co. and used by the latter. The firm was engaged in the prosecution of the rope and fur business in the West. Just before she failure the firm preferred the Leominster bank, of which Putnam is president, by turning over stocks and other property to it in satisfaction of claims against the firm.

—Within the last month, the scheme of shipping petroleum by steamer, instead of sailing vessel, has been tried from New York City. This calls to mind the effect of shipping American petroleum to India. All oil shipped to India is required by law to reach a fixed safety test. The oil is tested to the limit before being shipped, but on its arrival in India found to fall somewhat below the required standard. This is attributed to the effect of the change in climate, and the authorities have decided not to admit any more oils unless they are up to the legal standard. Sir Francis Abel, one of the leading authorities in oil matters and explosives, thinks that in consequence of this dangerous feature, the standard of the test should be raised rather than lowered, and states that "as shipments of oil from more temperate climates are occasionally liable when tested in India, to furnish results about 2 deg. F. lower than the flashing point recorded before shipment, trade arrangements should be made in view of that contingency." The feature in the shipment of oil may prove to be a matter of considerable importance to American shippers of petroleum, not only as an item of change in climate, but from the special effect produced by the warmth of the steamers as compared with that of the sailing vessel. The change from sailing vessel to steamer traffic may not have any effect on the quality of the oil, but who would have ever predicted this India depreciation? Forewarned is forearmed.

GRAND TRUNK RAILWAY.

Trains Leave Toronto on Under:

STANDARD TIME.
MAIN LINE EAST.
 7:15 a. m. Local for points East to Montreal.
 9 a. m.—Fast express for Kingston, Ottawa, Montreal, Quebec, Portland, Boston, etc.
 1 p. m.—Mixed for Kingston and intermediate stations.
 4:30 p. m.—Local for Colbourg and intermediate stations.
 7:50 p. m.—Express for main points—Ottawa, Montreal, etc., runs daily.

MAIN LINE WEST.
 7:55 a. m. Local for all points west to Detroit. 12:45 p. m.—Express for Port Huron, Detroit, Chicago, and all western points. 4:00 p. m.—Mixed from Kingston and intermediate stations. Through car to Palmerston, via Guelph, 6:45 p. m.—Mixed for Stratford and intermediate points. 11 p. m.—Express for Sarnia and western points sleeping car for Detroit.

ARRIVE FROM THE EAST.
 9:40 a. m.—Local from Colbourg. 10 a. m.—Express from Montreal, Ottawa, and main local points. 11:20 a. m.—Fast Express from Montreal, 1:40 p. m.—Mixed from Kingston and intermediate stations. 10:30 p. m.—Express from Boston, Quebec, Portland, Montreal, Ottawa, etc.

ARRIVE FROM THE WEST.
 7:55 a. m. Mixed from Stratford and intermediate points. 8:10 a. m.—Express from Chicago, Detroit, Port Huron, and all western points. 11:30 a. m.—Local from London, Guelph, etc. 7:55 p. m.—Express from all points west—Chicago, Detroit, etc. 11:30 p. m.—Local from London, Stratford, etc.

GREAT WESTERN DIVISION.

LEAVE TORONTO.
 7:35 a. m.—For Niagara Falls, Buffalo, and local stations between Niagara Falls and Windsor. 9:15 a. m.—For Detroit, St. Louis and points in the South West. For Port Huron, Chicago, and the West runs daily. 1:00 p. m.—For Niagara Falls, Buffalo, New York, Boston, and local stations bet. Hamilton and London, and Hamilton, St. Thomas, etc. 6:30 p. m.—Local stations bet. Toronto and Niagara Falls. 11 p. m.—For Niagara Falls, Buffalo, New York, Boston, and all points East.

ARRIVE AT TORONTO.
 8:40 a. m.—Express from Chicago, Detroit, Hamilton, etc. 10:35 a. m.—Express from London, St. Catharines, Hamilton, etc. 1:50 p. m.—Express from New York, Boston, Buffalo, and all points East. 4:25 p. m.—Express from New York, Chicago, Detroit, London, etc. runs daily. 7:05 p. m.—Mail from Buffalo, Detroit, London, Hamilton, and intermediate stations. 7:25 p. m.—Express from Detroit, St. Louis, etc. 11:10 p. m.—Local from London and intermediate stations.

BACK NUMBERS
 — OF THE —
 Dominion Mechanical and Milling News
 FURNISHED ON APPLICATION.

DWIGHT CUSHMAN,

MANUFACTURER OF
 The Cushman's Scroll Water
 Wheel, Combination Turbine
 Water Wheel, Iron Flumes for
 the Combination Wheel.
 The Revolt Wheel Needs
 No Flume.
 Also Mill Gearing and Shafting
 of every description.
 Prices low. Send for Circular
 and Prices before buying any other Wheel.

DWIGHT CUSHMAN, HARTFORD, CONN.

THE WATERS STEAM ENGINE GOVERNOR.

THE ONLY GOVERNOR PERFECTLY SUITED TO EVERY VARIETY OF STATIONARY AND PORTABLE STEAM ENGINES.

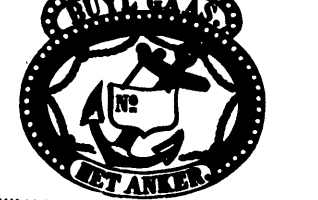
Warranted to suit or no sale.



MANUFACTURED BY
EDWARD DEWEY & CO.
 34 OLIVER ST., BOSTON, MASS.

SEND FOR CIRCULARS.

BOLTING CLOTHS




IMPORTANT TO MILLERS.—Agents for the Dominion for the Celebrated *Water Wheel and Governor Bolting Cloths*, furnished by the yard, or made up to order. Full stock of all numbers on hand.


E. WHITELAW, Woodstock, Ont.

GEO. C. TAFT'S IMPROVED Upward Self-Feed DRILLS.

Pat. May 9, '80, by G. C. Taft
 For Self-Feed, and Carriage Makers' use.
 This improved drill, made general, so arranged that by moving the handle down A to B it will give a slow motion for heavy drilling to the minute.
 Illustrated Circulars, giving description of my several self-feed drills sent on application to
GEO. C. TAFT
 34 Southbridge St., Worcester, Mass., U. S. A.



One Order for Gandy Patent Belting.



BEST MAIN DRIVER.
RUNS TRUE.
DOES NOT STRETCH.
NOT AFFECTED BY HEAT, STEAM, OR WATER.
RUNS SLACKER THAN ANY BELT MAKING STRAIN OR PULLEY VERY EASY.

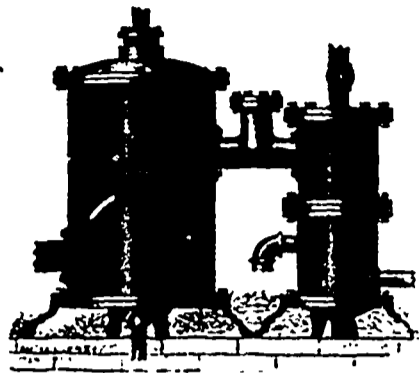
SEND FOR SAMPLE and PRICES.

WATEROUS, BRANTFORD, Sole Canadian Agents.

TURNER'S HEATER AND PURIFIER.

Silver Medal Awarded at the Toronto Exhibition, 1883.

PATENTED IN CANADA, MAY 6, 1882.



The advantages of this Heater over ALL OTHERS in use are in brief the following, which we guarantee:
 It is the only Heater that shows relief to the exhaust. By the use of the Condenser, overflow pipe, and settling basin, and means of cleaning. It is the only way to get pure water.
 It is the only method that removes from the water the gases, which are the cause of pumps knocking, stopping, and causing annoyance to an Engineer.
 It delivers water to the boiler at from 2.25° to 2.50° Fahr. hotter than any other Heater can, using only wa re steam to heat the same, thereby saving from 15 to 25 per cent in fuel.
 It exerts a beneficial influence on an engine and boiler in every way, and will give you more power and no scale in your boilers after its use.
 This heater has been examined and tested by nearly all of our first-class mechanics, who do not hesitate to emphatically pronounce that it does all that is claimed for it. We respectfully refer to any of them.

We claim to have not only the MOST EFFICIENT but also the MOST ECONOMICAL Heater and Purifier ever invented.

For Further Particulars apply to

H. C. ZOLLINGER & BRO.,

(Care of John Doty, Toronto, Ontario.)

MANUFACTURED BY JOHN DOTY, TORONTO.

THE BARBER & ELLIS COMPANY,

Nos. 15 Jordan and 10, 12 14 Melinda Sts.

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Manufacturers of

ACCOUNT BOOKS, ENVELOPES and MUCILAGE.

The Paper Used by this Journal their Make.

JNO. F. ELLIS, Managing Director.

JNO. R. BARBER, Georgetown Paper Mills, President.

R. HINCHLIFFE, ELECTRIC ENGINEER,

Hamilton, Ontario, Canada.

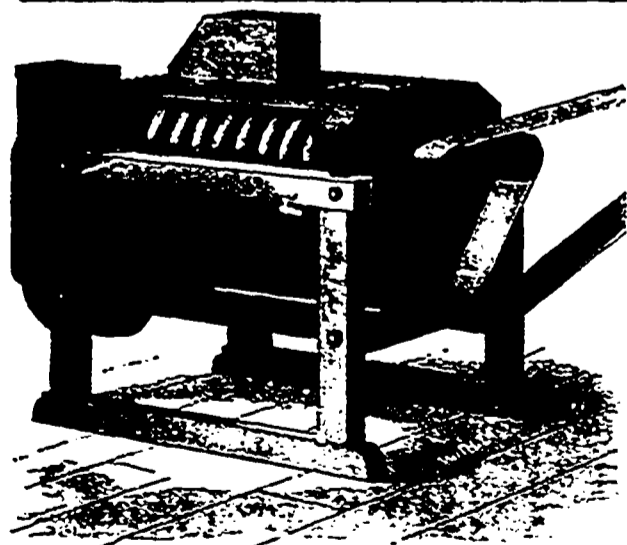
DYNAMO-ELECTRIC MACHINES,

- FOR -

Electric Light, Electroplating and Electrotyping.

PLATERS' SUPPLIES.

FULL PARTICULARS FURNISHED ON APPLICATION.



McCHESNEY & CRAIG'S PATENT WHEAT CLEANER.

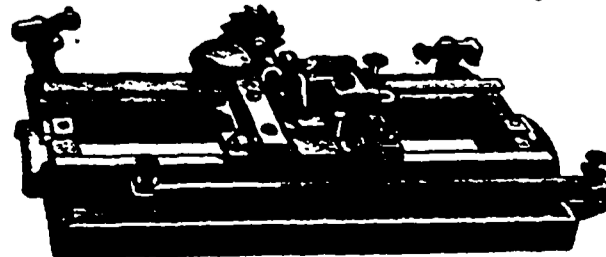
- It will scour thoroughly without breaking grain or injuring the bran.
- It will scour small as well as large wheat.
- It will increase bolting and purifying capacity.
- It will increase quantity of high grade.
- It will improve quality of low grade.

MANUFACTURED BY THE

CRAIG WHEAT CLEANER CO. (Limited), HAMILTON, ONTARIO.

SEND FOR PRICES AND TERMS.

HOOVER'S IMP'D DIAMOND MILLSTONE DRESSING MACHINE.



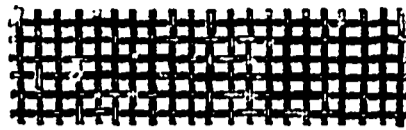
ADAPTED TO ALL KINDS OF DRESSING.

- No. 1, for facing and cracking, \$25.00
- No. 2, with furrow attachments specially adapted for small or large stones, \$40.00
- No. 3, with furrow attachment, \$20.00

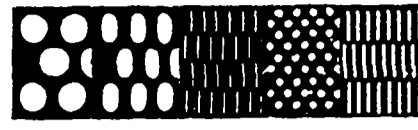
Will do as good work, and is more easily adjusted than any other machine. Sent on 30 days' trial. Address for circulars, containing full information.

C. S. HOOVER, Patentee and Manufacturer, 409 East King St., LANCASTER, PA., U.S.A.

Victoria Wire Mills.



WIRE CLOTH.



PERFORATED ZINC.

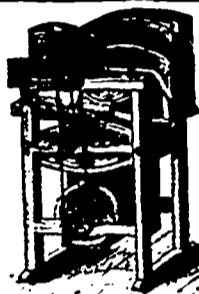
Fanning Mill Webs, Threshing Machine Webs, Strong Iron and Steel Webs for Malt-Kiln Floors, Smoke Stacks, &c.; Beam Duster and Mill Webs; Perforated Zinc, all Sizes; Iron and Steel Wire Ropes, for transmitting power, Elevators, Derricks, &c.; Galvanized Smoke Stack Stays and other Strands.

CAST-IRON WHEELS FOR TRANSMITTING POWER; BANK AND OFFICE COUNTER RAILINGS, AND ALL DESCRIPTION OF WIRE GUARDS; MOULDERS' RIDDLERS, BELLOWS AND STEEL WIRE BRUSHES; SAND AND COAL SCREENS, &c.

B. GREENING & CO.

HAMILTON,

ONTARIO.



'BUY THE BEST!

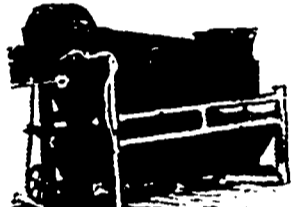
MY Ontario Combined Separator and Scourer and Polisher will remove more fuzz and germ from the ends of the wheat than any Smut and Separating Machine on the continent. Millers try it.



MY COMMON SENSE MIDLINGS PURIFIER



will purify any midlings. It has no equal on earth. It will be shipped to compete against the G. T. Smith Purifier or any Purifier on the continent.



SEND FOR NEW CIRCULAR, CONTAINING FULL INFORMATION, TO

H. J. Livergood, Brantford, Canada.

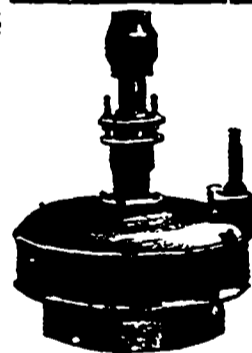
PAXTON, TATE & CO.

Port Perry, Ontario,

MANUFACTURERS OF THE CELEBRATED

VULCAN and LEFFEL WATER-WHEELS

Send For Price Lists and Circulars.



FULL PARTICULARS FURNISHED ON APPLICATION.

GURNEY'S & WARE STANDARD SCALES.



Mill and Elevator Scales

OF EVERY DESCRIPTION.

Dormant Warehouse Scales, Hopper Scales, Flour Packing Scales, All Sizes of Portable Platform Scales

HAY, COAL & STOCK SCALES,

MERCHANTS, MANUFACTURERS, FARMERS, MINERS AND RAILROADS. Can be supplied by us with Scales for their every requirement, from the smallest weigh balance to the largest Truck Scale. All sizes of Railroad and Warehouse Trucks, Alarm Money Drawers. EVERY SCALE WARRANTED.

All Makes Promptly Repaired.

Send for Illustrated Price List.

GURNBYS & WARE, Hamilton.

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MADE BY

J.J. SMITH & CO

TORONTO

EXCELSIOR
BOLTING CLOTH
Strongest in Texture.

EXCELSIOR
BOLTING CLOTH
Most Even in Mesh.

LEADING SPECIALTIES IN
FLOUR MILL MACHINERY.
WRITE US FOR FULL PARTICULARS.

The Best Centrifugal Flour Dressing Machine in the World.

READ WHAT THEY SAY OF IT!

Montreal, Canada, July 23, 1883.

Ottawa Mills, Ottawa, Ontario, Feb. 6, 1883.

Mr. Gould, to whom you sold Silver Creek Centrifugal Reels, talks of

We beg to state the Silver Creek Centrifugal Reel is giving every satis-

is well pleased with them: he saves more than he did before their use. from us again.

truly,
THOMAS PRINGLE.

THOMAS McKAY & CO.

WATER TIGHT
A: 09

THE EXCELSIOR **IRON-CLAD BRAN DUSTER**

IS AN EQUALLY MERITORIOUS MACHINE AND

WILL PAY FOR ITSELF IN A VERY SHORT TIME.

AUGUST HEINE,
EXCELSIOR WORKS
SILVER CREEK, N. Y., U.S.A.

EXCELSIOR
BOLTING CLOTH
We are Sole Importers.

EXCELSIOR
BOLTING CLOTH
Free from Gum or Sizing.

Important Announcement to the Trade!

HAVING bought the plant of the
THOMSON & WILLIAMS MANUFACTURING CO.
of this place and put everything in first-class order, I am
now prepared to offer to the trade (constructed in good
workmanlike manner) the following machines:

WE ARE MANUFACTURING
—ALSO THE—
FRINZ
DUST COLLECTOR,
*Which is so widely and
favourably known in
the States, being
used in*
ALL FIRST-CLASS MILLS.

WE HAVE
ALWAYS ON HAND
*Which we shall be pleased
to show*
THE TRADE.

THE GEO. T. SMITH CENTRIFUGAL REEL
AND THE BROWN AUTOMATIC CUT-OFF ENGINE
WHICH HAS NO EQUAL, ALSO
THE GEO. T. SMITH MIDDLING'S PURIFIER,
BRAN DUSTER, SEPARATOR, SMUTTER AND PACKER.

I have a full line of Patterns for general work
as well and shall be glad to correspond with anyone
anticipating changes in their mills, am prepared to supply
ANYTHING BELONGING TO MILL FURNISHING
and expect to meet the trade fairly.

Hoping to receive a fair share of the trade of the Dominion
I will endeavour to give one and all of my patrons satisfaction.

GEO. T. SMITH, STRATFORD, ONT.

GOLDIE & McCULLOCH,

GALT, ONTARIO.

— MANUFACTURERS OF —

STEAM ENGINES, BOILERS,

Improved Turbine Water Wheels, Flour and Grist Mill Machinery,

Saw Mill Machinery, Shingle and Lath Machinery, Stave and Barrel Machinery, Wood Working Machinery,

WOOL MACHINERY, SAFES, VAULT DOORS, &C.

SPECIALTIES:

The Wheelock Automatic Cut-off Engine,

SLIDE VALVE, CONDENSING AND COMPOUND ENGINES,

CHILLED IRON ROLLER MILLS, FOR THE GRADUAL REDUCTION SYSTEM OF MILLING. SOLE MAKERS IN THE DOMINION OF THESE ROLLS.

WHEAT CLEANING AND FLOUR DRESSING MACHINES OF EVERY DESCRIPTION,

MACHINE CUT GEAR--WOOD AND IRON.

Plans and Specifications for Fitting Up Flour Mills on the GRADUAL REDUCTION SYSTEM furnished at a Reasonable Cost. Rolls Re-ground and Re-Corrugated.

FIRE PROOF SAFES BURGLAR PROOF

FIRST PRIZES AWARDED AT THE TORONTO INDUSTRIAL EXHIBITION, 1882.

OUR FOUNDRY AND MACHINE WORKS,

— ESTABLISHED IN 1844, —

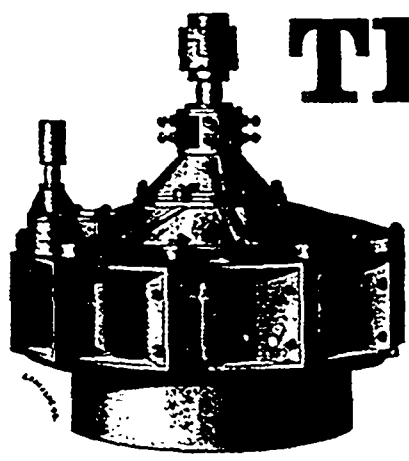
Best and most complete Establishment of the kind in the Dominion, and we will spare no efforts to maintain our present reputation as manufacturers of Machinery.

Illustrated CATALOGUES FOR OUR VARIOUS DEPARTMENTS FURNISHED ON APPLICATION.

All Orders will Receive Prompt Attention.

GOLDIE & McCULLOCH, Galt, Ontario.

THE EUREKA TURBINE



Celebrated as the Best Part-Gate Wheel Ever Built. From the Records of Actual Tests at the Holyoke, Mass., Testing Flume:

WE PUBLISH OUR PART-GATE FIGURES.

OTHERS SIGNIFICANTLY OMIT THEM.

No Other Turbine Ever Approached the Above Percentages at Part-Gate. For Catalogue and Information Address,

W. H. BARBER & CO. ENGINEERS AND MACHINISTS, ALLENTOWN, PA., U.S.A.

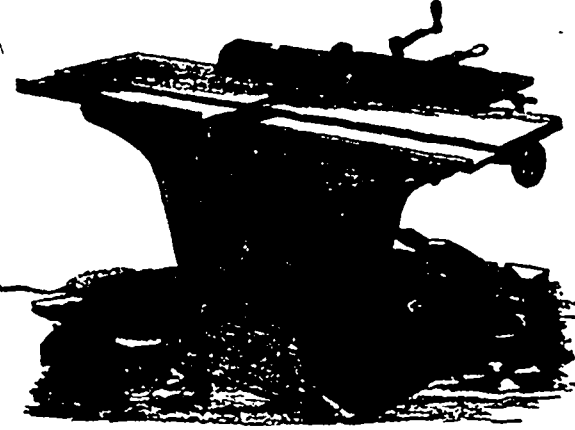
PERCENTAGE OF EFFICIENCY.			
Full Gate.	3/4 Water.	1/2 Water.	1/4 Water.
.8436	.8416	.8202	.8002
.8206	.7910	.7700	.7503
.8078	.7878	.7775	.7696
.8000	.8011	.7814	.6850

PATENT WOOD-WORKING MACHINERY.



HAND SAW.

— FOR —
Planing Mills,
Sash and
Door Work,
Carriage and
Car Shops.



UNIVERSAL WOOD-WORKER.

— FOR —
Furniture, Chair
and Bracket
Factories,
and General
Wood-Workers.

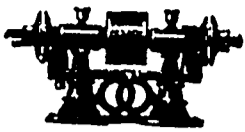


SCROLL SAW.

LATEST AND MOST IMPROVED DESIGNS.

BEST OF MATERIAL & WORKMANSHIP.

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UNION STONE COMPANY,

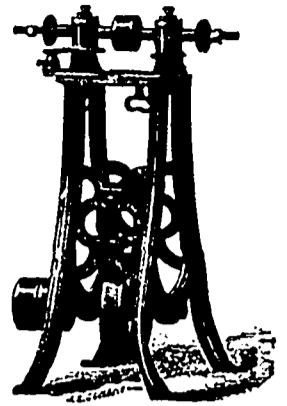
38 & 40 HAWLEY STREET, BOSTON, MASS.

Patentees and Manufacturers of

THE UNION EMERY WHEEL.

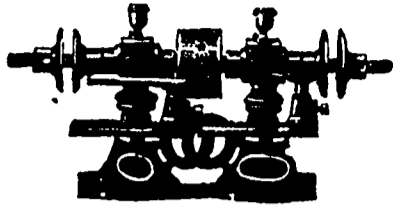
Emery Wheel Machinery and Tools a Specialty. Grinders' and Polishers' Supplies. Wooden Polishing Wheels. Quartz Corundum.

CATALOGUE ON APPLICATION.



A Has 3-4 in. Arbor.

UNION STONE COMPANY'S PATENT and Improved Automatic Knife Grinding Machine, for grinding



No. 0 Has 3-4 in. Arbor.

UNION OIL STONE STAND, Patented. Price, 25 cents.

UNION EMERY HONES, FOR SHARPENING tools. Size, 8x1 1/2x1; Price, 50c.

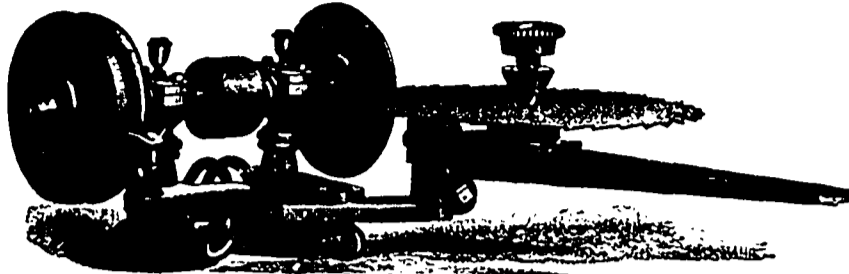
UNION EMERY SLIP STONES, for Sharpening Gouges. Price, 25c. and 35c.

UNION EMERY RUB STONES, for Castings; Size, 8x2x2; Price, \$1. For Foundry use, Size, 8x4x3; Price, \$2.

UNION EMERY WHEEL DRESSER, Price, \$2.00.

DIAMOND TOOLS for Lathe and Hand use in turning Emery Wheels.

AW GUMMING ATTACHMENT for Gumming Saws to 48 inches.



planing machine knives, book binders' carrier, long knives and shears of all kinds. Size, 24, 36, 50, 80, 100 and 120 inches.

THE GRINDING WHEEL is 26 inches in diameter and 1 1/2 inches thick, with Patent Sliding Boxes, so that the wheel can be entirely used up.

THIS MACHINE soon pays for itself in the labour it saves. It will grind a knife in less time than on a grindstone, and with a perfectly straight edge, in itself a sufficient reason for purchasing the machine, to say nothing of the economy.

Speed for Emery Wheel, 230 Revolutions per Minute.

PHOTOGRAPHS, CUTS AND PRICES ON APPLICATION.

THE JAS. JONES COMBINED SYSTEM OF ROLLER MILLING

IS THE BEST IN THE WORLD FOR SOFT WHEAT, EQUAL TO ANY FOR HARD.

Mr. James Jones, 3 Myles' Dock, Esplanade St., Toronto.

Toronto, December 2d, 1882.

DEAR SIR:—My mill at Waterdown has now been working since early in September, with the machinery put in by you. The quality of the flour made, the yield and the amount of work done daily is perfectly satisfactory, and fulfils in every respect the representations made to me by you, and I consider your PROCESS OF MILLING SUPERIOR to any other I have seen.

Yours truly, W. P. HOWLAND.

Spencer, Ind., January 1, 1883.

Mr. James Jones,

DEAR SIR:—After a test of 3 months' running, we are pleased to inform you that the mill you built for us is giving perfect satisfaction, and we think that the work we are doing cannot be surpassed. We have the MODEL MILL of this State, and can recommend your combined system of GRADUAL REDUCTION as the best we have seen.

Very respectfully, SPENCER MILL CO.

MACHINES USED IN THIS SYSTEM OF MILLING.

A METALLIC ROLL, working against a disc or concave, is used for reducing the wheat. A sharp or blunt cut can be used at the discretion of the miller. Six inches of grinding contact can be used, or any part of that surface down to one-half an inch. This is done at the pleasure of the miller. This is done by any other rolls.

FOR GRINDING MIDDINGS.

A stone roll, working into a stone concave, is used. The stone used is especially adapted to this work, having a fine sharp grit especially adapted to reducing middlings to flour. This machine has been in the market for five years: has stood the test, and is pronounced by those using them to be the best machine made for that purpose. It requires No Dressing, is always ready for work, and keeps in perfect face all the time, and the flour made on these machines is better than can be made on any machine in the market.

FOR GRINDING BRAN.

A corrugated chilled iron roll is used. Equal to the best standard rolls in the market.

FOR REDUCING GERM MIDDINGS.

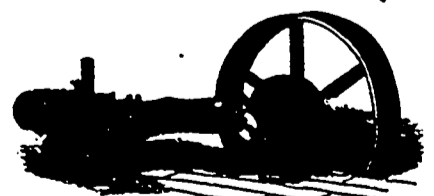
A smooth chilled iron roll is used. A combination of these rolls makes it a system of milling that commends itself to any and all millers that are looking for the BEST RESULTS.

WE ARE BUILDING SMALL GRIST MILLS, COSTING FROM THREE TO FOUR THOUSAND DOLLARS, USING ONE BREAK MACHINE, ONE BRAN ROLL, ONE MEDLEY MILL; CAPACITY TEN BUSHEL PER HOUR. For Further Particulars, apply to

James Jones & Co., - Thorold, Ontario.

IF YOU WANT A SITUATION
 Advertise in the Dominion Mechanical & Milling News.
 IF YOU WANT HELP
 Advertise in the Dominion Mechanical & Milling News.
 IF YOU WANT TO BUY OR RENT A MILL
 Advertise in the Dominion Mechanical & Milling News.
 IF YOU WANT ANYTHING
 Advertise in the Dominion Mechanical & Milling News.
 Only one-and-a-half cents per word.

BUCKEYE AUTOMATIC ENGINE.



The Simplest, Most Durable and Most Saving in Fuel of all the Automatic Engines Made.

HAS NO SUPERIOR AND FEW EQUALS.

— ALSO ALL SIZES OF —

Boilers and Every Description of Mill Machinery and Furnishings.

R. WHITELAW,

Oxford Foundry Woodstock, Ont.

WE CAN SUPPLY YOU

The Barter Purifier, Barter Centrifugal Reels,

The Barter Concentrated Roller Mill,

Barter Combination Oat and Cockle Separator,

Barter Dust Collector,

Barter Adjustable

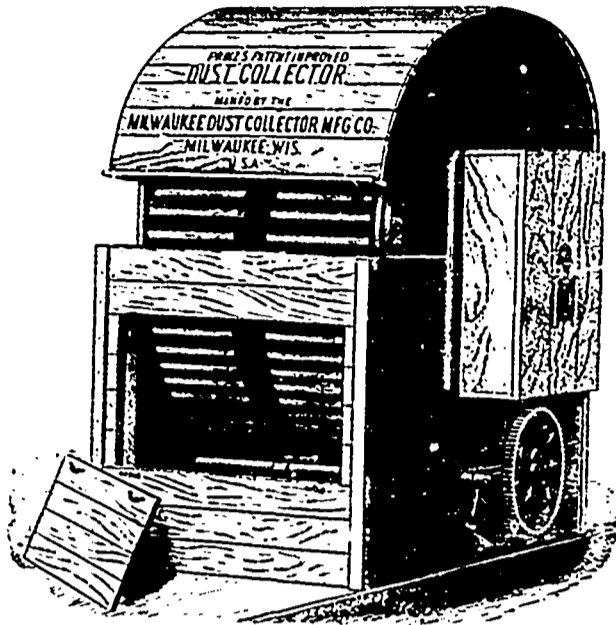
Barter Adjustable Brush Machine,

“Lion” Bolting Cloth, Gen

BARTER MANUFACTURING CO.

SPECIAL NOTICE!

MILWAUKEE DUST COLLECTOR MANUFACTURING COMPANY, MILWAUKEE, WIS., U. S. A. THE PRINZ IMP'D PAT. DUST COLLECTOR.



PRINZ PATENT IMPROVED DUST COLLECTOR.

1883 1883 1883 1883 1883 1883 1883 1883

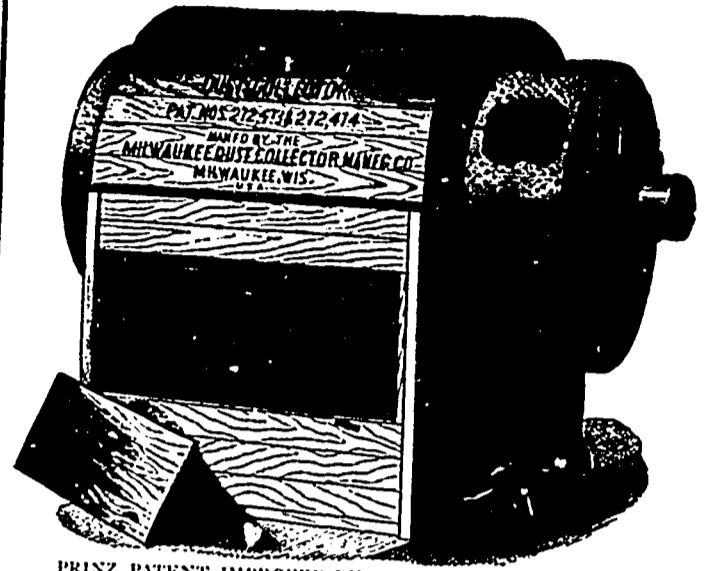
We have completed arrangements for manufacturing our machines in

CANADA,

thereby saving millers duty on American machinery.

All machines delivered F. O. B. cars at Stratford, Ontario.

1883 1883 1883 1883 1883 1883 1883 1883



PRINZ PATENT IMPROVED DUST COLLECTOR, WITH FAN ATTACHMENT.

2,500 MACHINES
— NOW IN
PRACTICAL OPERATION,
THE
**BACK-DRAFT CLEANING
MECHANISM,**
THE ONLY CORRECT PRINCIPLE,
EXCLUSIVELY USED BY US.

READ THE TESTIMONIALS:

GENS. The improved "Dust Collector" received from you a short time since is in successful operation, attached to a purifier for treating very fine middlings, and works to perfection. I consider the improvements which have been made on this machine have removed all objectionable features of the former ones. They, however, are giving good satisfaction except in the points wherein this has been improved.

Yours respectfully, **C. PACKHAM,** Head Miller for Jas. Goldie, Guelph, Ont.

GUELPH, Ont., July 18th, 1883.

ST. CATHARINES, Ont., May 11th, 1883.

DEAR SIR: Your favour of the 5th ult. came duly to hand, asking if the Collectors we got put in were working well, etc. in reply would say that they are doing all you claim for them and thus giving us entire satisfaction.

Yours truly, **JAS. NORRIS,**

GUELPH, Canada, Feb. 3th, 1883.

Yours truly, **JAMES GOLDIE.**

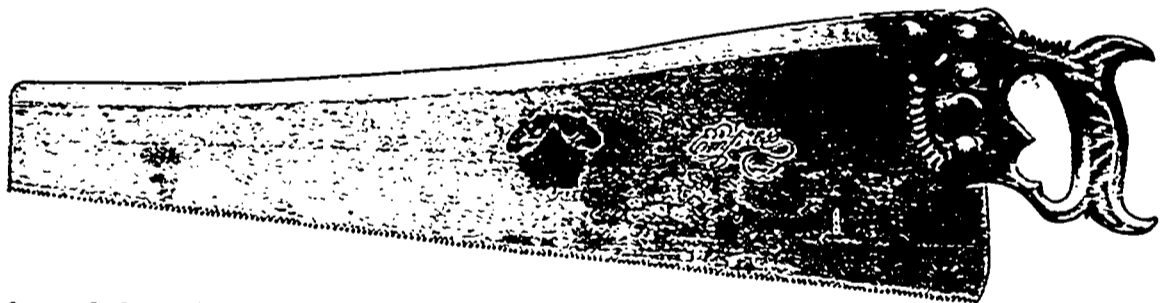
Milwaukee Dust Collector Manufacturing Co.
GENTLEMEN: Your Dust Collectors please me well on the purifiers.

BE SURE TO GET
— THE —
PRINZ DUST COLLECTOR,
THE ONLY PERFECT MACHINE.
BWARE OF IMITATIONS.

FOR FURTHER PARTICULARS, ADDRESS

Milwaukee Dust Collector Manufacturing Co., Milwaukee, Wis., U. S. A.

SHURLY & DIETRICH, SAW MANUFACTURERS, GALT, ONT.



Sole Manufacturers for the Dominion of Canada, under the Secret Chemical Process of Tempering, which toughens and refines the steel.

HAND SAWS, CIRCULAR SAWS AND CROSS-CUT SAWS, A SPECIALTY.

Our Silver Steel Saws are Unequaled. Largest Manufacturers in Canada.

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Have been awarded
World-Wide Reputation

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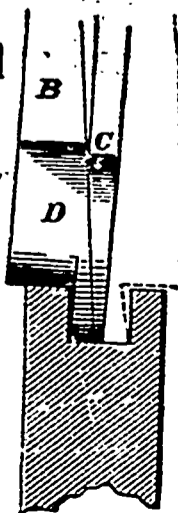
Strongest. The Most Durable.

MEET THE
EASIEST RUNNING

as in the World.



FIG. 1—A NEW CUTTER.

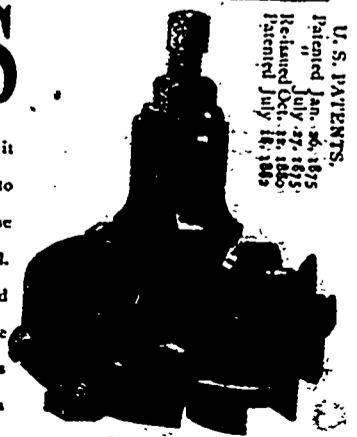


THIS diagram represents a bit (D) in the position it occupies when making a cut (the bit (C) which follows to complete the work is given in outline. This explains the division of cut and the free and easy working of the Tool. The bits are arranged in upper and lower series, and secured to a Head having seats alternately inclined for the purpose of giving the side clearance to their cutting points. This



FIG. 2—CUTTER NEARLY USED UP.

explains why these bits hold their shape and turn out standard work untrifled up: the entire circle of bit being Tool cutting edge—see Figs. 1 and 2. The Head carries its weight low down and in line of cut, and runs like a Top.



GROOVE HEAD.

U. S. PATENTS.
Patented Jan. 26, 1885
Patented July 27, 1885
Patented Oct. 15, 1885
Patented July 18, 1882

Milton, Pa. U.S.