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DOMINION MECHANICAL & MILLING NEWS

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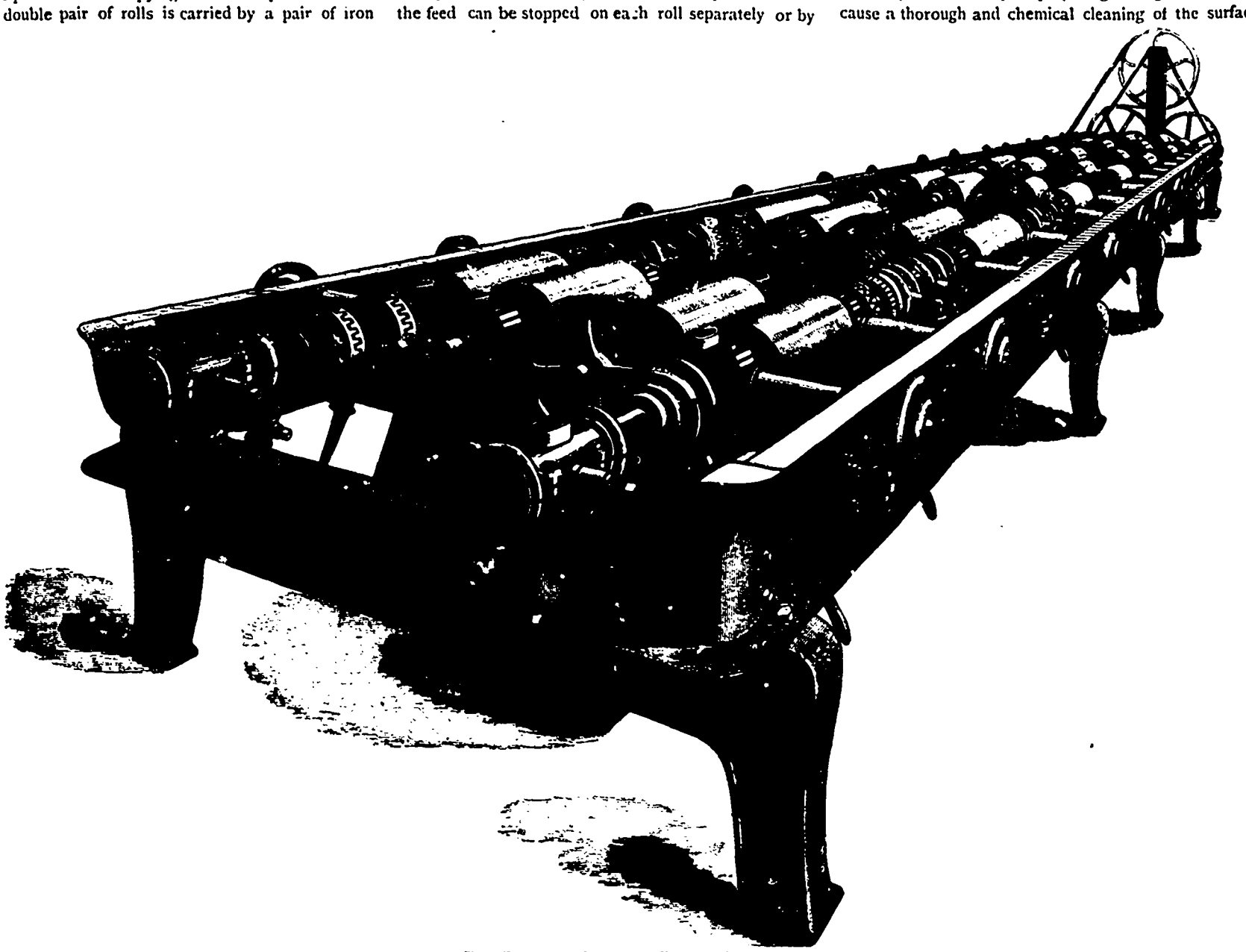
THE COCHRANE SYSTEM OF DRIVING ROLLS.

THE illustration appearing on this page represents the new Cochrane roller mill, the manufacture of which is about to be commenced by the Cochrane Roller Mill Supply Co., Dundas, Ont.

There are seven sets of double 9 x 24 rolls set in a solid iron frame 48 feet in length and 5 feet in width, each double pair of rolls occupying six feet of space in frame. Each double pair of rolls is carried by a pair of iron bridgetrees or girders, the back rolls being set rigid on the bridgetrees. The front or adjustable rolls are made with hollow journals, through which passes the driving shaft which transmits the power by means of drum gear to each roll in continuation along the frame from driving point at end of frame, the power being transmitted to each of the two lines of rolls by two 30 inch pulleys driven by a single seven inch belt with tightener. The differential is given by a compound gear attached to the shaft and back or stationary roll, and practically independent of the front or movable roll, so that the gears are constantly running on their pitch lines, and therefore noiseless. Also, by means of clutches on both front and back rolls, they can be stopped or started at will with mill running at full speed, and without strain or jar to any mechanical part of the mill. The adjustment of the rolls is done by means of a hand wheel and screw with coil spring in the ordinary way, with tension rod so arranged as to prevent the possibility of the rolls running together and scouring off their surfaces in case of accidental stoppage of flow of material going to rolls.

The mill is a continuous or combined mill or a single mill at the will of the miller, as he can stop and start each pair of rolls independent of the others. Indeed these rolls are said to be even more independent than separate rolls.

The hoppers rise above the frame the same as on ordinary rolls built by leading manufacturers, with automatic feed, which is also driven by a continuous shaft, through hollow feed rolls, with clutches adjusted so that the feed can be stopped on each roll separately or by means of lever and friction clutch. At end of shaft all the feed rolls can be stopped by one movement.



THE COCHRANE SYSTEM OF DRIVING ROLLS.

PAINTING IRONWORK.

CAST and wrought iron behave very differently under atmospheric influences and require different treatment. The decay of iron becomes very marked in certain situations, and weakens in direct proportion to the depth penetrated. This penetration becomes a serious matter when the metal is under one-quarter inch in thickness. The exterior surface of cast iron is very much harder than the interior, and affords an excellent natural protection, and when this is broken rust attacks the metal and soon destroys it. It is very desirable that the casting be protected as soon after leaving the mould as possible, for which purpose a priming coat of paint should be applied, the other requisite coats being given on at leisure. In painting wrought iron, when it is oxidised by contact with the atmosphere, two or three distinct layers of scale form on the surface, which unlike the skin on cast iron can be readily detached by binding or hammering. The iron has a tendency to rust from the moment it leaves the hammer or rolls, and the scale must come away. One way to preserve iron is to coat it with paint when hot at the mill; although this answers for a time, it is a very troublesome method, and the subsequent cutting process to which it is submitted leaves many parts bare. In addition it does not remove all the scale, and until that is done painting will be of little use. The only effectual way of preparing wrought iron is to cause a thorough and chemical cleaning of the surface of the metal upon which the paint is to be applied; to do this the iron must be immersed for three or four hours in water containing from 1 to 2 per cent. of sulphuric acid, and afterward rinsed in cold water, and, if necessary scoured with sand, put again into water and sulphuric acid, and then well rinsed. If, after cleansing, the painting is delayed for a short time, the iron should be preserved in a bath made alkaline by caustic lime, potash, soda, or their carbonates. Caustic lime is the cheapest and easiest used, and iron which has remained in it for some hours will not rust by a slight exposure to a damp atmosphere. When the surface of iron is clean, the question arises what paint should be used? Through the failure of bituminous paints, and those containing lead, resource has been had to iron oxide itself with satisfactory results. A pound of iron oxide paint when mixed ready for use in the proportions of two-thirds oxide to one-third linseed oil, with careful work, should cover twenty-one square yards of sheet iron. Oxide of iron paint endures very great heat without material alteration, and keeps both its color and preservative qualities well.

Steam Department.

METHODS OF SECURING "DRAUGHT."

By Geo. C. Rohn.

IN order to burn fuel in a furnace, a sufficient quantity of air must be supplied to it. The quantity required varies with the quality and composition of the fuel. The supply of air should be continuous and evenly distributed among the fuel, so that the fire may burn with uniform intensity. Each kind of fuel used requires a special method of firing, and kind of grate in order that the best results may be obtained.

The one point proposed for consideration in this article, however, is not so much the treatment of the fuel, as the methods by which a current of air may be made to pass through the fuel.

The production of "draught," when by means of a chimney or high pipe, is said to be "natural draught"; when by means of some machine or mechanical contrivance, it is called "forced draught."

In some of the modern types of war vessels both means are combined, and the vessels are fitted with smoke pipes or funnels of sufficient size to make enough steam in the boilers for all ordinary purposes, but when more steam is needed for some extraordinary purpose, the stoke-hole hatches are closed and powerful fans are made to blow air down into the boiler room in such quantities as to raise the pressure above that of the atmosphere. By this means the fires burn more intensely and the men in charge are supplied with abundance of fresh air.

Forced draught may be produced in several ways, such as by a fan blowing air, or by a jet of steam inducing an air current, the steam being used sometimes under the grate, and sometimes in the chimney. A fan drawing air out of the smoke pipe would produce an effect similar to the jet of steam, but as the parts of the fan would be exposed to the escaping heat, it is not a very practical method. In locomotives the draught is produced by a steam jet near the bottom of the smoke pipe, the steam used being the exhaust from the cylinders —hence the origin of the saying "the faster she goes, the harder she blows."

Some idea of the amount of draught thus produced may be formed from the statement that the power of a locomotive as used in England for passenger trains will run up as high as seven hundred horse power, and the coal used will be 3,000 pounds per hour. The smoke pipe from the boiler doing this amount of work is not over 13 feet high and 18 inches in diameter.

The locomotive gives the best results of any steam jet method of forcing draught. In portable engines for agricultural purposes, a similar method is used by many makers, but generally the results obtained are not as good as in locomotives. By far the most common way of obtaining draught is by means of a chimney; but though so commonly used, the reason of its producing "draught" and the natural laws which regulate its action are not so commonly understood. When a grate, covered with fuel closely packed, is supplied with air forced in by a fan, everyone at once recognizes the fact that power has been expended in order to supply the quantity of air needed in any given time; but when, by means of a chimney, the air is made to pass through the furnace, the work done is but seldom looked upon as power expended. Yet it is quite obvious that if it was power in the one case, it is power in the other, and the result obtained is precisely the same.

The draught of a chimney, then, is produced by expenditure of power. But how is the power obtained? What is its origin or source? A chimney is a vertical pipe in which the air is made to be of a higher temperature than the air outside the chimney. The outside air is therefore heavier than that inside, and as air may be termed an elastic fluid, the pressure of the atmosphere at once causes it to flow into the base of the chimney; or rather into every opening which may be in the chimney, where the outside pressure is greater than the inside. The draught is really produced, then, not so much by an up-current inside the chimney, as by a down-current on the outside. The inside should be kept hot —hence a brick chimney will produce a better draught from the same expenditure of heat, than can be got from an iron one. In arranging the furnace flues and connections from the boiler to the chimney, the fact that the air current is really forced from the outside towards the chimney, and not pulled as it it were a rope, should be kept in view.

When the air current is looked at in this light, it will be seen at once that in flues, all sharp turns should be avoided, and any bends made by easy curves. Sudden change in area should also be avoided, and as a general rule, the draught will be better if the area over bridge wall be less than area through the tubes or flues, and the chimney area be at least equal to the area through the tubes.

In cases where the fuel used packs closely, such as small coal and saw dust, a greater velocity of draught or rather force, will be needed. Height of chimney is essential for this as area is for quantity.

The difference between the quantity of air passing through a fire and the force or velocity with which it passes should be considered; and it is proposed to view the draught question from that standpoint and in relation to kind of fuel used in another article.

THE ADJUSTMENT OF CORLISS ENGINE VALVES.

THE following paper on the above subject was recently read before the Association of Stationary Engineers of this city by the vice-president, Mr. G. C. Mooring:

We will begin by taking off the caps, or back bonnets, when lines will be found as follows: For the steam ports, a line on the cylinder coinciding with that edge of the port towards the end of the cylinder; and a line on the back end of the valve coinciding with the edge of the valve towards the end of the cylinder. The lap movement of the steam valve is towards that end of the cylinder in which the valve is located. The exhaust valve covers or works over the opening in the valve chamber into the exhaust chest, and the opening edge is that side of the opening towards the center of the cylinder, the line on back end of exhaust valve showing its opening edge.

The wrist-plate is located central between the four ports on the front bonnet side of the cylinder, and has lines on the upper side of its hub, showing the extremes of travel and its center of motion.

To set the valves, place and hold the wrist plate on the center line, and by the adjusting rods for shortening and lengthening the valve connections, set the exhaust valves at the point of opening and lap the steam valves from 1/8 to 1/4 of an inch, according to the size of the engine—the less amount for an 8 inch cylinder, the larger amount for a 30 inch cylinder, and intermediate sizes in proportion. Connect the wrist-plate to the eccentric by the eccentric rod, and hook. With the eccentric loose on the shaft, roll it over and note if the wrist-plate vibrates to the mark of extreme travel. Adjust at the screw and socket in the eccentric rod to make it vibrate to the marks. Place crank on either dead centre, and roll the eccentric sufficiently more than one quarter of a revolution in advance of the crank (observing at this time which way you want the engine to run) to show an opening of the steam valve nearest the piston of from 1-32 to 1/8 of an inch, according to the speed the engine is to run. This port opening at the dead center is called "lead," and is for the purpose of making a cushion for the piston to rebound from or stop against; high speed engines require more lead than slow running engines, other things being equal. Tighten securely the screw in the eccentric, and turn the engine shaft over in the direction it is to run, noting if the other steam valve is set the same. If not, adjust by shortening or lengthening its connection.

To adjust the cam rods, place the govenor balls on the top motion pin; then move and hold the wrist-plate to one extreme of its throw, and adjust the cam rod for the steam valve. Open so as to bring the steel cam on the cam collar in contact with the circular limb of the cut-off hook. Move the wrist-plate to the other extreme of throw, and adjust the other cam rod in the same manner.

To test the correctness of the cut-off, block up the regulator to about its medium height, and with the eccentric connected to the wrist-plate, roll the engine shaft very slowly in the direction it is to run; and when the cut-off hook is detached by the cam, stop and measure the distance the cross-head has traveled, then continue the revolution of the shaft, and note if the other steam valve is cut off at an equal distance, traveled on the strokes. If not, adjust the cut-off rods until the points of cut-off measure alike from each center.

The Ontario Oatmeal Millers' Association met in this city on the 13th of January, to consider what course to take in regard to advancing prices of oatmeal in view of a considerable rise which has lately taken place in the price of oats. It was decided to take no immediate action. If the price of oats continues to go up an increase in the price of meal will be necessary. The demand for rolled oats is reported to be increasing largely. This will probably tend to lessen the number of oatmeal mills throughout the country, many of which will close in preference to putting in new machinery.

THE NEW 1,000 BARREL FLOURING MILL AT KEEWATIN, ONT.

FROM the *Milling Engineer*, of Milwaukee, published by Messrs. Edw. P. Allis & Co., the well-known mill-furnishers, who had the contract for the erection of the new 1,000 barrel flouring mill for the Lake of the Woods Milling Co., at Keewatin Ont., we reproduce the following illustration and description of the new structure and the manner of its equipment:

Keewatin is situated on the shores of that beautiful sheet of water known as "the Lake of the Woods," and on the Winnipeg river. The lake itself is unsurpassed for beauty by any sheet of water in America, being studded with innumerable islands covered with pine. It presents the appearance, from a distance, of a heavy forest traversed by innumerable rivers. This lake is destined at no far distant time to become one of the most famous of America's summer resorts, and with the enterprise and push of the Canadian Pacific railway, which skirts the northern shore, nothing will be left undone that will add to the traveler's pleasure.

The natural distance from the level of the lake to the level of the river was seventeen feet and ten inches, but the engineers saw where they could add to the power and, by building a dam across the outlet of the lake, have raised the water four feet, making the fall twenty-one feet and ten inches. It is from this scource the power for the mill is obtained, having the lake and its tributaries for a feeder and the Winnipeg river to carry off the discharged water from the wheels, it gradually finding its way to Lake Winnipeg. The raceway for carrying the water from the lake to the wheels is a natural ravine, terminating about 150 feet from the shore of the lake. Through this granite bluff they had to blast an opening for the water to flow. On this bluff runs the Canadian Pacific railway. A bridge was constructed to span the race way of the plate girder type.

The wheel pit, as is clearly shown, is of granite, resting on a solid rock foundation. The depth of water below the wheels is eight feet, and there are arched openings on three sides of the wheel pit to allow the water to escape to the river. The walls of this wheel pit are eight feet and six inches thick at the bottom tapering to six feet thick where the sills of the wheel house rest on them. The floor on which the turbines set is of four inch plank supported on 16 x 16 inch timber, which are supported in the middle by sixteen six inch and two ten inch iron columns which rest on the solid rock.

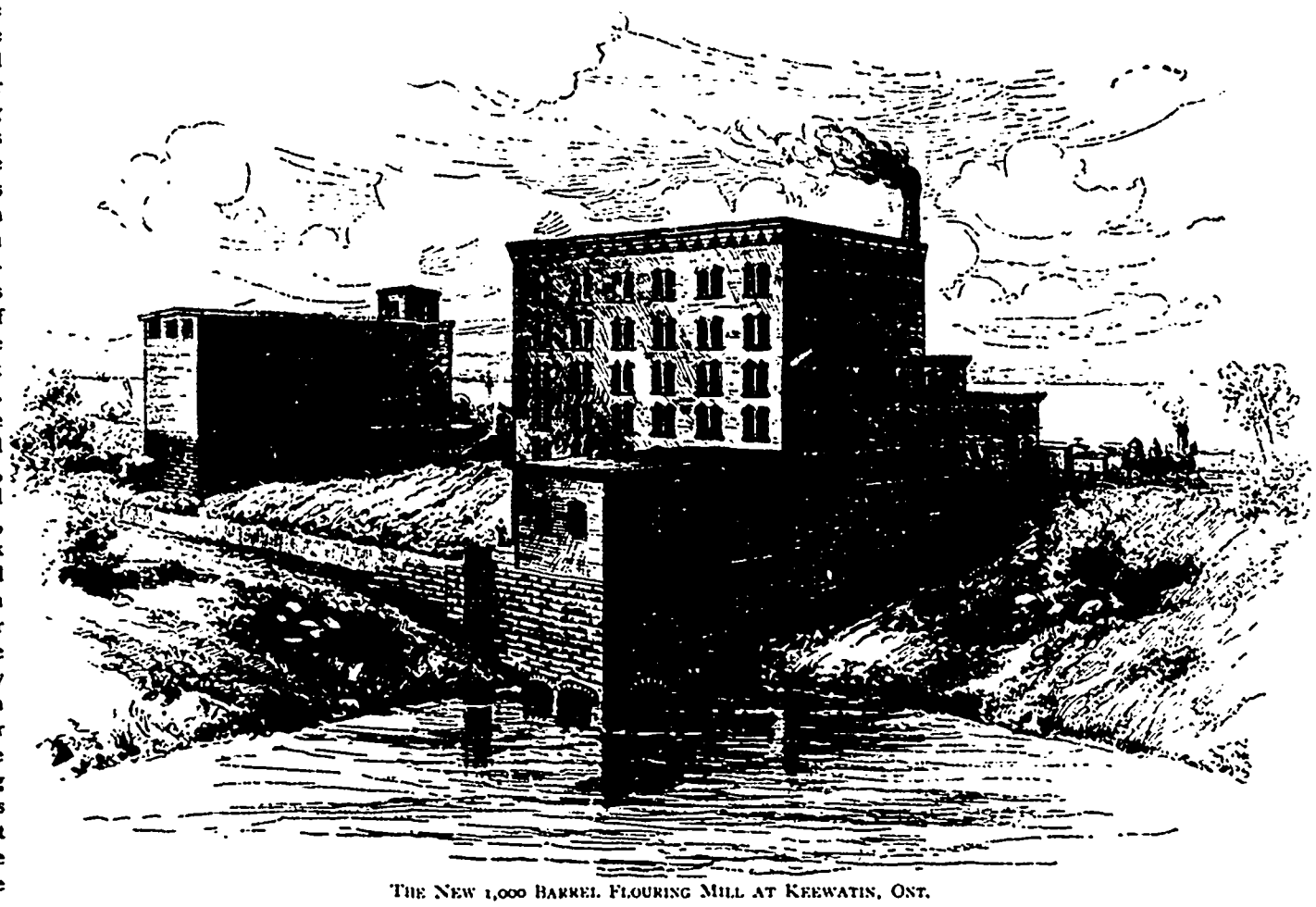
The power is obtained from two sixty inch New American wheels, furnished by Wm. Kennedy, of Owen Sound, Ont., although the wheel pit was made large enough to accommodate four wheels. These wheels will develop 900 horse power with a twenty-two foot head and have a draft tube of sufficient length to allow the tubes to stand clear of the tail water and in no way obstruct it. The opening from the race way to the wheel pit is thirty feet wide and the race has an average depth of ten feet of water. At the head of the race are massive head gates built between solid granite walls with wing walls spreading out in both directions to insure free access of water to the race way.

The wheel house is two stories in height at the end next the mill, and one story high directly over the wheels, thus giving plenty of room to take out the wheels without moving any flooring. In the first story of the wheel house, which is 36 x 70 feet, is located the heavy gearing, which transmits the power to the mill, being eight feet in diameter, four inch pitch and sixteen inch face. These gears and shafts connected to them are carried on three heavy trusses, which span the wheel pit and are made of 16 x 16 inch timber. There is also on this floor the fire pump which has a capacity of 900 gallons per minute under a pressure of 150 pounds. This is obtained from a Fales & Jenks rotary pump, which is driven from the wheel driving the cleaners and elevators, and can be started at a second's notice. There is also the shafting operating the gates of the wheels. In the second story of the wheel house are located the two water wheel governors and an electric dynamo, of the Edison make, 125 lights capacity. The entire outside of the wheel house is covered with corrugated iron and has a flat tar and gravel roof.

Passing to the mill building, which is of native granite, quarried from an island in the Winnipeg a few yards from the mill, we find the building to be six stories high and standing, as shown by the engraving, on a bluff of granite, the surface of which has been blasted off in level steps to secure a solid foundation. The building is divided into three separate parts by heavy granite walls, the mill proper being 50 x 85 feet, with an addition of 25 x 50 feet on the east end, and separated by a three foot stone wall, for cleaners and feed department, dust

room and bins over the rolls. On the south side is an addition 3[illegible] x 110 feet in which are located the packers, packer bins, office and flour storage. This addition is two stories high, next the railroad track, with an additional story next the mill for flour and feed bins, so that there is no flour in the mill except what is being bolted on the different machines. The basement walls of the mill building proper and cleaning room are four feet thick at the top and five feet thick at the bottom, resting on footing courses eight feet wide, which are down to the solid rock. The basement walls of the warehouse are three feet thick at top and four feet at bottom, resting on footing courses six feet wide, which are also carried down to the solid rock. This room at the north side is again divided into two rooms, in one of which is placed the boiler for steam heating. In the other is the oil and supply room. The balance of the basement has not been blasted out and is not intended to be used.

All the posts in the building rest on granite piers five feet square at top and seven feet at bottom, which are carried down to the solid rock and capped with one stone 5x5 feet and two feet thick, on which rest the building posts, the surface of cap stone being four inches above the level of the basement floor. The first, or roller, floor of the mill is on a level with the first floor of warehouse which is four feet three inches above the top of the rail on the side track, which brings them on a level with the car door. The walls of the mill house proper and cleaning room on this floor are three feet thick as is alsothe partition walls between mill and cleaners. The walls on this floor of the warehouse are two feet thick all around. The walls of the mill proper and cleaning house, on the second and third floor, are two feet six inches all around, and on the second floor of the warehouse they are twenty inches thick. On the fourth floor of the mill house and cleaning room the walls are two feet thick, while the attic walls of the mill and cleaning house are twenty inches thick and carried square up to a distance of eighteen inches above the level of the roof and capped with cut granite cap stone, extending around the whole building, twelve inches thick, twenty-four inches wide and four feet long.



THE NEW 1,000 BARREL FLOURING MILL AT KEEWATIN, ONT.

In the southwest corner of the mill is carried up the smokestack of the steam heating boilers to a distance of twenty inches above the capping stone. The roof of both mill and warehouse is flat, tar and gravel, pitching to the center, and the water is taken down through the mill in six-inch gas pipes, which connect with sewer pipes laid below the basement floor, which lead to the mill race. As one steps into the basement, the first thing that attracts the visitor's eye is the granite piers on which is carried the main roller line and the line connecting it with the water wheel. The gears connecting these two lines are eight foot diameter, four-inch pitch and sixteen-inch face. The top of both piers is capped with solid iron plates which are securely bolted down to the piers, which brings a bearing both in front and behind the gears. These stone piers contain 2,500 cubic feet of mason work and represent more than 175,000 lbs. of weight. Add to this the weight of the sole and angle plates which weigh some 16,000 lbs., and it can be realized easily that gearing under such conditions, must work in the most approved manner.

The power is transmitted from the first roller line to the remaining three lines by a 24-inch double leather belt running over 8-foot pulleys. The power is also taken from here to drive the packer line, which is suspended from the ceiling of the first floor in the warehouse.

The main roller line also extends into the cleaning department, and the pulley driving the whole upstairs is on this end of the line. This power is transmitted by a double 24-inch leather belt running over a 9-foot pulley. There is also located in the basement the suction trunk for aspirating the rolls, which is provided with a conveyor to always keep it clear. There are also the main steam heating pipes connected with the boiler which encircle the entire basement, also the main pipe from the fire pumps, which runs down the centre of the building, and has three stand pipes in the mill with a branch running into the boiler and store room and up to the first and second floors of the warehouse, on each of which are three lines of hose fifty feet long.

The main pipe extends into the cleaner room, which is also provided with a stand pipe, which is connected with a tank ten feet in diameter and ten feet high, which is put in a building located on the roof of the cleaning department, which is 20 x 20 feet square and two stories high, with door opening onto roof of mill proper. This tank operates the sprinkler system, one of which is placed over every bearing in the mill and one in each elevator head. By a system of check valves the tank can work direct on the sprinkler system or the hose, and as soon as a sprinkler starts in operation it rings an electric gong in the wheelhouse, which notifies the employes and sets the pump to work.

The mill is provided with twenty-seven lines of hose, each fifty feet long. A branch from the main line is taken to the elevator in which is located a stand pipe and four lines of hose fifty feet long, which is operated in the same manner as those in the mill. There are also two lines of hose in the house built for the protection and support of the belt carrying the grain from the elevator to the mill. There is also in the basement the four conveyors under each line of rolls which carry the stock directly in front of each elevator, thereby avoiding crooked and complicated spouting and gives the rolls a much better aspiration. The elevator boots, twenty-four in number, also stop on this floor.

In the cleaning room there are five elevator boots and the drive and tightener for the belt bringing wheat to the mill. Along the north wall is the belt which drives the cleaners and elevators, which transmits the power of one of the wheels. The boilers, which are located in the basement of the warehouse, are sixty inches in diameter and sixteen feet long, with fifty-two 4-inch tubes. The pump, injector and trap for delivering the condensed water from the steam pipes to the boiler are also located here, and the shafting operating the spools for switching cars.

On the first or grinding floor of the mill are thirty-six double 9" x 24" and 9" x 30" Gray's patent noiseless belt roller mills, arranged in four lines of nine each. There is also a passenger and freight elevator reaching from this floor to the attic. This floor is connected with the cleaning department and warehouse by four large iron sliding doors. On this floor, in the cleaning department, is a double 9" x 30" Gray's noiseless roller mill for feed, also the tightener for operating the shaft which transmits the power to the elevator by means of a wire rope running over six feet sheaves. Here is also the lever for stopping and starting the grain carrying belt, and handles for operating the slides to the two iron elevator boots which carry the wheat and feed to the bins as it is delivered from the belt. On this floor of the warehouse the office of the company is located. The balance of this floor is used for flour storage. On the second floor of the mill are two No. 35 Sturtevant wide exhaust fans and two No. 5 Prinz dust collectors for the roller aspiration. Also the small stock hoppers over the rolls, eight wheat heaters and twenty-one elevator boots for the elevators feeding the purifiers. In the cleaning department on this floor there is one upright special close scouring machine, driven from a horizontal shaft by means of a double belt tightener, which admits of being stopped and started. On this floor of the warehouse there are four flour packers, two bran and one feed packer; also the flour and feed bins. The flour after packing is lowered to the first floor by inclined shutes, one being located between each two packers. On the third floor of the mill there are twelve purifiers with dust collectors attached and three No. 1 Morse elevator bolts for rebolting the bakers' and low grade flour, and two lines of shafting, one driving the purifiers, the other driving the reels located on the fourth floor, while in the cleaning department is one upright special close scouring machine driven in the same manner as the one on the second floor; also the belt tightener for the cleaning machines.

The dust room for cleaners starts on this floor and extends up through all the remaining floors into the tank house where the air, after passing through the Cyclone dust collector, is allowed to pass out doors through slatted windows. Here also begins the storage bins into which the dirty wheat and feed from elevator is thrown before passing to cleaners and feed roll. Each of the two dirty wheat bins have a capacity of 1,500 bushels, while the clean wheat bin has a capacity of 1,200 bushels. From this bin it is drawn directly through the heaters to the first break roll. The feed bin has a capacity of 1,800 bushels, which is drawn directly to the feed rolls, so that no machine is in operation in the elevator during the night time. On the fourth floor there are ten purifiers with dust collectors attached and two No. 2 Gray's patent sectional purifiers with Cyclones attached.

The bolting machinery also commences on this floor and consists of eight flour dressers and eighteen centrifugal reels standing in two reel chests, both driven by one quarter turn belt with tightener. The flour dressers have a spur gear at the tail end. In the cleaning department are located two No. 4 double geared cockle separators; also the main belt tightener driving the mill proper. The dust room extends to this floor; also the feed, dirty and clean wheat bins. There is also a line of shafting driving the bolting reels on the fifth floor.

On the fifth floor are two purifiers with dust catchers attached; also two No. 2 Gray sectional purifiers, with Cyclones attached; there are also fourteen No. 4 8-foot double geared Gray's patent double scalping machines for scalping the break stock and grading the middlings before passing to the purifiers. There are also twenty flour dressers and eight centrifugal reels, standing in two reel chests, and driven in the same manner as those on the fourth floor. The two elevator lines are also

located on this floor, one directly above the other, discharging in opposite directions, thereby avoiding twisting and turning of spouts around the elevator legs. The shaft driving the scalping machines and purifiers is also on this floor. In the cleaning department is one large milling separator, the dust and bin for wheat and feed, and all ground feed, being stored in the adjoining warehouse.

The heating of the building is accomplished by 10,000 feet of 1-inch piping, the main steam pipe being 5 inches diameter and all the stand pipes being 3, 2½, 2, 1½ inches diameter, each coil provided with suitable valves for the admission and retention of steam, and each with an air valve. On the first floor there are three clusters of eight coils each, and on the second floor and in the warehouse are the same. On the third and fourth floors, there are three clusters of six coils, and on the attic floor there are three clusters of four coils. The cleaning department has one coil on each floor with the same number of pipes as the mill proper. The second floor of the wheel house is also provided with one cluster of eight coils. The shipping facilities are of the best, being provided with one siding 1300 feet long and one 650 feet long, and with suitable mechanism for handling cars.

The elevator, which as a capacity of 150,000 bushels, stands with its end to the siding, and is 200 feet from the mill, by which it is connected by a house covering and carrying the belt as before mentioned. The building is 43 feet six inches by 100 feet having bins fifty-three feet six inches deep and built on a solid stone foundation, part of the basement having been blasted from the solid rock. The basement is twelve feet high in the clear, with a pit for the receiving elevator boot at the front end twenty-one feet six inches deep, and a pit for the weigh hopper sixteen feet six inches deep, all blasted from the solid rock. The weigh room, which is on a level with the bottom of the bins, which begin twelve inches above the top of the foundation, is eighteen feet by thirty-one feet four inches. There are thirty-four bins ten feet by ten feet, fifty-three feet six inches deep, and two bins ten feet by ten feet, thirty feet deep, over the weigh hopper.

The lamina walls are two by eight inches for a distance of fifteen feet, and two by six inches for thirty feet, and the balance of two by four inches. In the center of the front end there are four bins spared out and floors put in with stairs connecting the different floors. The entire top of the bins are floored over and have a story twelve feet high in the clear, built of two by eight inch studding, with a flat, tar and gravel roof covering the whole.

At the front end, in the center, is a cupola twenty feet square and seventeen feet high with a door opening out on the roof. The basement contains the hopper over the grain belt which delivers the wheat to the mill; also a 12-inch Caldwell conveyor, and the spout for switching cars to and from the elevator, and a sink below the weigh hopper, with a capacity of 1200 bushels; also the pipe for fire protection and fifty feet of hose.

INTERESTING IMPROVEMENTS.

INVENTORS are asking themselves the question, says the Boston *Journal of Commerce*, what is there now that we can invent that has got the money in it. It must seem that they have been working on worthless inventions long enough and must strike something rich before long or give up the business. A steam gauge is a good thing to work on only they must not get up a new thing entirely. Add something to the looks for the eye to dwell upon and that is all that is needed. One inventor has already painted the dial white as far around as the boiler inspector cares to have the index hand turn and the rest of the face is painted red. The white portion is called the *field of safety*; the other the *danger* field. It must give the engineer the impression that there is too great a contrast allowed where the dividing line indicates that safety leaves off and danger begins. They should blend together, giving the idea that safety starts only free from danger at zero and gradually takes on this disagreeable feature till it gets to be more dangerous than safe, the safety part of the proceeding gradually disappearing until there is nothing left but pure danger, and explosion likely to occur at any moment.

Something must be done to leather belts to keep the link chain trash out of the market. The only place where trouble exist is in a small pulley which is to be driven from a large driving wheel. The arc is too small for the belt to cling to, so the pulley is covered with a material soft enough for metallic projection riveted to the belt to sink into. These grip teeth are kept from running on the driving wheel by giving a half-turn in the twist of each fold of the belt, which brings the teeth on the outside till they reach the pulley again.

The belt punch that punches a round hole is ever of the right size and two or more must be punched close together to form one large one. This has lead to making the punch in the form of the letter U which has only to be reversed at the second drive to give an oblong hole of any size.

Little inventions are useful, but the smallest thing we have heard of is making an improvement on "nature's" pen rack. No hole has to be bored to pin on the clamping device behind the ear to hold a whole kit of drawing tools.

COPELAND & SONS' NEW 150 BARREL MILL AT ELMVALE, ONT.

MESSRS. George Copeland & Sons, of Penetanguishene, must be counted among the most successful and progressive roller mill owners in Ontario. To their enterprise the village of Elmvale is indebted for one of the finest roller flour mills in the province. Being already the owners and operators of the Huron Roller Mill at Penetanguishene, built by Messrs. Wm. & J. G. Greey, of Toronto, some two years ago, and realizing that their trade had outgrown the capacity of that establishment, Messrs. Copeland decided upon the erection of a larger mill to be located at some point on the Barrie and Penetanguishene branch of the Northern R. R. nearly the centre of the wheat-producing section. The village of Elmvale was decided upon as a suitable location, and plans were immediately prepared for the buildings, and their erection was proceeded with at once.

The mill building is of frame sheeted with California siding on a stone foundation, the dimensions being 48 x 30 feet, three full stories each 13 feet high, with a cupola or lantern 10 feet high extending the whole length of the building. The basement is 9 feet high, built of stone. At the east end of the mill is a brick engine house 36 x 24 feet, one story high, separated from the mill by a brick fire-wall. At the west end of the mill, and separated from it by a passage-way 12 feet wide, is an elevator storehouse, 36 feet square, the same height as the mill, and capable of holding 50,000 bushels of grain.

The mill is fitted with all the latest improvements in machinery. On entering the "roller floor," the visitor finds seven double sets of Greey's improved roller mills containing 14 pairs of 9 x 24 chilled iron rolls, with belt drives, the latter being an improvement which abolishes the terrible noise that is a disagreeable feature of many roller mills. Over the first of these rolls is an ingenious little machine, automatically weighing the grain as it flows into the mill and accurately recording the same on a dial. Besides the rollers before mentioned the only other machinery on this floor is a large grain separator, a flour-packing machine, and the elevator bags or spouts, the latter being provided with neatly moulded sliding doors with black walnut trimmings, varnished. In the basement, is located the "line shaft," carrying the pulleys that drive the rollers, and grain-cleaning machinery, consisting of a scouring machine, a brush machine and cockle extractor; also the "boots" of the elevators before mentioned. On the second flat are 4 purifiers and a double aspirator, flour, bran and shorts bins, and the continuation of the elevators. The third flat contains 8 of Greey's improved flour dressing machines, two centrifugal reels, six scalpers and a bran and shorts duster. In the cupola are the "heads" of the elevators and a reel for dusting bran.

One noticeable peculiarity of this mill is the use of an endless rope running over grooved pulleys, instead of a belt or shaft, for driving the whole of the upstairs machinery. We are informed that the Messrs. Greey are the only builders using this device for saving power in flouring mills. The power for driving the mill is supplied by a fine corliss engine of 100 horse-power, built by Inglis & Hunter, of Toronto. The plans for the buildings and machinery were supplied by Messrs Wm. & J. G. Greey. The contract for the buildings was executed by Richard Whitacre, of Penetang., and the machinery for the elevator and roller mill supplied and put in place by Messrs. Wm. & J. G. Greey, of Toronto. The capacity of the mill is over 150 bbls. per day, and the owners state that they are making as fine grades of flour with as great economy as can be attained by any mill in the country.

HOW TO BECOME A MECHANIC.

PERHAPS no question in the whole range of mechanics is asked with so much earnestness, and usually receives so meagre a reply, as that from the young man who asks: "How can I become a good mechanic?" In nearly every case the young man asking this question feels that the circumstances surrounding him absolutely prohibit the idea of his attendance at any of the technical schools, and in his despair of finding any way himself, he turns to the editor of some mechanical journal. Too often he is told to read such and such a book, regardless of the fact that the reading of no one, or a dozen books, or a hundred books, will make a mechanic of him.

As one who has been compelled to get all of his mechanical information without personal assistance from any one, it may not be out of place for us to outline such plans as have been of the most help to us. The best of all mechanical educators of to-day is the mechanical journal.

Let the young man who wishes to become a mechanic subscribe and pay for one or two of such journals as have a special bearing upon what he wishes to learn. We say pay for it, because there is a moral influence of having paid for what he is getting that will cause him to obtain more real information from one journal so obtained than from a dozen which may be given him.

Each number should be read carefully, and every article studied so thoroughly as to be certain that there are no points not understood. Nor is this all; each statement made should be carefully compared with everyday experience, and when items of information are conveyed that have no direct relationship to his present surroundings, he should enter upon experiments or carefully retain the remarks until he can find such an opportunity. It is by the careful comparison of others' statements with one's own practical experience that the best and truest knowledge of mechanics comes.

Books on various subjects are also of great advantage to the young mechanic, in fact, they become a necessity if he wishes to develop far in mechanical science; but as a great number of minds are wiser than any one mind, so is the technical journal, which is the reflex of many minds, better than the book, which is the reflex of only one mind.

On the practical side of the question the young mechanic should carefully study the machine with which he comes in daily contact. A long time spent in study of a single machine may seem like a waste of time to the beginner, but if he thoroughly understands but one machine he has travelled a long road toward the comprehension of all machines.

By the understanding of a machine is meant, not only understanding how it operates but how it is made, the thickness and kind of the metal, the size of bolts, the proportions, and general arrangements of parts. The best way to go about the study of a machine is to carefully make a set of drawings of it, letting everything in the drawing be of the exact size and proportion that it is in the actual machine.

Having made this drawing, the next study, and the one that will give the test to native ability, is to locate in the machine the amonnt, kind and direction of the strains that come upon it when in operation, and see if the proportions are in true relationship to these strains. If he finds in his work what are apparent weaknesses in the machine, let him then carefully watch the machine in operation with every nerve on the alert, and see if he can detect these as actual weaknesses.

If this work is made and studied out faithfully without the assistance of any one, it will be of vastly more benefit to him than anything he could possibly learn in a college. Having extracted all the information possible from the first machine, let him take another of a somewhat different class and go through it in the same way.

A comparison of the strains and proportions in one machine to the strains and proportions in the other will give him some idea of the latitude exercised by designers. If the young man has the true mechanical instincts this investigation will have an absorbing interest to him, and he will see a wide vista of thought opening up before his mind, which in after years will bring forth good fruit.

Such work is not impossible nor even hard for the young man who has to work ten hours a day for his living. If he has any real desire, real ambition to become a good mechanic, his spare moments morning, noon and night, will be turned upon his investigations, and even in so short a time as a few months he will find that he has made wonderful progress.

The watchword of advance, is think. Think in all times and places. Remember that one hour's earnest thought upon a subject on which you have been reading is worth ten extra hours of reading upon it. The mechanic who will persistently study and think on his business will not down. He will certainly come to the front, even though he were confined within the walls of a prison.—*Wood and Iron.*

DOMINION MECHANICAL & MILLING NEWS

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BY

CHAS. H. MORTIMER,

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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 22nd day of the month.

Special advertisements under the headings "For Sale," "For Rent," &c., if not exceeding five lines, 50 cents for one insertion, or 75 cents for two insertions. If over five lines, 10 cents per line extra. Cash must accompany all orders for advertisements of this class.

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The DOMINION MECHANICAL AND MILLING NEWS will be mailed to subscribers in the Dominion, or in the United States, post free, for $1.00 per annum, 50 cents for six months. *Subscriptions must be paid strictly in advance.*

The price of subscription may be remitted by currency, in registered letter, or by postal order payable to C. H. Mortimer. Money sent in unregistered letters must be at senders' risk. The sending of the paper may be considered as evidence that we received the money.

Subscriptions from all foreign countries, embraced in the General Postal Union will be accepted at $1.25 per annum.

Subscribers may have the mailing address changed as often as desirable. *When ordering change, always give the old as well as the new address.* Failure upon the part of subscribers to receive their papers promptly and regularly should be notified at once to this office.

EDITOR'S ANNOUNCEMENTS.

Correspondence is invited upon all topics pertinent to the mechanical and milling industries.

This paper is in no manner identified with, or controlled by, any manufacturing or mill-furnishing business, nor will a bestowal 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.

Readers of the "MECHANICAL AND MILLING NEWS" will confer a favor upon the publisher and derive material benefit themselves by mentioning this paper when opening correspondence with advertisers. Drop us a postal card when you have written to an advertiser, give us his name, and then we will put you in the way of getting the benefit. Don't forget this.

WE regret to learn that the office of our excellent contemporary, the *American Engineer*, of Chicago, was destroyed by fire last month.

A RUMOUR is abroad to the effect that the Geo. T. Smith Middlings Purifier Co. have decided to remove their headquarters from Jackson, Mich., owing to the impossibility of obtaining sufficient land on which to erect additional workshops. The Company will doubtless be offered handsome inducements by towns and cities anxious to secure such a large concern.

THOSE towns that persistently act on the opinion that prosperity can be secured or enhanced by bonusing manufacturers, are one after another getting their eyes opened. Walkerton is the latest "horrible example" in this line. A year ago the town bonused a manufacturing firm to the amount of $4,000. Last month the firm collapsed, and the municipality and citizens are out of pocket about $20,000. Next!

MR. SIMEON JONES, ex-M.P., has been appointed by the Dominion Goverment to visit the West Indies and South America, with a view to establishing more intimate trade relations between Canada and those countries. Efforts of this kind are likely to be more productive of benefit to Canada than those of the Commercial Unionists, for the reason that the West Indies and South America do not produce articles similar to those of Canada.

THE daily press chronicles the fact that last year Canada consumed English beer to the value of $140,000. We are not told what the amount spent for Canadian beer was, but we know it to be many times the above sum. Here is an item of expenditure, which, if cut off, would in a very short time remove the talk of hard times. The times will always be much harder than they might be, and the scarcity of money for legitimate purposes greater than it should be, so long as this enormous and unnecessary expenditure continues.

THE name of Mr. John C. Ferguson, of Toronto, has been recommended to the City Council as that of a competent man for the position of Chief Engineer of the City Water Works. The MECHANICAL AND MILLING NEWS heard high testimonials from reliable sources regarding Mr. Ferguson's capabilities as an engineer long before he became an applicant for the present vacancy, and we have not the least doubt that the choice of the experts appointed to examine the various applicants is a wise one in every particular.

HAVING learned that the supplement issued with the last number of the MECHANICAL AND MILLING NEWS was understood by many millers as an expression of the editor's opinions concerning the merits of the Cochrane roller mill, we desire to state that such was not the case. It was simply a trade supplement prepared by the manufacturers of the Cochrane mill, who paid for its circulation as an advertisement in the ordinary way. The editor's opinions will always be found in the editorial department. He is content that the relative merits of different machines or different systems should be set forth by the manufacturers and be subject to the usual charge for advertisements.

THE Northern and Northwestern Railway, the last of the local independent roads in Ontario, has during the last month been absorbed into the Grand Trunk system. It is a good thing for the people of Canada that the country is traversed by canals, which have the effect of keeping railway freights at something like reasonable figures. Unfortunately for the shipper, however, the canals are only available four or five months in the year, and the balance of the time he must pay whatever the railway managers see fit to charge. The time seems to have arrived when the Government should take in hand to regulate by law, in the public interest, the charges which the railways may impose on shippers.

AS Canadians, we have been wont to congratulate ourselves upon the exemption which we enjoy from floods such as destroy valuable lives and property every year in certain parts of the United States. During the last few years, however, certain Canadian localities have been similarly visited, notably Montreal and Cornwall, where the loss of property has been very serious. In Montreal protective measures were adopted last summer, which it is hoped will keep back the floods the coming spring. Reports from Cornwall state that floods have occurred during the past month within a few miles of that town, and an uneasy feeling prevails among the citizens living in the districts flooded last year. When once a town or city has been overflowed, preventive measures should at once be taken, as it is obvious that should similar circumstances again arise, similar results must follow.

MILLERS in England are required to pass an examination and prove that they possess the knowledge of chemistry and other subjects which is so necessary and valuable to the successful manufacturer of flour by modern methods. Flour-making by the roller process is a scientific operation, requiring scientific knowledge on the part of the operator. How many of our millers or mechanics seek to obtain knowledge in any department of science, and particularly in the department where knowledge may be gained that would serve to enlighten them regarding cause and effect in the operations connected with their daily calling? The percentage of such is, we believe, surprisingly small. A few examinations such as they have in England would perhaps serve to show the great deficiency in scientific knowledge which exists among those to whom such knowledge is most valuable.

THE natural gas industry in Canada is assuming an importance that few persons would have been willing to accord to it twelve months ago. The latest development along this line is the application of a company to Parliament for incorporation for the purpose of acquiring certain lands near Ottawa, supposed to contain natural gas or oil, with a view to supplying therefrom light, heat and power. The stock of the company amounts to $100,000. Manufacturers will watch with interest the progress of any movement calculated to cheapen the cost of fuel. Meanwhile, natural gas corporations, should they succeed in their objects, would do well not to follow the course of similar organizations in the United States, where manufacturers who adopted gas as fuel are in many instances returning to the use of coal, owing to the greed of the gas monopolies in repeatedly increasing the price. If they are not careful the gas companies over there will kill the goose that lays the golden eggs.

WE have heard a great deal about the need of a higher standard of morality in political life in Canada, but until the last few weeks very little was said or written on the subject of reform in business life. The revelations in connection with the failure of the Central bank, exposing to the public gaze the corrupt practices of men both inside and outside of that unfortunate institution who were formerly regarded with confidence and respect, brings us face to face with a state of things which, if allowed to continue, must have a serious effect upon the character and prosperity of the country. It is unfortunate that some persons, apparently were most to blame, have been allowed to leave the country. In the interests of the business community, for the credit of the country, and as a warning to persons in positions of public trust *adequate punishment should be meted out to those on* whose shoulders belongs the neglect and misdoing.

OUR esteemed contemporary, the Toronto *Mail*, repudiates as absurd the statements of American journals that a general panic is imminent in Canada. It says: "The leading banks in the country are in a perfectly sound and healthy condition. They began to shorten sail months ago—in fact, some of them are blamed for *having been over-cautious—and are now doing* a thoroughly safe business. The depression is mainly confined to this province. In the North-West, where there was a splendid crop, the settlers are paying up their back debts and the outlook is hopeful In Montreal business is fairly good; while in the Maritime Provinces the fishermen made a lot of money last year, the catch having been exceptionally large and profitable." Our contemporary should not be too hard on American papers. Their conclusions are doubtless the result of reading day after day the statements appearing in the editorial columns of the *Mail* concerning the "hapless hopeless" condition of the Canadian people. The comments of the American press regarding Canadian affairs are the legitimate fruits of the *Mail's* anti-Canadian policy. If Canadian journals indulge in misrepresentation of their own country, and strive to belittle it in the eyes of the world, is it a matter of wonder that foreign opinion concerning us should be unfavorable and unreliable?

CHEAP (?) second-hand boilers sometimes turn out to be very much dearer than first-class new ones, though the first cost of them may be less. An instance of this appears in the particulars of a saw mill boiler explosion which occurred the other day at Jordan, Ont. This is the way a "cheap" boiler sometimes acts, as related by an eye witness of the accident referred to: "The saw mill was a temporary building owned by a man named Tallman. The engine was an old threshing one and the boiler was about used up. It is said the glass showed three inches of water, but one of the workmen says he thinks the glass was stopped up and that there was no water in the boiler. There were several men working in and around the mill at the time, and it was a miracle that there were none killed and so few hurt. Pat Flannigan, of Merritton, a teamster, was sitting beside the boiler room taking his dinner, and C. Holland, the engineer, and A. Honsberger were also in the engine room. Flannigan was thrown about twenty feet down an embankment, and scalded and badly cut about the face. Holland was thrown against a pile of lumber, and was also seriously cut and scalded. Honsberger was standing close to Holland, and merely got a few scratches on the face. None of the other men got hurt. The boiler went straight up in the air over the tops of the trees, and fell on the bank and part on the road leading up the hill, about one hundred yards from the mill. The engine was blown in another direction about one hundred feet. Other parts of the machinery and timber were scattered a long way. The engine in falling struck a telegraph pole, and cut a piece six feet off the bottom, and left the pole standing a little further off with all the wires perfect." Experience indicates that *machinery users will probably continue to buy "cheap"* boilers so long as they can be had "at a bargain," but it will do no harm to remind them that a trip sky-ward is one of the things that may reasonably be expected by persons handling that class of article.

At the late London exposition of inventions there was shown a working steam-boiler, the interior of which was illuminated by electricity. The whole apparatus used for this purpose consists of a little battery outside of the boiler, which is connected with incandescent lights screwed to the interior walls of the steam-space above the water-level and encased in steam-tight bulbs, while a second wire ends in a leading button outside of the boiler. Strong, double observing glasses are let into a brass rim set into the end wall of the boiler. If the current is closed by pressing the button against the metallic boiler-wall, then the incandescent lamps begin to glow and light the interior of the boiler. It is hoped by this means of observing the process of heating water and the production and withdrawal of steam to gain material knowledge and advantages for steam.

Northwest Letter.

THE movement to have a reduction in the Manitoba wheat standards seems to have stirred up a good deal of hostile feeling in the East, as is shown by the rather heated utterances of the grain and flour sections of the Toronto and Montreal Boards of Trade. When the Winnipeg grain men passed the resolutions in favor of a reduction of the wheat standards, it was never supposed nor intended that the changes should go into force during this crop year. The idea was merely to memorialize the Government in the matter, to pave the way for a change in time for next season's crop. Understanding the tedious and persistent efforts which it usually takes to induce the Government to make any change or reform in existing official regulations, the Winnipeg dealers concluded that if they set to work at once, it would take them all their time to induce the Government to assent to the change in time to have the desired regulations in force by the commencement of the next crop year. The sudden decision of the Government to make the reduction at once was perhaps a greater surprise to the Winnipeg grain men than to any other interested parties. The reason assigned for the sudden decision of the Government to grant the request of the Winnipeg board, and even go farther than that request by moving to have the change made at once, is generally attributed to the influence of C. P. R. officials. Mr. Van Horne promised his assistance to the grain men in urging the change, and it is understood he stated there would be no trouble about having the standards reduced at once. It is certain that without the assistance of the railway officials, the concession would not have been announced with such alacrity, and it would probably have taken a couple of years to have secured the desired reductions in the standards. The matter is looked upon here as showing the great influence which the railway company wield with the Government. The decision of the Government, on the representation of the Toronto and Montreal dealers, to postpone for the present the enforcement of the new standards, will not be objected to by the western dealers, who, as already stated, did not expect a change in the grades before the commencement of the next crop year. Indeed, they only hoped to be able to prevail upon the Government to make the change by that time.

It will be observed that the new grades, as announced in the *Canada Gazette*, are practically the same as requested by the Winnipeg board. These were set forth in our last letter. So far this has been a satisfaction to the Winnipeg grain interests, and it only remains yet to be seen whether the efforts of the eastern grain and flour men will have any influence in inducing the government to partially withdraw the concessions made. Naturally enough people here think that we should have control of our own grain trade, and the movement of eastern interests to frustrate our efforts, is not looked upon here with any degree of patience. It is charged in some quarters, that eastern grain men desire to keep the standards high, so that they can profit by mixing the wheat and still have it of high quality, as compared with grades of other countries. As to the flour interests, the latter would naturally desire that the grades be kept up to a high standard. At any rate, it is expected that eastern grain and flour interests will endeavor to thwart the enforcement at the proper time of the reduced standards. The resolutions passed by the Toronto and Montreal boards set forth that any change of the grain standards is depreciated, unless coming through the regularly constituted board of grain examiners, thus showing that the eastern grain interests are anxious to have an opportunity to pass upon the subject. Undoubtedly if they have such an opportunity, it will be to take a position not in harmony with the feeling here. Western dealers who remember the opposition which they had to encounter in establishing separate grades for Manitoba wheat, have good reason to expect little consideration from certain Montreal and Toronto dealers. It will be remembered that when the Manitoba grain standards were first fixed, a considerable section of the examiners desired to have Manitoba wheat graded the same as the soft eastern wheat, instead of having separate grades for the west. This being the case, it can be seen that people here do not relish the idea of having eastern interests control our grain regulations.

The reasons for desiring a reduction in the Manitoba wheat grades were fully set forth by the writer in a previous letter. Indeed, the first discussion of this subject in the press was first made through the columns of the DOMINION MECHANICAL AND MILLING NEWS, by the writer, some months ago, and before any action had been taken here with the object of having a reduction of the grades. We will therefore not attempt at this time to repeat the arguments in favor of the reduced grades It would however seem desirable to correct some misstatements made by certain papers concerning the change. The Toronto *Monetary Times*, a journal which has always shown gross ignorance in discussing Western matters, and which invariably makes a mess of any Western matter which it attempts to deal with, appears to be equally as badly informed regarding this grain question. This journal seems to be under the impression that the new standards will be lower than the Duluth grades, and it moralizes upon this idea to the effect that buyers will not be deceived thereby, and will pay for the wheat in accordance with the quality, and regardless of the standards. It states that nothing can be gained by the move to reduce the standards, and a loss of prestige is sure to follow. The *Monetary Times* is either wilfully or ignorantly astray. Manitoba wheat will not be below the Duluth grades, even with the proposed reduction in the standards. It will still be of as good and even of higher quality than the corresponding Duluth grades of No. 1 and No. 2 hard and Northern. But besides the Manitoba grades which will correspond with the Duluth grades, the new regulations provide for a special grade of Manitoba wheat, to be known as Manitoba hard, which will be very much superior to any Duluth or any other grade of wheat for that matter. There is therefore no reason why the new regulations should operate to depreciate the quality of Manitoba wheat. Wheat on a par with the Duluth grades, if not better, will be secured, whilst the new grade of extra Manitoba hard will provide a grade of wheat which will keep up the reputation of Manitoba hard wheat as the best in the world. The statement of the *Monetary Times* to the effect that "buyers will pay for wheat according to the quality," has not been borne out by the facts during the present season. To show this it is only necessary to point to the fact that Manitoba hard wheat is this year selling under Duluth wheat, though the very much superior quality of the former under the existing grades is not questioned. The *Monetary Times* should give a little more attention in the direction of studying and understanding the western questions which it so frequently undertakes to discuss, and it would not be continually making an exhibition of itself.

The London, England, *Miller* thinks one of the first effects of the completion of the C. P. R. is to stimulate the millers of the Dominion to enterprise in the far east. It notes the shipment of "cargoes" of choice Manitoba flour to China and Japan, and intimates that large shipments will follow. As a matter of fact the cargoes have so far only consisted of small lots of flour, shipped as an experiment. There has been a good deal of talk about the possibilities of extending trade between Canada on the one hand and China and Japan on the other, since the construction of the C. P. R., but the flour trade is not one which gives promise of much development in this direction. The demand for flour in those countries is not large in the first place, being confined principally to European residents of the seaport towns. If the natives could be educated to consume flour, there would certainly be a very large demand, but it would be for cheap grades, and not for choice Manitoba qualities. As it is, the present demand can be supplied to better advantage from other parts than from Manitoba. The millers of the United States Pacific Coast are in a much better position to supply the demand from China and Japan, both owing to their freedom from paying railway freights, and to the cheaper grades of flour which they turn out, and which answer well enough for this eastern trade. The fact that their Pacific coast millers still hold a considerable trade in British Columbia, in competition with the Manitoba millers, and with the duties in favor of the latter, attests their ability to handle the China and Japan trade to better advantage than our millers can hope to do. The C. P. R. line of steamers from Vancouver to the Asiatic countries have formed an additional means of export, which the Oregon millers have not been slow to take advantage of. They are now shipping large quantities of flour by the new C. P. R. steamship line, and thus the route is proving of much greater advantage to the Oregon than to the Manitoba millers.

An effort is being made to induce British millers to purchase Manitoba wheat here, and ship direct, instead of purchasing say at Liverpool or Montreal. By the latter course they would get the pure, unadulterated article, before it has been mixed and doctored in passing through several hands. No doubt in time this course will be largely followed, when the British millers have become thoroughly aquainted with the merits of Manitoba wheat. A large central wheat market here is also a necessity, if sales are to be made direct. The lately organized grain exchange in Winnipeg is the first step toward centralizing the grain trade here, and in time this may grow to such proportions as to fill the bill.

The completion of a through line of railway between Minneapolis and the east, via Sault Ste. Marie and the C. P. R. has been a matter of considerable interest to the flour world here and elsewhere. This road is first of all a flour route. It was conceived and pushed through by the Minneapolis millers, in the interests of their industry. The first object of the road was to give these millers an additional outlet to the east, independent of the Chicago lines. The matter is viewed here in a spirit akin to envy and jealousy. Minneapolis millers, who already get a 7 to 10 cent rate to Chicago, against a 23 cent rate from Winnipeg to Port Arthur, are thus given an additional outlet by the aid of the C. P. R.—the same road which forces a monopoly upon the people of Manitoba. No wonder that the trade here feels a little sore when they see these things. The few people here who are howling for Commercial Union with the United States, should readily discern from this that the Manitoba flour trade, the leading industry of the province, would be entirely ruined from a consummation of their pet scheme, with such fearful odds in freight rates against the local manufacturers.

The Manitoba oatmeal millers are enjoying a prosperous season. The short oat crop in Ontario, which has led to the recent advances there in the price of oatmeal, has left the western markets entirely in the hands of the local millers, besides enabling them to ship eastward at renumerative figures. The oat crop here this past season, like all other crops, was a heavy one, and oats are accordingly plentiful and of good quality. The situation will be fully appreciated by our oatmeal millers, coming after last year, which was a very poor one for them, owing to the light crop and poor quality of the oat crop of 1886 in Manitoba.

The heavy crops this year has found the railroads very inadequately supplied with facilities for taking the grain to market. The C. P. R. Co. has been making every effort to handle the grain, but though up to the middle of January everything was in their favor, a blockade has been steadily growing. The storm about the middle of the month brought matters to a crisis, and caused a general block. The inability of the railways to handle the grain has caused a great deal of loss and inconvenience to the province, and seriously retarded general business. With elevators and warehouses full, farmers have been obliged to either stop delivering wheat or pile it up in bags outside. Passing along the railways, one would notice great numbers of bags of wheat piled up at almost every station. There is a great quantity of wheat still in the hands of farmers, and it looks now as if previous estimates had not over-rated the crop. At many points it is believed that not over one-half the wheat has yet been marketed, and in some districts a great deal of threshing remains to be done. The experience of this season goes to show that it will not be long before an additional outlet will be an absolute necessity for this country, if our rapidly growing exports are to be taken to market at all.

The apologists for railway monopoly in Manitoba have in times past pointed to the fact that Manitoba farmers sometimes received higher prices for wheat than were paid in Minnesota and Dakota, at points distant from Duluth and Minneapolis. The writer explained in a previous letter why this was the case. Owing to the light crop here in 1886, there was a keen demand from millers for the grain, and prices were thus kept on a par with points south of the boundary, notwithstanding the higher freight rates here. This year, however, with a large surplus of wheat in Manitoba, the demand has not been quite as keen, and the result is that prices here have ruled from 4 to 10 cents lower than at points in Minnesota and Dakota, immediately south of the boundary. Thus, lately when wheat was quoted at 54 cents at Emerson, it was bringing 64 cents at St. Vincent, the two markets only being about a mile apart. The Manitoba farmers are of course prevented by the custom regulations from driving across the boundary to obtain their higher prices. The higher prices ruling south of the boundary this season are also partially due to the freer competition through the breaking up of the Minneapolis elevator monopoly.

A very pretty piece of business has lately come to light here. Last fall the N. P. R. completed their railway to the Manitoba boundary, south of Emerson. It was expected that this road would thus be in a position to compete for the grain carrying trade of the Emerson district. The Canadian custom authorities, however, have stepped in to prevent the American road from competing with the C. P. R. This they accomplish by refusing to grant landing privileges to parties wishing to avail themselves of the lower rates on the Northern Pacific. Without bonding for through shipment, the wheat would be subject to custom duties. This is certainly a small move, and shows to what length the government is prepared to go to protect the C. P. R. monopoly, no matter how the Manitoba settlers suffer thereby.

Correspondents' Opinions.

This department is set apart for the free use of subscribers in asking or answering questions, expressing opinions, or relating bits of shop practice or experience. The editor hopes to see it liberally employed and promises to enlarge it to any necessary extent to accommodate communications.

CORROSION IN STEAM BOILERS.

HAMILTON, Jan. 16th, 1888.

Editor Mechanical and Milling News:

I SEE in your December number three cuts of boiler plates showing how they had been destroyed in twelve months wear by corrosion, and this result is charged to the use of bad water containing sewerage, boiler compound, etc. I think when some people read this article they will scarcely know what to do, for they may think that all compounds are alike ineffectual to prevent corrosion on the boiler plates. That is not the case, however, for we can have good and bad boiler compounds, as in everything else. Now I think the best thing steam users could do would be to apply to the Stationary Engineers' Associations, where they can get good practical information concerning the value of different kinds of compounds from those who have tested them, and by this means they might learn the best that is to be had. Almost all waters require some compound to prevent scaling on the boilers, and boilers require to be frequently washed out. I have used compounds that had to be put on with a white wash brush, and were of no use except to eat holes in one's clothes. I have known branches of oak with the bark on to be put into the boiler to prevent scaling, and to be used for that purpose for fully 25 years. Still that did not prevent the scaling, for men had to go in and chip the scale off with hammers, two or three days being required to clean the boiler.

I have a very distinct recollection of coal tar being used in a boiler. On one occasion two men were putting it in the safety valve, another safety valve being connected with the same pipe. One of the men lifted the lever of the other valve, and in a moment the coal tar filled both men's eyes. They were laid on their backs and oil poured into their eyes to get the tar out.

Some have used coal oil, pure and crude, but there have been so many complaints about destroying iron that it has nearly passed out of use. Others have used soda until they found that it destroyed their boiler plates as well as their steam pipes.

Some people when they find their boiler has given out and leaks, resort to a hundred remedies, instead of having it repaired as it ought to be. Some will use horse manure, which contains so much ammonia that soon the trouble is made worse instead of better. Others use bran and shorts, potatoes, etc., and if it is a tube boiler, it will settle just over the fire in the warmest place, and they will soon find when the boiler is forced much, that the part where it is settled will bulge down and cause the plate to crack.

There should not be any remedies put in to stop any leaks or compounds but what can be proved by practical experience to be good for the boiler plates. Always keep your boilers well washed out and use nothing but well-known compounds, and then you will not have much work for the boiler maker to do.

Yours truly,

J. LANGDON.

HE WANTS SOME ADVICE.

CARLINGFORD, Ont., Dec. 31, 1887.

Editor Mechanical and Milling News:

WILL you please give me some advice in my case? I have a 35 h. p. tubular boiler, thirty-six 3-inch tubes 12 feet long, smoke stack 45 feet long, 32 inches diameter, but have no draft. I wish to be able to burn sawdust, which I can not do. I have the usual oval sawdust burners in furnace, but can only burn wood. If you or any of your correspondents could do me the above favour you would greatly oblige.

Yours respectfully,

LOUIS SEEBACH.

[The cause of defective draught in any particular case cannot be solved by the application of general rules, unless every detail as to arrangement of boiler setting, grate bars, chimney and its surroundings are known. High ground or high buildings near to a chimney will affect the draught. In this case the most obvious point is the great diameter of the chimney as compared with the area through the tubes. The tubes are 3 inches external diameter and 36 in number, the area through these, when clean, would be about 216 sq. inches. The smoke pipe is 32 inches in diameter and 45 feet high. The area through it would be about 804 sq. inches or nearly four times as much as through the tubes. The cause of the poor draught is probably due to the want of height in the chimney and the large surface exposed to the cooling influence of the air, from its being of so large diameter. A smoke pipe 18 inches diameter and 80 feet high would give for that size of boiler a good draught, and would, if made of the same thickness of iron, be the same weight as one 32 inches diameter and 45 feet high, as now in use.—THE EDITOR.]

LONDON, Ont., Jan. 21, 1883.

Editor Mechanical and Milling News:

I AM desirous of getting some information regarding what is known as short system milling. In thinking on the subject, I have been led to wonder why it is necessary to have six or more breaks in a mill, instead of three or four. Will some of your readers who are better posted than I am be kind enough to explain this matter to me?

Yours truly,

ENQUIRER.

TORONTO, Jan. 17th, 1888

Editor Mechanical and Milling News:

IN your last issue a sheet was enclosed purporting to be a supplement, issued editorially, of your paper, in which the name of our firm was made to figure in a very disadvantageous light. We feel that as far as you were concerned it was done unwittingly, and trust you will see fit to give as much prominence to our denial of the statement therein contained, viz., "that the Greey plant of rolls in Messrs. Meldrum's mill, cost $4,800." I find, on referring to the original estimate for the construction of the said mill, that at the outside not more than $2,236 can be charged to the cost of the rolls, their pulleys, belts, shafts, couplings and bearings. It is the first time we have ever known such tactics to be introduced into the mill furnishing trade in Canada, and we feel sure that they will in no way promote the prosperity of those adopting them.

We are, yours truly,

WM. & J. G. GREEY,
Per W. S. B. Lawrie, Supt.

PERSONAL.

Items of personal intelligence from or concerning persons engaged in the various branches of mechanical industry represented in Canada will always be welcome to this column, with the stipulation that the name of the sender be given, not for publication, but as a guarantee of good faith.

Mr. G. A. Brantt has taken charge of the Shoal Lake Milling Co.'s mill.

Miller A. Munro, has lately been re-visiting friends at Carluke, Ont. He comes from the vicinity of Montreal.

Mr. Galbraith, proprietor of the Tollendale roller mills, is receiving the congratulations of his friend. It is a boy.

Mr. Rolie Griffin, of Lakefield, Ont., had his hand severely injured by a circular saw in his father's planing mill.

Mr. Jos. P. Barber, Sr., one of the pioneer manufacturers of Georgetown, Ont., died suddenly last month at the age of 72.

Mr. T. A. Burrows, of the Selkirk, (Man.) Lumber Co., is recovering from a severe illness which confined him to bed for several weeks.

Mr. Robt. Burg, assistant mechanical superintendent of the Western Division of the Grand Trunk Railway, died a few days ago at Stratford, Ont.

It is generally believed that ill health will shortly force Hon. Mr. Pardee, Commissioner of Crown Lands in the Ontario Government to resign.

M. D. Babcock, who at one time was in receipt of $10,000 a month for royalty on the fire-extinguishing apparatus bearing his name, died recently in a San Francisco almshouse.

Mr. James Miller, proprietor of the Assiniboia, N. W. T., flour mills, has lately returned home after spending the holidays with his wife and family among friends in Ontario.

Samuel Devenue, sr., who met with serious injuries in Hillyard's mill, St. John, N. B., some weeks ago, has been sent to the lunatic asylum, his injuries having affected his brain.

Mr. J. D. Saunby, the well-known miller, of London, Ont., has been elected to a position on the Board of Directors of the Millers and Manufacturers' Mutual Fire Insurance Co.

Mr. Thos. Price, of the flour manufacturing firm of Hulton, Price & Co. Wingham, Ont., was suddenly stricken with paralysis in the middle of last month, and at last accounts his life was despaired of.

A few years ago James Montgomery had his right hand severed while feeding a circular saw at Hawkins' mill. The other day while working at Simon's mill, St. Thomas, Ont., the little finger of his remaining hand was amputated.

A Mr. Kiddie, while in the act of clearing a slab with an axe in Eagan Bros'. saw mill, South Dorchester, last month, lost his balance, and falling against a circular saw had his arm shockingly mutilated. Hopes are entertained that he may recover.

The death of Mr. John Crosby, of Minneapolis, President of the Millers' National Association of the United States, which occurred on Dec. 29th, has caused a feeling of deep regret in milling circles, where the deceased gentleman was highly honored for his many sterling qualities.

The daily *Citizen*, of Jackson, Mich., published on Jan. 3rd., contains a complete report of the proceedings at the fifth annual banquet tendered by the Geo. F. Smith Middlings Purifier Company to its friends and employees. Among the names of those present appears that of Mr. S. S. Heywood, manager of the Canadian branch, Stratford, Ont. Judging from the *Citizen's* report the evening was spent in a thoroughly enjoyable manner, and the result of the gathering will doubtless be to cause harmonious action on the part of employers and employees in the interests of the Company during the coming year.

USEFUL INFORMATION

TO TEMPER CUTTING TOOLS.—It has been stated that a good temper for cutting tools may be obtained by plunging the tool, heated for hardening, into boiling water and letting it remain there until cold. The tool is to be ready for work without further treatment.

A SIMPLE MIXTURE.—It is stated that soft soap with half its weight in pearlash, one ounce of mixture in about one gallon of boiling water, is found of great practical value in engineers' shops in the drip-pans used for turning long articles bright in wrought iron and steel. The effect of this mode of treatment is that the work, though constantly moist, does not rust, and bright nuts are immersed in it for days till wanted, retaining their polish.

NATURAL GAS AND EGGS.—According to a telegram from Uniontown, Pa., Mrs. Rider, living near the big gas well in German Township, Fayette County, reports a strange freak among her barn-yard fowls. After the flow of gas was lighted and had warmed the air in the vicinity, her geese and chickens suddenly began laying eggs. She has been raising geese for forty years and says she never knew them to lay except in the spring time. Now they are laying right along, as are also her chickens.

HOW TO CUT A BOTTLE.—Put the bottle on a level foundation, and fill up with oil as far as you wish the line of separation to be. Next get a rod of iron as large as possible, but small enough to go into the mouth of the bottle. Make the iron almost white-hot, and dip it into the oil. In a very short time the sound of a crack will be heard, when the iron can be taken out, and the bottom will be found as neatly cut as if with a diamond. Should the bottle be very thick, and the sound of the crack not heard in a minute or so, a dash of cold water outside will settle the business.

THE experiments with the incandescent electric lights which have been made at the torpedo station at Newport have developed a novel use for these lamps, and one that is said to promise to be of great value in naval warfare. With lamps of about 100-candle power fastened on the ends of poles submerged in the sea to a depth of twenty feet the water is so illuminated that objects in it can be distinguished within a radius of 150 feet. There is little or no glare from the submerged light to betray the presence of the boat using the poles. It is believed that by this means a boat might countermine an enemy's field of submarine mines by cutting his cables or sweeping them to one side. It is probable that torpedo launches will be equipped with these lights.

INCANDESCENT LAMP GLOBES.—The common practice of surrounding incandescent lamps with open globes or globes of ground glass, leads to a loss in the one case of from forty to sixty per cent. of the light, and in the other of from twenty-five to thirty-five per cent. A simple method by which the character of the light can be softened without experiencing so great a loss of intensity has recently been proposed, and consists in covering the globe of the lamp with a film of ordinary collodion, which can, by adding successive films, be made of any desired thickness. The reduction of the light of the lamp does not, it is said, with this method exceed ten per cent., and the system possesses the further advantage that the film can at any time be removed by simple friction.—*Boston Journal of Commerce.*

A FILLING FOR MILLSTONES.—A correspondent of the *Millstone*, writing on this subject, says: I have tried several kinds and after experimenting myself have found something that stands better than anything I have tried before. It is this: Take one pound of alum, add ⅛ ounce white glue and ⅛ ounce gum arabic; put them in a ladle with ¼ pint of water, then boil them until all is dissolved. The ladle or vessel should be large enough so that the liquid will not boil over. Should it become too thick before all is dissolved add a little more water from time to time. Do not boil too fast. Have the cavities brushed out well, so they are free from flour dust. Then when your liquid is boiled until no water remains in it, pour it into the cavities or seams of the stones. It will cool and be ready for work in about an hour. The liquid when ready for use should be some thicker than the white of an egg and a small paddle can be used to assist in running it into the cavities. I have this filling now, that has been running four years. It does not cost much. I just give the proportion of the different articles to be used. More or less can be made according to amount of filling to be done.

A GOOD CEMENT.—Very often a form of cement is required around shops and mills for filling cracks in stone or brick work. New factories, especially, often develop awkward cracks between the window frames and the brick walls, and during the cold months the air entering here will largely reduce the coal pile. Procure a lot of paint, old paint if possible, from a dealer, the skins forming on top of the paints, settling from the bottom of paint pots, and, in fact, any refuse which contains oil, zinc or other mineral body may be used for the purpose. Reduce this mass, especially if hardened from continued standing exposed to air, to the consistency of cream by soaking in some cheap oil. Heating may be resorted to if the hard paints cannot otherwise be softened. When the whole has become soft enough to be stirred into a homogeneous mass, more oil may be added and the whole worked through a sieve and then run through an ordinary paint mill. A quantity of common whiting is next to be worked into the oil and paint, much in the way as when ordinary putty is to be made. The thickness of this putty, as we may now call it, should not be as dense as when used for glazing. When the whiting has been thoroughly mixed in and the mass well worked over, add a quantity of good Portland cement sufficient to bring the putty to a consistency which will enable it to be handled readily. When in this state, the putty may be worked into cracks in brick or stone work much as ordinary putty is used when allowed to sit and harden, and it will become nearly as hard as iron, impervious to moisture and any reasonable degree of heat.

RETURNS.

Since the birth of roller milling—
And perhaps ere that occurred,—
Every expert has been willing
To abuse *ad lib* returns.

Fiercely they've been executed,
In the style that scalds and burns;
Every one was mocked and rated
Who abandoned not returns.

But too far the whim they've followed,
And their mills are now like urns—
They hold fast what they have swallowed,
Never giving out returns.

And so we find at every meeting
Everybody present churns
This great grievance, and is bleating,
Bleating wildly for returns.

And the premier they petition,
But the great man coolly spurns
Their o'er weening requisition
To restore them their returns

"WHANG. in London *Millers' Gazette.*

Reesor's flour mill at Newmarket, Ont., is again in operation.

A new roller process grist mill has been started at Cookshire, P. Q.

The new roller mill at Minnedosa, Man., is now working satisfactorily.

Among other things, Kincardine wants a flouring mill and a grain warehouse.

The firm of Tolson, Scott & Co., millers, Highgate, Ont., has been dissolved.

The milling firm of Snider, Lake & Bailey, Hamilton, Ont., has been dissolved.

The people of Strathclair, Man., are talking about erecting a roller mill there.

One end of J. G. Snetsinger's grist mill at Moulinette, Ont., was carried away by floods last month.

Mr. R. B. Morrison, is putting in a run of stones for oatmeal at his mill at Aberfoyle, Ont.

The Young's Point, Ont., grist mill was closed down last month to allow of repairs being made

The flour mills of Manitoba and the Northwest have a daily capacity of about 6000 bushels.

Over 900 bushels of grain were received in eight days at the Lotus, Ont., grist mill, recently

The flour mill at Kettleby, Ont., was obliged to cease operations last month, owing to a break in the dam.

The ruins of the Oak Lake, Man., mill destroyed by fire in December, were smoking far into January.

A fire, originating from the explosion of a lamp, has destroyed Mr. Pettit's flour mill at Amelhasburg, Ont.

The new middlings purifier built by Mr. Purdy of the Carberry, Man., mill, is said to be doing good work.

The re-building of the Oak Lake, Man., grist mill, recently destroyed by fire, will be completed in February

D. H. McMillan & Co., is the new name of the old firm of D. H. McMillan & Bro., of Winnipeg and Qu'Appelle.

A correspondent writes the Goderich *Signal* that the roller process flour mill at Port Albert, Ont., is the best in the county.

It is reported that Messrs. McMillan Bros., whose mill at Winnipeg was destroyed in December, intend to rebuild at Rat Portage.

The C. P. R. has commenced work on the new grain shed at Fort William, which will have a capacity of five hundred thousand bushels.

The Assiniboia roller mills which were closed part of last month owing to the breaking of the piston rod of the engine, are again in running order.

Messrs. Hutton, Price & Carr, millers, of Wingham, have bought Turner's mill for $7,410 and expect to get possession in about a month.

The new roller mill at Lethbridge, N. W. T., it is expected, will have a capacity of 50 to 75 barrels, and will cost in the neighborhood of $8,000.

The mill formerly owned by Mr Andrew Little, at Teeswater, has been purchased by Mr Fred. Deutchmann, and operations will be started at once.

The report comes from Halifax N. S., that winter freight rates on the Grand Trunk and Intercolonial railways are driving Ontario flour to Halifax via Boston.

The burning of McMillan's mill at Winnipeg has caused the mill at Qu'Appelle to be kept going to its fullest capacity, to meet the demands of western customers.

The new roller mill at Crystal City, Man., is about ready to make a start. The proprietors propose to erect a warehouse, and lay in a stock of grain for summer grinding.

Mr. Fenwick Miller, a former resident of Lotus, Ont., but who has been living for some time in Minnesota, has returned to Canada and rented a mill in the township of Cavan, Ont.

The elevator at Carberry, owned by Crowe & Co., burst on the night of the 18th January About three thousand bushels of wheat were spilled on the ground. The loss will be about $350.

A correspondent writing from Dominion City, Man., says there is a good opening there for a roller mill and the people would be willing to grant a bonus to a person starting such an enterprise.

Hoover's large flouring mill at Pickering, Ont., was totally destroyed by fire last month. The mill and all the machinery and books, together with a large store and dwelling house were consumed. Insurance $13,500.

The new Waddell elevator, capacity 30,000 bushels, at Dominion City, Man., is almost completed. Mr. George Agnew who has a flat warehouse at the same place has commenced the erection of an elevator of 35,000 bushels capacity.

There is said to be no better opening in the province of Manitoba than at Deloraine for a flour and grist mill. Mr. Corcoran of Stratford, Ont., who recently purchased Shepherd's flour mill at old Deloraine is considering the advisability of moving there.

The exports of grain from Montreal during the season of 1887 were as follows: 7,732,848 bushels of wheat, 1,181,483 of corn, 1,923,304 of peas, 407,383 of oats, 9,648 of barley, and 109,123 of rye, making a grand total of 11,372,789, being a decrease compared with the previous year of 2,772,529 bushels.

The Brandon City Council are discussing two schemes for the erection of a second flour mill there. The first is a proposal to build a farmers' mill and elevator by a joint stock company. Leitch Bros. have also submitted a proposal to build a mill provided certain aid be given, but as yet have not accepted the terms laid down by the council.

Of the 6,000,000 bushels of wheat said to have been moved east from Winnipeg by the Canadian Pacific Railway about 5,000,000 bushels has passed through Ottawa in bond to Boston and New York for export, or to Montreal and Quebec. A small proportion of the remaining million bushels has been purchased in western Ontario, the balance being in the company's elevators at Port Arthur.

Mr. John Martin's grist mill at Garden Hill, Ont., took fire a fortnight ago, and was totally consumed. The mill was two stories and a half high, contained two runs of stones, was valued at about four thousand dollars, and was insured for two thousand. The fire, which occurred on Sunday morning, is supposed to have been caused by a stove left burning on Saturday when the mill was closed down.

The first train of 100 cars carrying Minneapolis flour east over the C. P. R. to New England, passed through Montreal last month. Its cargo amounted to 15,000 barrels, and the trip was made in less than seven days. Quicker time would have been made but for snow-drifts. Unless the American railroad corporations succeed in getting changes made in the tariff, this will prove a profitable trade for the Canadian road.

At the annual meeting of the Canadian Millers' Mutual Fire Insurance Company, held last month, the following officers were elected:—President, D. Goldie, Ayr; Vice-President, Wm. Snyder, Waterloo; Secretary-Treasurer, Seneca Jones, Hamilton; Directors—A. Watts, Brantford; Isaac Wareup, Oakville; R. Shirra, Caledonia, R. Quance, Elfrida, James Goldie, Guelph; J. D. Saunby, London; J. R. Wissler, Salem.

A manufacturer of mill-picks advises millers that if in grinding picks the pressure be not too great, and sufficient water be used, that heating which always damages the temper may be prevented. It should also be remembered that "cracking" picks should never be used for furrowing, and no pick should be used after its edges are worn too blunt. When picks are blunt grind them to a straight level one-eighth or three-sixteenths long.

With regard to the total imports of flour into the U. K. (1887), says the London *Millers' Gazette*, they have been the largest on record, viz., 7,200,000 sacks of 280 pounds, of which London, Liverpool and Glasgow have received 5,364,000 sacks, or nearly three-fourths of the whole. America has of course been our chief contributor, her total exports of flour to the U. K. during 1887 reaching nearly 6,000,000 sacks of 280 pounds.

At the annual general meeting of the Teeswater Milling and Manufacturing Co. held last week, the following directors were elected for the ensuing year. Messrs. Thos. Fairbairn, Geo. Colvin, J. L. Howson, L. A. Brink, W. J. Howson. Messrs. Howson, the lessees of the mill owned by the company, strongly recommend the selling of the property, which will probably be attempted. The original cost of the mill was $19,000.

The St. John, N. B., *Sun* says: It appears to be certain that the Canadian Pacific railway will have the inside track for the flour traffic from the great milling centre of the west to Boston and New York. The complaint is familiar that the maritime provinces are obliged by the duty to purchase flour from Ontario millers instead of in our natural market at Boston. The absurdity of this story has always been evident to commercial men. But it will be more apparent to the popular mind when it is realized that the United States manufactured flour found in the Boston market is hauled right past the Ontario mills and wheat fields from a much more distant country. The nearest source from which Boston, as well as St. John, is able to supply itself with flour and meal, is Ontario.

The flour trade in this province is at present extremely dull. It is said that at no corresponding period within the past thirty years has the demand been so light. This is accounted for by the fact that heavier purchases than usual were made before the advance in freights, and that stocks have not been broken into to any great extent. In Montreal there is a good deal of flour held. There is also a considerable quantity in Quebec, but there is not so much consigned stuff there. Stocks in Halifax are heavy, being between 30,000 and 35,000 bbls. The worst feature of the situation is that Ontario millers, getting short of funds, have commenced to consign to the eastern markets. This is almost a suicidal policy. These consignments will be immediately placed on the market. Forced sales will have to be made at consequent lower prices. The result is that not only does the miller who makes the consignment suffer, but so also do all others interested in the trade.—*Canadian Grower.*

The *Millers' Gazette* says: A patent has been obtained in England by Mr. Theodore Voss, of Manchester (Dated Oct. 28, 1887), for quite a novel "break" mill. In this appliance the grain is squeezed between smooth, or nearly smooth, rollers, so that they (the grains) will be flattened in the form of thin round or oval cakes, which are sawn or cut through immediately, by means of thin circular or other saws or knives, whilst the grain is still held in contact by the rolls. Or a hollow wedge-shaped grinding block may be so placed underneath and between the squeezing rollers that the flattened grain is divided into two slices, and that each slice will be compelled to pass with its floury side over the finely fluted concave surfaces during one reduction, without exposing the branny husk to the influence of sharp working surfaces. It is not desirable, however, to work the bran too close, and it is, therefore, considered preferable by the inventor to finally clean it by fluted rollers, or other suitable means. The floury parts of the grain are, however, by this means reduced to a greater and better extent than by four or five reductions by "break" rolls. There seems to be a lot of theory in this invention which we should like to see worked out.

A recent issue of the Victoria, B. C., *Times*, contains the following description of the oatmeal mill at Stanwich, north of Victoria, on Vancouver Island: "The Stanwich oatmeal mill is propelled by steam, the horse-power being an 80 horse engine. The machinery consists of four run of stones, three pair of which are French buhrs, the other set being a four-foot sand stone for hulling the oats. One set is constantly employed in grinding oatmeal; another flour and a third pair for chopping feed. The capacity of the mill is 25 barrels of flour, three tons of oatmeal and five tons of chop feed per day. The machinery is all in excellent order and made expressly for the requirements of the firm's trade. The building is a substantial frame structure, 100x30 feet, 3½ storys high. The drying kiln has a capacity of four tons per day. The drying is done by the use of coke. Vessels call at the wharf, the accommodation being such that the largest steamers can enter and tie up at the wharf with safety. The firm have also a store attached to the mill. The firm was established in 1876, and is composed of Henry Brackman and David R. Kerr. It is understood that the operations of the firm are to be largely extended and that branches are to be opened by them throughout the Province. This step they deem as a necessity, in order to meet eastern competition."

London (Eng.) *Miller:* The advantages presented by Manitoba and the Canadian Northwest generally as granaries for the British miller have so often been pointed out in our columns that any further insistance would at this time be out of place. We all know that that region of the British Empire produces a wheat than which our millers can wish no better. It is equally well known that this grain is so coveted that it cannot make its way unaided to these shores, at least in large quantities. Under such circumstances it has always seemed to us that the best thing the British miller could do would be to follow the example of the Arabian prophet and go to the mountain. In plain words he should either personally or by deputy purchase his wheat directly of the Manitoban cultivator and ship it straight home. It is clear that the British miller, if he can make up his mind to this course, will find his path greatly smoothed by the Canadian Pacific Railway, which runs directly from the seaboard into the region of this desirable grain, and we are given to understand that the company has made every provision in the event of an active export trade springing up, by providing elevators at Montreal and the lake ports with sufficient bin accommodation to preserve the grades of wheat intact. It is obvious that the interests of this most enterprising company are identical with those of British and Irish millers in this matter. The necessary facilities for operating direct purchases of Manitoban wheat thus seems to be all ready to the hands of our millers. How long are such opportunities to be neglected?

HEATING SHOPS WITH HOT AIR.

JOHN WALKER, Cleveland, Ohio, read a paper at a recent meeting of the Civil Engineers' Club of that city, on the system of heating and ventilating a company's works by hot air. The works are scattered over seven acres of land, and it became a problem of some difficulty to heat them satisfactorily. The process now employed was adapted for the work by Mr. Walker.

Air is taken into a blower from outdoors, passes over a coil of steam pipe, and is forced through earthenware conduits underground for several hundred feet. Last winter the method was tried for the first time, and it was successful beyond the expectation of its projector. In the summer the air is forced through the pipes without submission to the steam radiator, and cools the air in the different departments several degrees below the outdoor temperature.

With this system it is possible to keep an equal temperature in the works, summer and winter. The advantages of the system are economy, good ventilation and convenience. So far as known, this method has never been used in the heating of factories before, though it has been applied to public buildings. The entrance of a strong current of warm air, and its tendency to carry up with it all impurities, keeps the factory free from smoke and the air wholesome.

The pipes, in passing from one building to another, pass under open ground for several hundred feet. It was noticed last winter, when the blower was first turned on, that no heat reached the opening at the further end. As soon as the ground became heated, the air entered the building heated. When snow fell it was melted for a space of eight feet across the pipes, which are buried four feet. In the hot weather last summer the temperature was kept at least 10° lower by means of the air blast.—*Metal Worker.*

PROGRESS OF GAS AND ELECTRIC LIGHTING.

THE electric lighting industry, like every other industry to which men apply their brains and inventive faculties, progresses with wonderful rapidity. This fact must be admitted by the most prejudiced advocate of gas lighting, unless, indeed, he apes the action of the ostrich when it sees danger approaching. The admission does not alter circumstances in the least. The acknowledged progress has not done the slightest harm to the gas industry; on the contrary, we are prepared to maintain that it has done good by stimulating both manufacturers of gas and gas apparatus, the former to produce pure and good gas at a low price and the latter to introduce improved methods of burning it so as to get the best results in the way of illumination at the least possible cost. Hitherto, however, certain engineers have been wedded to the belief that progress in electric lighting is inimical to the interests of the gas industry. Others, again, have pooh-poohed the idea of electricity trenching upon the preserves of gas, and have been more inclined to regard oil as the real competitor. But to view the matter of electric lighting in this way is a mere burying of the head in the sands in order to avoid the impending danger of competition. We have never banished from our minds the thought that one day electricity may be applied in such a way as to constitute it a rival of gas in the domains both of public and domestic lighting; but we have seen nothing to lead us to any other conclusion at present than that this period is yet in the the unknown future. Every-day experience, however, teaches us new lessons. When we find that vessels can telephone long distances to each other through the medium of the intervening waves, and when we learn that reprints of existing books may be produced without the aid of the compositor or the printer's reader, we do not know what next may happen.—*Progressive Age.*

A SMOKE PREVENTIVE.

THE *Iron Age*, in speaking of smoky chimneys, tells about a device upon which the patent has expired. The device is known as the Woodson patent, but is now open to the use of anybody without royalty, as the patent ran out last year.

It is described as being very simple in its arrangement. A boiler-plate drum eighteen inches in diameter runs horizontally through the furnace from side to side about twelve inches above the grate and two feet from the doors of the furnace. The space above the drum to the boiler is bricked up so that the smoke and heat generated in front of the drum must pass down under the bed of fire and under and in rear of the drum, in order to find its way to the flue in the rear, and the smoke in passing through the fire is absolutely consumed and destroyed.

The coal is first thrown in the front, where it is coked and all smoke eliminated, after which it is shoved under the drum into the back furnace with iron bars, and fresh coal is fed in its place. With fine coal a little smoke can be detected coming from the chimney at the time of firing, but with coarse coal it does not smoke at all. This drum is supplied with hot water from two five-inch circulating pipes, one on each side of the boiler on the outside, and connected with the ends of the drum through the wall of the boiler. The water is fed into these pipes from the mud drum in the rear of the boiler.

From the large drum in front there is a six-inch connecting pipe with the boiler, through which the water passes, keeping it constantly in circulation, and thereby making the drum not only a means of heating the water, but a generator of steam. The purpose of the drum running through the bed of burning coal is simply to shut out the smoke of the front or coking furnace from the rear furnace, which connects directly with the flue and chimney; the water is introduced to the drum for the purpose of preventing its burning.

The cheapest Illinois soft coal is used in this furnace, costing only $2.65 per ton delivered at the works, but the chimney is as guiltless of smoke as though the purest anthracite was being consumed. The boilers are 5 x 16 feet, supplying power to a 20 x 48-inch engine, and heat to a four-story building 90 x 100 feet, and but 2½ tons of this cheap coal are required per day.

It is sufficiently shown that all smoke is consumed from the fact that the flues of the boilers are cleaned but once a week, and then not one-sixteenth of an inch of soot is found in them, while in furnaces not using a smoke consumer the flues of the boiler require to be cleaned every day, and always found heavily clogged with soot. A strong point in favor of this consumer is that it costs but $150, and can be attached to any furnace without requiring a change of boilers or the remodelling of the entire furnace.

CHIPS FROM A MILLWRIGHT'S LOG.

THE decree has gone forth that the fan pump must run faster. A very small pulley on the pump precludes all possibility of a change there, so let us look above. Here we find a "solid" pulley seven feet diameter and eighteen-inch face, keyed on to a 6¾-inches diameter section of the "main line."

To take this section out, take off the pulley and replace it with another, is more of a job than we can get away with between shutting down Saturday night and starting Sunday night. So we decide to split it off.

Bright and early on Sunday morning, Charlie, with a helper, "rigs up" a ratchet drill, and drills three ⅝-inch holes on opposite sides of and through the hub to the shaft. Next he drills one ⅝-inch hole through the rib in the center of the rim on two sides. By this time it is night, and we leave the pulley to run another week before we split it off.

During the week Charlie makes three steel pins, tapering, and about four inches long. These pins, after we have "checked" or "channelled" the rim with a "diamond point" chisel, are inserted in the holes in the hub, and by gentle driving with a sledge the hub is easily split open. One pin driven in each hole in the rim is sufficient to split it, and there she is.

Some time previous to this we had made another change in the machinery, and left us a "solid" 21 x 90 inch pulley, 10½ inch bore. This pulley was of the size we wanted, but we had to split it to get it on.

This was accomplished by means of holes and taper pins as above described. To make it a "clamp" or "split" pulley I had two very heavy forged clamp collars, one for each side of the hub, and four heavy pieces of iron, two on each side, to hold the rim. These pieces were held in place by means of countersunk head bolts. The bushing was made in two parts, one keyed in the hub, the other on the shaft. Two long five-eighths cap screws, tapped in between hub and bushing, held them firmly together.

This dodge, though not as mechanical as might be, was much cheaper than a new split pulley of the required size. It was a good job, well done and highly satisfactory. We have made more "clamp" pulleys since, as above described, and find it pays to do so.

I have split pulleys before and since, but not with a view to their subsequent use.

When any changes are to be made in a paper mill, time is closely limited, and you have your new pulleys ready to clap on, don't fritter away time and patience trying to get them off. If all reasonable methods fail, grab a sledge—look out for the pieces boys, and—smash. When you get down to the hub, a good solid cold chisel, backed up by Mike with a sledge, is the best "persuader."

I have read much in the papers lately about the care of tools, etc. This is all very good to talk about, but "what availeth a man," etc. Some men are very proficient in making their own tools. That is, they can, but won't. I have seen many a man working with tools (lathes and others) that were nearer ready for dressing than work. And why so? Simply from negligence to attend to them.

Such habits of shiftlessness are greatly detrimental to an otherwise good mechanic. Where it is a possible thing to do, let every man give his tools or the tools in his care the best attention, immediately replacing any worn out or broken ones. The care of tools is something very simple to learn, and once the habit is formed, like others, it is hard to break. Many millwrights think that they cannot make their own chisels and drifts, when in reality the working of steel is a matter that requires but little judgment.

The best screw driver that I ever had I made out of five-eighths octagon steel, two feet long. My forge was a soft coal stove in a Pennsylvania flour mill. The anvil was my hand axe stuck in a block, and I tempered the screw driver in the snow and ice on the door sill.

When "stuck" I have made chisels and drifts at the mill, heating them in the furnace under the boilers and using an old gear-hub for an anvil.

Of course such work is better done by men of experience, but when they are not available, one can learn.

After a few trials one may readily learn the different steels he uses, and at what temperature they stand the best. Let no one be afraid to try.—J. A. Lawrie in *Manufacturers' Gazette.*

PUBLICATIONS.

The fifth annual holiday number of the *Northwestern Miller* is to hand. In beauty of appearance and interest of contents, it surpasses all previous efforts of the enterprising publisher.

We are pleased to notice the prosperity of the Winnipeg *Commercial* as evidenced by an increase in the number of its pages.

MACHINERY MFG.

Thomas Clarke & Co., machinists, Brandon, Man., want to sell out.

Green & McWilliams will build a machine shop at Virden, Man., in the spring.

Mr. McKelvie's foundry at Vancouver, B. C., will probably be in operation by March.

A new shingle mill will be erected at Foxmead, Ont., this winter by Mr. James Hadden.

Mr. Merner is said to be thinking of removing his foundry from New Hamburg to Stratford, Ont.

Mr. Begg of North Gravenhurst has invented a machine capable of splitting 1,300,000 matches in a day of ten hours.

The Ontario Wheel Co., recently incorporated with a capital of $50,000, has commenced operations at Gananoque, Ont.

A joint stock company is said to be contemplating the purchase of the Patterson foundry at Whitby, with a view to operating it.

The foundry at New Westminster, B. C., is being thoroughly repaired preparatory to the erection of a new 15-horse power engine.

The D. F. Jones Manufacturing Co., of Gananoque, Ont., having just put in $3,000 worth of new machinery, will revolutionize the manufacture of shovels.

A number of mogul engines, with six wheel couplings and extension boxes, are being built in the Montreal shops and will be put on the G. T. R. in a couple of months.

The Hamilton *Spectator* thinks the demand for bells for public buildings, churches, etc., in Canada, is sufficiently large to warrant somebody in establishing a bell foundry in the country.

W. H. Russell, of Vancouver, B.C. has lately invented an elevator, by which it is claimed a vessel can be unloaded with less than half the labor and in one-quarter of the time required at present.

The consumption of water has increased in Hamilton from 441,549,270 gallons in 1878 to 1,098,746,650 gallons in 1887. The bulk of this large increase is attributed to the increase in number of manufactories.

The St. Anseline Manufacturing Co., is being organized with a capital of $10,000 at Moncton N. B., to manufacture lumber, furniture and flour. For this purpose property has been purchased on which saw and grist mills already stand.

The Winnipeg City Council will have surveys made with the object of erecting a dam across the Assiniboine river to provide water power for manufacturers. The Council is said to be desirous of increasing the flour milling capacity of the city.

A new steam generator in England is arousing a great deal of interest because of its great efficiency. It runs on the pressure instead of the draft principle. This obviates the expensive tall chimneys and costly methods of firing now in use. It is simply done by forcing an increased amount of air into the fuel.

The Association of Stationary Engineers of this city moved into new and more commodious quarters in the Shaftesbury Hall building last month. The meetings of the association are increasing in interest. The membership also is on the increase.

Seattle, B. C., was the scene of a severe conflagration on Dec. 30th, destroying the new mill of the Mechanics Mill Company and the building of Puget Sound Hide Co., the Seattle Boiler Works being also badly damaged. Total loss will aggregate $40,000.

The Stratford, Ont., Council are negotiating with Mr. Maxwell, implement manufacturer, of Paris, Ont., for the removal of his shops to Stratford. St. Thomas, by proposing to grant a bonus of $30,000, a free site and water, and exemption from taxation for ten years, is trying to induce Mr. Maxwell to go there.

The process for the instantaneous generation of steam, lately patented in England by John Blum, it is claimed saves 53 per cent in fuel, 96 per cent in boiler space and 53 per cent in the cost of plant; also that by its use a boiler explosion becomes an impossibility. Such an invention should supply a long-felt want.

The present steam mill capacity in Winnipeg is about 1,000 horse power, about 40 per cent. of which is used in flour milling. By a slight additional cost in the construction of the dams required for the improvement of navigation it is thought that about 30,000 horse power can be made available for manufacturing purposes on the Red and Assiniboine rivers in the city of Winnipeg.

The contractors who are doing the excavating for Bell's new organ factory at Guelph, Ont., attempted to loosen a large vein of frozen gravel by blasting. Some organ boxes were placed over the blast, the fuse lighted, and a moment later broken boards, gravel and clay were flying in all directions through the air. Several panes of glass were smashed in the factory, and a number of the men were greatly frightened, but no one was hurt.

The Cochrane Roller Mill Supply Co. was formally organized at Hamilton last month when the following officers were elected: Valancey E. Fuller, President. C. M. Counsell, Vice-President; Messrs. W. F. Cochrane, Chas. Riordan, C. M. Counsell, J. M. Gibson, M.P.P., V. E. Fuller, F. S. Mallock, and Robert Thompson, directors, with power to add to their number. The company's headquarters will be at Hamilton, and their works at Dundas.

A certain doctor in this city, says the Augusta, Me., *Journal*, was called upon the other day by a man who desired to get a prescription for alcohol. "For what purpose?" asked the doctor. "Mechanical," said the man with a countenance honest enough to look any judge in the county out of countenance. After writing the prescription and handing it to the man the doctor said:—"For what kind of mechanical purposes do you intend to use the alcohol?" "Sawing wood. Good day, sir," was the reply.

A shingle mill has been erected at Springbrook, Ont.

Needler's saw mill at Waubaushene, is still running.

Wm. Mattinson, saw mill owner, Wallace, N.S., has assigned.

A shingle mill is to be built at Vasey, Ont., by Thos. Greenlaw.

The old Gildersleeve saw mill at Lake Opinion is being torn down.

New machinery is being added to Perley & Pattee's mill at Ottawa.

Peter Gavin saw mill operator at Coleman P. E. Island, has assigned.

Harrison's new planing mill at Owen Sound went into operation a week ago.

A new saw and shingle mill will shortly be erected near Kinmount, Ont.

J. C. Bedard's new steam saw mill at Hardwood Hill, Que., will soon be in operation.

The various lumber firms at Fisher River, in the Northwest, are getting out logs in large quantities.

Quebec timber merchants are commencing to leave for Europe to push sales in the European markets.

H. C. Green, lumber merchant, London, Ont., is reported to be seeking a compromise with his creditors.

A saw mill and grain crusher are being erected by Mr. Elam Livingston, on his bush farm at Warnock, Ont.

A company with a capital of $10,000 is talked of at Madoc, Ont., for the purpose of operating a sash and door factory.

Lumbermen in the vicinity of Nickesport, Ont., are very busy, and expect to do a large amount of work this winter.

Mr. F. Galbraith has purchased a factory at Bethany, Ont., and is fitting it with circular saws for lumber, lath machinery, &c.

Chase & Son's saw mill at Hartland, N. B., is to be rebuilt. A new steam saw mill will also be erected by Messrs. Carr & Shaw.

Mr. Thos. Stinson is erecting a new saw and shingle mill at Minden, Ont. Operations will be commenced early in the spring.

The owners of the Glen Major, Ont., saw mill are trying to arrange with the C. P. R. Company to run a switch up to their mill.

W. H. Murray's saw mill at Indiantown, N. B., is being enlarged, and machinery added for the manufacture of staves and clapboards.

At the annual sale of lumber at Nassau Mills, Peterboro', last week, over one million feet were disposed of. A large quantity will go to Albany.

Raymond's saw mill at Mitchell's Bay, Ont., which was destroyed by fire, is to be rebuilt and in addition to cutting lumber the manufacture of staves will be commenced.

Peter McLaren, of Perth, Ont., who owns extensive and valuable timber limits in Donald, B. C., purposes putting up a large mill on the Columbia River in the spring.

The minister of Customs has decided that teams which go from Canada to work in the lumber woods in Maine or Michigan cannot be readmitted into Canada free of duty.

Vance Bros. large saw mills, near Inwood, Ont., were destroyed by fire last month. A large quantity of staves and lumber was also burned. Loss, $2000; no insurance.

Two new saw mills will, it is said, shortly be erected at Papineauville, Que., by Messrs. McLachlan Bros., of Arnprior, Ont., and Messrs. John Gilles & Bro., of Braeside, Ont.

The timber in many parts of Canada is specially adapted to the manufacture of pulp used in the manufacture of paper, and as a substitute for lumber in the manufacture of furniture and other articles.

During the season of 1887 there was shipped from Montreal 89,785,368 feet of lumber to Great Britain and 26,684,322 feet to South America, a total decrease of 11,042,850 feet as compared with 1886.

Reports from Lake Megantic state that lumbering is going on briskly, but notwithstanding a good demand, no more is paid in log than last year, although men get from three to four dollars a month more, and are scarce at that.

Lumber exports from Ottawa to the United States, for the month of December are as follows Sawn lumber 5,866,303 feet $83,531, lath 942,300 pieces $797, R. R. ties 2,854 pieces $565, bark 367 cords $1,839, shingles 136,250 $267.

A project is on foot at St. John, N. B., to construct a canal around the Grand Falls for the passage of logs down the river, thereby preventing the heavy loss to lumbermen resulting from the hanging up annually of large quantities of logs at the falls.

Parry Sound lumber operators report five camps in full blast this winter to every one in operation during the past two winters, although a large number of men were hired in Toronto for the camps, the demand was not satisfied. Good wages were offered.

A bill has been introduced into the U. S. Congress by Mr. Rice, of Minnesota, providing for the admission into the United States, free of duty of the products of Minnesota forests belonging to American citizens but manufactured into lumber in Ontario saw mills.

Mr. T. G. Hawthorne, of Ottawa, representing manufacturers of axe and fork handles, etc., has asked the Minister of Customs to place white ash lumber on the free list, because, as he alleges manufacturers cannot get a sufficient quantity of it in Canada. Sir Charles Tupper will consider the matter on his return from Washington.

Lumbering on an extensive scale is being carried on in the Kinmount, Ont., district, by Mr. Boyd. Over 600 men are engaged at his shanties, and 270 head of cattle were recently sent to them. Ten shanties employing about 60 men each are in full swing. The cut of logs will be enormous. As soon as snow makes its appearance the drawing will begin. Over 100 teams will take part in this work.

St. John, N. B., *Sun*. At the timber sales at the Crown land offices on Wednesday, the 11th, $31 per mile was bid for one of the berths. There have been more leases of crown timber lands taken out this year than for many previous ones. Up to January the 11th, 120 new applications for leases had been received by the office, in addition to the 900 licenses which were renewed under the system of annual renewals.

The electric light is pretty generally used in the Puget Sound saw mills. The Port Gamble mill was the first to introduce the light about 1881, and the example was quickly followed. The Gamble mill has a small dynamo and a few incandescent lamps in addition to its big lights. With that exception the arc light is used by all the mills. Most of the mills have their own plants, though in Seattle the lights are furnished by the Edison and the local gas companies.

An Ottawa despatch says The creditors of Mr. R. J. Stewart, the well-known lumberman, with a view to hastening a settlement, have made Mr. A. G. Grier, of the firm of Stewart & Grier, an offer for the purchase of Mr. Grier's interests. No arrangement has yet been reached, however. Mr. Grier, it is understood, offered to sell his interest for an advance of $100,000 on the market value of his interest. The market value of the mills and limits is understood to be nearly a million dollars.

Settlers in the Parry Sound District have drawn up a petition to the Minister of Crown Lands for Ontario praying that the Government would cancel all timber license locations that have not 50,000 feet M. B. and that a reservation of 50,000 feet M. B. be made to the location in each license granted after the present license year expires. The Parry Sound *Star* suggests that a friendly conference between the settlers and the lumbermen would probably result in a satisfactory understanding regarding the matters complained of.

Much sympathy is expressed in business circles for the lumber firm of S. C. Kanady & Co., of this city, who were announced some ten days ago to be in financial difficulties. The trouble is said to be due to the failure of a number of lumbermen whose paper they held, among them being Lellel & Co., lumber merchants, of London, Ont., $6,000 worth of whose paper they held. The liabilities of the local firm amount to $70,000, to the Parry Sound Lumber Company and other similar companies throughout the province; while to the Ontario Bank and others the firm owe $150,000. It is believed that the difficulties which now beset the firm will shortly be overcome.

A Quebec paper charges Deputy Commissioner of Crown Lands Tache with using his official position to grant favors to his relatives in the shape of sales or leases of certain timber lands under conditions which do not harmonize with the rules of his department. One instance is cited in which it is alleged that a lease was granted a member of the Tache family without any payment being required until after the lessee had disposed of his lease at a sum considerably in advance of what he was to pay for it, and it is charged that shortly after the transaction, the lumberman to whom the lease was transferred in consideration of the higher price, was suddenly notified by the Crown Lands Department that the lease had been cancelled. By this procedure it is alleged the lumberman lost considerable money. These are serious charges, and call for an immediate investigation of the facts.

THE DRYING OF LUMBER.

FROM the earliest history of the lumber development of this country a necessity has been felt for a rapid process of seasoning. Up to a few years ago an intending builder thought it requisite to lay his plans and purchase his material many months if not years before he expected to use it, and garret and barn loft filled with lumber was often the silent witness that building projects were filling the brain of the farmer or the merchant. When at last the time had come for the structure to rear its noble proportions heavenward, it was almost invariably found that through miscalculation a portion of the needed material had not been provided or that exigencies had arisen leading to its utilization in other schemes, and when most wanted it was not available. Then came a make-shift, for the work on the building couldn't be delayed, and in one corner of the usually spacious lot could be seen an odd-looking structure from which, night and day, smoke could be discovered issuing through its crevices with the chances about even that about the time the "smoke seasoning" process should be sufficiently advanced to warrant the cooling of the pile it would suddenly disappear in a baptism of fire, and the loss of money and time in preparing another batch be the supplement to a delay of the workmen in the progress of the work. The second endeavor was usually (in latter days) in the line of heat seasoning, rather than of smoke, often ending no less disastrously than did the first. In smoke seasoning the lumber was usually stood on end forming a tent or shanty, the upper end resting upon the limb of a tree, or upon a frame erected for the purpose, and after a sufficiency of lumber was thus gathered a smudge was built at the base and the heated smoke was maintained for several weeks or until the lumber was reasonably seasoned, a result attained oftentimes as much through the influence of the sun as by the artifical means. After the heavy box stove became common, the smoke process gave way to one in which the lumber being piled on sticks, with a recess built in the center and the outside tight boarded on sides and top, a box stove or boiler flue was placed in the recess and a moderate fire maintained for such period as was deemed requisite. Not seldom was the moderate fire fed once too often, and like its predecessor of the smoke process, the labor of months in procuring and of weeks in drying was lost in an hour. Then came an era of steam seasoning, in which the lumber was subjected to a bath of live or exhaust steam for an hour or two, effectually cooking the native moisture of the wood which speedily dried out after a few day's exposure to the sun or wind. But all these processes were slow, and did more or less damage to the texture of the wood, and when the consumption of lumber reached the development of the period just subsequent to the close of the war, more speedy methods became a necessity, and inventive genius exercised itself in producing methods which should be effective in proportion to the demands of trade, and it as been the aim of each of those who have delved in this direction to attain the highest degree of excellence, first in the shortest length of time in which the largest amount of lumber could be prepared for the proper use of the consumer or builder; second, with the greatest economy of cost; third, with the least development of inherent defects in the texture of the lumber, and the avoidance of defects which should be induced by the process. Nature's processes of air drying are not always the most conducive to the best preparation of lumber as it is used in these days of stoves and steam heat, however effective it might have been in the days of fire-place ventilation. Supplementing it, no doubt, the best means of preparing lumber is in permitting it to remain in water until the more soluble of the resinous products are dissolved, after which the process of seasoning is a rapid one, but even then the tendency to warp and twist is not wholly overcome, and it will invariably be found that when the hard outside shell is removed a contraction of the fiber of the wood takes place, and a shrinkage occurs after the lumber has been dressed.

Slow processes of seasoning did very well and answered all purposes, as long as the consumption of lumber was restricted to the quantity which could be dressed by hand, but with the influx of planing mills and wood-working factories, supplying a demand in the building of cities and the populating of vast prairies, in a national development such as was never witnessed before in the world's history, a demand requiring the building of immense railway systems in which the transportation of lumber forms no inconsiderable portion of the traffic, more rapid preparation of stock is requisite, and capital must be turned more rapidly in the competitive race than would be possible were nature left alone to dry out the moisture and prepare the lumber for the use of the consumer.

Another economic and most important factor also enters into the consideration in the expense of transportation by rail, for while in water carriage this cuts but little figure, by rail where charges are based upon weight, it becomes a most important item, as it costs just as much to transport a pound of water which must be eliminated before the lumber can finally be used, as it does the product ready for use, and it is to a large extent true, that the saving of expense in this respect constitutes the profit of a saw mill or jobbing yard. Hence the demand of the day is for the simplest and most effective method of expelling the moisture from lumber, and various devices are offered to the public to this end. Among the requisites to be considered are, first, efficiency in doing the work thoroughly; second, without injury to the lumber; third, with sufficient rapidity; fourth, at a minimum of cost both in original construction and in operating. The first three, and in fact all these points, are of the utmost consequence in determining the value of any process for drying lumber. If the work is not thoroughly done, or if it leaves the lumber in a condition of reduced value by reason of checking or splitting, or the development of defects, which by natural process would not be inherent to it, the economy of operation would be an expense in place of a saving. If the cost of construction and operating eats up all the profits accruing from the seasoning, then the other advantages are nullified. Of the last point economy of operation is more to be considered than the first cost of the device, as construction once perfected, expense ceases, while operating, expense is an ever present factor. The subject is a most important one which interests consumers and dealers in lumber equally with manufacturers.—*Chicago Lumber Trade Journal.*

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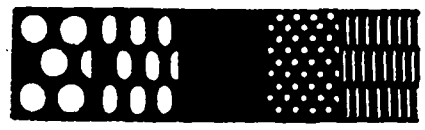

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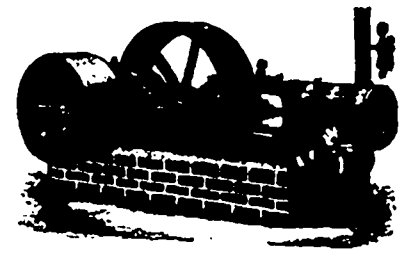

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TRADE NOTES

Wm. Reynolds, Stayner, Ont., is putting in one of Wm. & J G. Greey's wheat heaters.

Wm. & J. G. Greey have booked an order from B. Hoover, of Markham, for one No. 1 purifier.

Messrs. Wm. & J. G. Greey have sold Eath & Schmidt, of Midmay, Ont., a No. 1 wheat heater.

J. & L. Pfeffer, of Milverton, are putting in a packer supplied by Wm. & J. G. Greey, of Toronto.

C. O. Apps, of Brantford, has ordered from Wm. & J. G. Greey, a wheat heater and steam generator.

N. Wenger & Bros., of Ayton, are putting in another set of rolls of Wm. & J. G. Greey's manufacture.

Messrs. Freur Bros., of Acton, have started a new chop roll, built by Wm. & J. G. Greey, of Toronto.

Wm. & J. G. Greey have filled an order for Wm. Milne, of Ethel, for one of their new flour dressers.

Thos. Scythes, of Thornton, Ont., is putting in a wheat heater supplied by Wm. & J. G. Greey, of Toronto

Moody & Sons, of Dunnville, have bought a No. 2 steam wheat heater from Wm & J. G. Greey, of Toronto

McKenzie Bros., of Kirkfield, have ordered from Wm. & J. G Greey, of Toronto, one No 0 smut machine.

Wm. & J. G. Greey are supplying Whitlaw, Baird & Co., of Paris, Ont., with two improved wheat heaters.

Wm. & J. G. Greey, of Toronto, are supplying the Moose Mountain Trading Co. with a packer for flour.

Jean Reany of St Therese P Q has purchased a three roll chop mill from Wm. & J G. Greey, of Toronto.

B. F. Reesor, of Newmarket, has bought a run of 4 ft. 4 in. chop stones from Wm. & J. G. Greey, of Toronto.

Samuel Campbell, of Progresston, Ont., has bought of Wm. & J. G. Greey, Toronto, a No. 1 wheat brushing machine.

Messrs. Geo. H. Haworth & Co., of this city, have received a large order for belting for the new Keewatin flouring mill.

Wm. & J. G. Greey have an order for a No. 3 smutter from Messrs. McKinnon & McLean, of Prince Edward Island.

Nasmith & Merrilees, of Almonte, Ont., have bought a No. 2 Cockerell scouring case from Wm & J. G Greey, Toronto.

E. W. Farr, of Lockton, Ont., has placed an order with Wm. & J. G. Greey, Toronto, for a single set of 9 x 18 feet rolls.

Wm. Hodge, of Cornwall, Ont., has ordered a No. 1 improved cockle machine from Messrs. Wm. & J. G. Greey, Toronto.

Messrs. Wm. & J G. Greey have received an order from R. Muir & Co., Winnipeg, for a No. 2 velocity middlings purifier

Wm. Wilson, of Wilson's Mills, has bought a No 1 combined smut and brush machine from Wm. & J. G. Greey, of Toronto.

Messrs. Dexter & Foulds, of Onondaga, Ont., are putting in a wheat heater. Wm. & J. G. Greey, of Toronto, are furnishing it

Jacob Steinmuller, of Walkerton, Ont., is putting in a Cockerell scouring case, manufactured and supplied by Wm. & J. G. Greey, of Toronto.

May Bros., of St. Thomas, Ont., have ordered a double set of 9 x 24 improved rolls, with shaker feed, from Wm. & J. G. Greey, of Toronto.

D. M. Lyman, of Munroe's Mills have received from Wm. & J. G. Greey a 4-ft. oatmeal shelling stone, of Derbyshire Peak, for his oatmeal mill.

J. N. Horton, of Bolsover, has placed an order with Wm. & J G. Greey, for one double set 9 x 18 improved chilled iron rolls, with shaker feed.

F. L. Green, of Greenwood, Ont., has purchased from Wm. & J. G. Greey one of their new style double belted 9 x 18 roller mills with Sperry feed.

Messrs. D. & J. Clark, of Ayr, Ont. are putting in a Cockerell scouring case for their brush machine. Wm. & J G. Greey, of Toronto, are supplying it.

Messrs. Wm. & J. G. Greey have received an order from Dodds & Co., of Orchard, Ont., for three pairs of 9 x 18 rolls, with improved feeds, for the additions to their mill.

John Lillburn, of Holland Centre, is changing his mill to the roller system. Wm. & J. G. Greey, of Toronto, have the contract in hand. E. P. Cave doing the millwright work.

Wm. Farr, of Lockton, Ont., has put in a double set of 9 x 18 rolls, No 1 separator, No. 1 bran duster and a No 2 improved flour dresser, all of Wm & J. G. Greey's manufacture.

M. S. Deane, of Bridgenorth, Ont., is completing his mill to the roller system. He has ordered his rolls (3 double sets), purifiers, centrifugals and packers, from Wm. & J. G. Greey, Toronto.

Messrs. Wm. & J. G. Greey have been favored with an order for one No. 2 cockle machine, one No 2 separator, one No. 2 smutter, one No. 2 purifier and one No. 2 centrifugal, for Albert Hagar, of Plantagenet, Ont

Messrs. Goldie & McCulloch, of Galt, have recently placed engines and boilers for electric light purpose in the following places Yarmouth, N. S., Fredericton, N. B., Halifax, N. S., Oshawa, Ont.; Guelph, Ont., Berlin, Ont., Galt, Ont.; Orillia, Ont., Belleville, Ont.; Brockville, Ont., Renfrew, Ont.; London, Ont. They are also building engines and boilers for other points, including Napanee, Woodstock and Colburg.

The roller plant supplied to Mr. Milton Teskey, of Appleton, has been running since the first of December. It consists of 6 double sets of 9x15 and 18 inch rolls, with the necessary bolting and purifying machines. The contract for the entire work was given to Messrs Wm & J. G Greey of Toronto, and was filled in a most satisfactory manner The capacity is above 75 bbls. per day Mr. Alfred Cox, lately of Almonte, has charge of the mill.

Alonzo Brown, of the village of South Mountain, has erected a fine 100 barrel full roller mill at the station of South Mountain, on the new short line from Smith's Falls to Montreal The building is frame, 36 x 48 feet, sheeted with iron, and three full stories high. The power is a Leonard-Ball Engine. The machinery was supplied and put in place by Messrs. Wm. & J. G. Greey, of Toronto, and embodies all their latest improvements. The millwright work is neatly finished in varnish and stained woods.

During the latter part of December, Thos. Macrae & Co., of Cookshire, P Q., completed and started their new steam roller custom grist and chopping mill. The machinery was supplied by Wm & J G Greey, of Toronto, and consists principally of eight pairs of 9 x 15 belted rolls, two purifiers, five flour dressers, four scalpers, a combined separator and cockle machine and a combined smutter and brush machine. There is also a chop stone and wheat smutter and bolt When completed the mill is reported to have started off very smoothly, making good work from the start. Mr George Plewes, late of Creemore Ont., has been given charge of the mill

Wm. & J. G Greey have just completed and started a fine little roller mill for George Fenson, of Elmwood, County of Grey. The machinery comprises four double sets of 6 x 15 inch, and one double set of 6 x 12 inch silent belt roller mills, in Greey's new style frames for small rolls and fitted with the celebrated Sperry feed a smut machine and oat and seed separator, seven of Greey's new flour dressing machines two middlings purifiers and four scalping reels There is also a stone for grinding feed The motive power consists of a Corliss engine, 30-inch stroke by 11-inch diameter of cylinder, with a boiler 12 feet long and 4 feet diameter. The building is a neat two-and-a-half story white brick with basement of stone, the dimensions being only 30 feet square, yet by the compact arrangement of machinery, sufficient room is left for the ordinary business of a country mill.

WHAT THE STRIKES OF THE PAST SIX YEARS HAVE COST THE UNITED STATES.

THE third annual report of Commissioner Carroll D. Wright, U. S. Bureau of Labor, which has just been officially submitted, relate principally to the strikes and lock-outs that have occurred during the past six years. From the facts and figures therein contained, says the *Manufacturer and Builder*, we are enabled to place before our readers, in concise and comprehensible form, a statement of the vast and irreparable injury which they have done. The following table shows the number of strikes occurring during each of the last six years, the number of establishments involved, and the average number of establishments involved in each strike:

Years.	Strikes.	Establishments involved.	Average No. Establishments.
1881	471	2,928	6.2
1882	454	2,105	4.6
1883	478	2,759	5.8
1884	443	2,367	5.3
1885	645	2,284	3.5
1886	1,412	9,893	7.0
Total	3,903	22,336	5.7

In 1887 there were, according to the best information obtainable, 853 strikes.

During the six years covered by the investigation, New York had the largest number of establishments affected, both by strikes and lock-outs, there being of the former 942 and of the latter 1,528. The building trades furnished 6,060 of the total number of establishments involved. The total number of employees involved in the whole number of strikes was 1,318,624. The number of employees originating the strikes was 1,020,832. The number of employees in all establishments before the strikes occurred was 1,662,045, while the whole number employed in the establishments involved after the stikes occurred was 1,636,247, a loss of 25,978. There were 203,308 new employees engaged after the strikes, and 37,483 were brought from other places than those in which the strikes occurred. In 2,182 establishments lock-outs were ordered. In these there were 173,995 employees before the lock-outs occurred, and 169,436 after the lock-outs, while the number actually locked out was 159,548. There were 13,976 new employees secured at the close of lock-outs, and 5,682 were brought from other places than those in which the lock-outs occurred.

The States whose industries were principally affected by these disturbances, were New York, Pennsylvania, Massachusetts, Ohio and Illinois, in which 75 per cent of the strikes and 90 per cent of the lock-outs occurred. These States contain 48 per cent of the manufacturing establishments of the country, and 58 per cent of all the capital invested in the mechanical industries of the United States.

Of the 22,336 establishments in which strikes occurred, 18,342 strikes were ordered by labor organizations, while of the 2,182 establishments in which lock-outs occurred, 1,753 were ordered by combinations of managers. Of the whole number of establishments subjected to strikes, there were temporarily closed for business 13,443, or 60.19 per cent; on account of lock-outs, 62.60 per cent. The average duration of stoppage on account of strikes was 23.1 days; for lock-outs, 28 days.

The results of the strikes, as far as gaining the objects sought are concerned, are shown to be as follows: Success followed in 10,407 cases, or 46.59 per cent of the whole; partial success in 3,004, or 13.45 per cent of the whole, and failure followed in 8,010 cases, or 39.89 per cent of the whole. By lock-outs, 564 establishments or 25.85 per cent of the whole, succeeded in gaining their point; 190, or 8.71 per cent, partly succeeded, and 1,305, or 59.80 per cent, failed.

As to cause or objects of strikes, it is shown that increase of wages was the principal one—42.44 per cent. The other leading causes are given as follows: For reduction of hours, 19.45 per cent; against reduction of wages, 7.75 per cent; for increase of wages and reduction of hours, 7.57 per cent; against increase of hours, .62 per cent. Total for the five leading causes, 77.83 per cent. All other causes, 22.17 per cent.

Disclaiming absolute accuracy, the report gives the loss of employees and employers resulting from strikes and lock-outs as follows: Losses to strikers, $51,816,165; loss to employees through lock-outs, $8,132,717, or a total wage loss to employees of $59,948,882. This loss occurred for both strikes and lockouts in 24,518 establishments, or an average loss of $2,445 to each establishment or of nearly $40 to each striker involved. The assistance given to strikers during the same period, so far as ascertainable, amounted to $3,325,057; to those suffering from lock-outs, $1,105,538, or a total of $4,430,595. These amounts, however, the commissioner says, are undoubtedly too low.

The employers' loss through strikes for the six years amounted to $30,732,653; through lock-outs, $3,432,261; or a total loss of $34,164,914.

The tables also show that the chief burden of strikes was borne by thirteen industries—namely, boots and shoes, 352 establishments; brick-making, 478; building trades, 6,060; clothing, 1,728; cooperage, 484; food preparations, 1,419; furniture, 491; lumber, 395; metals and metallic goods, 1,585; mining, 2,060; stone, 468; tobacco, 2,959; transportation, 1,478. These represent 89.35 per cent. of the whole number subjected to strikes.

In lock-outs, five trades 80 per cent. of the whole burden, as follows: Boots and shoes, 155 establishments; building trades, 531; clothing, 773; metals and metallic goods, 76; and tobacco, 227; or a total of 1,761.

It will therefore appear from the commissioner's report, that during the period of six years which his facts and figures cover, no less than 22,336 establishments in all parts of the country have been rendered unproductive for a longer or a shorter time by reason, in nine-tenths of the cases, of strikes; that in these disturbances nearly 1,500,000 working men and women were involved; and that these disturbances caused a loss to the country, in wages and profits of capital, of not less than $100,000,000.

RATES ON THE WELLAND CANAL.

THE Chicago *Times* says: The question of unjust discrimination by the Canadian government in regard to tolls on vessels passing through the Welland canal has caused considerable comment among shippers. The discrimination is not so much aimed at the interests of American shippers as such, as against the American transportation companies, and tantamount to imposing a tax on export shipments by lake and subsequently over American railways or the Erie canal. A prominent member of the board of trade, speaking of the subject, said: It seems to me that there must be something radically wrong in the system of dues over the Welland canal. According to my interpretation of the international treaty, all commerce over the waterways of either nation must be subject to exactly the same laws and regulations. Now, in the case of the canal at Sault Ste. Marie, which is under the control and in fact the property of the American government, all of our vessels are allowed to pass through free of tues, and the Canadians are allowed the same privilege. In regard to the Welland canal it is true that American and Canadian vessels are taxed on precisely equal terms, but none the less is there a discrimination which indirectly operates in favor of Canadian interests. To illustrate: I can ship grain consigned to either American or Canadian ports for 20c a ton canal dues; but if that grain is intended for export I can save 18c a ton by consigning via Montreal instead of unloading it at an American port and shipping it thence by canal or rail to the American seaboard for exportation. Of course we would much prefer to send our shipments from American ports for many considerations, but this unwarrantable tax of 18c compels us in many instances to avail ourselves of the St. Lawrence river route. It is a matter which the people of every Canadian or American port on Lake Ontario ought to agitate, as it effects their interests even more than it does ours.

BOILER SCALE AND ITS PREVENTION.

IN both past and present, and without doubt in the future, says the *American Engineer*, one of the most troublesome features and results of steam development and use is boiler scale. Many are the methods suggested and temporarily adopted, and many the "Compounds" concocted and sold, all sure preventors of scale; all to be finally abandoned as lacking in efficiency as well as economy. The clarifier too comes in for its share of doubtful success. Too much is claimed, too little is done.

The problem to be met is, at times not at all understood, or possibly where understood is totally ignored in the interest of a profitable sale. The troublesome points in the problem are that the scale, as a material, is a poor conductor of heat, also that it is hard to hinder the formation and hard to get rid of, if formed. In many cases, the broad condemnation of scale as a retarder of boiler efficiency is enlarged to too great a calamity, and often in the interest of the "Preventor" or "Compound." The standing of scale as a conductor of heat as compared with iron is as 22 for scale as against 375 to 435 for iron. If now we have equal thickness of combined scale and iron, the efficiency will be reduced to $(22 + 400) \div 2 = 211$. The bad effects of this really bad capacity for conduction is only felt to any great extent when first firing up. When the metal and scale become thoroughly heated, the efficiency increases. Danger to the metal arises of course from the application of too high a temperature to the metal beyond the capacity of the scale to transmit or rather to take up, hence the necessity for careful firing that the metal shall not become red hot. Such necessities are quite similar to those of extra thick metal over the furnaces. The outside metal must not be heated too quickly; ample time must be given, to thoroughly impregnate the metal with heat of good temperature. With the thick metal or the combination of metal and scale, the trouble decreases as the metal or metal and scale become permanently heated and the fire permanently operative. The firebrick walls of the furnace take considerable time before they become thoroughly heated, but when so heated, assist rather than retard the operation of the furnace by giving out a steadying temperature when fresh coal is thrown on the fire. Similar too, though not at all considered beneficial, is it with the scale, when the furnace heat is low, there is a reserve in the scale that acts while the metal of the boiler is not receiving so much heat, especially so as the ratio between the temperature of water and heat of furnace is reduced. Of course the thicker the scale and the thinner the iron, the less efficient is the combination, and thinner the scale and thicker the iron the more efficient is the combination.

The principal scale forming matter or materials in fresh water are the carbonates of lime and magnesia and the sulphate of lime. Lime is one of the infusible bodies, fusing with great difficulty even with the oxy-hydrogen blowpipe. Its affinity for water in slaking is very great and is attended with considerable heat. This slaking forms hydrate of lime and upon being reheated to a red heat, will part with its water again. But very little lime will be dissolved by water, it taking a very large proportion of water to that of lime, and the more according to the increased heat of the water into which the hydrate is cast. It takes some 640 grains of water at 37 degrees, and 778 grains of water at 60 degrees Fahr. to dissolve one grain of lime, it takes 973 grains of water at 130 degrees, and 1,275 grains of water at 212 degrees to effect the same result. Thus it will be seen, that upon heating water containing lime, a separation and deposit of lime at once takes place in accordance with the temperature developed. Therefore, by means of a feed water heater of ordinary pattern, preferably the closed heater, some 50 per cent of the lime will be left behind upon the feed water passing to the boiler, provided, of course, the feed water be at 212 degrees temperature; at 160 degrees, but one quarter of the lime will have been deposited before entering the boiler. The reason we prefer the closed heater is because in consequence of the steam mingling with the water it heats, and there is so much pure water to take up its share of the lime upon becoming condensed and liquified It has been stated on this subject by Prof. Chandler of Columbia College, New York, before the Polytechnic Association of the American Institute, that boiled water expels the free carbonic acid, and causes the separation of the carbonates of lime and magnesia, and if the water be raised to a high temperature and kept under considerable pressure, there results almost a complete preripitation of the sulphate of lime. This is good as far as it goes, but is evidently a little broad.

Water containing carbonic acid will freely take up lime in proportion to the contained acid, and since all natural waters contain dissolved carbonic acid, it is to be expected that lime will naturally be contained. River water, but more especially spring water, invariably contains more or less lime, particularly in limestone districts. The hardness of water due to this temporary presence of the carbonate of lime can always, as already stated, be reduced by boiling or raising the water to a high temperature, or it may be reduced by the introduction of lime water into the hard water when the dissolved carbonate and dissolved lime become mixed, the lime is carbonated and the whole is precipitated without trouble.

Such methods, of course, account only for the precipitation of the lime but do not dispose of it, so that if in a heater, the water is raised to a temperature capable of precipitation even to 200 or 212 degrees, the circulation of the water due to varying heats and the action of the feed pump will carry the lime with it into the boiler. The reason the lime is left behind in the boilers is because of the constant evaporation of the water and the carrying off of the steam, and the replacing of such evaporation by new water. If the exhaust steam be turned into feed water by means of a condenser and pumped back into the boilers, the scale to considerable extent will be prevented as but little outside water will be necessary to take the place of that due to loss by leakage etc., such being the method generally adopted in salt water practice to keep the salt out of the boilers. The reverse of this is the general practice where stationary engines are used. In a majority of cases no condenser at all is used, and the exhaust steam is either allowed to escape to the atmosphere as a total loss, or partially used in the feed water heater, or for some special business purpose, and in winter time used for heating purposes. This brings us down to the distinct question of feed water heaters and clarifiers which we propose to make the basis of a future discussion of this subject.

REVOLUTIONIZING COTTON OIL MAKING.

OUR Southern cotton oil makers will be glad to know that the entire oil industry of the country is to be revolutionized by a new machine that is soon to be put on the market. In order that the importance and value of this machinery may be better understood it will be necessary to explain the present method of the manufacture of cotton seed oil. The lint adhering to the seed necessitates that the seed be cut in two and the kernel extracted and the oil pressed from it. The shell and adhering lint are used as fuel, or thrown away. Now this machine simply removes all the lint from the seed, leaving it perfectly clean, like corn, which will enable oil manufacturers to crush it whole, as the English mills crush Egyptian seed, thus increasing the product fully fifty per cent. The difference in results between the old and the new process is as follows:

Matter obtained from one ton of seed by present process:	
Gallons of oil	37.
Pounds of oil cake	700.
Pounds of cotton	25.
Matter obtained from one ton of seed by new process:	
Gallons of oil	55.
Pounds of oil cake	1,400.
Pounds of cotton	25.
Pounds short fibre—paper stock	200.

The oil cake produced by the new process is not as rich as the old process cake, and is worth a little less, but for food purposes is better than the old, as it is not too rich to feed without any mixture with bran or other feed. What is here termed as the "new process" is new only so far as America is concerned. The English oil mills crush annually about three hundred thousand tons of cotton seed—their principal source of supply being from Egypt. The reason of this is that owing to the nature of the Egyptian seed the fibre leaves it more readily than American seed, and in ginning the cotton the gins remove all fibre from the seed, which allows it to be safely shipped to England, where the English oil manufacturers crush the whole seed in the same manner as this machine will enable oil manufacturers to crush American seed. The English manufacturers of oil heretofore have not been able to obtain American seed for the reason that until the present time no machine has ever been made that would remove all the fibre from the seed, which would admit of its being exported. American seed that has the fibre on cannot be exported for the reason that the fibre adhering to the seed absorbs and retains the moisture in crossing the ocean, which causes it to heat.

As the English crush the seed whole their product from a ton of seed is about 50 per cent. more than the American process, therefore they are enabled to pay a greater price for seed than the American mills. The American seed, after being cleaned of all fibre, is a better seed than the Egyptian, as the hull is thinner and the kernel larger and richer in oil. As Egyptian seed is worth in Hull and Liverpool about thirty dollars per ton, there is no reason why American cleaned seed is not worth more for the reasons stated; but at present the English manufacturers are only offering the same price for American cleaned seed that is paid for the Egyptian.

The writer is not at liberty to say anything about this new machine, except that it will be put on the market shortly and sold direct to the cotton planters of the South. It removes all the fibre from the seed without damage to the hull, and puts it in the same condition as Egyptian seed, so that it can be as safely exported. The result of this is to at once open the markets of Europe for American seed, and bring the English and mills of other countries into active competition with American mills for cotton seed.

If Southern planters can get a machine of this kind cheap, it will place them in a position to clean and export their cotton seed, and not be dependent upon the oil monopolies for a market, as has been the case heretofore. The result of this will be that the oil mills of this country will be compelled to change their present process of manufacture to that of the English, as they cannot pay as much for seed as the English and still use their present method of manufacture. As an evidence of this fact, the English pay thirty dollars per ton for Egyptian seed, and make it into oil and oil cake, and sell their products in competition with American manufacturers of oil who pay only from $6 to $10 per ton for seed. The reason why they are enabled to compete with America in the manufacture of cotton oil and pay so much more for seed, is that they crush the whole seed, and from a ton of seed they obtain a ton of product; whereas the American mills from a ton of seed only obtain half a ton of product.—Henry Featherstone *Dixie*.

SOME USEFUL "CHESTNUTS."

NEVER work with a dull tool.

Take time to sharpen and put your tools in good order, it saves time in the end.

Above all, never use a dull or badly "set" saw. It will ruin your work sour your temper, and make you disgusted with the whole world.

If you are varnishing or polishing a piece of work, have the room or shop warm, exclude draught and dust, and don't be in too big a hurry.

If you are polishing in the lathe see to it that all dust and dirt are removed from the lathe bed before you commence work.

It is better, when possible, to polish all turned work in the lathe. It always has a better appearance for it.

In making patterns for castings, if you have no experience you had better consult me, or some person who has had experience. Patterns are difficult things for amateurs to make if they do not understand the principles of moulding and founding.

White pine or mahogany makes the best work for patterns. Lead, brass, copper and sometimes plaster Paris are used for making patterns; especially is this so for small, fine castings.

Shellac varnish is the best material for coating patterns.

Beeswax may be used for stopping up holes or to cover defects in patterns if it is coated with shellac varnish afterwards. The beeswax will "take" the varnish readily, and will not cling to the "sand," like ordinary putty.

Shellac varnish may be mixed with a little lampblack to give it body and make a black pattern.

Sometimes pattern makers use stove polish, or "black lead," as it is called, to finish their patterns. It is applied nearly dry then polished with a brush.

Wood used for patterns must be of the very best finish, straight grained, free from knots or shakes, and well seasoned.

A clean pattern gives a clean casting, and much labor may be saved by making the pattern the right size, and smooth and clean.

After patterns have been used they should be kept in a dry place, as damp will distort and otherwise injure them.

Always make a drawing of patterns before making. Much time and labor will be saved.

Where patterns part in the centre they should be made to separate easily.

Put on your best workmanship when pattern making. —*Universal Tinker.*

RECOLLECTIONS OF AN APPRENTICE MACHINIST.

IF there is a trade known to the ordinary average man so good in all respects as the machinist's trade, I should like to hear of it. What other trade is there that demands so much from both brain and hands, that requires so much good judgment, skill, quick perception and accurate measurement and calls for so thorough knowledge of all its details from beginning to end? It is a trade that bestows its rewards in the enthusiasm of success, perfection of automatic results and the commendation of mankind for its generous gifts to them. It is the trade that offers to the apprentice the best returns commensurate with his ambition, study and labor. It offers him steady work at good wages, the position of foreman, superintendent, mechanical engineer and proprietor respectively of a trade that is always advancing, always leading him into new fields, bringing out new ideas, making new application of old principles, producing new triumphs in the mechanical arts, and always requiring better workmanship, better designs, simpler methods and quicker results. It is the trade that will yield him fame, honor and a comparatively easy time faster than any other that I now have in mind. In a crude way I had these ideas presented to my mind about twenty-two years ago when I entered as an apprentice to learn the machinist trade. I have remained steadily at the trade ever since and am free to say that I am just as much an apprentice as ever, although I have passed through the stages of jour and foreman. I find I know less every day, that is to say, there are so many new problems, processes and improvements presenting themselves to me constantly that I keep on learning and don't think I shall get my papers as a jour while I live. To say that new mechanical ideas are born every minute is not putting it too strongly. A good thinking, studying machinist has few idle moments, and his busy ones are in the main pleasant because he generally succeeds in accomplishing something in the line of success.

I well remember my first day in the good old machine shop where I engaged to learn my trade. I carried my little paperful of overalls and presented myself at the foreman's desk subject to his orders and instructions. After listening to a few general remarks on the duties of an apprentice boy I was introduced to my predecessor, who handed me the water pail and accompanied me to the place where I should fill it. The source of the water supply was through a large pump in the public school yard, where I found at least from fifteen to twenty other boys from the neighboring factories, foundries, mills and shops. As I was about to fill my pail and return I was very quickly informed that I was too fast for a new boy. It was customary to rest on the schoolhouse steps for at least fifteen minutes and then join the procession of water pails back. As I was fearful of being tardy and so expressed myself, my partner assured me that it was all right—he had done so every day. After a week or so had passed I lost my fear and could sit fifteen minutes with the best of them, but I think my employer did not lose any time by these resting spells, for I am sure I made up for it during the day. My pard apprentice next introduced me to one of those old-fashioned, greasy, nut-tapping and bolt-cutting machines. It was one of the kind that had two sliding-heads, one for the nut-holder when tapping nuts and one for the die-holder when in form for cutting bolts. It was one of those old machines that could mangle more and cut fewer bolt-threads than any machine we see in these times. You put a bolt in the jaws and squeezed the dies thereon by means of a handle that turned a right and left-hand screw which carried each half of the die toward the center of the bolt. The die-holder or head had an oil-drip basin for the reception of dripping oil and an automatic feed was obtained by means of a spoon and your humble servant's right hand. After the thread was started far enough on the bolt the machine was reversed by means of a foot-treadle, or if you thought you could catch the thread again you could release the dies and back towards the end for a fresh hold. After about three or four applications of the dies a thread was finished so that a nut could be put on. There were two or three sets of dies that were just as liable as not to cut any thread or lead except what they were intended for. I still have a very vivid recollection of this fact because it nearly cost me my place. It happened this way: After my partner had got me fairly initiated and started in the deep mysteries of cutting bolts, he was called away to some other job. He had scarcely left me when the boss boiler-maker came in with a bolt for a man-hole plate which he wanted threaded for a nut. I finally in some way succeeded in getting a nut on the bolt which he accepted and carried away. Several days after when the boiler was about to be shipped, the superintendent discovered some of my "fine" thread-cutting and called Mr. Boilermaker to account. The latter did not feel called upon to say that he had stood by and seen it spoiled but stated that the new boy in the machine shop did the job. The man-hole plate was removed and the bolt brought to the machine foreman with the superintendent's compliments to that new boy. Mr. Foreman came to me with that common, ordinary, everyday looking bolt in his hand and asked me if I ever saw that before. As I did not remember that particular bolt and had cut lots of one-inch bolts, I replied that I thought I never had seen it before. "Was I sure I had not seen it?" I was not prepared to swear but still thought I had not. Mr. Foreman informed me in no gentle terms that it was bad enough to spoil the bolt but still worse to lie about it, and if that was an illustration of my work and truthfulness I would in all probability graduate from the shop before the prescribed time. One can guess my feelings, an honest, ambitious boy, anxious to excel and please, innocent of his misdeeds, betrayed by the foreman of the boiler shop and nothing to say in my own defense, for mind you, my foreman did not volunteer any information as to where the bolt had come from. Since then I have had many apprentice boys in charge, and when any jour accepts a poor job and only when detected does he try to lay the blame on the apprentice, he is the fellow I am after every time and not the apprentice boy.

One satisfactory recollection I have in this connection, and that is that as time rolled on and I was just out of my "time" the boiler shop was slack and the machine shop busy, and I had charge of setting up a large engine 28 x 42, and the whole boiler shop gang including the big foreman was sent in to me as helpers. I had a soft job sprinkling the emery on the cylinder-heads and watching the boiler maker walk around while grinding it down to a steamtight fit, and how I delighted to put on an extra dose of dry emery and make him sweat walking the treadmill! It makes me laugh even now to think that time equalizes all things and grinds down even cylinder-heads.

I well remember the old-fashioned tap-sockets used on that bolt-cutter. They had square holes for the end of taps and a huge long set-screw to hold the tap in them. One day while pushing the nuts up on the tap to get them started, the ragged sleeve of my blue overshirt got too closely acquainted with said sleeve and twisted me so much that I could not put my foot on the treadle to reverse the motion or reach the belt-shipper to stop it. Just then a big moulder came in and, seeing my predicament, reversed the treadle instead of stopping the machine, and the result was that I was speedily thrown over the machine to the other side. As I could not speak and the moulder evidently did not know how to stop the machine, and perhaps thinking I would look better on the proper side of the machine, I was given another toss by means of the treadle. By this time I was well wound up and my clothing torn to strips and as help came the machine was stopped. When the heat of the battle was over I found myself more scared than hurt. My arms and back were all bruised and skinned, and all my clothing except pants and shoes torn off. I looked like a prize-fighter, but although badly disfigured I was "still in the ring." I might mention that I was advised by a fellow-workman to moisten my back and arms with turpentine to allay the pain!

Well, I stuck to that old bolt-cutter until I knew all its weaknesses and what few good points it had and could cut bolts with uniform success on all sizes from ¾ to 1½ inches diameter. I also found out why the dies would sometimes cut 20 bad threads when they should cut 10 good ones, and, what is more to the point, I made them work right every time. Why? Because I tried to find out and know the *reasons why*. I was not satisfied to know that such was the case but determined to learn why.

An apprentice who is ambitious to get to the top, where there is no scarcity of elbow room, must not be satisfied to know that certain causes produce certain results, but they must investigate and discover why. He must keep his eyes and ears open and never forget that the best and most valuable results are obtained only by the closest attention and study. I have given you a few specimen bricks, illustrating not only the ways of apprentices but also of some of those with whom the ordinary apprentice has most to do.

TIMBER RAFTS ON THE OCEAN.

SHIPMENTS of timber in great ocean-rafts have long been considered possible. Interest in the subject is revived by the abandonment of the great Nova Scotian raft off Block Island in December. Readers of *The Lumber World* are familiar with the history of some of these rafts, but it may not be uninteresting to recite the points in their history. Hugh R. Robertson, of two Rivers, Nova Scotia, in 1883 conceived the idea of building an ocean-raft of logs all sizes, bound together by chains in the form of a ship. In 1884 he patented his plan in the United States, Canada, Great Britain, Norway and Sweden. The patentable point in this system of rafting is the adjustment of the chains which bind the whole together. The main or centre chain runs from one end of the raft to the other, and it is that by which the structure is to be towed. The lateral chains are used to prevent the raft from working apart longitudinally by the action of the waves. The encircling chains are attached to the lateral chains and are to prevent the raft from flattening out while afloat. On this plan Mr. Robinson began in November, 1885, to build his first raft on the Bay of Fundy, six miles from Joggins. This was ready for launching in August, 1886. It was 400 feet long, 50 feet wide at the centre, 33 feet deep, and 25 feet in diameter at the ends. The ways on which it rested broke and the launch of the 2,000,000-foot monster was a failure.

Mr. Robertson tore it apart and rebuilt it on a large scale on stronger ways. The monster in its new form was 585 feet long, 62 feet wide and 37 feet deep. It contained 3,000,000 feet of lumber, in 27,000 pieces, and weighed 11,000 tons. It was successfully launched November 15, 1887, and the steamer "Miranda" took it in tow on December 6 and started on the 600-mile ocean trip to New York, where the lumber was consigned to James D. Leary, the shipbuilder. The weather was tempestuous and on Sunday, December 18, in a heavy gale off Nantucket South Shore lightship, the towing cables parted at 7 a.m. and the giant went adrift. The "Miranda" proceeded to New York and the captain reported that the raft had gone to pieces, although other vessels reported several days later that the raft was intact and lying quietly near the spot where the hawsers parted. Government vessels were dispatched to the scene to clear the pathway of incoming ocean vessels. At this writing reports do not indicate the finding of the raft.

According to Hon. William Gould, of Portland, Me., the well-known down-east historian, this great raft is not the first of its kind. It had a number of predecessors, and all of them were successfully launched but came to grief before reaching their destination. In 1792 a raft containing about 1,000 tons of timber was built at Swan Island in the Kennebec, by Dr. Tupper, a somewhat noted eccentric character. It was made by treenoiling square timber together in the form of a ship's hull and was ship-rigged, the intention being to send her across to England. At that time no manufactured lumber was admitted into Great Britain; hence the timber in the raft was simply squared with the axe, to make it stow well. The ship or raft lay at Bath for some time, as it was difficult to get men to go in her. She finally went to sea, carrying a small vessel on her deck. But off the Labrador coast, her crew were frightened by bad weather and abandoned her. She was afterwards boarded by sailors from a passing vessel and found to be in good order, and it was suspected that she was deserted without sufficient cause. Two other similar attempts were made from the Kennebec, and both vessels went safely across, but foundered on the English coast, under the same suspicions of fraud as in the case of the Tupper ship.

In 1825 the ship Baron of Renfrew was launched at Quebec, having made a previous unsuccessful attempt when she stopped on her ways, owing to the grease being consumed by fire from friction. She was towed down to the island of Orleans and anchored. Her dimensions are given as follows: Length 209 feet; breadth 60 feet; depth 38 feet internally and 57 feet externally; tonnage 5,888 tons; draft when launched 24 feet; cargo on board when launched 4,000 of timber. She was ship-rigged, with four masts, and was perfectly flat on the bottom, with a keel of about 12 inches; wall-sided, sharp forward and rather lean aft, and looked more like a block of buildings than a ship. She sailed in August 1825, in command of a Scotchman, a half-pay lieutenant in the British navy. October 27 the Baron of Renfrew drove on shore on the coast of France, near Calais, and went to pieces.

The Nicola Milling Company, of Nicola, B. C., composed of Messrs. H. Woodward, Edwin Caswell, Lewis Marks, and J. J. Rutledge, have dissolved partnership.

Latest Canadian Patents.

Process of Treating Low Steel.

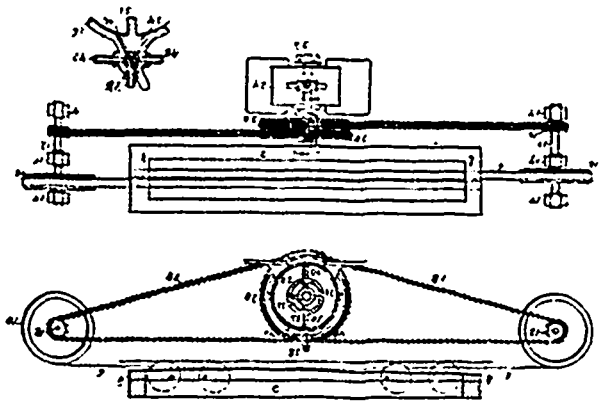
376,194. Hayward A. Harvey, Orange, N. J., assignor to the Harvey Steel Company, of New Jersey. Filed Dec. 8, 1886. Serial No. 221,026. Dated Jan. 10, 1888.

Claim 1. The process of treating ingots or objects composed of low steel —such as Bessemer steel—for the purpose of imparting to the metal of which such objects are composed the qualities of refined crucible steel, which consists, essentially, in embedding the object or objects to be treated in a body of granulated or powdered carbonaceous substance, such as wood-charcoal, deposited in a crucible or receptacle made of plumbago or any other suitable refractory material and provided with a cover to prevent the combustion of the charcoal, and in heating such receptacle and its contents in a furnace or heating-chamber the temperature of which is above the melting-point of cast-iron for such length of time that the objects treated when removed from the charcoal will exhibit clean unblistered surface of a prescribed color or colors, as herein set forth, and will possess the capacity of taking in tempering the degree or degrees of hardness ordinarily indicated by such color or colors.

2. The process of treating ingots or other objects composed of low steel– such as Bessemer steel—for the purpose of increasing the tensile strength of the metal of which such objects are composed and giving it the quality of weldability, so that it can be piled and reworked in the ordinary manner, which consists, essentially, in embedding the object or objects to be treated in a body of granulated or powdered carbonaceous substance, such as wood-charcoal deposited in a crucible or receptacle of plumbago or other suitable refractory material and provided with a cover to prevent the combustion of the charcoal, and in the heating such receptacle and its contents in a furnace or heating-chamber the temperature of which is above the melting-point of cast-iron for such length of time that the objects treated will on removal from the charcoal exhibit clean unblistered surfaces of a prescribed color or colors.

Steam Feed for Saw Mill Carriages.

376,169. John B. St. Louis, Minneapolis, Minn. Filed Dec. 13, 1886. Serial No. 221,391. Dated Jan. 10, 1888.



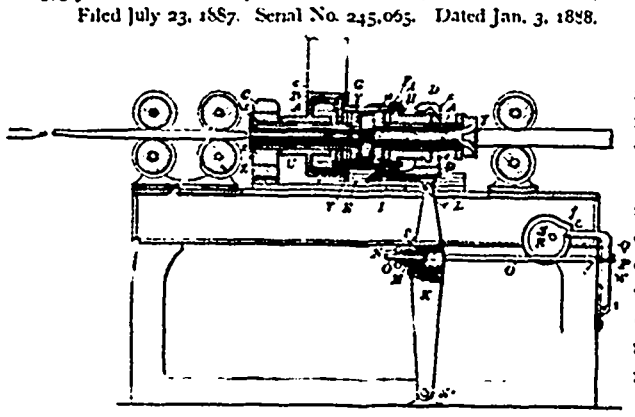
Claim 1. A steam feed for saw mill carriages, comprising an oscillating steam motor arranged below said carriage, with its shaft at right angles to the line of travel of said carriage, shafts 12 upon opposite sides of said motor, gearing connecting said shaft with said motor-shaft, whereby they are oscillated with said motor-shaft, and independent flexible bands 6, connecting the opposite ends of said carriage with said shafts 12.

2. The combination, with a saw mill carriage, of the shafts 12, arranged at the opposite ends of the carriage and provided with the pulleys 10, the independent flexible bands 6, attached to the opposite ends of the carriage, extending under the carriage and having their ends attached to the pulleys 10, and means for simultaneously driving said shafts 12 in the same direction.

The combination, with the saw mill carriage 2, of the flexible bands 6, attached to the opposite ends of the carriage and extending in opposite directions under said carriage, the shafts 12 having pulley 10, to which said bands 6, are attached, the oscillating motor 24, having the shaft 22, provided with the sprocket wheel 20, and sprocket chains 18, extending from said shaft 22 to each of said shafts 12.

Lathe.

375,988. William Chaplin, St. Catharines, Ontario, Canada. Filed July 23, 1887. Serial No. 245,065. Dated Jan. 3, 1888.



Claim 1. In a lathe, the main hollow shaft, a hollow drum cast solid with the main hollow shaft and having slots cut in the drum, carriers fitted into said slots, and one or more shaping knives adjustably attached to said carriers, combined with sleeves on the main shaft engaged with the carriers and adjustable on the main shaft to move the cutting edges of the knives nearer to or farther from the center of the main shaft.

2. the main hollow shaft A, the drum F thereon and having slots *i*, the carriers *j*, having wings *k* and arms *k* and *l*, and the shaping knives secured on said carriers, in combination with the sleeves G and H, adapted to be adjusted longitudinally on the main shaft, and having guides *m* and *n* formed therein for the reception of the carrier arms *k* and *l* respectively.

3. The main hollow shaft A, the drum F thereon and formed with slots *i*, the carrier J having wings *k* and shoulders *g*, and the shaping knife I, adjustably secured on said carriers by the bolt *f*, in combination with the adjustable sleeves G and H, held rigidly together by the shouldered bolts *a* and to the sliding standard D by the V shaped ring *e*, formed on the sleeve H, and having guides for the carrier arms *k* and *l*, and said carrier arms.

4. The standard C, the sliding standard D, the hollow shaft A, supported by said standards, and the drum F, cast solid with said shaft and adapted to carry the shaping knives, in combination with the shaping knives, and the sleeves G and H, held together by the shouldered bolts *a* and to the sliding standard D by the V-shaped ring *e*, formed on the sleeve H.

THE MELBOURNE EXHIBITION.

AT Melbourne, Australia, there will be held in the fall of 1888 a centennial exhibition. It is to be opened the first of August, 1888 and is to continue until January 31, 1889. It will be open day and evening. Space will be free, but the committee reserves the right to limit the space allotted to visitors in cases where it is evidently necessary. A general reception of exhibits will begin about May 1, 1888, and after the 15th of July of that year no more goods will be received. Exhibitors are to furnish all the fittings which may be required, but the motive power to run them is free. By the patent laws of Victoria no exhibited article can be copied, drawn or reproduced in any manner. The awards will consist of gold, silver and bronze medals, a certificate of honorable mention, and a certificate will accompany each medal. Canada should be well represented in this exhibition.

NIGHT WORK IN MACHINE SHOPS.

AFTER a great deal of discussion on the subject of night work, says a contemporary, employers have not reached any uniform conclusion, apparently because they have allowed their desires to bias all their observations. Night work, or that which has to be performed by lamp light, is of a poor quality, because men cannot see to do good work by any light which has yet been used for the purpose of shop illumination. Perhaps a better form of the statement would be to say that such work is not as good in quality as that done by daylight. How great a falling off there is likely to be, any one may see by trying to do any little delicate piece of metal work in the evening, and again in the daytime.

The following conclusions may be set down as facts, having been deduced from a long experience: Night work does not pay for the gas or oil used in lighting up the shop. The work done at night is not satisfactory in quality as compared with that done by daylight. The quantity of work done after lamps are lighted is insignificant as compared with the amount of time taken. In other words, loafing begins at dark. This is not always intentional, but it takes place all the same. Night shifts coming on after the lamps are lighted do but little work as compared with what the same shifts could do in the daytime.

In a shop where small machinery of a regular character was made, it was the habit not to light up in the winter months, but close when it became dark. Winter and summer the men were paid for nine hours' work, the early closing shortening the day's work and not the day's pay. At the end of the year the manager took an account of the quantity of work done, and found that he had not only saved the expense of oil and lamps, but that the work done in December, January and February exceeded that done in June, July and August by eight per cent. The number of men, character of work and all details having been the same for both periods, he naturally reached the conclusion that it did not pay to work over-time, or even full time in winter.

While the electric light does something towards sufficiently lighting the shop, it is lacking in several of the most important requisites for shop use. Its bluish color is bad and does not properly illuminate cast or wrought iron. Oil is cheap, but does not give light enough, while gas is costly. It seems best, therefore, to obey the command, "work while it is day, for the night cometh when no man can work."

FIRE EXTINGUISHING EXPERIMENTS.

A SERIES of experiments of interest to fire underwriters, as well as to manufacturers of rubber goods, were lately made at the works of the Walworth Manufacturing Company in South Boston, the object primarily being to determine by actual test the behavior of the material known as rubber cement. This material is composed substantially of rubber dissolved in naphtha, and is indispensable in the manufacture of rubber goods. Both the naphtha and the cement have hitherto been dreaded by the fire insurance interest, and with good reason. It is well known that the pouring of water upon burning naphtha is worse than useless, since it not only fails to extinguish the flames, but serves to simply splash the burning oil about, thus scattering the flames; and the opinion is generally entertained that rubber cement behaves in a similar manner.

The object of the experiments above referred to, was to observe the behavior of these articles, while burning when treated to a stream of water, and particularly when subjected to the finely divided spray delivered from the so called "sprinklers," which of late have come into very general use in mills. The result of these trials demonstrated that rubber cement is by no means so hazardous as has been supposed, since it is shown that water, especially when delivered from an effective sprinkling apparatus, will quickly extinguish it. Naphtha alone, however, is shown to maintain its bad pre-eminence as a specially hazardous material.

We give below an account of these tests, with the results obtained, as recorded by the insurance editor of the Boston *Commercial Bulletin*. The tests were as follows:

First: A quantity of naphtha of 70° was placed in an iron pot and ignited. It continued to burn without being affected by the shower from the sprinkler.

Second: Boards representing flooring or wood-work, as benches, fixtures, etc., were wet with naphtha and ignited. By the time the naphtha had burned off the wood-work was afire.

Third: The above was repeated with fresh wood. The sprinkler was allowed to operate, and while it did not extinguish the flames, it prevented them from igniting the wood.

Fourth: A quantity of rubber cement, worked up with naphtha into the ordinary consistency, was ignited in an iron pot. The sprinkler promptly extinguished the flames. The wet cement was then immediately ignited from the touch of a match and again readily extinguished by the sprinkler. Cement placed on woodwork was ignited and extinguished just as it was in the pot. Re-lighted and again extinguished in the same way.

Fifth: Cement was placed on woodwork and ignited. No sprinkler was used, and the cement shortly communicated the flames to the woodwork.

Sixth: A lot of woodwork was saturated with naphtha and another lot was covered with cement. Both were ignited and the sprinkler allowed to work. The flames on the lot covered with cement were promptly extinguished, but the flames on the lot covered with naphtha continued unaffected by the water, and the naphtha exhausted itself. But neither lot of woodwork became ignited.

Seventh: A considerable quantity of cement still remaining, it was ignited in a tin dish, and the sprinkler promptly extinguished the flames. The receptacle was warped out of shape but not melted, and can be seen at Secretary Taft's office containing the cement which was ignited and extinguished.

ROCK DRILLS RUN BY ELECTRICITY.

M. TAVERDON has successfully applied electricity, as a motive power, to rock drills. The system adopted consists in the use of drills armed with black diamonds at their extremity, capable of cutting away the hardest rock. In attaching these diamonds, they are first electroplated with copper, and then fixed by a very hard solder into the holes prepared for them in the drill. The electric motor is carried upon a special carriage, with a driving pulley and belt for the transmission of power.

The drill is fixed upon the usual drill column, and, instead of being fitted to run by steam or compressed air, is provided with a belt-pulley and the proper mechanism to run the drill. The motor is a Gramme machine, of the type used for a number of years past at Sermaise. On the same carriage with the motor is a reservoir of water, with an air space in the upper part of the vessel, the water being supplied under any desirable head. This water is forced by the pressure-head into the drill, and down into the drill-hole, from which it washes out the debris produced by the drilling.

The advantage claimed for this motor is, that by using it at the heading, the long lines of steam or compressed air pipes, usually employed, are entirely avoided, and that the stoppages in the work are less frequent. No record is given of the rate of drilling, or, in fact, any data concerning the actual use of this electric drill.