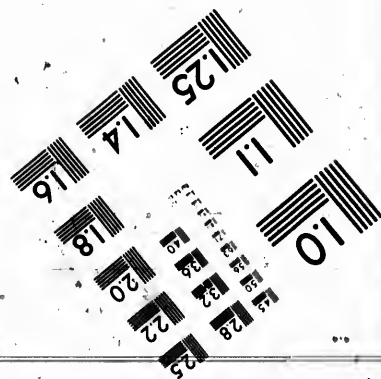
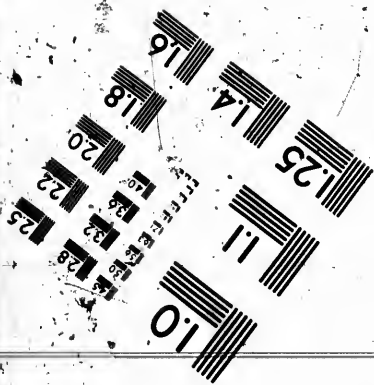
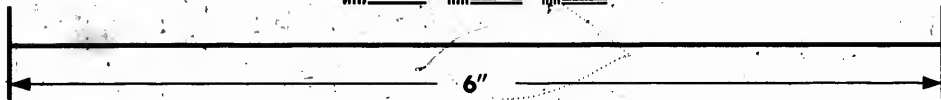
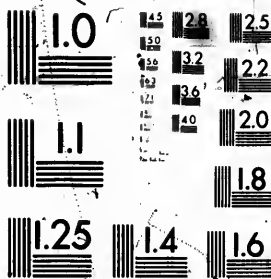


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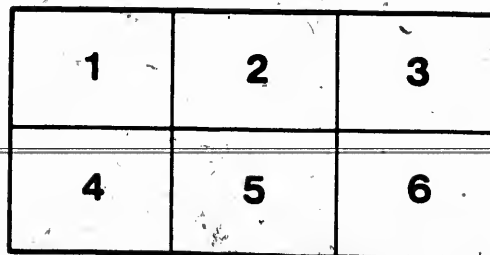
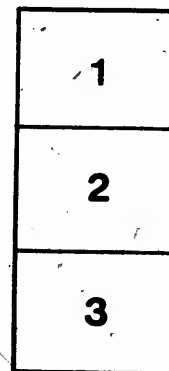
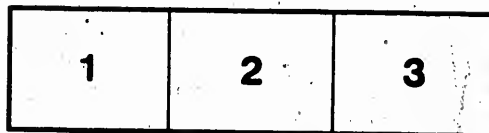
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WATEROUS ENGINE WORKS ©

ILLUSTRATED CATALOGUE

SAW MILL

Machinery & c.

BRANTFORD
AND WINNIPEG,
CANADA.



DUNCAN STEWART, BRANTFORD

All Machines Manufactured or sold by us are subject to such modification or change as will in our judgement improve them, either in design, material or size.

All former Price Lists conflicting with this are cancelled.

ERRATA.

Knight Dogs, page 72, should read 40 and 85 dollars in place of Cents. London office, page 14, clause "Boss" Shingle Machine, page 92, is fed with friction and returned by weight and spring, and not by rack and pinion feed as mentioned.

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ALWAYS PREPAY FREIGHT OR EXPRESS CHARGES TO US, ALSO ALL TELEGRAMS.

IN WRITING ABOUT MACHINERY OR REMITTING MONEY, always give name, post office address and County, and for what remitted. When ordering repairs, give us rough sketch of broken part, and as full description as to sizes, &c., as possible, and when at all convenient, send broken part; for although we make everything as nearly as possible to a gauge, we find it necessary to change frequently the styles of our machinery to keep abreast of the times.

Don't expect us to remember what machinery you have. Give full particulars every time. Your order may be filled by a new clerk who does not know you.

WATEROUS ENGINE WORKS CO.,

WINNIPEG, MANITOBA.

Brantford, Canada.

June 1st, 1886.

P. RYAN, THE BOOK AND JOB PRINTER, BRANTFORD

SAW MILLS

Saw Mill Machinery

AND

ESTABLISHED,

1844.

1885.

ENGINES.

In this Catalogue we purpose giving such information of our Saw Mills, Saw Mill Machinery and Engines as will be interesting and useful to those who contemplate investing in such machinery.

In Circular No. 10 we fully describe our Grist Mills and Chopping Mills. In No. 11, our Wood-working Machinery, Shafting, Belting, Pulleys. In No 12 Saws, and Saw Mill Furnishings, and in No. 13 our Champion Engine in all its many phases.

There is of a necessity some repetition in these Circulars, for instance, shingle machinery comes under wood-working machinery and saw mill machinery. Champion Portable Saw Mills have to be described in the Champion Circular as well as here. We, however, wish to avoid repetitions as much as possible, having found it advisable to lay before our many customers for the large and varied output of our establishment, concise particulars, as near as possible, of the class of machinery they want and that alone.

Having been established in business in Brantford since 1844, it is unnecessary we think, to do more than illustrate our machinery, describe the different machines and the improvements we are from

time to time making. Our machinery is scattered all over Canada, from British Columbia to Newfoundland, and from Hudson's Bay to Southern Ontario, and in many foreign countries as well. It all speaks for us. Mills we built 30 or 35 years ago are running to-day cutting their five hundred thousand feet of lumber per year; and we are really proud to say that in every section where our machinery is once introduced more is sure to follow.

Our maxims have been that "Nothing can be too well made," "Make the machinery as it should be in every part and then set the price at a fair profit considering the cost." "Never cut the price and then cheapen the production to suit the price." "That mill men and people generally can and do appreciate a good article and will generally buy it, even if first taken in with some cheap machine said to answer as well." After over forty years of successful business life on the same premises, conducted on these lines, our President has no reason to regret having started out with this standard before him. It has given us a reputation we are proud of, one that we cannot afford to injure; and one that has kept us in full operation during the last two years, while many shops have been closed and others run short handed or on short time. During this period our output has been 30 per cent. more than the best of former years, and our men have been steadily employed on full time.

This stimulates us to fresh endeavors to merit the approval of our customers, who can therefore rely on our utmost exertions in this direction.

OUR EXPORT TRADE which has been growing steadily for the last ten years, has assumed proportions that warrant our giving it the closest attentions, and our many foreign customers can rely on having their machinery properly made, properly packed and boxed, suitable extras provided free and machinery properly shipped to prevent delays in transit.

We must confess it has not always been so. That it has required much experience to suggest proper methods, etc., to overcome the many obstacles incident to a foreign trade; but we have crossed the Rubicon; we feel ourselves veterans now in this branch and can with confidence ask your patronage.

OUR NORTH-WEST BRANCH WORKS, located at Winnipeg, under the management of our President's sons, MR. FRED L. WATEROUS and MR. FRANK J. WATEROUS, is well equipped with tools and plant to do the large trade springing up there. We have there the Home Works on a smaller scale, machine, pattern and wood-working shops, boiler, blacksmith and moulding shops, and have tools large enough to do the greatest variety of work.

The Winnipeg Branch gives special attention to Engine, Boiler and Mill Repairs of all kinds. The Works are easy of access, being within one block of the C.P.R. Station, in the City of Winnipeg.

As it is impossible in a short circular of this kind to more than outline our various machines, we shall be much pleased to answer any and all enquiries. When asking for descriptions, prices, etc., it is better to give all the particulars possible in regard to the nature of your wants and the material you want to manufacture. If a saw mill is wanted, the average and extreme diameter and length of logs, into what sizes, etc., they are to be manufactured; capacity of mill you wish per day; whether saving of timber is of more object than fast cutting; how often you expect to move the mill, if at all; if brick or stone can be conveniently procured; if you contemplate in a short time increasing your plant by the addition of more machinery; position mill is to occupy, if it is already located, *i. e.* if on level ground, at foot of gentle slope or incline, if on a sheet of water from which logs can be drawn; if a ground mill or an elevated mill is desired, etc., etc. The more information given us on these and other points of the work to be done, the better we are enabled to decide what will best answer your purpose and to send you estimates accordingly.

When ordering it is well to send a rough sketch of location if any special one is desired, showing the size of building; on which side or end engine and boiler is to be placed; where logs are to enter, and where lumber to go out. This enables us to determine which hand saw irons and engine you require. It is well too, if the position is immaterial, to say so, especially if in a hurry for the

machinery, as we sometimes have one hand of mill
more advanced than the other. In direct action mills
use a left hand engine and right hand saw irons and
in these mills this hand is the one we usually have
advanced state.

We solicit your enquires and orders which we need
shall have our best attention.

Address us at,

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SYDN

BRANCH WORKS WINNIPEG AND OFFICE, (WINNI

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22 to 25 CLARANCE ST.,
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154 ST. JAMES ST.,
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ine Works, Co.,

BRANTFORD, CANADA.

BRANTFORD, ONTARIO, CANADA.

5

The following is a very fair description of our Champion Portable Saw Mills taken from the *American Exporter* of June, 1885. The description of the working of the Mill is applicable to all our Portable Mills:—

A Complete Portable Saw Mill.

(FROM THE AMERICAN EXPORTER.)

The cut shown on this page (see page 10) represents a complete portable saw mill as used in America. It is complete within itself, capable of being taken into any timber tract or on any gentleman's estate, and cutting from the rough logs of any size from 30 inches in diameter downwards, of any length from 6 feet up to 20 or 22 feet long, or longer lengths when the carriage is so arranged. This mill is placed on the ground in any convenient locality, oftentimes at the foot of a gentle slope rising say 6 feet in 25 or 30 feet. On this slope the logs are piled, and a wooden tramway or track made of wooden rails is run slantwise gradually up the hill. Along this track, on upper side, skids are placed, with their outer end just the height of a log car. These skids hold the logs back, and on them and behind them are piled all the logs that are to be cut in the mill. A car is run out, and a man, with what are called cant hooks in America, rolls the log on the car, and the car of its own weight then runs into the mill. On arriving at the mill, the platform of the car is the same height as the skidway before the carriage in the front part of the mill. Two or four or more logs can be placed on this skidway, depending on its size. As the carriage is run down to the skidway, the headblocks being run back as far as necessary for the size of the log that is to be sawn, the log is rolled on and held firmly to each upright by the Knight dogs shown in the cut, they, for this purpose, being run out further than the headblock as shown in the headblock nearest the saw in cut, (see page 10) and the sawyer, who stands in front of the carriage immediately at the frame, grasps the handle of the set works which extends over the log and sets the log forward on the slides till it is sufficiently past the saw, that the saw will take off the proper thickness of slab. He then grasps the lever shown in the centre of the end of the frame, pulls it towards him, and the log at once moves up to the saw and past it, the saw cutting off the slab. When the saw has made the entire cut, the lever referred to before is shoved the reverse way from the sawyer, and the carriage immediately starts back. While it is running back, the sawyer puts his foot on a treadle, not shown, but which rises an inch or

two above the floor, which brings into play a friction arrangement on the back of the carriage, which immediately recedes, the knees or uprights of the carriage to which the log is attached pulling the log back with it, so that when the carriage returns to its starting position all that has to be done is to lift the outer levers of the Knight dog shown with a ball, which spring into their catches above, not shown in cut, where they are held, thus withdrawing the dog from the log. The log is then rolled over with its flat side on the log seat, or against the upright as wished, dogged again as before, and the operation is again proceeded with, taking off another slab. If in either case the slab taken off does not expose sufficient surface or width of face on the log, a second or third board is taken off. The log is thus partly squared to the size desired. The dogs are again withdrawn and the log turned a second time with its square corner toward the uprights and the flat surfaces against them and on the log seats. The operation explained before is then continued until a slab and one or two boards are taken off. Then if the log is to be made into timbers of different thicknesses, the set roller and timber gauge shown on the front corner of the frame is brought into play. The round wheel on the top of the gauge is marked off in quarters of inches from one inch upwards, so that if a piece of timber $6\frac{1}{4}$ inches thick is required to be cut from the log, the pin is dropped into the hole marked $6\frac{1}{4}$, and the handles shown on top of timber gauge are brought round to this pin. The sawyer then grasps the set handle again and sets the log up against this roller, and he knows that as soon as it strikes the roller it is set so that a piece $6\frac{1}{4}$ inches thick will be sawn the full depth of what the log happens to be. He can as easily, of course, set it to any size desired. On the slides, to which uprights are attached, (one to each of the slides) is a lumber and timber rule and pointer, so arranged with the pointer that the sawyer at a glance can tell what thickness of log he has remaining to be sawn, and can calculate readily to what size it is best adapted to be sawn into, without any measuring whatever.

After the timber is turned with its squared side to the uprights, the dogs shown in cut as holding the square timber are run back till they do not project more than half an inch from the face of the upright, so that the last board can be made as thin as 1 inch, or even $\frac{1}{2}$ inch or $\frac{3}{4}$ inch thick without removing the dogs. These dogs are worked in a very simple way. The inside small or short lever with the ball on the end, when raised, permits the dog to be raised up and down anywhere on the standard, and immediately the lever is released it falls of its weight and holds the dog in the position it is placed on the standard. If, therefore, it is left from the last log near the top, all that has to be done to make it engage the log is to lift this lever and drop it; it falls till the point of the dog strikes the timber where it is

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held firmly to its position. Then by releasing the longer lever and ball on the back of the dog from the spring catch on the top of the upright, it falls and of its weight drives the point of the dog from $\frac{1}{2}$ inch to $1\frac{1}{2}$ inch into the log, depending on the force of the downward throw of the lever. When this short lever is raised the dog can not only be raised up and down at will on the standard, but the dog itself is released so that it can be moved forward and backward, forward to take a round log, and backward to hold square timber for the last board. It will be seen, therefore, from this description (and that with cut on page 9) that this is an exceedingly handy sawmill dog, one not liable to get out of repair, one very strong, and one that always holds the log under all circumstances, and thus prevents accidents of the log slipping out on the saw while in operation and damaging the saw.

Returning to the saw frame it will be seen that the feed and gig works are arranged to work by frictions shown in the saw frame. There is a shaft with a large friction wheel fastened to it which runs through the frame and under the track, with a pinion on its outer end engaging the segment rail shown immediately behind the wheels of the log seats of carriage. The outer end of this shaft is held in an eccentric box operated by the lever, with weight attached, shown about the middle of the rear side of saw frame. There is also a friction wheel, as shown, on the saw mandrel. Between this and the large friction wheel there is another friction which transmits the reverse motion from the friction wheel on the saw mandrel to the large friction wheel on what is called the rag or pinion shaft of carriage. On the opposite or rear side of the large wheel is a small friction wheel attached to the shaft on which the cone pulley is shown in the forepart of the engraving. When the handle, referred to before, is pulled toward the sawyer, it throws the large friction wheel on the rag shaft against the small wheel on cone shaft, and the motion from the saw mandrel is communicated to the carriage and drives it forward toward the saw. When the lever is reversed the large friction wheel on the rag shaft is moved against the intermediate friction, to which the motion is communicated by the friction on saw mandrel; it in turn communicates a reverse motion to the large friction wheel on rag shaft and runs the carriage back.

It will thus be seen that the operation of running the carriage forward and backward is extremely simple. The lever shown at the lower part of the front of frame is drawn too high; it really lies down nearly level with the lower part of the frame. It is connected with a stop motion attachment, so that if the carriage is returning too fast the sawyer puts his foot on this and throws a brake by it on the large friction wheel on the rag shaft and thus instantly stops or checks the motion of the carriage. The remainder of the mill hardly needs an explanation, as the

engine is very clearly shown attached by belt to the pulley on the saw mandrel. It will be noticed that there are three bearings under the saw mandrel, making it perfectly strong and rigid. This, coupled with the timber gauge explained before and the inserted tooth saws that are used, enables the mill to saw perfectly smooth and true lumber.

One other feature is very noticeable in this mill, namely the fire-proof qualities of the engine. Mills of this kind would no doubt be more frequently used on large estates to cut up timber that is blown down by storms, or in forests that require to have the timber thinned out from them, provided the owners were assured that there would be no danger in communicating fire to the remainder of the forest. This engine being perfectly fireproof, every spark or coal being thrown into water, obviates all danger of fire, so that gentlemen can introduce it to their forests without any hesitation, resting assured that it will cut their timber perfectly true, and at the same time very expeditiously, and also in no way endangering their property. The manufacturers assert that saws can be used on these mills as large as 52 inches in diameter, 10 gauge, which is $\frac{1}{8}$ inch full in thickness; and 54 inches in diameter, as thin as 9 gauge, which is scant $\frac{1}{32}$ inch thick. It will be seen, therefore, that very little of the timber is wasted in sawdust. The manufacturers also assert that with the mill shown in the engraving four men will cut of pine 7,000 feet board measure per day of ten or eleven hours, and of square timber a much larger amount. Of hard wood, such as English oak and other hard woods, 5,000 feet per day would be a good day's work, although, no doubt, more than this could be done by expert men.

The manufacturers send us a letter from Mr. William Stoddart, (see page 10) contractor on the Canadian Pacific Railway, in which he states he has cut with one of their 16 h. p. mills as high as 15,000 feet of bridge timber in ten hours. We should imagine that this would be an invaluable plant for railway contractors and others to be moved along new lines of railways as they are advanced to cut the ties or sleepers, bridge timber, station house timber, etc., etc., as required.

The manufacturers do not confine themselves to the style of engine here shown. They also manufacture sectional upright boilers readily taken apart; horizontal boilers of the locomotive style; or the return tubular fire box style; or return tubular boilers to build in brick. In fact they state that they are prepared to furnish any style of boiler that customers may desire, and portable and stationary mills of all capacities. As they are doing a very large export trade they feel confident that they can give good satisfaction to any who may entrust them with their orders. They have lately issued a very large and comprehensive catalogue of their machinery which will be sent free to all.

THE PATENT EXCELSIOR SAWMILL DOG.

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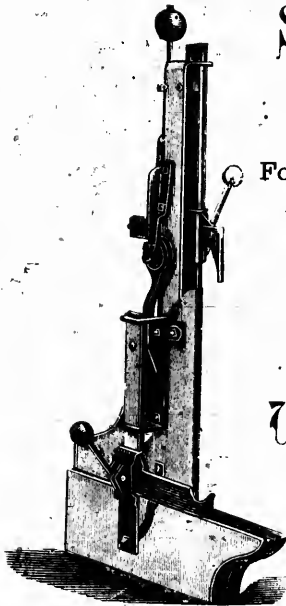
Handiest Saw Mill Dogs Made.

For **SIMPLICITY,**
DURABILITY,
STRENGTH,
RAPIDITY OF ACTION,
AND
EFFECTIVE WORK,

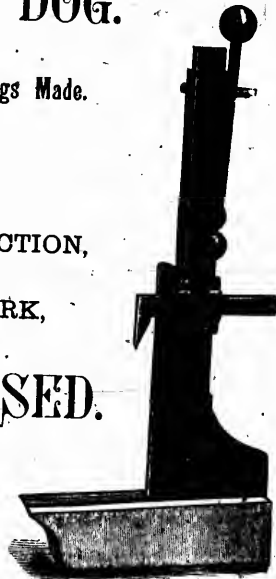
THEY ARE

UNSURPASSED.

We might enumerate
among its many
Advantages,



DUPLIX DOG.



SINGLE DOG.

THE GREAT SAVING OF TIME.—Every révolution a saw makes, when not cutting, is a loss of time. With the Excelsior the sawyer dog: not require to wait a moment for a log to be fastened, no matter how frosty or how hard the log is frozen.

CANNOT WORK LOOSE OR FALL OUT.—No possible way for it to let go, except by hand of operator.

LESS LIABILITY TO DAMAGE SAW.—Dogs driven in on slant have points hidden endangering the saw.

HOLDS FOR CENTRE RIPPING.—All sawyers understand that in ripping a cant through the centre it is difficult to hold the piece left on carriage square with the knee, the greatest weight being off the carriage the cant inclines to tip outward towards the saw, making timber when sawn diamnd shape. The Excelsior obviates the difficulty.

DURABILITY.—Made of malleable iron and steel, they should last a lifetime without repairs.

RANGE OF WORK.—Is of the largest; combined with simplicity, strength and rapidity of action.

To Attach the Plain Excelsior to any Mill, it is only necessary to drill two one-half inch holes through the standard of knee, and bolt the dog firmly to the same, as shown in cut. They should be set far enough back from the face of the knee to allow the frame of the dog to pass the burr on the top saw when holding the last piece, or one inch on the carriage. The bottom of the dog should be two inches from the top of the log seat.

The Duplex Excelsior is used principally in sawing quarter stock or other irregular piece suff. The lower attachment is bolted fast to the opposite side of the knee, from which the dog is attached, and can be readily disconnected, and the upper dog used alone, same as Excelsior. They are manufactured upon special orders only, as the dimensions of the knee must be given before the attachment can be made. In giving dimensions, make a paper pattern of the knee, full size, and give thickness of same four inches back of the face of the knee, also the height and width of the head block.

Since we attached the above Dogs to our mills we have remedied some defects, making the eccentric holding the Dog of double width, giving a much stronger and more serviceable bearing. As soon as we can procure steel the proper size we shall use it in place of wrought-iron throughout its construction.



THE CANADA PACIFIC RAILWAY HAS FOUR OF THESE MILLS.

To *Waterous Engine Works Co.*,

GENTLEMEN,—I am now through with the 16 h. p. Champion Saw Mill. The engine and machinery is in as good condition as when received, excepting the usual wear and tear. The mill has given entire satisfaction, and since getting into better timber has gone far beyond my expectations, sawing on an average 15,000 feet of bridge timber, of following sizes 6 x 8, 6 x 12 and 9 x 12, every 10 hours.

DALTON, CANADA PACIFIC RAILWAY, April 20th, 1885.

Biscotosing P. O., via Sudbury, C. P. R.

Very respectfully yours,

WM. STODDART, Sub-Contractor.

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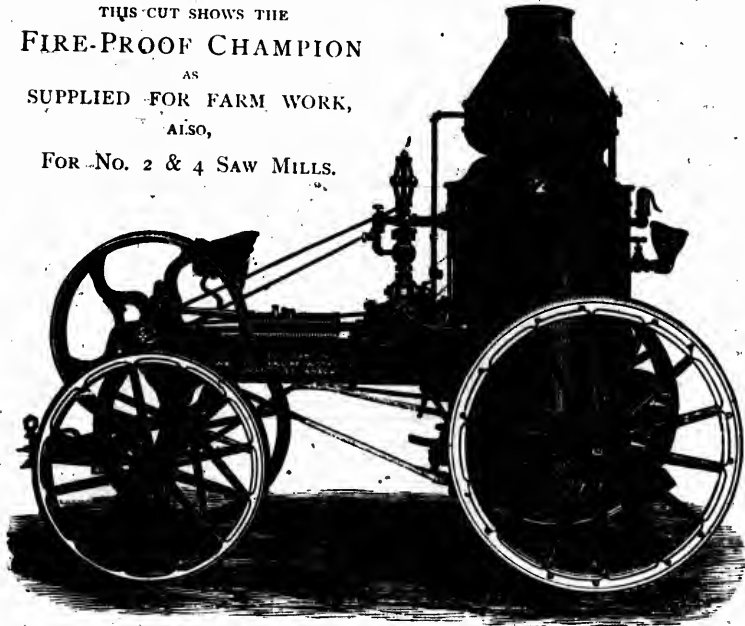
No.

Champion Portable Saw Mills.

WE USE EVEN NUMBERS FOR PORTABLE SAW MILLS, ODD NUMBERS FOR PORTABLE GRIST MILLS.

THIS CUT SHOWS THE
FIRE-PROOF CHAMPION

AS
SUPPLIED FOR FARM WORK,
ALSO,
FOR NO. 2 & 4 SAW MILLS.



NOTE.—To prevent repetition we do not give all the possible changes that can be suggested or desired in these mills. Where a larger engine is required for the same size mill, or where Saw-irons are to be changed for larger or smaller, the advance or reduction in price will be the difference in the list prices (which will be found elsewhere,) for the articles changed, except some slight addition, where size of belt, pulleys, &c., are increased.

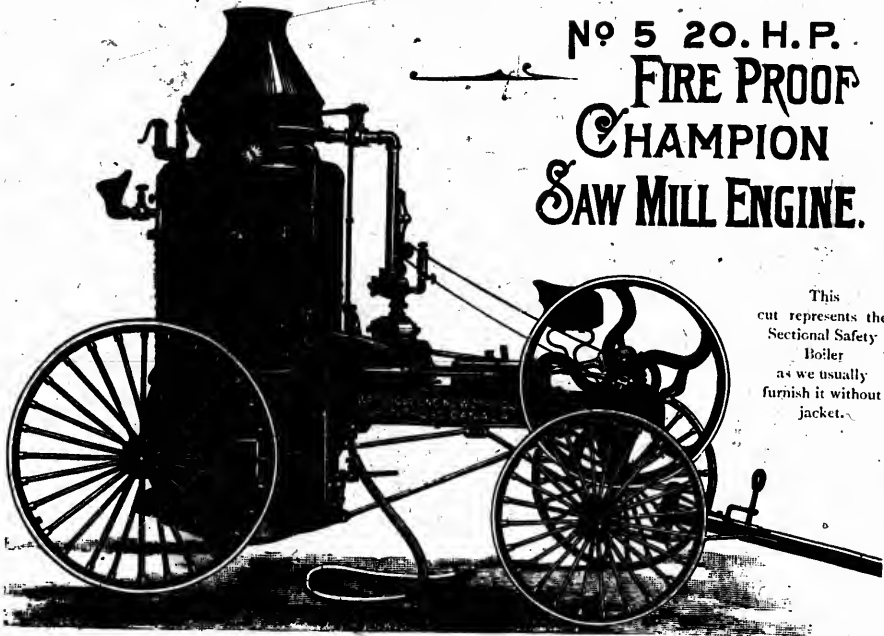
No. 2.—12 Horse-power Mill consists of the 12 Horse-Power Patent Fire-Proof Champion Engine, or No. 7 Champion on wheels, connected by endless 8-inch 4-ply belt and tightener to our **NO. A** patent iron frame saw irons—using a 40-inch inserted tooth saw—carriage has 3 iron log seats, and cuts 5 to 20 feet long. Capacity, 3,000 to 4,000 feet per day. Price complete, put in operation on our usual conditions and terms; see cut on opposite page. *Only recommended for the very lightest work.*PRICE...\$1,365

The same with engine and boiler on skids, or engine stationary and boiler Return Tubular Fire Box; see cut page 13.PRICE...\$1,300

No. 2½.—The same as **NO. 1**, but with sectional safety boiler with Horizontal or Vertical Tubes; see pages 23 to 25 No. 13 Circular.....\$1,465

good condition as when received, excepting the usual wear and tear. The mill has given entire satisfaction, and since getting into better timber has gone far beyond my expectations, sawing on an average 15,000 feet of bridge timber, of following sizes 6 x 8, 6 x 12 and 9 x 12, every 10 hours. Very respectfully yours,

WM. STODDART, Sub-Contractor.



**NO 5 20. H. P.
FIRE PROOF
CHAMPION
& SAW MILL ENGINE.**

This cut represents the Sectional Safety Boiler as we usually furnish it without jacket.

No. 4.—16 Horse-Power Mill consists of the 16 Horse-Power Patent Fire-Proof Champion Engine or No. 8 Champion on wheels, attached to **No. A** saw iron, same as 12 h. p. but using 48-inch inserted tooth saw, and Ewart chain sawdust carrier. 15 feet long. Capacity, 4,000 to 5,000 feet per day. Put in operation on our usual conditions and terms; see last page of price list. **PRICE...\$1,575**

The same with Engine and Boiler on skids, or Engine Stationary and Boiler Return Tubular Fire Box; see page 13 **PRICE...\$1,500**

No. 4½.—The same as **No. 2**, but with Sectional Safety Boiler with Horizontal or Vertical Tubes; see pages 23 to 25 No. 13 Circular. . **PRICE \$1,700**

No. 6.—20 Horse-Power Mill consists of the 20 Horse-Power Patent Fire-Proof Champion Engine or No. 9 Champion, with iron wheels and springs under boiler, attached to our **No. C** iron frame saw irons by an endless rubber belt, 9-inch 4-ply, 50 feet long, using a 52-inch inserted tooth saw. Carriage has 3 iron log seats, and cuts 5 to 20 or 23 feet long, with sawdust carrier as in **No. 2**. Capacity, 5,000 to 7,000 feet of lumber day. **PRICE...\$1,890**

The same with Engine and Boiler on Skids, or Engine Stationary and Boiler Return Tubular Fire Box, being **No. 9** Champion, see page 13. **PRICE...1,800**

N. 6½.—The same as **No. 6**, but with Sectional Safety Boiler with Horizontal or Vertical Tubes; see pages 23 to 25 No. 13 Circular. . **PRICE...\$2,000**

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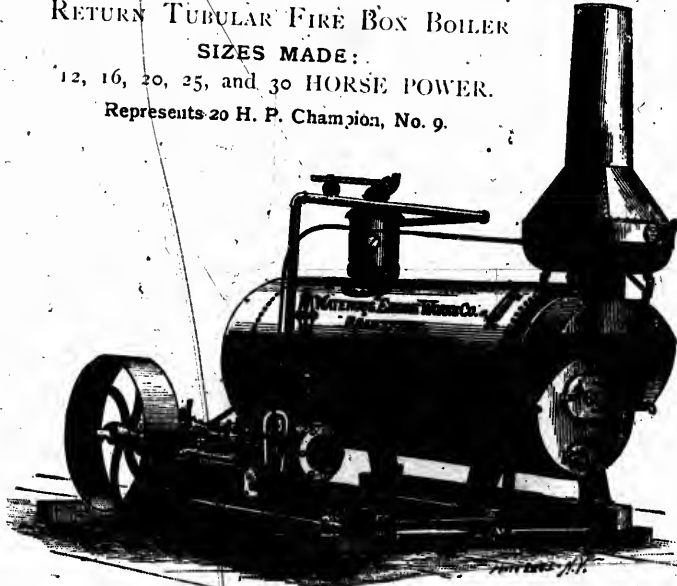
FIRE-PROOF CHAMPION

WITH
RETURN TUBULAR FIRE BOX BOILER

SIZES MADE:

12, 16, 20, 25, and 30 HORSE POWER.

Represents 20 H. P. Champion, No. 9.



- No. 8.—Patent Direct Action Saw Mill, 20 Horse-Power, with Locomotive Boiler, see cut page 16 or Return Tubular Fire Box Boiler like above cut. No. C Saw Irons with usual length of carriage to cut 5 to 20 feet logs, using 52-inch saw—including 52-inch solid Saw, Ewart Chain Sawdust Carrier, 20 feet long No. 45 Chain, and Millwright work—putting mill in running order, to the reasonable satisfaction of purchaser, on conditions and terms on last page of this price list. Capacity, 6,000 to 8,000 feet per day PRICE.. \$2,100
- No. 8½.—The same Mill as No. 8, 20 Horse-Power, but with return Tubular Boiler, 44-inch x 12 feet long, 3-inch tubes, to build in brick work, including all fittings for boiler &c., and complete mill put in operation, as in No 8..... PRICE. \$1,850
- No. 8 a.—The same Mill as 8½, but belted in place of Direct Action, with 20 Horse-Power Stationary Champion Engine, with Return Tubular Boiler to build in brick; including Driving Belt, Pulleys and Tightener.....PRICE.. \$1,740
- No. 10.—Direct Action Clipper Saw Mill, 25 Horse-Power, with Return Tubular Boiler to build in brick. No. E Circular Saw Irons, including 60-inch solid Saw, Ewart Chain Sawdust Carrier, 25 feet long, using No. 57 Chain, and millwright work as in No. 8. Capacity, 8,000 to 12,000 feet per day. The regular size boiler for above mill is 48-inch diameter, 12 feet long with 3-inch tubes PRICE.. \$2,400
- No. 10½.—Direct Action Clipper Mill, 25 Horse-Power Engine, 30 Horse-Power Boiler, 48-in. by 14 feet, with 3½-in. tubes, otherwise the same as No. 10... PRICE.. \$2,500

If larger engines with same mill, or larger boilers, or saw irons are required, see note page 11.

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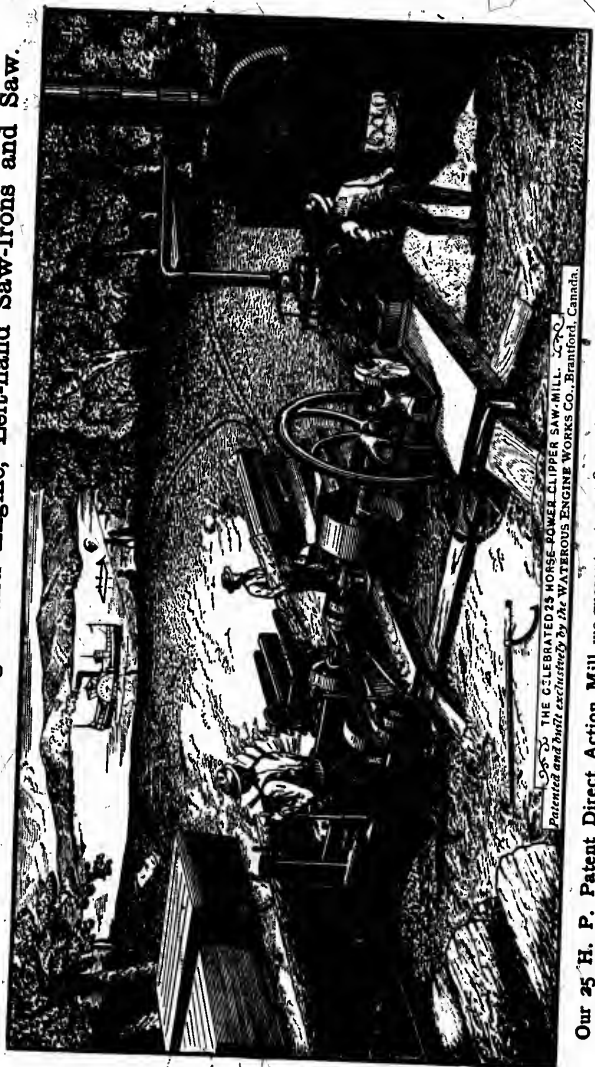
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DIRECT ACTION CLIPPER SAW MILLS.

This Illustration shows Right-hand Engine, Left-hand Saw-Irons and Saw.



IS THE CELEBRATED HORSE-POWER CLIPPER SAW-MILL. PATENTED IN CANADA AND THE UNITED STATES BY THE WATEROUS ENGINE WORKS CO., BRANFORD, CANADA.

Our 25 H. P. Patent Direct Action Mill we guarantee to cut 8,000 feet of lumber per day of ten hours, and to be the most efficient, economical and durable mill built in America, and will saw lumber cheaper per thousand than heavy large size belted or gang mills.

When purchasers wish it, we add edger, bull-wheel and cross-cut saws to our portable mills at an advance in price, there being plenty of power in the large mills to drive all at once.

In our 20 H. P. Saw Mill No. 8 and 8½ we have obtained, as the result of a great many experiments, the maximum of efficiency, simplicity, and durability, with the minimum of weight.

The above cut represents Mills enumerated on page 15. Specially constructed for hard work. For over a quarter of a century the leading Pioneer Mill of the Canadian Settlers. Owing to its freedom from repairs, can be used with safety in pineries situated long distances from manufactories or machine shops.

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Stationary (Semi-Portable) SAW MILLS

DIRECT ACTION AND BELTED.

No. 10a.—The same Mill as No. 10, but using a 25 h. p. Stationary Champion Engine, new pattern, and Return Tubular Boiler to build in brick, including driving belt 40 feet of 12 inch 4 ply Gandy, tightener and pulleys, also millwright work PRICE.. \$2,100

No. 14.—Direct Action Clipper Saw Mill, 30 horse-power, with Return Tubular Boiler. Regular size 48 in. x 14 feet long, with 3½ inch tubes. No. E Saw Irons, 8 in. face frictions, ordinary carriage, to cut 5 to 20 feet long, 62 inch solid saw, Ewart Chain sawdust carrier, 25 feet long and No. 67 chain, including millwright work as in No. 4. Capacity, 9,000 to 13,000 feet per day PRICE.. 2,600

No. 14a.—The same Mill as No. 14, but using a 30-h. p. Stationary Champion Engine and with Return Tubular Boiler to build in brick. Engine connected to saw by 40 feet of 16 inch 4 ply Gandy belt and tightener PRICE.. 2,400

No. 14½.—Patent Direct Action Saw Mill, 30 horse-power, with Return Tubular Boiler, 52 in. x 14 feet long, with 3½ in. tubes. No. J Saw irons to cut 5 to 20 or 23 feet long, 66 in. solid saw, Ewart Chain Sawdust carrier 30 feet long, using No. 77 chain, and millwright work as in No. 5. Capacity, 10,000 to 14,000 feet per day . . PRICE.. 2,950

No. 20.—Patent Direct Action Saw Mill, 35 horse-power consist of our new pattern 35 h. p. engine with boiler 52 inch diameter, 14 feet long, 3½ inch tubes 14 feet long. New No. J iron frame without top saw rig, 3 block carriage new pattern with independant knees, with 2 Knight patent dogs, heavy rack and pinion feed works, 12 inch face frictions, friction or ratchet set works, Sawdust carrier 30 feet, No. 77 chain and millwright work . . PRICE.. 3,400

In Direct Action Mills we furnish engines with Sawyer's Valve and connections, so that Sawyer controls the working of engine. We also furnish governors to be used when engine is doing any work other than sawing.

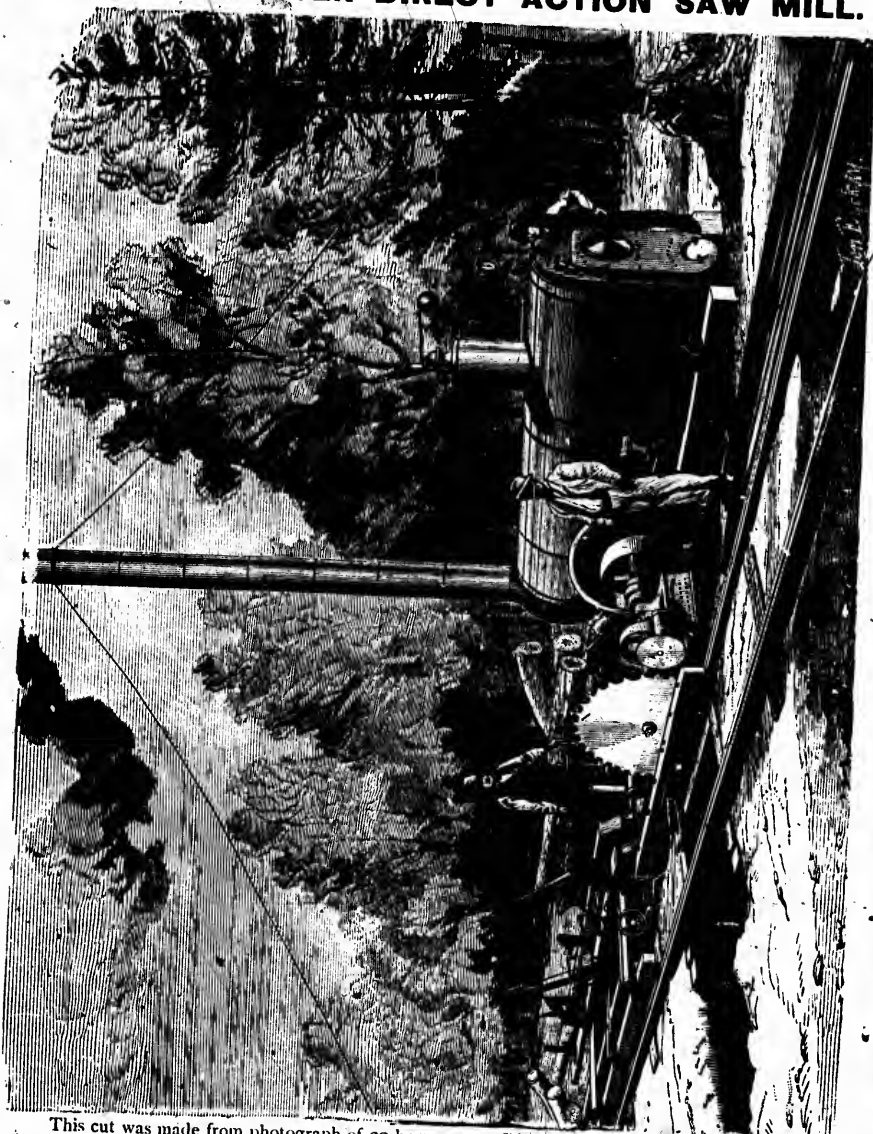
LLS.

In our 20 H. P. Saw Mill No. 8 and 8½ we have obtained, as the result of a great many experiments, the maximum of efficiency, simplicity, and durability, with the minimum of weight.

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WATEROUS ENGINE WORKS CO.,

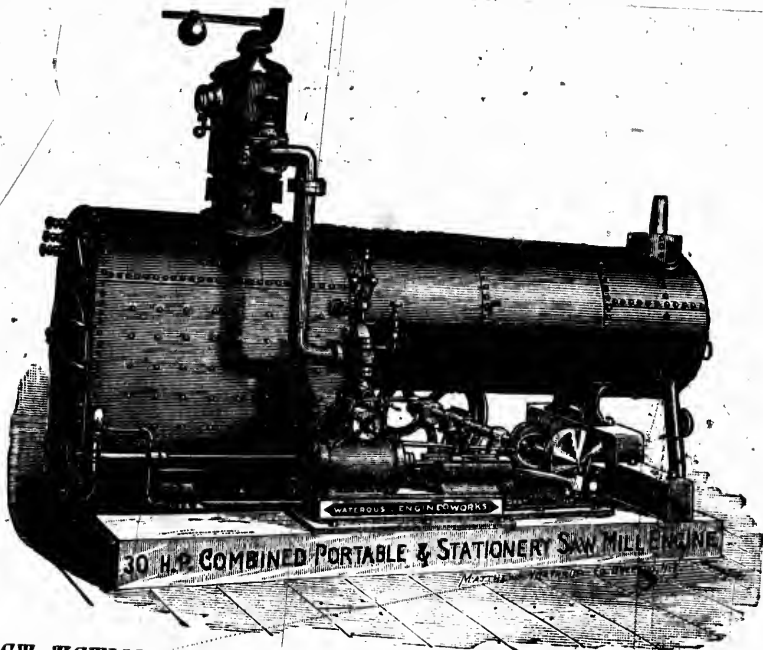
20 HORSE-POWER DIRECT ACTION SAW MILL.

This cut was made from photograph of 20 horse-power Direct Action Saw Mill, taken at the Exposition at Santiago, Chili, South America, in 1875, where it obtained the highest award, medal and diploma, competing against the English, American and French Saw Mills. Although this mill has been changed very materially in the last 10 years we insert this cut to show the general appearance of a 20 h. p. portable mill set up in the woods.

MILL.

BRANTFORD, ONTARIO, CANADA.

17



DIRECT ACTION SAW MILLS WITH FIRE BOX BOILERS.

No. 12.—Patent Direct Action Saw Mill, 25 horse-power, with Locomotive Boiler, (of which this cut is an exact illustration) or Return Tubular Fire Box Boiler, No. E Saw-irons with improved stop motion attachment, including 60 inch solid saw, Ewart Chain sawdust carrier 25 feet long, using No. 57 chain, and carriage to cut 5 to 20 feet long, 3 iron log seats, and millwright work as in No. 8. Capacity, 8,000 to 12,000 per day.....PRICE... \$2,650

No. 16—Patent Direct Action Saw Mill, new pattern Engine, 30 horse-power with Locomotive Boiler or Return Tubular Fire Box Boiler, new style No. J iron frame Saw-irons, 12 inch face frictions, stop motion attachment, carriage has 3 iron log seats, 2 Knight dogs, cuts 5 to 20 feet long, 66 inch solid saw, Ewart Chain sawdust carrier 25 feet long, using No. 67 chain and millwright work as in No. 8.....PRICE... 3,100

No. 18.—A Portable Belted Mill, new pattern, 35 horse-power Engine with Locomotive Boiler or Return Tubular Fire Box Boiler and otherwise the same as No. 16, including belt and pulleys.....PRICE... 3,650

†† Inseted Toothed Saws furnished when desired at a slight advance on cost. For Prices of Saws and Saw Furnishings see No. 12 Circular.

WATEROUS ENGINE WORKS CO.



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Railway Sleeper or Tie Mill.

This mill has been invented and arranged to meet a long felt want in Canada. In many districts along new railroads are vast tracts of small timber, cedar, tamarac, hemlock, etc., that will not pay to turn into ties if taken to a saw mill to be cut in the ordinary way. This mill is intended to be placed in the bush or along side a railway. The logs 8 to 14 inches diameter, 8 feet long or more, are thrown on skids at bottom of trimmer frame, where one man adjusts them on the endless chain which carries them through between the trimmer saws. These saws are 8 feet apart or length of tie; if logs are long enough for two ties, the untrimmed piece rolls back on to the skids at bottom, is adjusted on the chains, and carried through the trimmers; from these saws the trimmed log rolls down to a trough, with hinged sides worked by a lever, shown in cut. This device centres the logs for the main saws; it is then let down on to the endless and continually moving chain and carried through the main saws, there being two saws 6 inches or more (thickness of tie) apart. Endless carriers on each side of log chain take away the refuse slabs, bark and sawdust. On arrival at the end of carriage the tie is caught by an endless chain carrier and carried out as far as desired through a gang of men who take them off and pile for shipment on either side of carrier. The sawdust and refuse is carried to the fireman. The larger slabs are piled on one side to be made into shingles with Spalt machine or into lath.

The operation it will be seen is continuous, and the capacity 3 to 5 ties per minute. The engine is our 30 horse power. Larger or smaller engine could be furnished if desired, though 30 h. p. is, we think, as small as should be used.



IMPROVED CIRCULAR SAW IRONS,
3-SIZES BUILT, NO. 2 LARGEST, C, AND A SMALLEST.

MEDIUM SIZE SAW FRAME.

Right hand. The reverse of this would be left hand. To distinguish right from left, stand in front of saw's edge, saw cutting towards you on which hand does the log pass. If right hand of saw it is a right hand saw and saw irons. If on left the reverse.

All sizes of saw frames are made either hand.

Medium Size Saw Frame.

In our No. A or smallest size Saw Irons we use a much smaller and lower frame than that shown in cut. It will only practically admit of a 50 inch saw, although a 52 inch is sometimes used—still the frame is not designed for such heavy work. In all its details it is like the medium size, only smaller and lighter.

The **Medium Size Frame** is used for C, E, and F Irons, using from $4\frac{1}{2}$ inch face friction to 8 inch. It can also be arranged with wider ends to enable driving pulley to be placed inside of the frame where space or position of mill requires this. When nothing is said in order, we always send frame as shown in cut, with pulley outside of frame and 3 bearings under mandrel.

Saw Mandrels are Heavy Steel or Hammered Iron, forged specially for us. They are made with the greatest of care—to special templates—so that at any time saws can be ordered by telegraph and a sure fit guaranteed. The Mandrel is one of the most important parts of the mill, for if not properly made and fitted the saw will not hang or run true and uneven lumber is the result; either unsaleable, or if sold, at largely reduced prices. See remarks on this point pages 3, 16 and 17 in **No. 12 Circular on Saws**. The Mandrel boxes or bearings are adjustable either way so that saws can be readily lined in or out of the log and adjusted any way to overcome a tendency to run. See pages 8, 9 and 10 in circular 12.

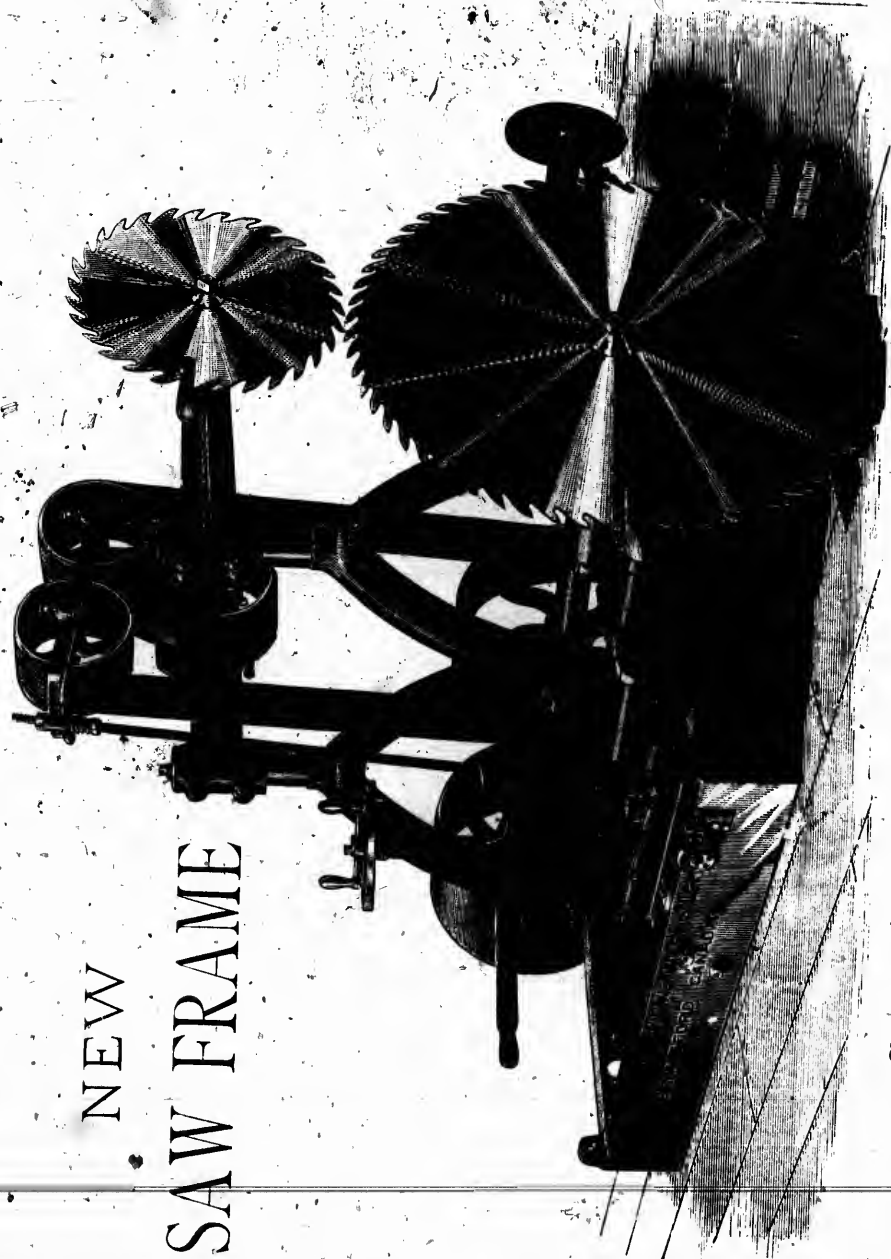
Large Rollers on frame inside saw in front and behind mandrel to receive heavy slabs, timber, or boards, and prevent sagging or binding on the saw.

Timber Gauge is a special feature. The wheel or dial on top is brass faced, marked and drilled in $\frac{1}{8}$ -inches from $\frac{1}{8}$ to 9 inches. To cut dimension stuff, it is on y necessary for sawyer to drop a pin into the hole marked the size desired and turn handle to it, this brings the rollers the exact distance from the saw, so that when log is set up to it, the exact size wanted is cut.

Feed and Gig Lever shown in centre of front end of frame is easily operated to run the carriage backward or forward.

Stop Motion Lever shown in cut of mill, page 10, is about level with the floor, and in such a position that sawyer can slow up the motion of carriage if it is returning too fast; this prevents excessive wear of frictions.

Receding Lever is also near sawyers foot, being generally a small knob coming up through the floor. A slight pressure of the foot on this throws the edge of a plank properly hung against the pulley shown in cut, page 24, attached to dog shaft by bevel gearing. Before, however, it can reach the pulley it acts on a trip lever which throws the ratchet or set works out of gear. As the carriage returns its motion causes the pulley to revolve by friction with the plank and this runs the head blocks back as far as desired by sawyer, to receive the next log be it large or small.



NEW
SAW FRAME

Improved No. J Saw Frame.

We have made this new pattern of saw frame specially for heavy work, in connection with our new carriage for large logs that require a very large saw. The mandrel is forged steel, very heavy and runs in three long adjustable reservoir oil boxes. The frame takes in any size saw to 72 inches and is amply strong and well braced, as will be seen from the glimpse shown of the inside, to stand the strain of so large a saw and the largest Top Saw Frame also. The engraving shows the frame arranged with No. 3 or medium size top saw rig.

Saw Guide is arranged so that outer arm turns up and permits saw to be taken off without disarranging guide. This is an improvement old sawyers will appreciate, as they know the trouble sometimes experienced to get the guide adjusted properly.

It is also adjustable. The hand wheel shown in front of frame adjusts to a nicety the guide either way, so that while saw is running it can be controlled without stopping by the sawyer. This is another improvement sawyers will appreciate.

New driving arrangement for upper saw, answers for an adjustable tightener by connection with the lever and stop attached in front of the top saw frame, and also reverses the motion running top saw against the log in place of with it as lower side of under saw runs. By running this saw in this way the dirt, gravel or grit is thrown out of cut by saw in place of into it, as would be the case with reverse motion.

Top Saw Frame, clearly shown in cut, is strong and well braced, making it very stiff. By means of the turned uprights it is adjustable by screws, to line with lower saw or to take up the wear in the saws.

It is furnished with self-oiling boxes and an adjustable saw guide.

MEDIUM SIZE SAW CARRIAGE.

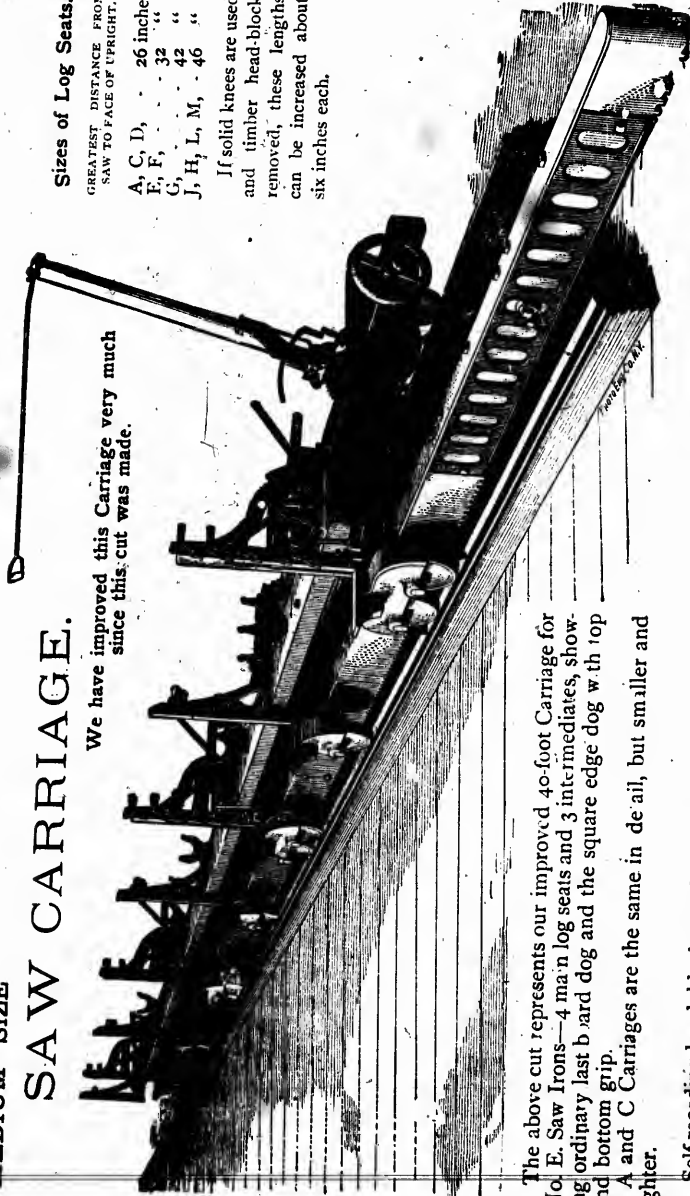
We have improved this Carriage very much since this cut was made.

Sizes of Log Seats.

GREATEST DISTANCE FROM
SAW TO FACE OF TRIGHT.

A, C, D, - 26 inches
E, F, - 32 "
G, - 38 "
H, L, M, - 42 "
J, - 46 "

If solid knees are used and timber head-block removed, these lengths can be increased about six inches each.



The above cut represents our improved 40-foot Carriage for No. E, Saw Irons—4 main log seats and 3 intermediates, showing ordinary last board dog and the square edge dog with top and bottom grip.

A and C Carriages are the same in detail, but smaller and lighter.

Self-receding head block attachment, enables sawyer, by pressing a lever with his foot, to run the head blocks of carriage back as they return for log after taking off last board. **Saves time, and time is money.**

This attachment is included in the price of E and all larger Saw Irons.

RECENT IMPROVEMENTS.

Recognizing the fact that nothing is perfect, we are constantly devoting time and energy to improve our machinery. In **A, C & E Carriages we have strengthened the LOG SEATS**, making them heavier and stronger to enable them to withstand careless handling.

New Reservoir Solid Brass Boxes take the place of the old half box for axles of V wheels. These boxes are **dust proof** and have in the reservoir a simple self-oiling device, and will hold enough oil for a week's run.

Our "**Knight**" Dog, fully shown in cuts of new carriage, is another feature added to and used on all our large carriages. It is very strong, quick working and reliable, with it a round log can be instantly dogged firmly, although frozen hard, and in a second the log can be undogged and the dog put in position to hold last board while it is being sawn 1 inch or $\frac{3}{4}$ thick. **Its use increases the capacity of a Mill fully 10 to 20 per cent.**

Self-Receding Attachment, also clearly shown, has been simplified and improved and is now placed on all our **Carriages**.

Friction Set Works are more reliable, less inclined to wear and get out of order than the old ratchet set works. They are very durable, do not slip; hold all they take and set the log accurately.

They can be arranged to set from behind as well as in front. We make all our Carriages to set from the front side by handle over the log, as shown in our cuts, unless specially ordered to set from behind.

The advantage we claim for this is the position given the sawyer. He stands in front of the log, sees the last board as it drops, and at a glance can tell as the log is returning into what thickness of board it is best to put the next cut. If clear a two or three inch plank is much more valuable than one inch, etc., etc. The instant the log stops he grasps the set lever and sets for the next board while log is stopping and returning to the saw. With an expert sawyer the log never stops, and 7 boards 14 inches wide, 1 inch thick, 16 feet long have been easily dropped in one minute with our No. 8 and No. 12 Direct Action Mills.

These Set Works are also arranged so that one pull of the set lever as far as it will go sets for $\frac{1}{2}$ inch, 1 or $1\frac{1}{2}$ or 2 inches as case may be. That is it can be set for any of these thicknesses so that if set for 1 inch, one pull is 1 inch, two pulls make 2 inches, etc., or if set only $\frac{1}{2}$ inch, 3 pulls will make $1\frac{1}{2}$ inches.

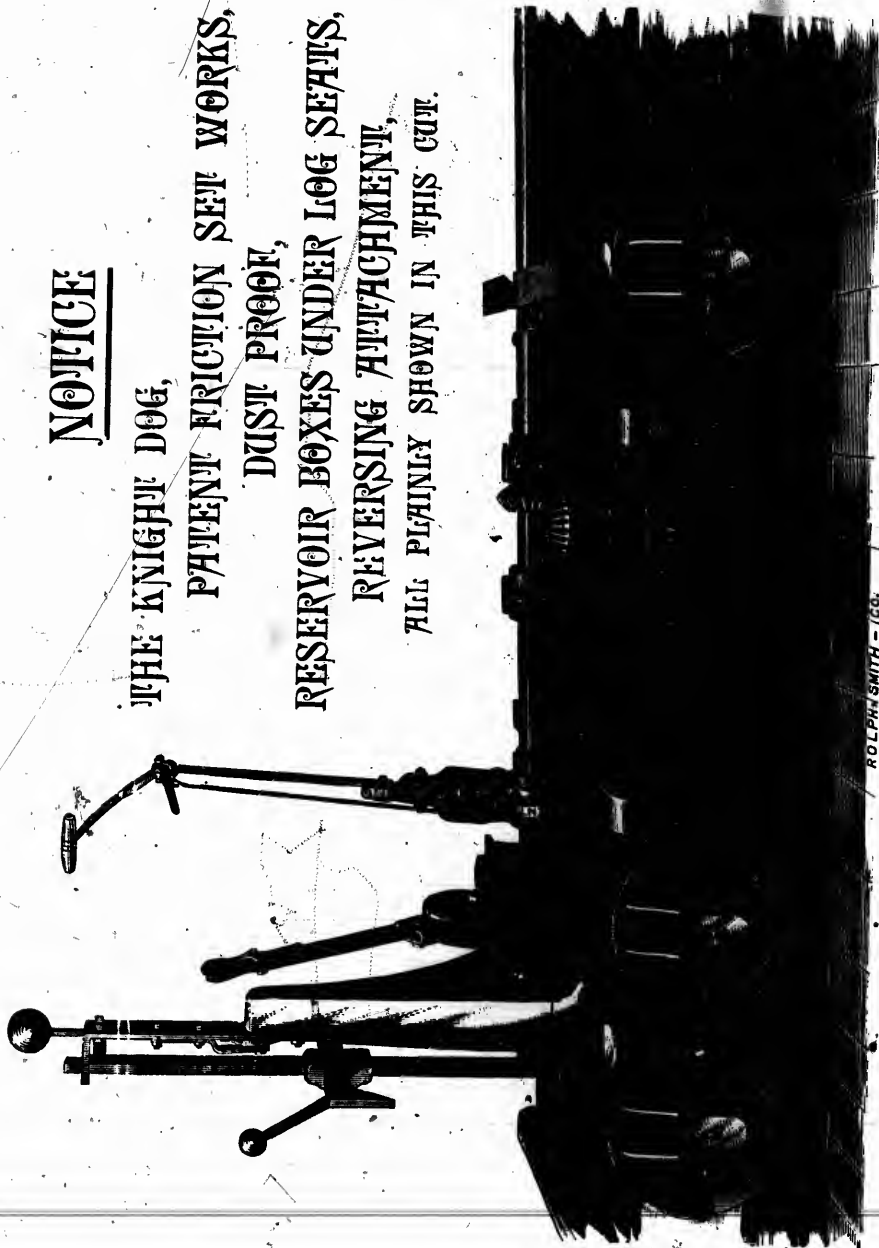
Log and Board Rules placed on front main log seat cover are great conveniences. By noticing the pointers it can be instantly seen without measuring or calculating just what width of log remains on the log seats, and enables sawyer to decide into what sizes it is best to saw the cant or log.

Steel "A" Track under log seats. This track is steel, *planed perfectly true*, and makes a very stiff, strong, accurate track. It is in 10 feet sections, double the length of our old cast track. **It is the only Steel track in the market.**

back as they return for log after taking off last board. Saves time, and time is money. This attachment is included in the price of E and all larger Saw Irons.

NOTICE

THE KNIGHT DOG,
 PATENT FRICTION SET WORKS,
 DUST PROOF,
 RESERVOIR BOXES UNDER LOG SEATS,
 REVERSING ATTACHMENT,
 ALL PLAINLY SHOWN IN THIS CUT.



ROLPH SMITH - 100.

Improved J Carriage with Independant and SIMULTANEOUS STANDARDS.

The improvements in our new Carriage, shown in opposite cut, when compared with Carriage on page 24, are readily seen. First, the Log Seats are made very heavy, having been heavily ribbed throughout where the strain is greatest. The front has been ribbed and braced to support the increased size of wheel axles both in length and diameter.

The Reservoir Solid Dust-proof Brass Boxes are clearly shown, and when compared with cut on page 24, of old carriage, the difference in size and style will be seen.

V Wheels are increased to 14 inches in diameter, and made solid to prevent flanges splitting off.

Back Wheels have had a flange placed on the inner edge to assist in keeping the Carriage on the track when log is being rolled on from skids.

Rubber Cushions can be seen in cut placed over the brass boxes. These relieve the log seat of any very heavy jar that may occur from the rolling on, or lifting up and dropping of a heavy log by the careless handling of the log turner.

Simultaneous and Independant Standards. This improvement does away with the wedge that was advanced from the centre of the old standard by lever and pawl to take up the crook and taper in a log, and fills its place very much better.

Straightening small crooked logs. In sawing long logs these standards can be advanced 4 inches to a crooked end of the log, fastened to it, and if the log is not too stiff, it can be drawn back to its former position bringing the log with it, and if this is not enough to straighten the log, the other standard can be shoved out any portion of the four inches and held there.

The Rack is made heavier, square toothed, with webbed sides, which strengthen and support it, so that pinion cannot bottom and catch. The carriage shown may be arranged for steam feed.

All our Carriages are wooded with seasoned timber before shipment, and are very strong and rigid, being firmly braced.

Saw Mill Machinery.

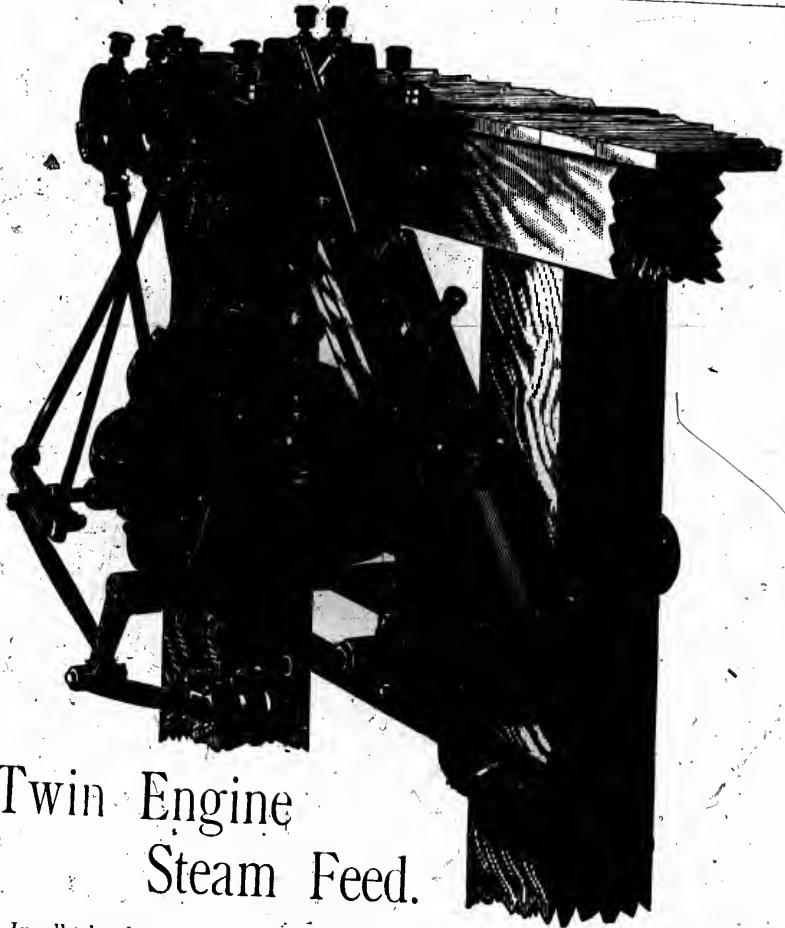
Different Sizes of Saw Frames and Carriages, made either right or left hand.

When ordering always state if right or left hand carriage is required, see remarks page 3. See pages 5, 6, 7 and 8 for description of the mode of operation.

- No. A** (originally No. 3 $\frac{1}{2}$).—**Smallest Size of Saw Irons we make**, has improved iron frame, 3 $\frac{1}{2}$ -inch face friction, 2-inch double leather feed belt, timber gauge, improved Gauley friction set works arranged so as to run knees forward or back, 3 feed speeds, adjustable guide, lumber rollers on frame, pulley 24x10 outside of frame with outer journal. Carriage will take any size log up to 24 inches diameter; has 3 log seats, 2 mains and 1 intermediate 5 feet apart, square edge dogs that grip top and bottom of square side of timber or lumber, enabling last board to be cut $\frac{3}{4}$ inch thick if desired, adjustable lever wedges for crooked and taper logs, 27 feet segment rail, 50 feet V and flat track; cuts 5 to 20 feet logs, takes any size saw up to 48 inches. Carriage is wooded, marked, knocked down ready for shipment. Without saw.....PRICE.. \$ 475
- No. C** (originally No. 3).—**Medium Iron Frame**, 4 $\frac{1}{2}$ -inch face friction, 2 $\frac{1}{2}$ inch double leather feed belt, timber gauge, friction set works, 3 speeds, adjustable guide, large lumber rollers on frame; pulley 24x13 outside of frame, with outer journal; carriage the same as A, with small segments; takes any size saw up to 52 inches. Without saw.. 525
- No. D**.—**The same Saw Irons as C**, but 6 inch face friction, 3-inch double leather feed belt, 14x24 pulley, wider segment, larger mandrel; made for fast speed as a pony or stock mill for large mills; has stop motion and self-receding attachments; will take up to 54-inch saw. Without saw.....PRICE.. 575
- No. E** (originally No. 2).—**Medium Iron Frame**—Can be made wide for pulley to go inside of frame, when so ordered, otherwise made narrow and pulley placed outside, with extra journal, thus placing 3 bearings under mandrel and taking all jar off saw, uses 15x24 to 30 inch pulley, 6-inch face friction, 3-inch double leather feed belt, 3 speeds for feed, adjustable guide, 4-inch lumber rollers on frame, timber gauge, friction set works, stop motion attachment; carriage has 3 iron log seats, 2 mains and 1 intermediate, taking in a 30 or 36 inch log; cuts 3 to 23 feet long, 27 feet segment, 50 feet heavy V and

SAW FRAMES AND CARRIAGES CONTINUED.

- flat track; has self-receding head-block attachment, Knight Dogs, takes any size saw to 60 inches. Without saw.....PRICE.. 600
- No. F.**—The same as No. E, but with 8-inch face fractions, 4½-inch double leather feed belt, heavier mandrel, 16x24 or 26-inch pulley, 3-inch segments; larger bearings containing oil-reservoir; otherwise the same as No. E but strengthened, with different cones for faster cutting; made strong for heavy work.....PRICE.. 650
- No. G.**—The same as No. F, but with New Pattern Carriage, one size smaller than J.....PRICE.. 725
- No. H.**—New Pattern Iron Frame, with 10-inch face fractions. The carriage is one size larger, original style, with 2 mains and one intermediate, suitable for logs 5 to 23 ft. long, 54-inch in diameter, 4-inch segment. Last board dogs that grip top and bottom of square side of timber or lumber or Knight's patent dogs enabling last board to be ¾ inch thick, adjustable lever wedges for crooked logs, log seats arranged to prevent a "Nigger" or under floor log roller from shoving carriage off the track; has self-receding head block attachment, takes up to 62-inch saw. Without saw.....PRICE.. 750
- No. J** (originally No. 1).—New Pattern Iron Frame, (see page 22), heavy and strong, with 4-inch mandrel, pulley 17x30 inch, webbed and turned inside and out. Takes in any size saw up to 72-inch, has 12-inch face fractions, the one on mandrel webbed and turned inside and out, feeds 4 to 8 in. per revolution if power permits, or proper feed for power used, 6-inch double leather feed belt, timber and lumber gauge, new adjustable guide, large and improved mandrel bearings with oil reservoir, and new pattern carriage the same as shown on page 26 and 32. Without saw.....PRICE.. 850
- No. L.**—The same Improved Saw Irons as J, but frame enlarged and webbed pulley, 17x30, placed inside of frame, friction pulley taken off, mandrel (which is thus relieved of its strain) and placed on a counter shaft below frame, on this shaft is a 17x30 pulley around which the main driving belt laps, driving the feed works, and in its turn acts as a tightener to main belt.....PRICE.. 1,000
- No. M.**—Same as J. but frame arranged for Twin engine steam feed, without friction feed works, but in their place Twin engines (See page 30) arranged to be placed in engine room with connections to carriage and connections to sawyer's lever, carriage as shown in cut page 32 with double segments. Engines and everything complete for carriage to cut 5 to 23 ft logs; no saw and no top saw rig.. PRICE.. 1,350
- Saw mandrels are invariably either hammered (forged) iron or steel. No common rolled iron mandrels are used.



Twin Engine Steam Feed.

In all the larger mills in the lumbering centres the "Gun Shot" steam feed as it is frequently called is being replaced with the Twin Engine Feed for many reasons, viz. :

Cheaper in first cost, and more economical in steam. The engines being only 10 to 12 h. p. take very much less steam than the long cylinder (it having to be full length of carriage) which it was necessary to fill for each movement of the carriage ; requiring in some instances several extra boilers.

More Sensitive, and still more easily controlled by the sawyer ; much less liability to accidents.

Being in Engine Room, it is under the supervision and control of engineer as well as the control of the Sawyer.

Advantages over friction or power feeds is its great and instantaneous range of speed. The carriage can be slowed up till it barely moves along, and next moment speed can be increased till it fairly seems to fly. The variations being under control of sawyer can be exercised at will without stopping carriage or mill to change. In the cone feed you have two or at the most three feeds, these are changed by moving belt on the cone pulleys so that feed is not often changed.

Speed of Cutting is therefore much increased provided there is plenty of power behind to drive the mill in unison with the carriage.

The Engine shaft runs level with the floor and on its other end are the pinions working in the racks on carriage barrel for **Rope Feed**.

The valve shaft runs to a convenient position and terminates in a lever so arranged as to instantly bring the lever back plumb on the centre no matter where it is when Sawyer releases it, and thus shut off steam and stop the carriage. The ball valve is worked by a cam attached to shaft, hidden in cut behind the brace, which raises it admitting steam no matter which way shaft is turned, but only lets in steam in proportion to the amount shaft is turned by sawyer's lever.

TOP SAW RIG.

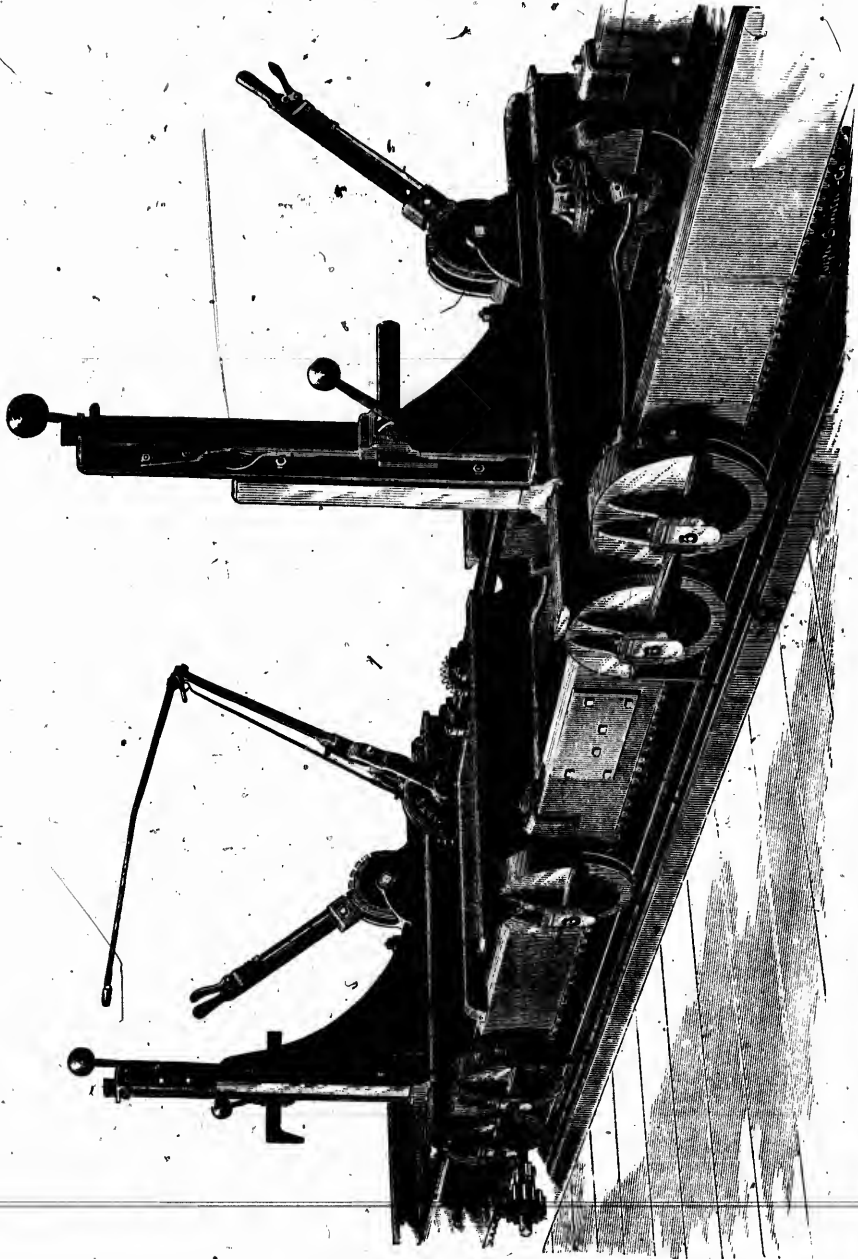
No. 1 and 2 can be added when desired to all the Saw Frames. No. 3 and 4 can only be added to E and larger Saw Frames.

- No. 1.—Consists of Mandrel, Adjustable Boxes and Pulley**, arranged to hang on beams of mill immediately over large saw mandrel, with pulley on large saw mandrel and belt. For saws up to 30 inches. Without saw.....PRICE.. \$ 150
- No. 2.—The same, but much heavier**, for saws up to 40 inches. Without saw.....PRICE.. 200
- No. 3.—Medium rig for saws up to 30 in.**, to attach to saw frame, including all fittings and belt, also the necessary change in frame to attach the rig; including the improvements illustrated on page 22 to reverse the motion of saw. Without saw.....PRICE.. 250
- No. 4.—Large size, same as No. 3**, for saws up to 40 inches. Without saw.....PRICE.. 300

Inserted Tooth Saws furnished with our Large Portable Mills at an advance in price.

Saw mills, of all capacities, estimated for on application; plans for Belted Mills given when contract is made. Plan of foundation for Portable Mills given if purchaser wishes it.

If interested see that you get our new 62 page circular devoted exclusively to Saws and Saw Furnishings, and valuable hints on the management of saws.

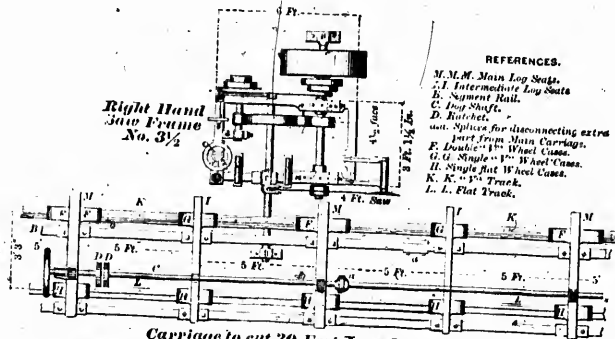


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Extensions to Saw Carriages,

To Enable Different Lengths of Logs to be Cut.

Carriages—When needed to cut 30 feet logs—require two extra log seats, one main and one intermediate; 10 feet of extra log shaft, 10 feet of extra segment rail, 20 extra feet of back and front track. The whole carriage would, when this is added, be like illustration below, being 3 main and 2 intermediate seats.



Carriage to cut 30 Foot Logs, Right Hand.

Shows Carriage with Slides on Log Seats, Upper Rail and Knives or Uprights removed.

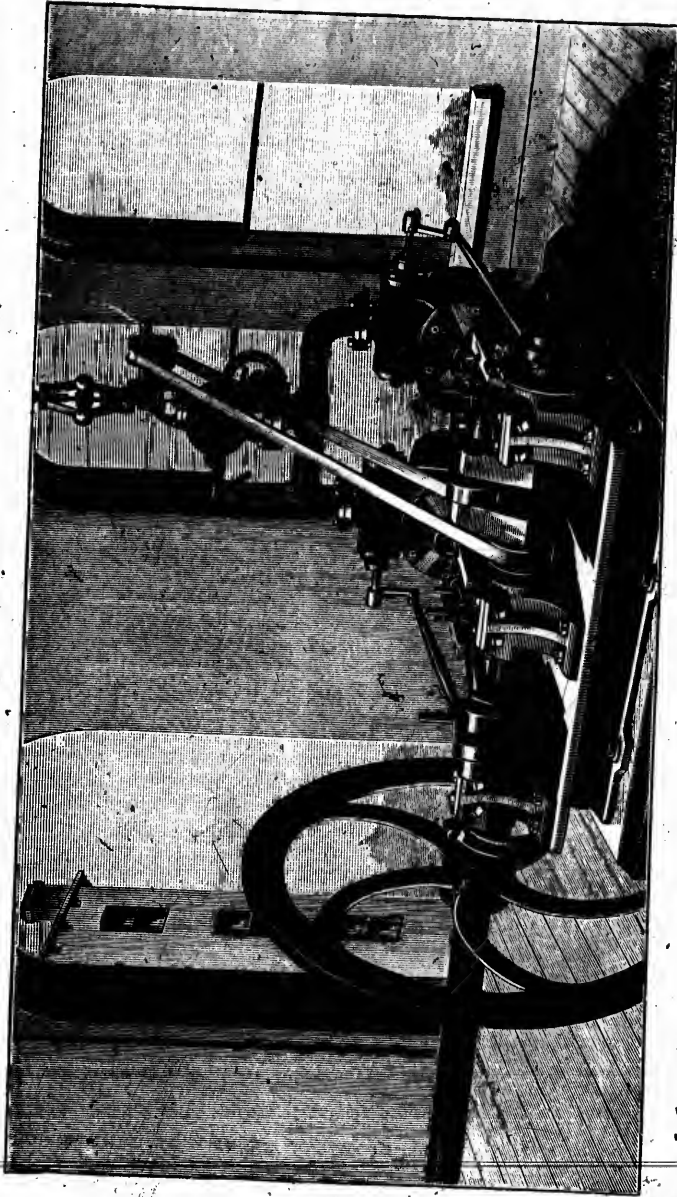
30 foot Carriage extra	Nos. A, C and D Saw Irons	.....	\$120
“ “ “	“ “ E and F “	.....	150
“ “ “	“ “ G “	.....	180
“ “ “	“ “ J, H, I. and M “	.....	200

Carriages—when needed to cut 40 feet logs, it is necessary to add 4 log seats to the ordinary carriage, viz. 2 Main Blocks and 2 Intermediates. The whole carriage would then be like above illustration, but with two more log seats added to carriage. See cut of 40-foot carriage page 24.

40 foot Carriage extra	Nos. A, B, C and D Saw Irons	.....	\$240
“ “ “	“ “ E and F “	.....	See cut page 24 . 300
“ “ “	“ “ G “	.....	340
“ “ “	“ “ J, H, I. and M “	.....	375

The above is the arrangement we would advise in lengthening out carriages, but when parties desire it we can place the extra log seats further apart, thus making the same log seats cut longer logs, or taking fewer log seats to cut the same length of logs. In large timber, 6 to 6½ or 10 feet can be safely used between extra log seats, but in small springy timber, such as spruce, it needs a log seat every five feet, Carriages can be made any length desired.

Always give hand of Saw Frame, carriage or engine when ordering; when nothing is said, right hand carriage is invariably sent and engine to suit it. See particulars pages 3 and 20.



Double Engines.

The above cut represents a pair of engines built for one of our Australian customers. They are running in or near Sydney, N. S. Wales. It will be noticed that they are very heavy and substantial. The shaft is forged in one solid piece, has long bearings running in brass boxes. Every portion of the engines are made for the purpose of standing heavy and continuous work at high speed. Can be run any speed up to 400 to 450 revolutions per minute. Can be fitted with link motion for reversing and other purposes requiring engines to be reversed.

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Dowie Engines.

The above cut represents a pair of engines built for one of our Australian customers. They are running in or near Sydney, N. S. Wales. It will be noticed that they are very heavy and substantial. The shaft is forged in one solid piece, has long bearings running in brass boxes. Every portion of the engines are made for the purpose of standing heavy and continuous work at high speed. Can be run any speed up to 400 to 450 revolutions per minute. Can be fitted with link motion for reversing to adapt them to hoisting and other purposes requiring engines to be reversed.

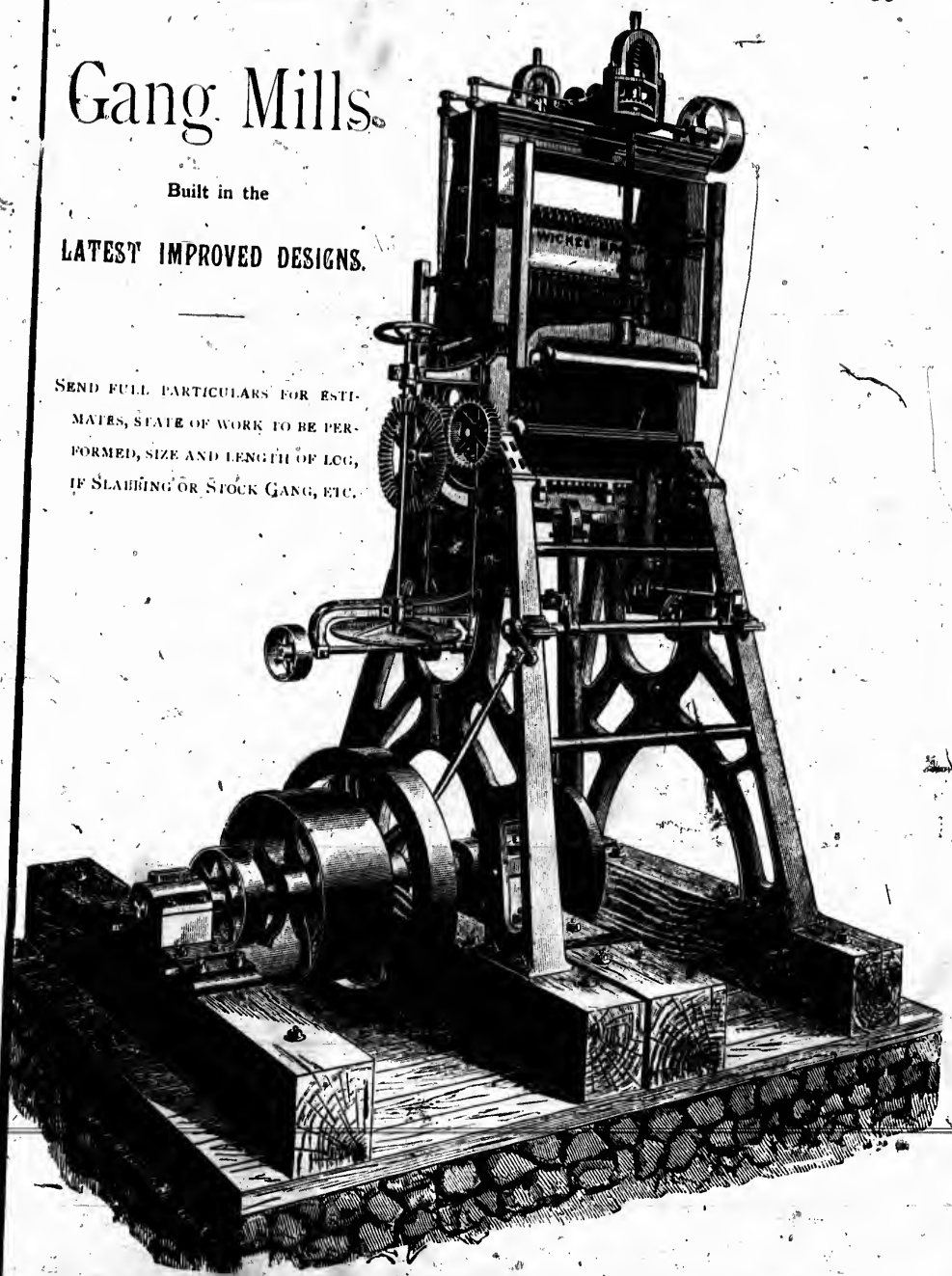
BRANTFORD, ONTARIO, CANADA.

Gang Mills.

Built in the

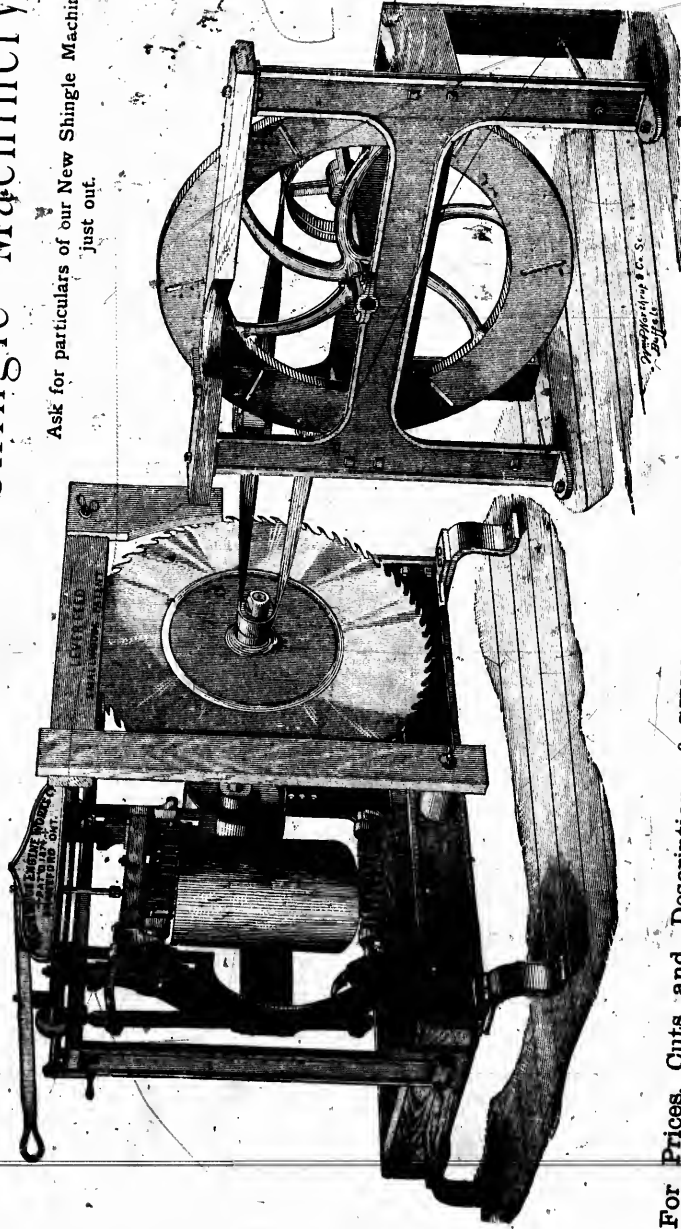
LATEST IMPROVED DESIGNS.

SEND FULL PARTICULARS FOR ESTIMATES, STATE OF WORK TO BE PERFORMED, SIZE AND LENGTH OF LOG, IF SLABBING OR STOCK GANG, ETC.



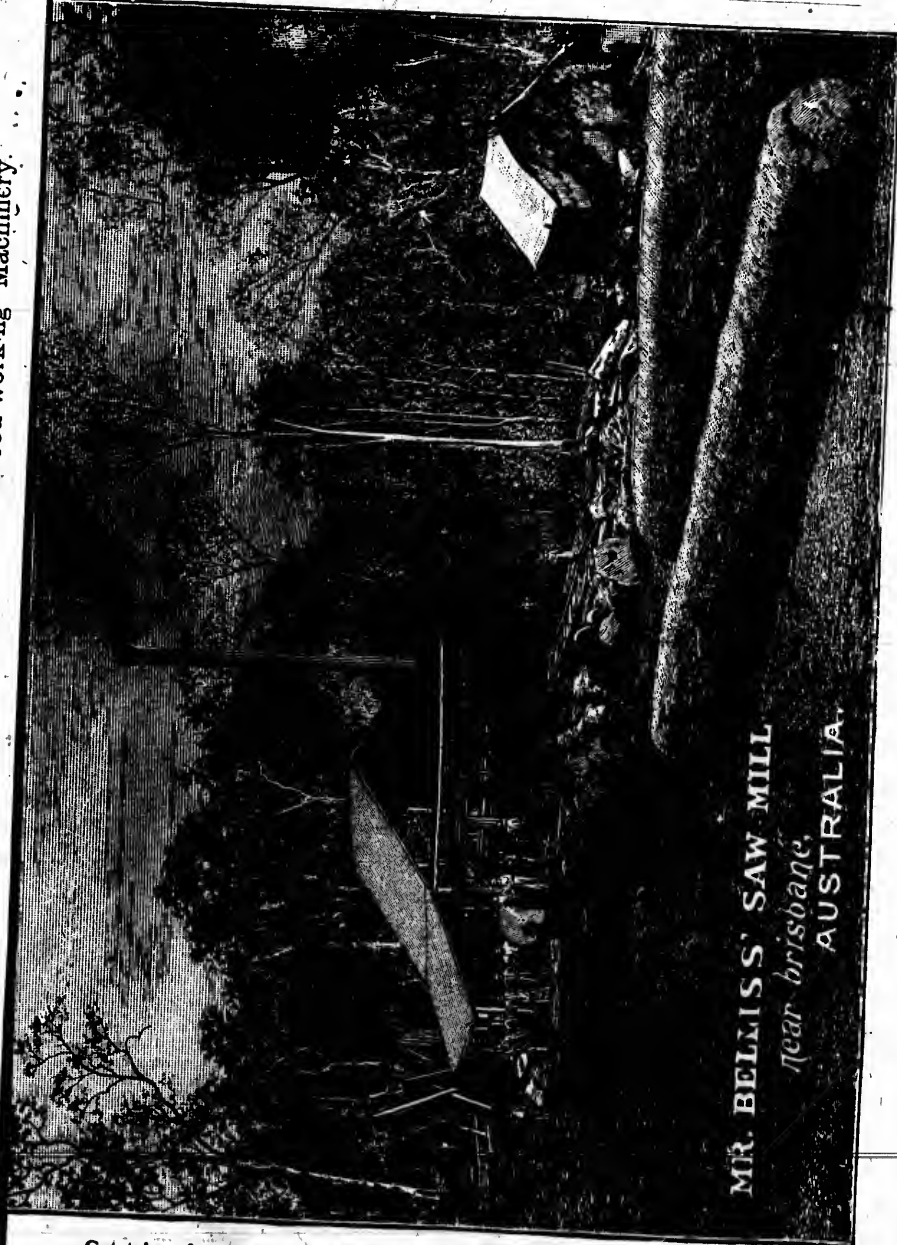
Smallwood's Lever Feed Shingle Machinery.

Ask for particulars of our New Shingle Machine just out.



For Prices, Cuts and Description of SHINGLE MACHINERY, LATH MACHINERY in all its details, send for Price List No. 11 of Wood-working Machinery.

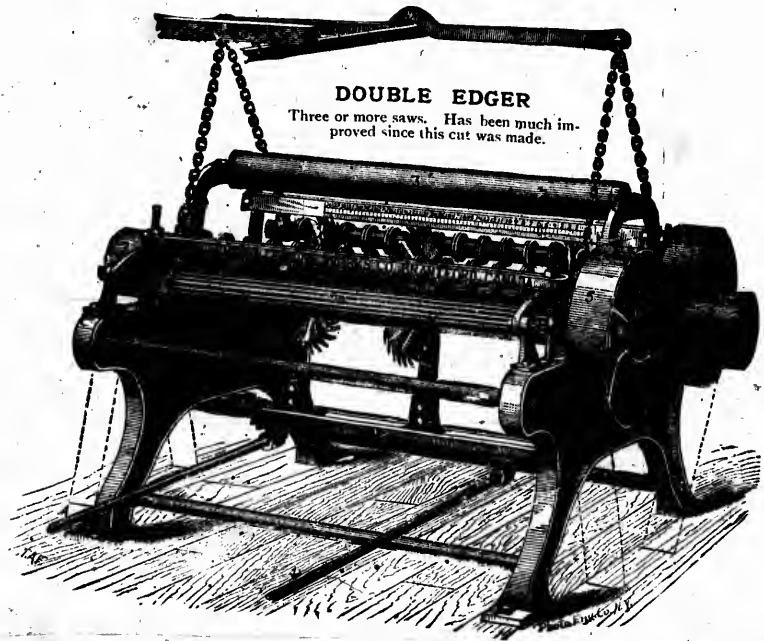
For Prices, Cuts and Description of SHINGLE MACHINERY, LATH MACHINERY in all its details, send for Price List No. 11 of Wood-working Machinery.



MR. BELLISS' SAW MILL
near Brisbane,
AUSTRALIA.

Cut taken from photograph sent us by one of our customers in Australia.

SAW MILL MACHINERY.

**DOUBLE EDGER**

Three or more saws. Has been much improved since this cut was made.

2, cross bars to lift feed rollers; 3, rollers to shove over lumber not needing to be edged; 4-4, rod's working saws with hand wheel at out end, or can be arranged to be worked with levers by the knees; 5-5, feed pulleys; 6, arms, carrying upper toothed feed roller, can be thrown back to clear the saw in filing; 7-7, driving pulleys on either end of mandrel; counter shaft to drive feed under the floor not shown, but furnished.

Double Edger, complete, as shown.—No belts. Three 16-in. 9-gauge saws, two to move with hand wheels and third stationary, including dials and pointer..... PRICE.. \$ 300

The same, with 18-in solid saws, 9-gauge..... PRICE.. 310

The same, with 18-in Lumberman's Clipper Inserted Toothed Saw, 18 teeth in saw, extra teeth, 25 cents each..... PRICE.. 350

Our Improved 5 Saw Gang Edger, 3 to move by hand wheels, arranged with guides so that two men can edge at once, one either side, furnished with tables, front and rear; one end of mandrel is carried by bridge tree in a circular casting; this bridge tree bolts, and saws can be drawn off mandrel when required, and replaced by sharp saws in 20 minutes, without disturbing mandrel. Price, complete, including 18-in. solid saws..... 575

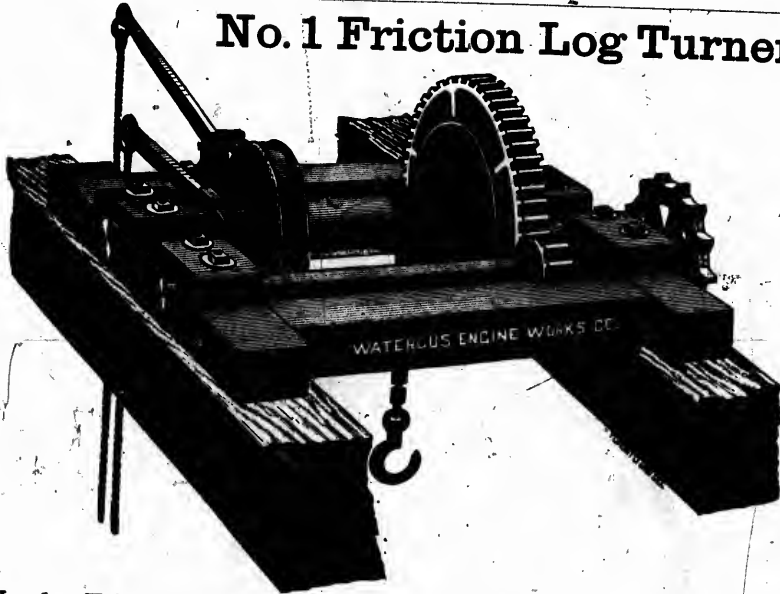
The same, with 18-in. Lumberman's Clipper Saw, in place of solid saws..... PRICE.. 625

Single Edger, with countershaft 26 feet long, 2 pulleys the driven and the driver to edger, with 40 feet 10-in. belt from power to counter and 35 feet 6-in. belt to edger, and Millwright work..... PRICE.. 150

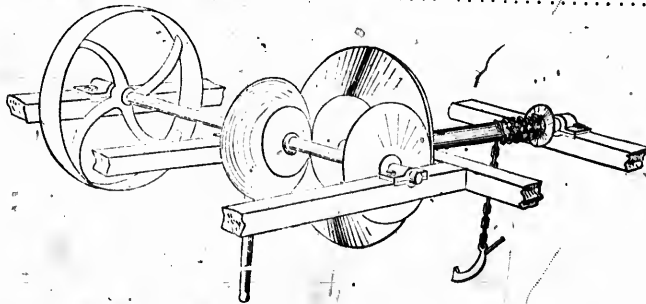
New Brunswick Edger, suitable for edging long timber and deals, including 26 feet countershaft, driven and driving pulleys, 40 feet 12-in. belt, 35 feet 10-in. belt, rollers, all very heavy. Includes 30-in. saw..... 240

NERERY.

No. 1 Friction Log Turner.



- No. 1.—Friction Log Turner or Canter, to work over head in mill; will turn logs either way, or completely around on carriage, shaft, projects a foot, with Sprocket Wheel (as shown in cut), pulley, or coupling, to drive log turner. \$ 75
- No. 2.—The same arranged at right angles to saw, with shaft extended and a second shaft 8 feet long, connected with a pair of iron bevel wheels to log turner. 95
 Either put in a mill including pulley on power shaft, with belt and millwright work, extra. 35



- No. 3.—Double Friction Log Turner-Irons complete, as shown in cut, ready to attach power. 85
- No. 4.—Plain, square face Friction Turner with shaft 20 feet long pulley and friction, pinion on same with 3 boxes and lever, barrel shaft and boxes, friction wheel chain and hook. 65

eding to be edged ;
 worked with levers
 can 'be thrown back
 r shaft to drive feed

two to move
 . . . PRICE.. \$ 300

. . . PRICE.. 310

teeth in saw,
 . . . PRICE.. 350

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 sharp saws
 18-in. solid
 575
 . . . PRICE.. 625

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 . . . PRICE.. 150

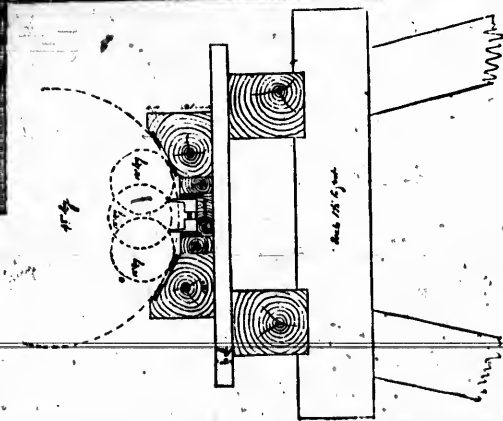
ug 26 feet
 elt, rollers,
 240



The Sectional Cut below shows the proper way to build the slide for Giant Chain Log Jack.

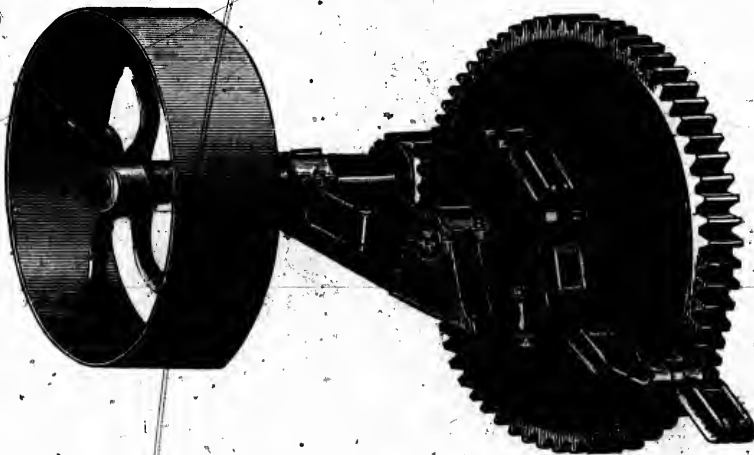
The Chain should run on maple or hard iron; the logs should also slide on maple or hard iron.

A full working drawing will be furnished when Log Jack is ordered if desired.



Log Haul up.
Showing Giant Chain in use. This Chain is best returned by having the tooth specials ride on the edge of a scantling or plank running between the teeth in place of device shown in cut. See prices page 41.

IMPROVED GIANT CHAIN LOG JACK OR BULLWHEEL.



See Cut of Wheel in operation, page 40, and references, page 46.

- No. 1.—Endless Giant Chain Log Jack Irons**, as per above cut, weight about 2,400 lbs., includes tail shaft and boxes, and sprocket wheel or sheive pulley, as desired.
- | | |
|---|----------|
| Capacity with 1075 chain, 80 to 100 m. per day (Can be speeded to a great-) | \$160 00 |
| Capacity " 1050 " 50 to 80 m. " (er capacity if desired.) | |
| No. 1075 Giant Chain, including log special, every 5 feet, per foot | 1 50 |
| No. 1050 " " " " " " " " " " " " | 1 40 |
- No. 2.—Endless Chain Log Jack**, similar to above, but with toothed wheels for wrought chain..... 150 00
- Wrought Chain**, per foot, no specials; hooks with short chains are driven into logs, and hooked into chains as it passes.
Capacity 20 m. per day, chain..... per foot 0 50
- No. 3.—Friction Bull-Wheel**, with lever and eccentric box to throw it in and out of gear, including two shafts, winding barrel and pulley to receive power..... 140 00
- No. 4.—The Same Irons** as No. 1, without cast frame, using spool or barrel for wrought iron chain. Price, without chain..... 130 00
- No. 5.—Medium Heavy Geared Log Jack**, with barrel for chain to wind on, including 100 feet of 1 1/8 straight link proved chain.... 100 00
- No. 6.—Light Log Jack**, same style as No. 5, includes 100 feet 3/8 chain 90 00
- Sawdust Carrier Irons**, 3 shafts, boxes, driven pulley from mandrel, 1 pair gears, 2 chain wheels for 57 chain and larger. See pages 46 and 47..... 18 00
- The same Irons** for No. 45 chain..... 15 00
- No. 45 chain, per foot, 16c.; S¹ link with 6 in. iron scrapers, usually placed every 16 or 18 inches, 10c.; 8 in. long, 12c.; 10 in. long 14c.
- No. 57, chain, including special link every 16 to 18 inches, ready to attach wooden scraper, 26c. The same No. 67 chain, 32c.

up. on the edge of a scantling or plank running be-
tween the teeth in place of device shown in cut. See prices page 41.

Emory & Garland's Bay City Patent Lumber Trimmer.



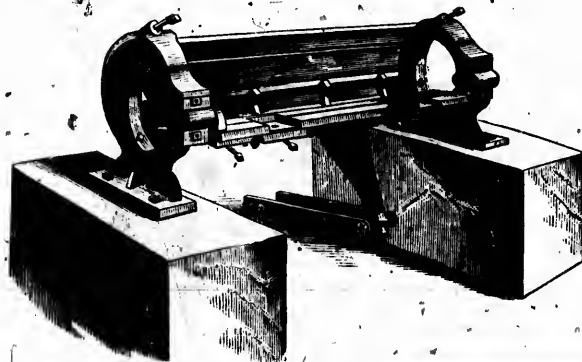
Gang Trimmer.—Emory & Garland's Patent; capacity 100,000 to 150,000 feet per day; over 100 of these trimmers now in successful operation. The saws are hung on independent frames (a separate saw for each length cut), and are thrown up in action by foot levers, which at same time drop the saw last used. They are made either right or left hand, as may be desired. Cut represents right hand machine.

Above Trimmer to cut 10 to 16 feet boards, as shown in cut, ready to attach power...

Do.	10 to 18	being 6 saws.	PRICE... \$400
Do.	10 to 20	" 7 "	PRICE... 450
Do.	10 to 22	" 8 "	PRICE... 500
Do.	10 to 24	" 9 "	PRICE... 550
			PRICE... 600

SAW MILL MACHINERY.

- No. 1 Small Trimmer.**—One swing saw for portable mills; saw to run parallel with large saw; includes short counter shaft, 8 feet long, boxes for same, ladder and swing boxes, 26-inch saw and receiving pulley from power, and pulley and belt from shaft to saw mandrel. PRICE. \$ 75
- No. 2 Timber and Deal Trimmer.**—The same as small Trimmer, but has shaft and boxes 6 feet long, with bevel frictions to connect to trimmer counter, to run saw at right angles to big saw. The distance from saw is regulated by drive belt, or longer trimmer shaft can be furnished at an advance in cost. Trims one end of a deal while on the rollers, and it is then showed along and the outer end trimmed. PRICE. 100
- No. 3 Two Saw Trimmer**—iron work only—consists of two mandrels, boxes, pulleys and saws, one to set a few feet in front of the other, and just twelve feet apart, with 3 endless Ewart chains No. 75, with H attachments, chain wheels, tail shafts, and boxes; head shaft 12 feet long, pulley and chain wheels to drive chains, 12 feet counter shaft under floor, boxes, 4 pulleys, 1 driver 12x12, 2 drivers to mandrels, driver to head shaft. Iron work and bolts only; no-belts. PRICE. 160
- The same put in a mill,** ready to attach driving belts, the millwright work being on usual conditions and terms: PRICE. 200
- Slab Saw Rig** includes one swing saw to hang on shaft or stand above it, 26 inch saw, mandrel, pulleys, boxes, ladder, 10 feet counter shaft, boxes, driven pulley and pulley and belt to mandrel, and handle. PRICE. 75
- Waterous' Patent Set Gauge** PRICE. 45
- Swing Tightener, Frame and Pulley** for belts up to 9 inches PRICE. 20
- Swing Tightener, Frame and Pulley** for belts 10 inches and upwards. PRICE. 25
- Gawley Patent Friction Set Works,** to set behind. PRICE. 30
- Gawley Patent Friction Set Works,** to set over log. PRICE. 40
- Improved Double Wheel Ratchet Set Works,** set either behind or in front. PRICE. 40
- Improved Double Wheel Ratchet Set Works,** with steel-toothed wheels. PRICE. 50
- Self-Receding Headblock Attachment,** for ordinary length short carriages. PRICE. 20



- State Machine (all iron) including knife and arm for pitman** PRICE. 120
- Pitman, shafting, balance wheel, fast and loose pulleys, boxes, &c., to drive same.** PRICE. 70
- Stave Equalizer,** to cut off from one to three different lengths. PRICE. 60

500
PRICE.
550
PRICE.
600
PRICE.

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8
9

10 to 20
10 to 22
10 to 24

Do.
Do.
Do.

for each length cut), and are thrown up into action by foot levers, which at same time drop the saw last used. They are made either right or left hand, as may be desired. Cut represents right hand machine.

Veneer Cutting Machines.

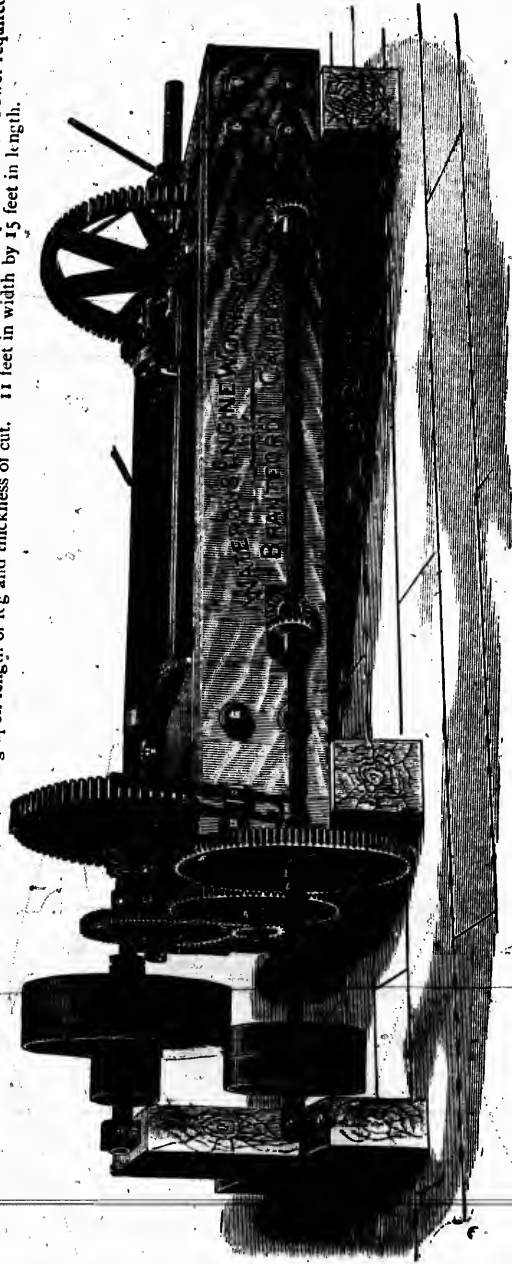
THIS machine specially adapted for cutting Veneers from the rough log; also thin lumber for any purpose such as berry, grape, cheese and other boxes, fruit baskets and packages of all kinds, furniture veneers, etc., cutting any desired thickness from 1-32 up to $\frac{3}{8}$ of an inch.

Each machine will swing a log 48 inches in diameter by five feet in length, and its centres are adjustable for different lengths of logs, from the extreme length of its knife down to 20 inches shorter.

Scoring knives, which are adjustable to any desired distance on the scoring bar, cut the Veneer into any length shorter than the log, or mark it for bending.

Capacity of Machine, on logs 20 inches diameter, 25,000 lineal feet in 10 hours.

Diameter of core or centre of log remaining un-cut, from 5 to 8 inches, depending upon the solidity of the centre of the log. The drive pulley is 30 inches diameter, and 8 inch face, and should run 150 revolutions per minute. Power required from 4 to 12 horse, depending upon length of log and thickness of cut. 11 feet in width by 15 feet in length.



Price of machine including crane 1 out of 10 logs to suit of var.
 Box rounder and nailer, ready to attach belt, include frame-work..... \$ 600
 Knife 6 feet long and frame to cut veneers off in any desired width for bands..... 45
 75



Light Sawdust Conveyers.

Using 35, 42, 45, 57, with S attachment, suitable for Mills cutting from 5 to 15 m. per day, in lengths of not over 80 to 100 feet between centres.



Heavy Sawdust Conveyers.

Using 67, 77, 85, 103, 108, 600, 1200, for mills cutting 20 to 100 m. per day, No. 600 or 1200 being guaranteed to take all the refuse of a Shingle Factory of daily capacity of 100 m. any reasonable distance.

REFERENCES.

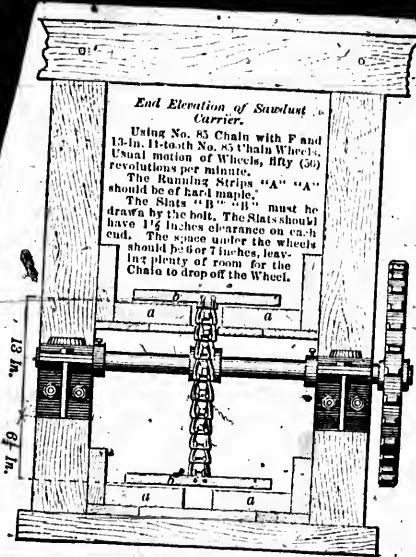
- EWART CHAIN**—Light conveyers are too numerous to mention. See chain certificate pamphlet. Heavy conveyers. See chain certificate pamphlet.
- R. POWERS, Barrie, mills at Victoria Harbor, uses 350 feet No. 108, with one gap wheel, to remove all refuse from 100 m. shingle mill.**
- A. CALDWELL & SON, Lanark, use an 84 chain conveyer, with cross conveyer, driven by No. 52 chain; also have automatic fuel feeder.**
- GHAMOUR & CO.'s New Mill at Trenton, the finest in America, uses over 4,000 feet 75 and 103, handling the entire product into, through and out of the mill with Ewart Chain.**
- RATHBUN & SON, Deseronto, have several thousand feet in use, splash tables, shingle block tables, trimmers, conveyers, elevators, large grain elevator, 250 feet grain conveyers, all driven by 803 chain.**
- R. & G. STRICKLAND, Lakeshield, over 1,000 feet. J. M. POLLAR, Milland.**
- BRITISH CANADIAN TIMBER AND LUMBER Co., Midland.**
- McLACHLAN BROS., Amherst.**
- BOYD CALDWELL & SON, Lanark.**
- MEDONTE LUMBER Co., Hillsdale.**
- GIANT CHAIN LOG JACKS, only introduced early in 1882.**
- GEO. COOPER & SON, Orr Lake, Simcoe Co., Ont., report chain working beautifully.**
- A. CALDWELL & SON, Lanark, 275 feet, report it the best Bull Wheel rig ever saw used.**
- A. SHORT, Winnipeg, reports works to perfection, and orders a second one.**
- MILLIAMS & MURRAY, Blind River Mills; also Goderich P. O.**

EWART'S PATENT

Number 85 full size link.

DRIVE CHAIN

ALL SIZES MADE TO EQUAL 1/4" TO 30 INCH BELTING.



End Elevation of Sawdust Carrier.

Using No. 85 Chain with F and 13-in. 11-tooth No. 85 Chain Wheels. Usual motion of Wheels, fifty (50) revolutions per minute. The Running Strips "A" "A" should be of hard maple. The Slat "B" "B" must be drawn by the bolt. The Slat should have 1 1/2 inches clearance on each end. The space under the wheels should be for 7 inches, leaving plenty of room for the Chain to drop off the Wheel.

WATEROUS ENGINE WORKS CO., BRANTFORD, CANADA,
Sole Manufacturers and Proprietors of Canadian Patent.

Send us full particulars of your requirements in conveyers; what you wish to convey—if sawdust, slabs, edgings, tanbark, shingle blocks, corn in ear, straw, grain, ice, stove bolts, or anything else that can be moved; give distances between centres—where you wish to drive from, if level or inclined, and how much—speed of driving shaft, if it runs parallel or at right angles to conveyers, &c. The more information we receive, the better we can advise and estimate cost.

LORD'S BOILER COMPOUND Rots and Decomposes Scale in Boilers, and when used continually keeps them clean.

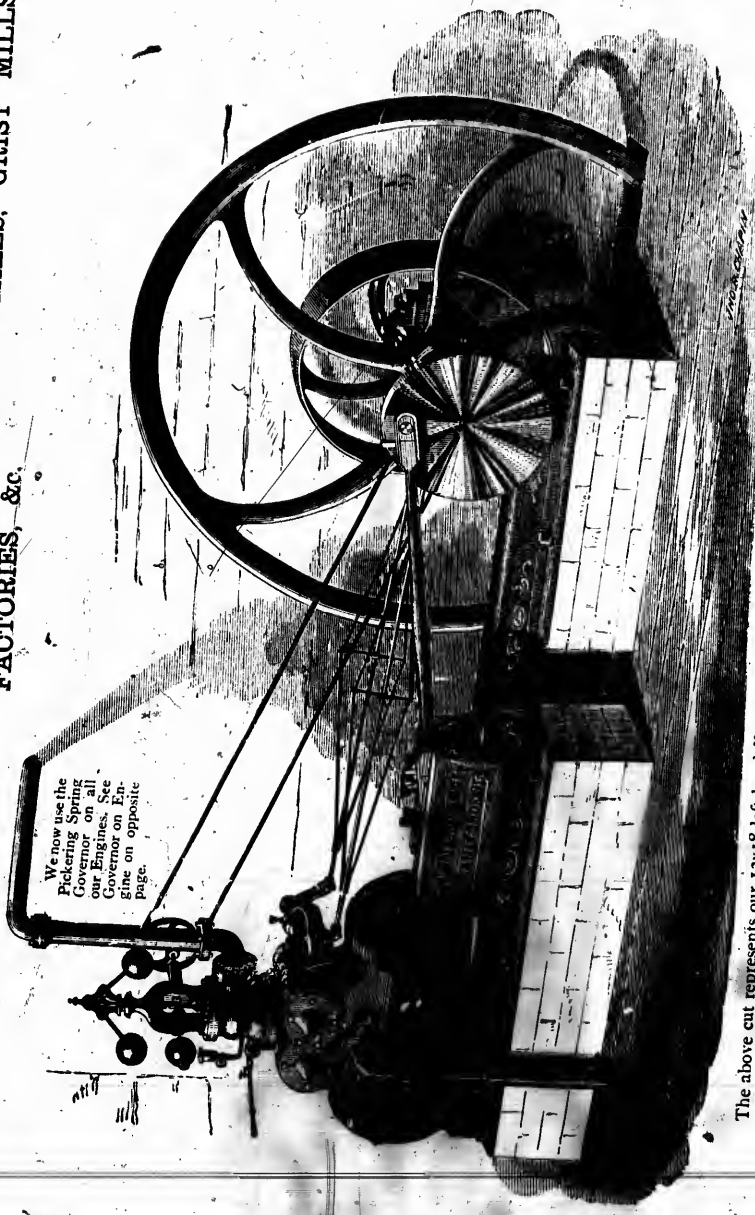
PRICE.—In small lots, 10c. per lb.; 50 lbs. to 80 lbs., 7 1/2 c.; 150 lbs. to 200 lbs.; 7c.
DOSE.—One-quarter of a pound per horse-power, every 2 weeks before blowing off.

and orders a second one.
MILLIAMS & MURRAY, Blind River Mills; also Goderich P. O.

being guaranteed to take all the refuse of a Shingle Factory of daily capacity of 100 m. any reasonable distance.

ORIGINAL STYLE OF STATIONARY ENGINES FOR SAW MILLS, GRIST MILLS, FACTORIES, &c.

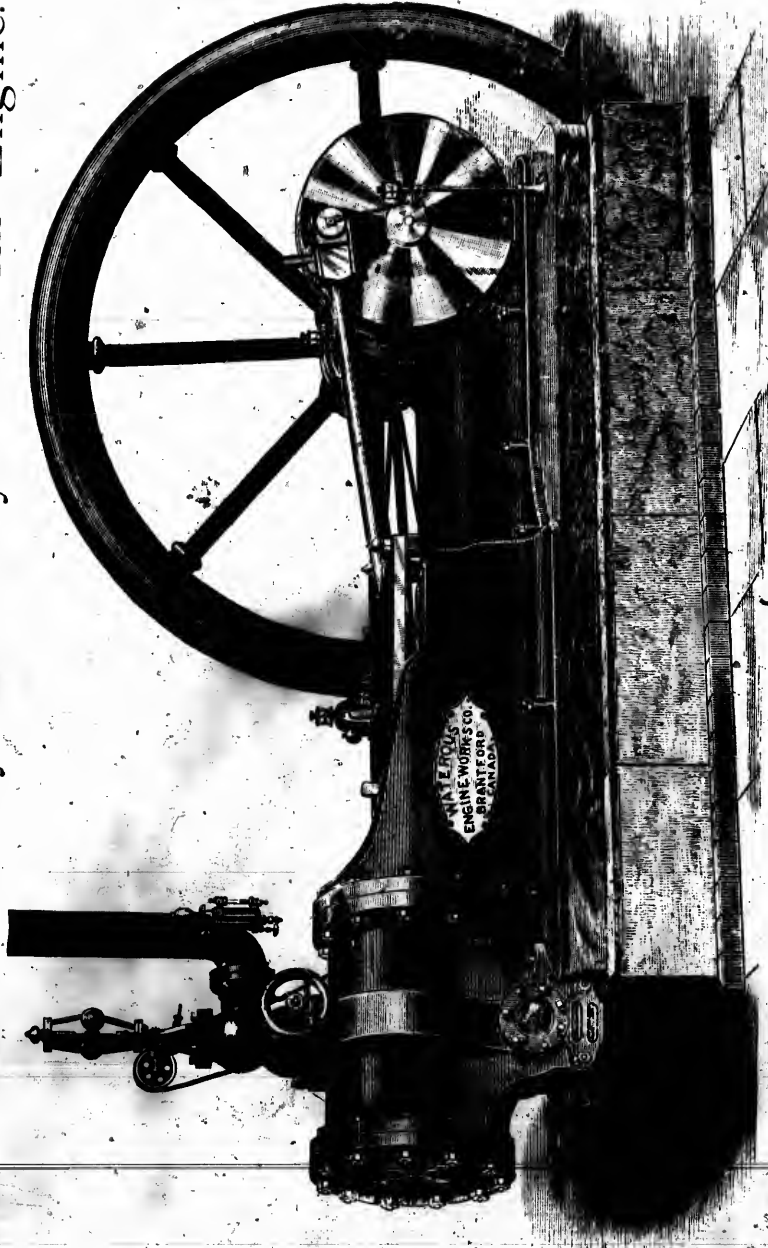
We now use the Pickering Spring Governor on all our Engines. See Governor on Engine on opposite page.

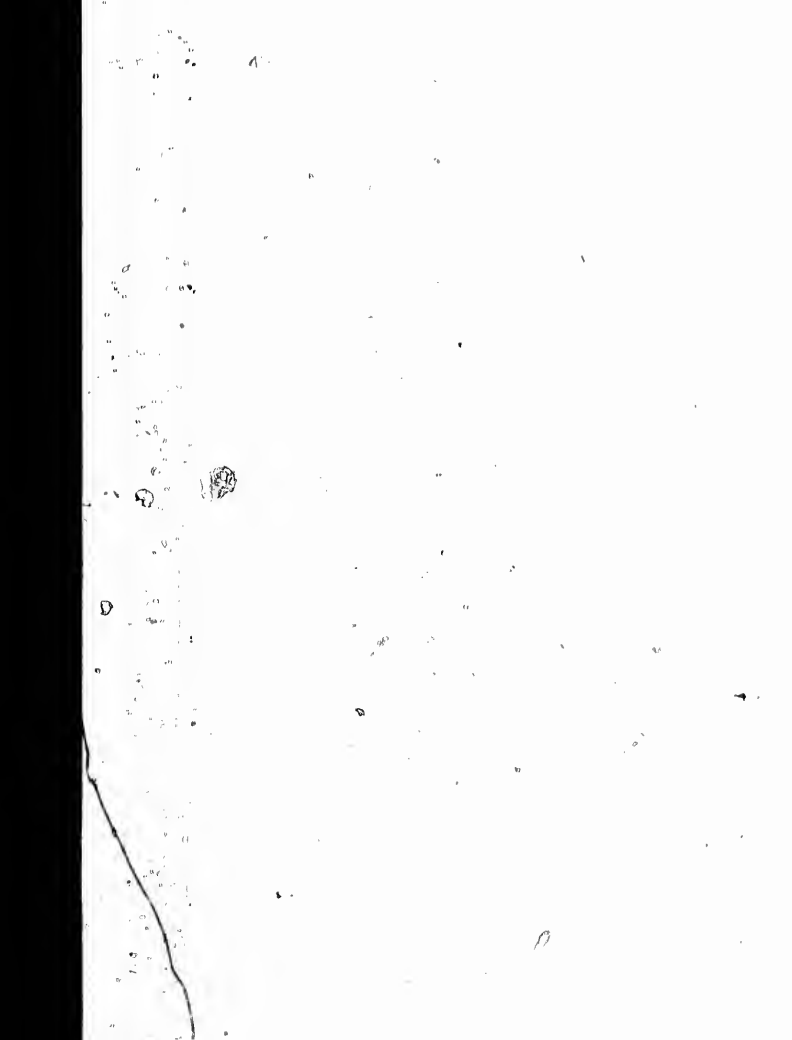


The above cut represents our 13x18 left hand Engine. It is a fac-simile of our original style of cut-off and single valve Engine.

New Pattern Heavy Stationary Saw Mill Engine.

The above cut represents our 13x18 left hand Engine. It is a fac-simile of our original style of cut-off and single valve Engine.





DISCRIPTION OF ENGINE.

We describe our New Pattern Engine as follows :

FRAME.

By reference to cut the shape of frame is seen. It is very strong and rigid, and will resist successfully the different strains that are brought to bear upon the frame of a fast running engine working under a high pressure of steam. There are no sharp angles, the design is handsome and susceptible of high finish.

The cylinder is made of special Salisbury iron, is bolted to head by means of Lowmoor iron bolts and nuts. The flanges are extra heavy and no part of bolting the frame to the bed comes upon the cylinder. The front head carries the stuffing box, which is screwed in and has a brass gland and brass nut.

GUIDES.

The lower half of Guides are cast to frame, are planed true with cylinder, and can never afterwards get out of line.

PISTON ROD.

The Piston Rod and Valve Spindle are of steel, running through amply deep stuffing boxes, and are proportioned to their work.

STUFFING BOXES

Our Stuffing Boxes, Glands and Caps are made of brass, the cap screws over gland, so that by turning cap the packing is forced up to rod perfectly even. Being brass they do not corrode and stick fast.

PISTON.

The piston of engines over 12 inch cylinders will be made of three rings and set springs, unless otherwise ordered.

VALVES.

The valves are circular, the same as we have so successfully used for very many years. These as well as cylinders are made of a special mixture of Salisbury iron and will withstand the greatest wear.

EXHAUST.

Exhaust is below steam chest and can be taken out of either side. The valve and steam chest being below cylinder, no cylinder cocks are needed as there is no danger of water accumulating in cylinder.

CROSS HEAD.

The Cross-head is heavy, and wrist pin is a solid portion of it.

CRANK.

The Crank is a counterbalanced disk, nicely polished and adds much to appearance of engine. It is forced on shaft by power press and keyed.

CRANK PIN.

The Crank Pin is of cast steel, fitted tapering into crank and ground in and held with a draw key. It cannot become loose, and can be readily repaired if necessary.

SHAFT.

The shaft is of steel or hammered iron, amply large and runs in heavy brass boxes in pillar blocks on bedplate; the boxes are so fitted that all wear can be taken up.

FINALLY.

Our engines are made throughout in a strictly first-class manner of first-class material. Steel and Lowmoor iron and brass being freely used and all the joints that permit of it are ground joints.

The Pickering Spring Governor,

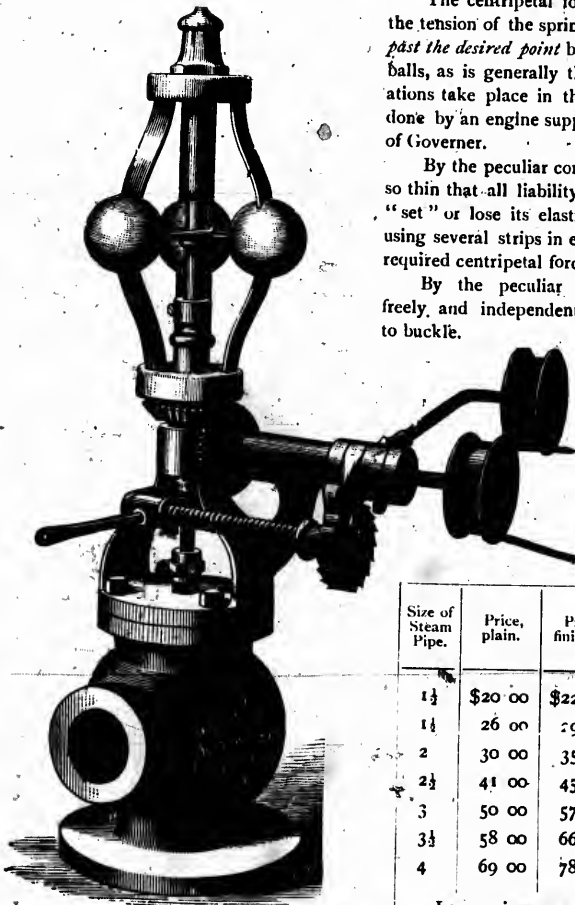
Which we use on all our Engines.

The centripetal force being entirely due to the tension of the springs, *the valve is not carried past the desired point* by the momentum of heavy balls, as is generally the case, when sudden variations take place in the amount of work being done by an engine supplied with the OLD STYLE of Governor.

By the peculiar construction we can use steel so thin that all liability to break, or tendency to "set" or lose its elasticity is avoided, while by using several strips in each set we can obtain the required centripetal force.

By the peculiar curve the springs work freely, and independent, without any tendency to buckle.

When ordering to attach to engine in use give diameter of both flanges.



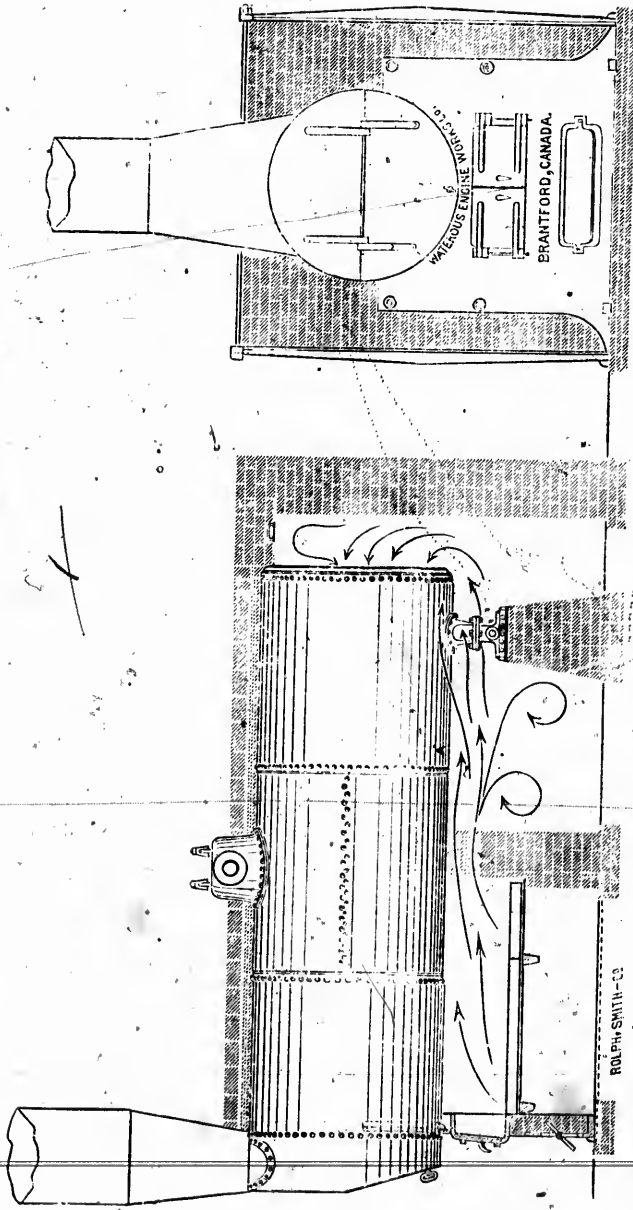
Size of Steam Pipe.	Price, plain.	Price, finished.	Speeder, extra.	Stop Mot. on extra.
1½	\$20 00	\$22 00	\$2 50	\$7 00
1¾	26 00	29 00	2 50	8 00
2	30 00	35 00	3 00	9 00
2½	41 00	45 00	3 50	10 00
3	50 00	57 00	4 25	12 00
3½	58 00	66 00	4 50	13 00
4	69 00	78 00	5 00	15 00

Larger sizes on application.

Speed Adjuster.—By a simple arrangement of a ratchet wheel and pawl, which can be used while engine is in motion, the speed can be regulated as desired.

Improved Stop Motion, as shown in cut, can be attached to all these governors, which stops engine should governor belt break, and so prevents engine running away.

This Governor has been in constant use for many years, and is offered entirely on its own merits. Its price is low; its durability is beyond question; its economy in fuel has not been equalled. Having no joints, the Governor is extremely sensitive.



Stationary Tubular Boilers. These are the most economical boilers in general use. We order, but we only carry in stock *iron boilers*. Upon standard sizes of boilers we make the shell project a suitable distance beyond the front head for the smoke-box. (See cut.) We furnish a mud or stand pipe casting riveted to the boiler-as shown in cut, to support the back end of boiler, and front end rests on the front plate. Arrangements for larger boilers are made to permit the boiler to move as it expands and contracts without straining the boiler. When desired we furnish loops, or lugs to hang or support boiler. See remarks on mud pipe upper part of page 56.

Discription of Boilers, Sizes, Etc.

STANDARD BOILERS, SIZE NUMBER.....	1	2	3	4	5	6	7	8	10
Power rated at 12½ square feet of heating surface per horse-power.....	19½	28	30	47	53	61	64	68	98
Heating surface.....	243	347	377	594	666	767	799	858	1233
Diameter of Boiler, in inches.....	36	48	48	48	52	54	56	60	70
Length of Boiler over all, in inches.....	138	162	163	187	188	188	188	188	212
Length of Tubes, in feet.....	10	12	12	12	14	14	14	14	16
Diameter of tubes, in inches.....	2½	2½	3	3	3½	3½	3½	3½	4
Number of tubes in standard sizes, these can be increased or diminished.....	30	38	32	42	46	52	54	58	64
Thickness of iron in shell.....	¼	¼	¼	¼	¼	¼	¼	¼	¼
Thickness of iron in head.....	¼	¼	¼	¼	¼	¼	¼	¼	¼
Diameter of Stack in inches.....	16	16	16	16	16	16	16	16	16
Length of Stack in feet.....	15½	15½	22	22	22	24	26	28	32
Weight of Boiler without fixtures.....	30	40	50	50	60	60	60	70	70
Weight of Stack.....	2800	3450	3839	4444	5400	6800	7970	8170	12191
Fixtures and Fittings.....	275	360	615	615	735	1030	1425	1740	2775
Price naked boiler with raised manhole and mud castings riveted on.....									
Price of Stack per foot.....									
Fixtures and Fittings.....									
Boiler complete ready to attach steam pipe.....									

Boiler Fixtures Comprise Arch Front, with doors and dampers, Grates for saw dust, coal or bolts, Smoke-box and Cover; Mud Pipe, which also supports back end of boiler; Binder Plates, Back Plate and Boiler Fixtures. COMPRISE—Safety Valve, Lever and Ball; Water Gauge with guards and 2 glasses; 3 Gauge Cocks and Pipes; Whistle and Pipe; Tube Cleaner and Poker; Steam Gauge and Syphon Pipe.
Smoke Stacks for Nos. 1, 2, 3, 4 are made of No. 18 iron, larger sizes of No. 16 iron, unless specially ordered.
When boilers are ordered complete it is understood Fixtures, Fittings and stack are included.

permit the boiler to move as it expands and contracts without straining the boiler. When desired we furnish loops, or lugs to hang or support boiler. See remarks on mud pipe upper part of page 56.

BOILERS.

Our boiler shop is thoroughly equipped with special tools and machinery for accurate and rapid work, and our customers can rely on securing the best work at the lowest possible figure consistent with the use of strictly first-class material and the employment of the most skilled labor.

We import our iron from standard makers whose iron we have used for years; and can rely on, in as large sheets as is consistent with proper rolling so as to have as few joints in boiler as possible.

We give some of the standard sizes of our Tubular Boiler, but are prepared to furnish on short notice any size or style of boiler, Upright, Return Tubular, Fire-Box, or Return Tubular Fire-Box or any special style desired.

We prefer iron and generally use it when not otherwise ordered although it is more expensive than steel. When parties wish steel boilers we can furnish them equally as well as iron. We test all our stationary and portable boilers with a cold water pressure of 125 lbs. to the square inch, and our portable boilers to 100 lbs. steam pressure. Our upright boilers are tested to 160 lbs. cold water and 110 lbs. steam pressure. We give a certificate of test, description of boiler, etc., with all of the large boilers. We furnish with our boilers, when desired, plans and specifications, showing an improved construction of furnace of our own design, which we have had in use for several years to the entire satisfaction of our customers.

Tubular Boilers.

Where space is valuable the Tubular Boiler with a suitable number of $2\frac{1}{2}$, 3, $3\frac{1}{2}$ or 4-inch tubes, presents many advantages. It gives the largest capacity with the least first cost, and involves considerable less after-cost in the construction of the furnace from its shorter length than flue boilers. But a tubular boiler should never be run without using a good lime-extracting heater.

unless the water is exceptionally pure and soft. Too little attention is usually paid to this important factor of economy. In the selection of a heater and purifier we recommend the use of one at least one size larger than is specified in the tables and price lists usually published on the subject, so as to secure ample capacity in all respects. Lime incrustation or scale is an extremely bad conductor of heat, and where this formation is allowed to accumulate upon the small, thin tubes of a Tubular Boiler, it prevents the transfer of heat to the water, and it frequently happens that the tubes, heads and bottom becoming red hot, burn out in a very short time necessitating troublesome repairs. There are a number of boiler compounds for the removal of scale in the market that have been tried with success, and they should be used.

The most common error found in the construction of Tubular Boilers is the use of too many tubes. Sometimes they may be found crowded in, without systematic arrangement or order, and with the sole idea of increasing the heating surface in the effort, no doubt, of proportionately increasing the horse power. There is no mistake so fatal to the efficiency of a boiler as this. The circulation is totally destroyed. The water space between the tubes is so contracted that contact of the water with the metal surface is prevented by films of steam which cannot disentangle itself from the water with sufficient rapidity for want of room. The result is the tubes are speedily burnt out. But in addition to this a more serious evil, if that were possible, results from the use of too many tubes, viz.: The indraught through the furnace of a quantity of air largely in excess of what is required for complete combustion, resulting in a lowering of the temperature of the heated gases which are passing through the furnace and tubes of fully 50 per cent., producing an extravagant wast of fuel, and diminishing the efficiency of the boiler very materially.

In our practice, we arrange the tubes in vertical and horizontal lines, with ample space between the tubes, and wherever practical, introduce a vertical space of about 3 inches in width down the centre of the boiler to procure circulation and allow of proper cleaning. The outside tubes are not allowed to approach the shell nearer than $2\frac{1}{2}$ to 3 inches. We have made the spacing and arranging of the tubes in a tubular boiler a special study for years, and the number of tubes for each size boiler specified in the tables is based largely on practical observation and experience.

Very small and long tubes are insufficient, because they cannot be traversed by flame, or even by very lightly heated air, most of the heat being given up in the first few feet of length. We do not recommend the use of anything under $2\frac{1}{2}$ inches, and where 3 inch tubes are selected, they should not be longer than 12 feet.

MUD PIPE.—When we sell boiler alone and mud pipe is not specially ordered, we will put blow off cock in end of boiler and lugs on the side to support it, doing away with stand and mud pipe castings to enable us to compete with others who use this cheaper style of setting. In the care of a tubular boiler it is very important that the tubes are kept constantly cleaned and free from soot.

Locomotive and Return Tubular Fire-box and Upright Boilers.

We build our Locomotive Boilers of the most approved patterns. The Fire-box is made of No. 1 Krupp or Lowmoor iron, heads the same, with water front, all most thoroughly stayed with Lowmoor iron stay bolts, screwed through both sheets and then riveted over at each end, making a most durable stay, one offering the least resistance to the water or cleaning out, and the least lodging place for mud and scale to accumulate. In our smaller boilers the steam dome is of cast iron and joined to the lower section with a planed flange and thoroughly bolted. The lower section is riveted to boiler with a caulking ring between.

The Return Tubular Fire-box Boilers are of the newest design with large flue extending about two-thirds the length of the boiler and ending in small tubes for the remainder of the distance with a corresponding number of return tubes surrounding the fire flue to return smoke, &c., to stack. They are thoroughly built and stayed and furnished with every means of obtaining access to inside for cleaning purposes.

The Champion Upright Boiler is made in three styles, plain, sectional with horizontal tubes entirely covered with water, or sectional with upright tubes. Full description of these upright boilers will be found on pages 23, 24 and 25 of No. 13 Circular. These boilers are made any size desired, and can be placed on wheels when desired, making the boiler still more portable and the engine on timber beside it.

Stationary Engines.

20	Horse-power, single valve, with Return Tubular Boiler, saw mill Engine ..	\$1,100
20	Horse-power, single valve, double crank same as engine on page 58, with locomotive boiler, engine arranged to sit on top of boiler, or on foundation at one side, changeable from one position to the other	1,250
20	Horse-power, single valve, combined portable and stationary, with locomotive boiler, with water front, similar to cut on page 17	1,350
25	Horse-power, Single valve, saw mill Engine with tubular boiler	1,250
25	" Two valve, adjustable cut off Engine, with tubular boiler ..	1,350
25	" Single valve, saw mill Engine, with locomotive boiler	1,500
25	" Two valve, adjustable cut off Engine, with locomotive boiler ..	1,600
30	" Single valve, saw mill Engine, with tubular boiler	1,500
30	" Two valve, adjustable cut off Engine, with tubular boiler ..	1,600
30	" Single valve, saw mill Engine, with locomotive boiler	1,750
35	" Single valve, saw mill Engine, with tubular boiler	1,750
35	" Two valve, adjustable cut off Engine, with tubular boiler ..	1,850
35	" Single valve, saw mill Engine, with locomotive boiler	2,000
40	" Two valve adjustable cut off Engine	2,000
45	"	2,250
50	"	2,500
55	"	2,700
60	"	3,000
70	"	3,000
85	"	5,500
100	"	4,250
	"	5,000

Boilers complete of ample size to develop the power rated are included in the above prices.

Waterous' Patent Moveable Case Heater and Lime Extractor.

No. 1, Small Size, for 25 Horse-power Engine	\$ 65
No. 2, Medium Size, for Engines up to 45 Horse-power	100
No. 3, Largest Size, for Engines up to 80 or 100 Horse-power, with wrought iron case	150

INJECTORS supplied in place of power pumps at same price or steam pumps at slight advance in price.

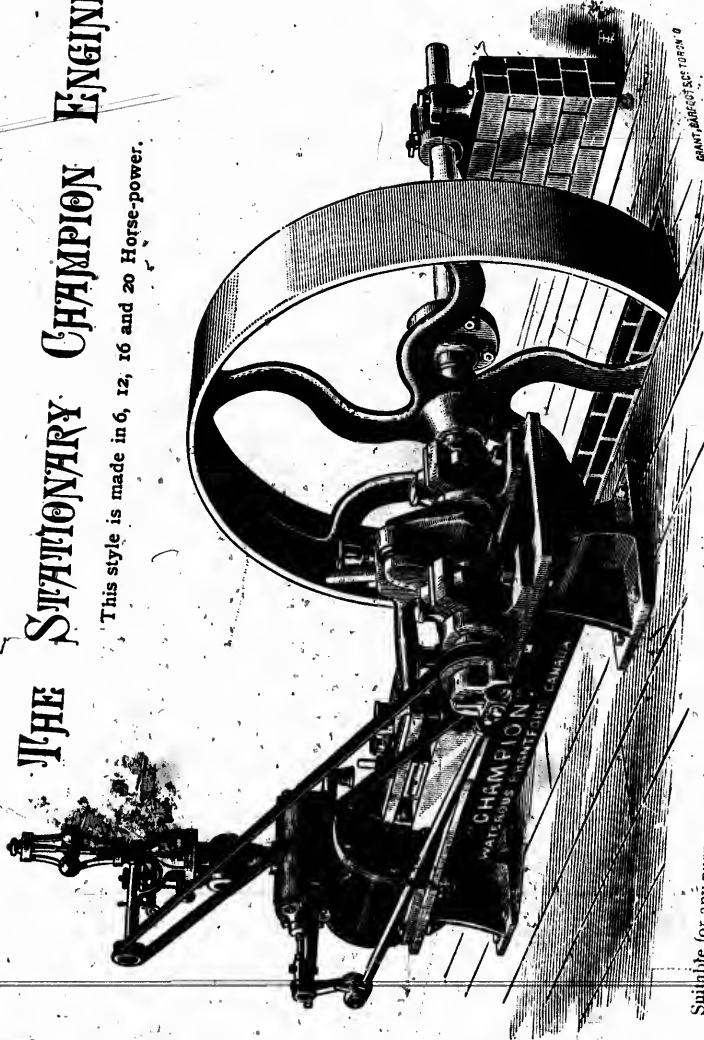
STEAM POWER.

For Shingle Factories, Planing, Sash and Door Factories, Brick Yards, use the Stationary or Portable Champion Engine, with Upright, Locomotive, Return Tubular Fire-box, or plain Return Tubular Boiler.

We are prepared to quote prices or give estimates on any size engine or boiler from 6 horse power up.

THE STATIONARY CHAMPION ENGINE.

This style is made in 6, 12, 16 and 20 Horse-power.

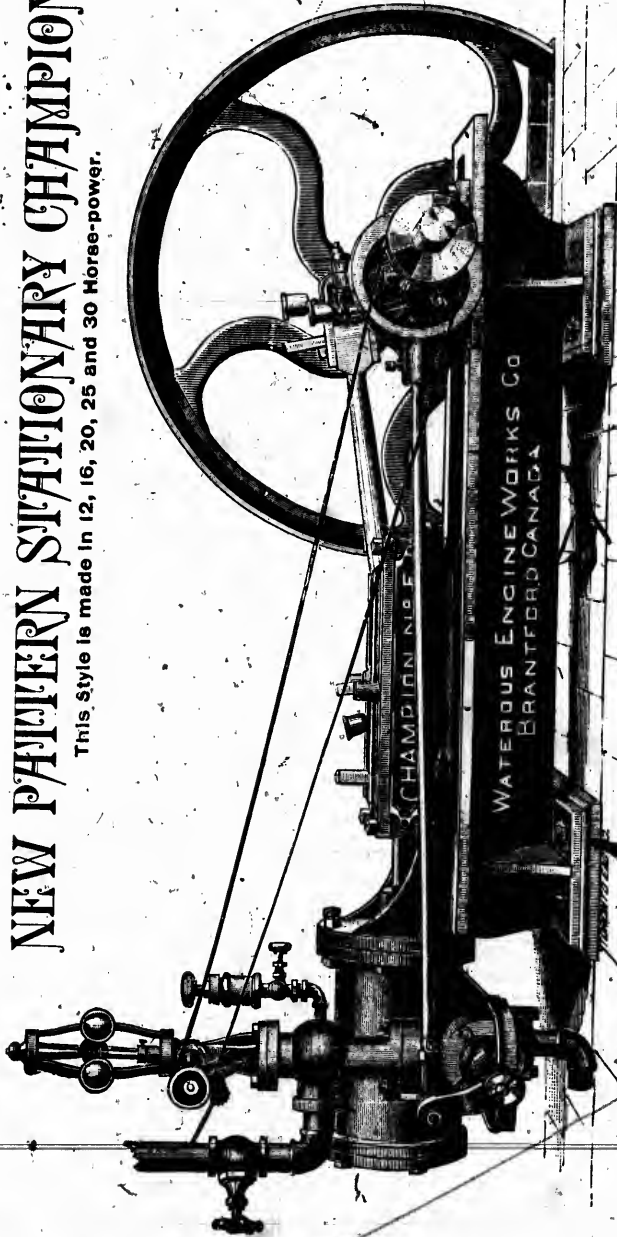


Suitable for any purpose requiring a Stationary Engine. Its points of excellence are: Perfect Governor, Cylinder of special Iron, Valve Spindle, Piston Rod and Cylinder Bolts of Lowmoor Iron, Brass Slides to Cross Heads, heavy connecting Rod Brasses, Double Crank made of Lowmoor Iron with heavy long Brass Boxes, Brass Boxes and Huts each end of Valve-Rod, Balanced Cut-off Valve, giving great economy.

When desired, these engines can be arranged to drive from both ends of Engine Shaft, as shown in cut on opposite page, at an extra expense of ten dollars.

NEW PATENT STATIONARY CHAMPION.

This style is made in 12, 16, 20, 25 and 30 Horse-power.



The above cut represents our new style Stationary Champion Engine. We can furnish this engine with Return Tubular Boiler to build in brick, or Return Tubular Fire-Box or Locomotive Fire-Box, arranging engine so that it can be placed on boiler or on timbers at one side, or with the plain Upright boiler or Sectional Upright boiler. The Fire-Box boilers can be placed on skids or on wheels. The valve being under the cylinder drains it thoroughly of all condensed steam.

Yards, use the Return Tubular

engine or boiler

Stationary Engine. Its points of excellence are: Perfect Governor, Cylinder of special Iron, Valve Spindle, Piston Rod and Cylinder Bolts of Lowmoor Iron, Brass Slides to Cross Heads, heavy connecting Rods, Double Crank made of Lowmoor Iron with heavy long Brass Boxes, Brass Boxes and Butts each end of Valve-Rod, Balanced Cut-off Valve, giving great economy. When desired, these engines can be arranged to drive from both ends of Engine Shaft, as shown in cut on opposite page, at an extra expense of ten dollars.

The Fire-Proof Champion on Wheels,

Upright and Horizontal Return Tubular Fire-Box Boilers.
Specially Illustrated and Described in No. 13 Circular.

- No. 1.**—6 Horse-power "Fire-Proof" Champion Engine on wheels, arranged with shafts for one horse, &c., all complete, like our 12 and 16 Horse-powers for driving Separators up to 24 in. cylinders. Weight about 2,900 lbs. PRICE. \$ 575
- No. 3.**—12 Horse-power "Fire-Proof" Champion Engine, standard size, suitable to drive, with ample power, any size cylinder, 18 in. diameter to 40 in. long, with wheels, axles, clamps, and usual fittings. Weight about 5,000 lbs. PRICE. 790
- No. 3a.**—The same, with sectional safety boiler, either style PRICE. 890
- No. 4.**—16 Horse-power "Fire-proof" Champion Engine on wheels, our standard size, for No. 3 portable Saw Mills and No. 15 Flouring Mills. Weight, about 5,500. PRICE. 950
- No. 4a.**—The same, with sectional safety boiler, either style PRICE. 1,085
- No. 5.**—20 Horse-power "Fire-Proof" Champion Engine on wheels, in same style as 12 and 16 Horse-power, especially adapted for Portable Saw Mills and Grist Mills. With this engine we use iron wheels and Springs under boiler. Weight, about 6,500 lbs. PRICE. 1,200
- No. 5a.**—The same, with sectional safety boiler, either style PRICE. 1,375
- Self-Propelling or Traction attachment**, with reversing and steering arrangements, added to 12, 16 or 20 Horse-power Engines, at an advance of 250
- A Cross-Cut Wood Saw** can be attached to the boiler of No. 3, 4 and 5 Engines, driven by belt from pulley on Crank shaft outside of fly wheel, at an advance, including belt, 24 in. saw and pulley 35
- Semi-Portable Champion Engine on Skids.**
- A.**—6 Horse-power Upright Boiler and Stationary Horizontal Champion Engine, occupies about 3 ft., 6 in., x 4 ft. 4 in., five feet high. Other sixes in proportion. It is a "self-contained machine," ready to drop down and run immediately. Boiler and engine set on one casting, being in shape of large pan under boiler to catch all ashes, coal, water, etc., obviating danger of fire from these causes. PRICE. \$ 475
- B.**—6 Horse-power, the same as above, but with Patent Spark Arrester, for use about barns for steaming and cutting feed, sawing wood, and for use in driving light wood-working machinery. PRICE. 525
- L.**—12 Horse-Power No. 3 Champion Engine on skids in place of wheels, Upright or Return Tubular Fire-box boiler; if not stated which boiler, will send upright. PRICE. 740
- M.**—12 Horse-power No. 3 Champion Engine, with sectional safety boiler, either style, on skids. PRICE. 840
- N.**—16 Horse-power No. 4 Champion Engine, on skids in place of wheels, Upright or Return Tubular Fire-box boiler; if not stated which boiler, will send upright. PRICE. 900
- O.**—16 Horse-power No. 4 Champion Engine, with sectional safety boiler, either style, on skids. PRICE. 1,040
- P.**—20 Horse-power No. 5 Champion Engine, on skids in place of wheels, Upright or Return Tubular Fire-box boiler; if not stated which boiler, will send upright. PRICE. 1,125

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Wheels,

Boilers.

- Engine on complete, like in cylinder. PRICE... \$ 575
- Engine, cylinder, and usual fittings. PRICE... 790
- Engine on Mills and adapted for use iron. PRICE... 890
- Engine on adapted for use iron. PRICE... 950
- Engine on adapted for use iron. PRICE... 1,085
- Engine on adapted for use iron. PRICE... 1,200
- Engine on adapted for use iron. PRICE... 1,375
- Engine on adapted for use iron. PRICE... 250
- Engine on adapted for use iron. PRICE... 35
- Engine on adapted for use iron. PRICE... 475
- Engine on adapted for use iron. PRICE... 525
- Engine on adapted for use iron. PRICE... 740
- Engine on adapted for use iron. PRICE... 840
- Engine on adapted for use iron. PRICE... 900
- Engine on adapted for use iron. PRICE... 1,040
- Engine on adapted for use iron. PRICE... 1,125

R.—20 Horse-power No. 5 Champion Engine, with sectional safety boiler, either style, on skids in place of wheels. PRICE. 1,300

All of the above Semi-Portable Engines can, if so stipulated when order is given, be changed to Stationary Champions to be placed on foundation on one side of boiler; when in the case of Upright Boilers an iron bottom plate is furnished. When ordering state which style of boiler is wanted; if no mention is made, regular Upright Boiler sent.

Stationary Champion Engines.

- C.—6 Horse-power Champion Engine with Return Tubular Boiler, to-build in brick, with front plate, back plate, smoke-stack 25 feet long, and all the usual fittings. PRICE... \$ 445
- D.—The same Engine, 6 Horse-power. Stationary Champion, with 8 Horse-power Return Tubular Boiler. PRICE... 500
- E.—10 Horse-power Stationary Champion Engine, with 10 Horse-power Return Tubular Boiler, 30 feet smoke-stack, and all usual fitting. PRICE... 625
- F.—12 Horse-power Stationary Champion Engine, with Return Tubular Boiler of 12 Horse-power, 30 feet of smoke-pipe and all the usual fittings. PRICE... 685
- G.—12 Horse-power Stationary Champion Engine, with Return Tubular Boiler of 14 Horse-power, 30 feet of smoke-pipe and all the usual fittings. PRICE... 735
- H.—16 Horse-power Stationary Champion Engine, with Return Tubular Boiler of 16 Horse-power. PRICE... 865
- H¹.—The same, with Return Tubular Fire-Box Boiler 16 Horse-power. PRICE... 890
- K.—20 Horse-power Stationary Champion Engine, with Return Tubular Boiler, complete with all fixtures and fittings. PRICE... 975
- K¹.—The same, with Return Tubular Fire-Box Boiler 20 Horse-power. PRICE... 1,050
- S.—20 Horse-power Stationary Champion Engine, with Return Tubular Boiler No. 3, complete with fixtures, fittings and stack, see page 53. PRICE... 1,050
- S¹.—The same, with Return Tubular Fire-box Boiler 25 Horse-power. PRICE... 1,150
- T.—25 Horse-power Stationary Champion Engine with Boiler No. 3, complete with fittings, fixtures and stack. PRICE... 1,125
- U.—25 Horse-power Stationary Champion Engine with Boiler No. 4, complete with fittings, fixtures and stack. PRICE... 1,200
- V.—30 Horse-power Stationary Champion Engine with Boiler No. 4, complete with fittings, fixtures and stack. PRICE... 1,300
- W.—30 Horse-power Stationary Champion Engine with Boiler No. 5, complete with fittings, fixtures and stack. PRICE... 1,400

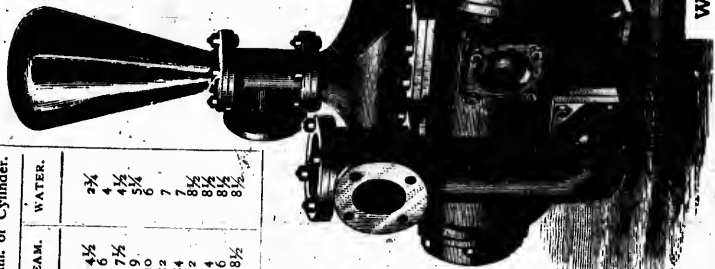
Wheels can be placed under the Return Tubular Fire-Box Boilers for \$60 extra, and Return Tubular Fire-box Boilers can be furnished with T, U, V, W, Engines, at an advance of \$50 for each size.

The Worthington Steam Pump.

Ordinary pattern, for boiler feeding, fire and general service, having two double-acting Plungers. Water valves of rubber or metal as required. The stated capacities of the pumps given below are based upon a piston speed of from 50 to 84 feet per minute. In case of fire or other emergency, this speed can be considerably increased.

Length of Stroke.	Gal. per Stroke of One Plunger.	Strokes per min. of one Plunger.	Gal. per min. by both Plungers.	Price.	Diameter of Plunger in any Single Cyl. Pump to do same work at same speed.	Sizes of Pipes for Short Lengths, to be increased as length increases.	
						Steam.	Exh. & Suct. in Dis. &rg.
4	.10	75 to 100	15 to 30	\$ 175	4 in.	1/2	1
6	.33	75 to 100	50 to 80	300	5 1/2 in.	1 1/4	1 1/2
10	.60	75 to 100	100 to 140	475	6 3/4 in.	1 3/4	2 1/2
10	.93	75 to 100	100 to 165	540	7 1/2 in.	2	3
10	1.22	50 to 100	155 to 225	590	8 1/2 in.	2 1/4	4
10	1.66	50 to 100	165 to 335	630	9 1/2 in.	2 1/2	5
10	2.15	50 to 100	245 to 400	890	11 in.	3	6
10	2.45	50 to 100	245 to 430	975	12 in.	3 1/4	7
10	2.45	50 to 100	245 to 490	1,060	12 in.	3 1/2	8
10	2.45	50 to 100	245 to 490	1,100	12 in.	3 1/2	9

Diam. of Cylinder.	
STEAM.	WATER.
6 1/2	2 1/2
7 1/2	4 1/4
9	5 1/4
10	6
12	7
14	8 1/2
14	8 3/4
16	8 3/4
18 1/2	8 3/4



Worthington Pump. Size 9 x 5 1/2 x 10.

INJECTORS AND INSPIRATORS FURNISHED AT MANUFACTURERS' PRICES.

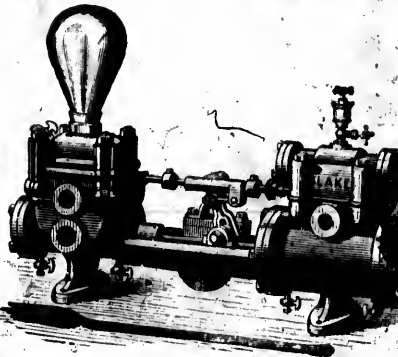
Pump.

two double-acting
 capacities of
 to 8.4 feet per min-
 erably increased.

BLAKE'S STEAM PUMPS,

FOR FEEDING BOILERS, &c., &c.

We Furnish Pumps of all sizes
 and for all purposes.



This Engraving represents Size No. 3, with Hand Power Attachment.

These Pumps are substantially constructed, having all working parts made extra strong and of lasting material. The water pistons, piston rods, stuffing boxes, linings, valve seats, valve bolts, are made of the best composition. The parts being interchangeable, can be removed and duplicated in case of accidental breakage or unusual wear. The improved water piston (secured by letters patent) is suitably packed for hot or cold water or other liquids, adjustable to any pressure, and always tight.

No.	Steam Cylind'r	Water Cylind'r	Stroke	Gallons per Stroke.	Strokes per min. capable of running	Capacity per Minute at Ordinary Speed,	Steam Pipe	Exhaust Pipe	Suction Pipe	Delivery Pipe	PRICE
000	2½	1½	3	.023	1 to 350	150 Strokes, 3½ gal.	¼	¾	½	¾	\$ 60
02	3	1¾	3	.031	1 to 350	150 " 4¾ "	¼	¾	¾	½	75
0	3½	2½	3	.04	1 to 350	150 " 6 "	¾	¾	1	¾	100
1½	4	2¾	5	.10	1 to 350	150 " 15 "	½	¾	1	¾	160
2½	4½	2¾	6	.15	1 to 350	150 " 22 "	½	¾	1½	1	185
3	5½	3¼	7	.25	1 to 300	125 " 31 "	½	1	1½	1½	250
4	6	3¾	7	.33	1 to 300	125 " 42 "	¾	1	2	1½	275
4½	6½	4½	8	.46	1 to 300	125 " 58 "	¾	1½	2½	2	340
5	7¼	4½	10	.69	1 to 250	100 " 69 "	1	1½	2½	2	420
6	8	5	10	.85	1 to 250	100 " 85 "	1	1½	3	2½	450
6½	8	5	12	1.02	1 to 250	100 " 102 "	1	1½	3	3	475
7	10	6	12	1.47	1 to 250	100 " 147 "	1½	2	3½	3	525
8	12	7	12	2.00	1 to 250	100 " 200 "	1½	2½	4	3½	600
9	14	8	12	2.61	1 to 250	100 " 261 "	2	3	5	4	675

Includes Hand Power Attachment up to No. 6.

Each pump has suction and delivery openings on both sides, consequently connections can be made on either side desired.

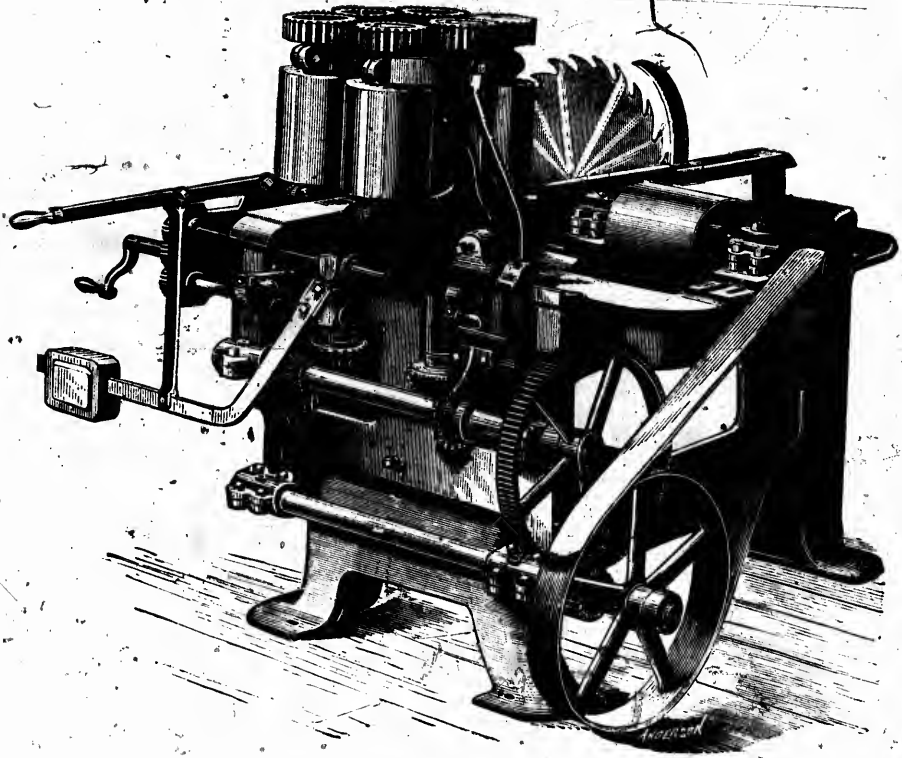
When ordering a pump please answer the following questions:

- 1st. Whether for hot or cold water?
- 2nd. To what height is water to be lifted by suction, and what is the length of suction pipe?
- 3rd. Against what pressure is water to be forced?
- 4th. What is the greatest quantity of water needed per hour?

Hand Lever works Pump when Steam is down. Can be Attached or Detached instantly.

Worthington Pump. Size 9 x 5½ x 10.

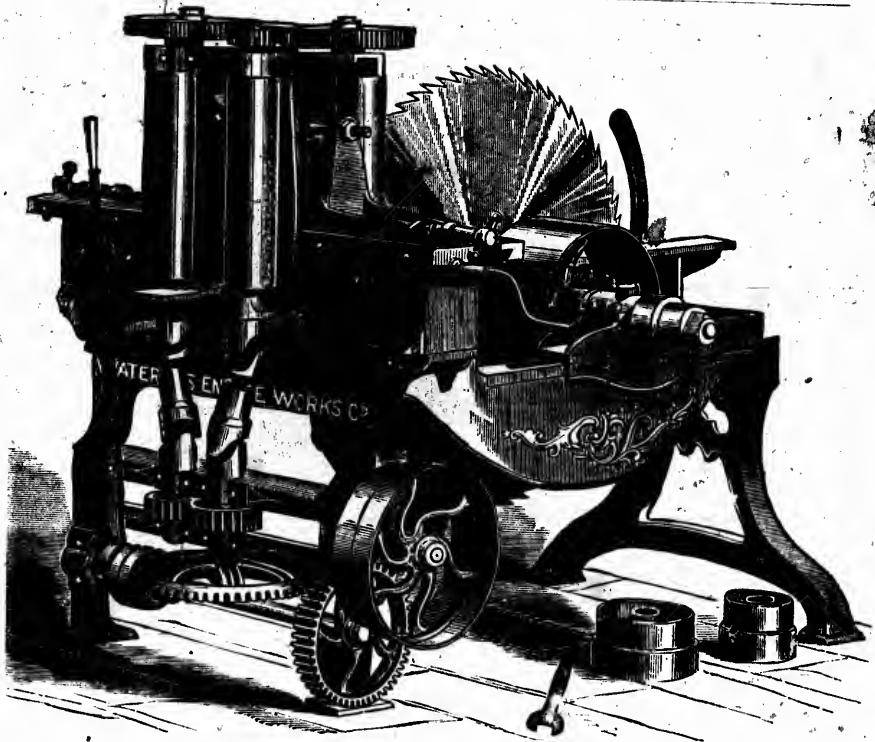
RS' PRICES.



RE-SAWING MACHINE.

The machine, shown by the accompanying engraving, is intended for sawing siding or weather-boards, and re-sawing thin lumber. It has four 6-inch diameter feed-rolls, all strongly geared, and so arranged as to saw in the centre of the lumber; or the rolls on one side can be set rigid. They can be all tipped to saw beveling by turning one screw. The saw runs close to the rolls, and can be moved forward as the saw wears. The saw can be taken off without disturbing the mandrel. The movement of one screw adjusts the rolls on either side, and they are held in position by weight and lever. We build two sizes of this pattern one with 24-in saw and one with 30-inch. The 24-inch will saw nine inches wide; the 30-inch twelve inches. Size of pulley, 8-inch diameter, $7\frac{1}{2}$ -inch face. This machine is specially adapted for the Australian market, and one should be placed in every saw-mill.

Price of 24-inch	\$	275
Price of 30-inch		300

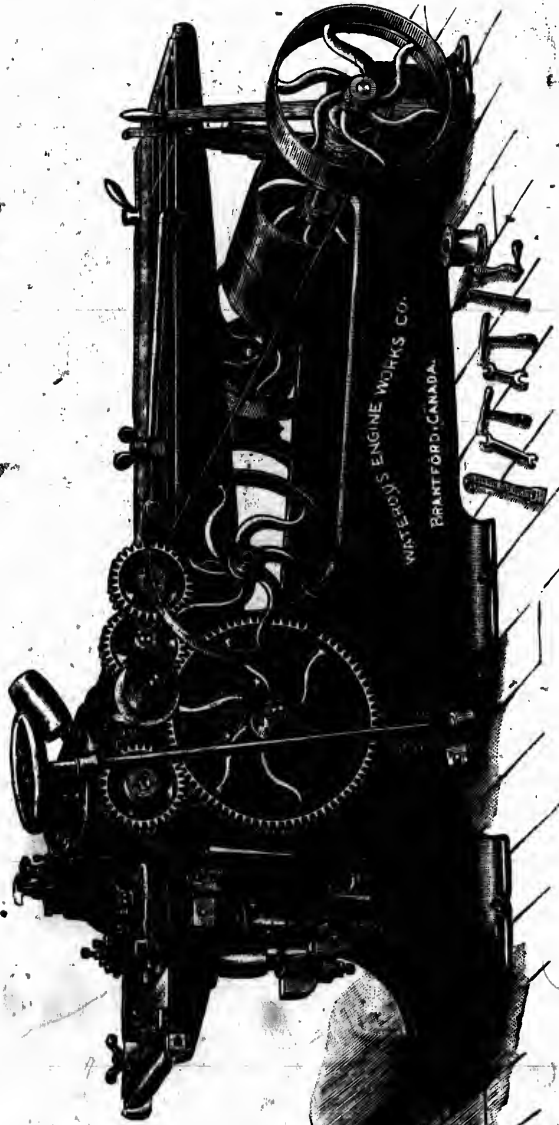


RE-SAWING MACHINE.

This Cut represents our Circular Re-Sawing Machine with an improved arrangement for driving feed rolls. It will centre any thickness of stuff from $\frac{1}{4}$ to 8 inches. The feed works are very powerful, having four feed rolls, with power applied to each, and can be rigid on either side, so as to take any thickness required, leaving the opposite rolls yielding; and the rolls are so arranged as to be set for any bevel required, always working free and easy. The arbor is very heavy, to prevent springing, which is necessary to a good working saw, and runs in a movable frame that can be set up to the rolls as the saw wears. We furnish with it a saw, ground thin on the rim, to take out as little kerf as possible.

This machine is built as shown in cut ready to attach main belt.

- | | |
|---|--------|
| No. 1 Machine takes 24, 26 and 28 inch saws; has 12 inch pulley, 7 inch face, should run 1050 revolutions per minute. Weight, 1600. | |
| Price, including saw..... | \$ 275 |
| No. 2 Machine with 30 or 36 inch saw, has pulley 14 inch diameter, 7 inch face, should run 950 revolutions per minute. Weight, 1,700 lbs. PRICE | 300 |
| No. 3 Machine with 42 inch saw has pulley 16 inch diameter, 7 inch face, should run 825 revolutions per minute. Weight, 1,850 lbs. PRICE | 400 |



The New Champion Planer, Matcher and Moulder.

Champion Planer, Matcher and Moulder.

The cut on opposite page represents our improved Champion Planer and Matcher. This machine is of new and improved design and can be used for rapid matching, surfacing or fine panel work on either hard or soft wood. The cylinder head is solid forged steel, the journals 6 inches long and of large diameter. The pressure bar swings in a circle around the cutter head, the bar working on trunnions receives lumber of varying thicknesses, and does not check the feed, the pressure bar keeping the same relative distance from knives on cutter head at all points of the cut. Both top and bottom feed rolls are $3\frac{1}{2}$ inches in diameter and are all driven by heavy gearing, giving a positive and reliable feed. The matcher spindles are of steel, and to change from matching to surfacing simply unscrew the head and top of the spindles, leaving the main arbors in their place. The matcher heads are the ordinary brass heads with two slots, unless otherwise ordered. It has two speeds for feeding; the feed is started and stopped by an entirely new arrangement, doing away with belt tighteners. The cut shows feed pulley in position. If requiring to stop or slow feed for a rough or knotty board, you simply take hold of handle attached to counter-shaft and lower pulley which has gear pinion in center and which turns in a true circle around gear wheel, relieving belt from small flange pulley on counter-shaft allowing feed to stop or slow up as desired.

This machine will plane 24 inches wide and from $\frac{1}{8}$ to 7 inches thick, and match 14 inches wide, and as short as four inches, and not clip the ends of work.

We also have a beading and moulding attachment for this machine, with a 7 inch brass slotted head and adjustable guides, which makes it one of the most desirable machines in the market for small Planing Mills. With moulding attachment it has as large a range of work as a 3 sided moulder.

Tight and loose pulleys, 10 inches diameter, and $6\frac{1}{4}$ face, and should run 900 revolutions per minute. Weight of Machine, 2,900.

Price, as Planer and Matcher.....	\$350
Beading and Moulding Attachments, Extra.....	50
Beltting extra.	



The New Canadian Economist Planer, Matcher
and Moulder.

Canadian Economist Planer, Matcher and Moulder.

A THOROUGHLY GOOD, CHEAP MACHINE.

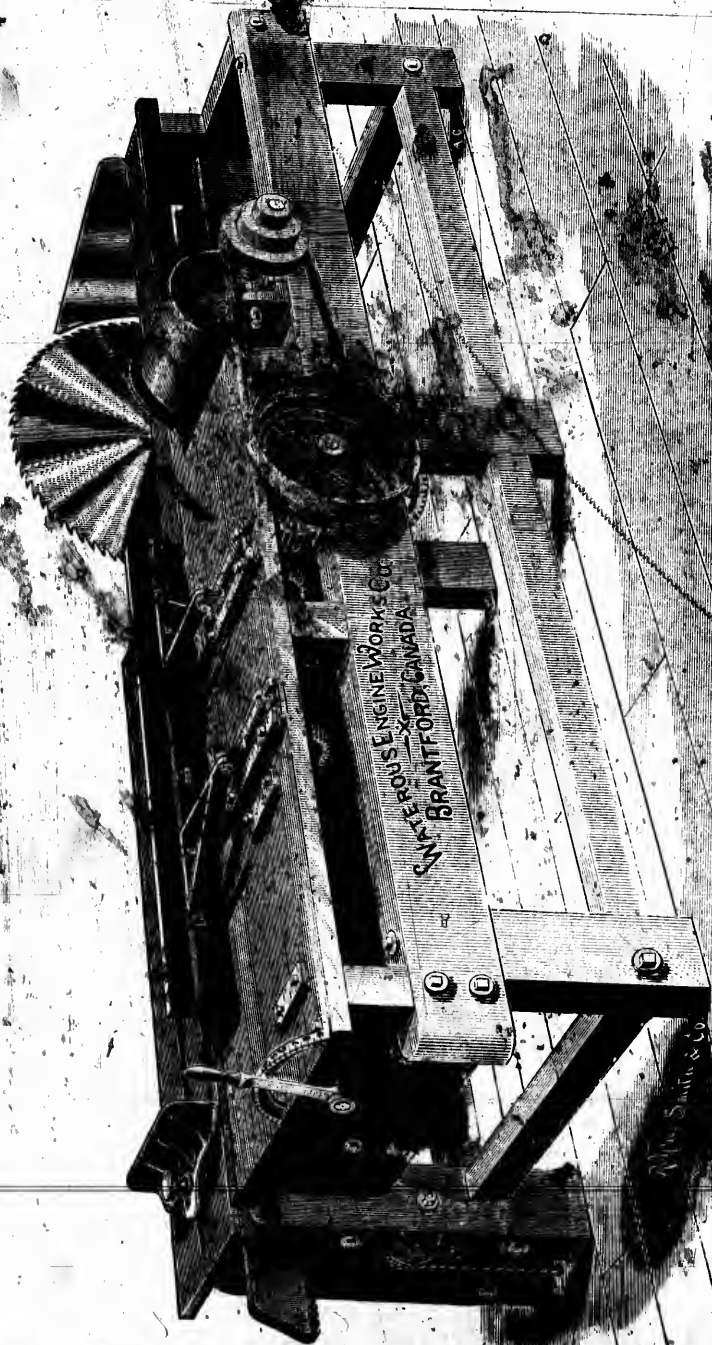
The cut on opposite page gives a very good representation of our Canadian Economist Planer and Matcher. This machine is of new and improved design and can be used for rapid matching, surfacing or fine panel work, on either hard or soft wood. The cylinder head is solid forged steel, the journals six inches long and of large diameter. The pressure bar swings in a circle around the cutter head, the bar working on trunnions, receives lumber of varying thicknesses, and does not check the feed, the pressure bar keeping the same relative distance from knives on cutter head at all points of the cut. The matcher spindles are of steel, and to change from matching to surfacing simply unscrew the head and top of the spindles, leaving the main arbors in their place. The matcher heads are the ordinary brass heads with two slots, unless otherwise ordered. It has two speeds for feeding; the feed is started and stopped by an entirely new arrangement, doing away with all belt tighteners. The cut shows feed pulley in position. If requiring to stop or slow feed for a rough or knotty board, you simply take hold of handle attached to counter-shaft and lower pulley which has gear pinion in centre and which turns in a true circle around gear wheel, relieving belt from small flange pulley on counter-shaft, allowing feed to stop or slow up as desired.

This machine will plane 24 inches wide and $\frac{1}{8}$ to 7 inches thick, and match 14 inches wide, and as short as 4 inches, and not clip the ends of work.

Tight and loose pulleys are 10 inches diameter, and $6\frac{1}{2}$ face, and should run 900 revolutions per minute. Weight of machine, 2,180 lbs.

Price of Machine complete as a Planer and Matcher, without Belts..... \$280

Extra 7 inch slotted head, shaft, and pulley to drive it, as shown in cut of Economist page 45. Will bead and mould $\frac{3}{8}$ inch deep, any width desired up to 7 inches wide..... Price, extra..... 35



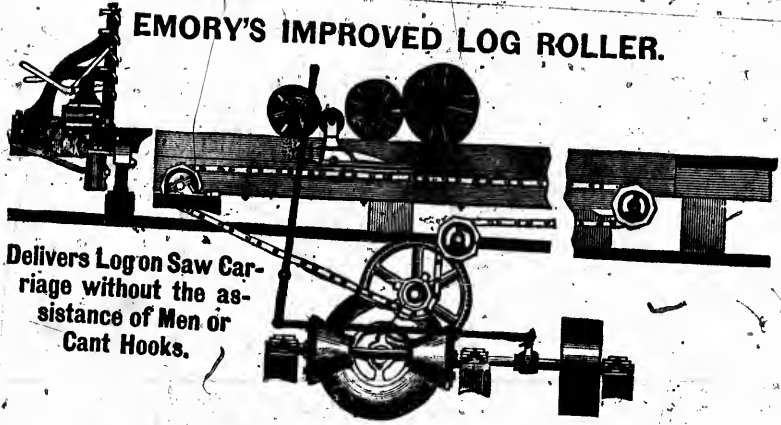
NEW BOX BOARD

AND

RIPPING MACHINE.

The cut on the opposite page illustrates our Self-acting Box Board Machine for sawing staves, spool stock, pickets, heading, lath bolts, handle stuff, &c., from mill refuse or bolts. The piece to be cut is placed on the table against the stop at the back end, the carriage is started by moving the lever in front of machine *backward*; this throws the gear up and the table starts forward until a pin placed in one of the sockets on the front side of carriage comes in contact with a lug on the slide, throwing the lever *forward*, letting the gear drop down, which leaves the carriage free to be drawn back by rope and weight. When the carriage is nearly back a rubber bumper on carriage strikes another lug on the slide, which connects with lever and drives it *backward*, throwing gear up again, starting carriage forward, thus making machine automatic. The carriage is stopped by shoving the lever forward. The operator merely shoves the block up to the gauge everytime a cut is taken off. The gauge can be moved to cut any width up to 8 inches while the machine is in motion. The length of cut is regulated by a pin being placed in one of the pin sockets on the side of the carriage. It is done in a moment and while machine is running. Any length can be cut up to five feet; we also make them to cut any desired length above five feet at a small advance in price. When desired we add a pair of dogs, so that from slabs of suitable thickness one or more box boards can be cut. On the later machines we have put a pair of heavy hinges on the table so that the machine can be easily got at without unscrewing the top. When desired the slide or rest can be arranged for adjusting to any desired angle to saw beveled boards and clap boards out of lumber.

Weight 1100; floor space 11x4 feet; usual diameter of saw 32 inch; gauge size of pulley 14x10 inch; speed 1000 to 1200.

EMORY'S IMPROVED LOG ROLLER.

Delivers Log on Saw Carriage without the assistance of Men or Cant Hooks.

- No. 1 Log Roller**, to roll logs 10 to 16 or 20 feet long, folding knees being placed 8 feet apart, all iron work, ready to set up and attach power..... PRICE.. \$ 275-
- No. 2 Log Roller**, for logs up to 30 or 34 feet long, 3 folding knees, 24 ft. between first and last, or spaced as desired..... PRICE... 375
- No. 3 Log Roller**, for logs up to 40 or 45 ft., 5 folding knees, spaced as desired..... PRICE... 500
- No. 4 Log Roller**, for logs up to 50 or 60 feet, 5 folding knees, spaced as desired..... PRICE... 600

The above Log Roller is operated by the sawyer, the handle shown in cut being placed within his reach; he grasps it, runs knees back under log, they bending down to pass under log, but immediately regaining their upright position on passing it. The motion is then instantly reversed and log rolled as fast as desired on to carriage. When used in connection with our improved carriage the operation is as follows: When last board is taken off sawyer starts carriage back to log skids, places his foot on receding lever, and as carriage comes back the knees or slides on log seats are automatically receded and are ready to receive log on reaching skidways. While this is being done with his free hand, sawyer has worked the log roller lever, and a log is being slowly rolled on skidway, and almost before carriage stops it is on the log seats. One motion of the tail-sawyer's Knight Dog lever dogs it, and carriage meantime starts for saw, the log oftentimes being so well placed that carriage hardly makes any stop; the only stop necessary being occasioned by size of log not being well gauged, and too much setting up required.

Knight's Saw Mill Dogs { Excelsior, plain, per pair.... 40 cts.
 { Duplex, per pair..... 85 cts.

IMPROVED BOX-BOARD & RIPPING MACHINE.

Illustrated and described page 70 and 71. Price with two 36 inch saws... \$300

Improved Gang Slab Slasher, using Ewart Chain Belt.



The above cut represents our six saw machine. We make these however with any number of saws required, with wide or narrow table, and with top of table either inclined or level to suit the varying conditions in different mills. The Feed Gear is so arranged that the carrying chains may be stopped and started at the will of the operator. These chains run in guides same as in our Trimmer, (see page 42) and are provided with sharp spurs (R2 special page 76), which aid in holding the slabs securely, while the Lug (or H) carry them to the saws. All our Slashers are fitted with our Improved Saw Collars, which allow the Saws to accommodate themselves to the side pressure caused by a wedging slab, thus avoiding breakage of saws. This feature we think will commend itself to all millmen. We shall be pleased to furnish plans and estimates for Slashers of any description. Prices according to number of saws, length, capacity, &c.

... knees
... attach
... PRICE... \$ 275.
... es, 24
... PRICE... 375
... oaded
... CE... 500
... oaded
... CE... 600

... own in cut
... they bend-
... position on
... at as desired
... e operation
... o log skids,
... or slides on
... ching skid-
... ed the log
... re carriage
... ight Dog
... s being so
... ary being
... required.

... 40 cts.
... 85 cts.

... LINE.

... \$300

No Friction, Tension, Stretching.



SOLE MANUFACTURERS IN THE UNITED STATES OF AMERICA

STEWART'S Patent Drive Chain.

Positive Transmission, Stands Exposure.
Best in existence for Sawdust Carriers
Lumber Trimmers, Wheat
Elevators.

Runs Fast, Slow, Reverse, Horizontal or Half-Wrist.

Price List of Chain.

No.	Links per foot.	Working strain.	Price per foot.	Equivalent in belting.	No.	Links per foot.	Working strain.	Price per foot.	Equivalent in belting.
25	13.3	75 lbs.	\$0 13	3/8 in. round	67	5-16	700 lbs.	\$0 30	8 in. flat.
32	10.5	150 "	0 13	1 1/2 in. flat	73	3-7	800 "	0 40	9 "
33	8.6	150 "	0 12	"	75	4-5	800 "	0 35	9 "
34	8.6	175 "	0 13	2 "	77	5-16	800 "	0 35	8 "
35	7.4	200 "	0 14	2 "	78	4-5	1000 "	0 40	10 "
42	8.75	350 "	0 16	4 "	85	3-	1400 "	0 50	10 "
45	7.4	400 "	0 16	4 "	88	4-5	1400 "	0 50	10 "
48	6.	400 "	0 17	5 "	95	3-	1500 "	0 60	12 "
49	7.4	450 "	0 20	5 "	103	4.	1800 "	0 75	14 "
52	8.	600 "	0 25	6 "	105	2.	1700 "	0 70	12 "
53	8.	650 "	0 26	6 "	108	2.5	1800 "	0 80	14 "
55	7.4	650 "	0 22	6 "	114	3-6	2000 "	1 10	14 "
57	5-16	650 "	0 24	6 "	123	3-	2500 "	1 30	18 "
62	7-25	700 "	0 30	7 "	146	2-1/2	2800 "	1 40	20 "
63	6.	700 "	0 30	7 "	600	2	7000 "	1 00	24 "
64	6.	700 "	0 30	7 "	1050	1-2	12000 "	1 30	30 "
65	5-66	700 "	0 30	7 "	1075	1	16000 "	1 40	40 "
66	6.	700 "	0 31	8 "	1200	1	7000 "	0 90	24 "

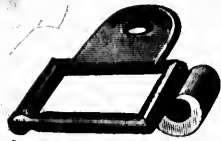
All chains are tested at two and one-half times the working strains given above. Run chain with open side of coupling out, and keep coupling hook against driving side of wheel sprocket.

Attachment Price List: per Foot.

See above list for number of links per foot.

No. Chain.	The only attachments that are made on each side chain are given below.	Foot Price.	No. Chain.	The only attachments that are made on each side chain are given below.	Foot Price.
25	A2 A3 C1 E1 G1 K1 K2 K6 S1	\$0 17	77	E1 H1 K1	\$0 44
33	A1 D3 E1 F1 K1 K5 K6 M1 S1	0 45	77	E1 F2 G1 H1 K1 K8 R1 S2	0 44
35	A1 A2 A16 C1 K1 S1	0 18	78	A3 E1 F2 F4 G1 H1 K1 S2	0 50
42	A1 C1 D2 K3 K5 M2 S1	0 20	83	D5 E1 M3	0 56
45	A1 2 3 10 C1 H1 D3 D5 E1 G1 H1 I3 K1 K3 K5 M1 S1	0 31	85	F2 F1 F2 FF H1 K2 K4 K7 S2 and Hod link	0 62
52	A1 D2 E1 K5	0 32	88	F2 G1 K1 S2	0 69
55	A1 C1 K1 S1	0 27	95	F2 H2 K2	0 75
57	A1 D3 D5 E1 F2 H1 K1 S2	0 30	103	A1 F2 H1 K1 M2	0 94
67	A1 E1 F1 F2 H1 K1 S2	0 37	105	F1 H1 K4 M3	0 87
73	K1 K8 S2	0 50	108	F2 F3 FF G1 K2 Hod link	1 00
			146	E2 F1 F5 K4	1 85

See page 75 for the list of attachments that are made for each size chain



A 1. Made right & left.



C 1.



C 4.



E 1.



F 2. F 1 the same but standards faced the opposite way.



F 4.



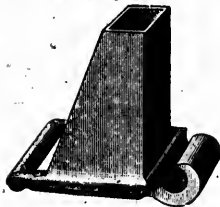
F F



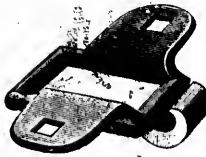
G 1. Made right & left.



H 1. H 2 the same but lower and faced opposite way.



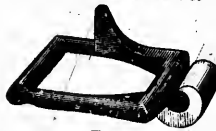
H 4. Can be lengthened by cast attachments of different shapes.



K 1. K 2 the same as K 1 but flanges square K 8. and 2 holes on each side. In K 3 the flanges are lengthened and 2 holes on each side.



M 2. M 1 has uprights on sides with round holes.



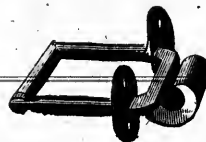
R 1.



R 2.



S 1. Used for receiving cross bars for saw dust scrapers.

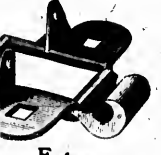


S 2. Used for same purpose as S 1 but brings the scraper lower, for heavier chains.

ice chain



C 4.



F 4.



I 2 the same but
over and faced op-
posite way.

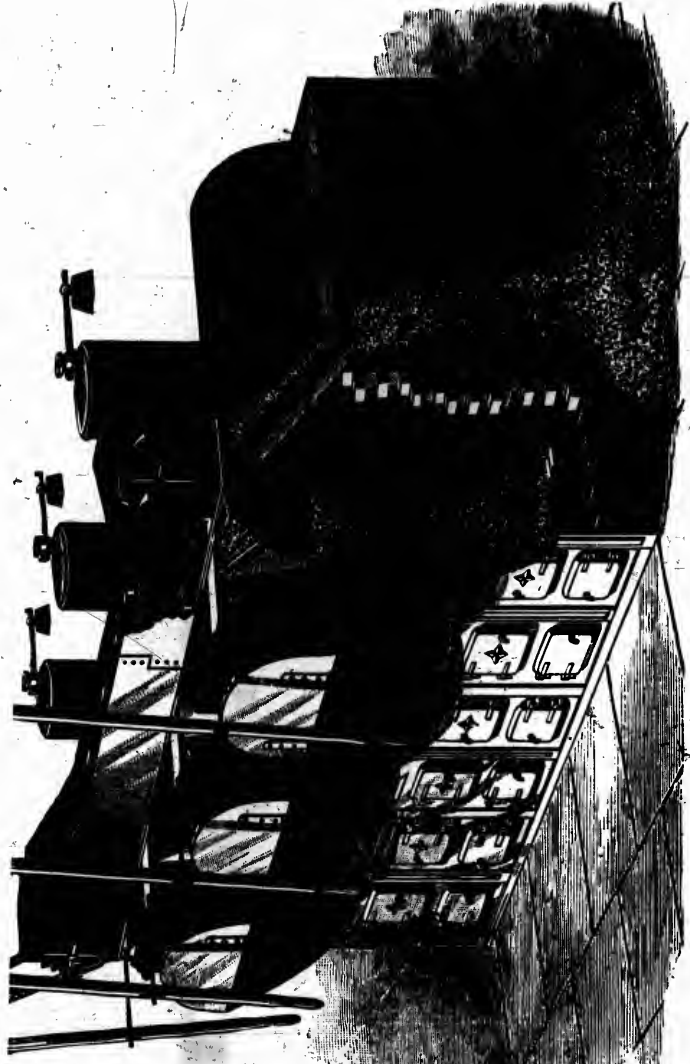


es square K 8.
K 3 the
holes on



R 2.

Used for same
purpose as S
but brings
the scraper low-
er, for heavier
chains.



HYDRA-MATIC FUEL FEEDER FOR BOILER FURNACES

Can be made for any number of Boilers and of any Capacity. Prices given on application.

50	75	98	133	174	232	301	385	521	695	993	1204	1586	2083	2946	3909	5075	6048	7244	8730	11541	15045
Revolutions.....	724	860	1046	1273	1545	1860	2230	2730	3360	4140	5070	6180	7470	8940	10600	12450	14500	16750	20200	24950	31100
Horse Power.....	1.3	1.7	2.2	3.0	3.9	5.2	6.8	8.9	11.8	15.7	20.5	27.3	36.0	47.3	55.1	68.3	83.8	113.8	141.9	200.8	261.9
Cubic Feet.....	60	84	108	139	181	241	313	410	542	708	940	1233	1650	2168	2580	3132	3907	5282	6564	9138	12006
Revolutions.....	750	952	1208	1497	1924	2520	3284	4290	5640	7368	9516	12324	15912	20400	25800	33300	42900	55800	72000	92700	119700
Horse Power.....	1.5	1.9	2.5	3.3	4.4	5.8	7.5	10.0	13.2	17.6	22.9	30.5	40.3	52.8	61.6	76.3	94.8	129.5	175.7	224.4	292.7
Cubic Feet.....	75	104	140	188	250	325	425	564	730	975	1260	1614	2052	2652	3420	4464	5804	7548	9955	12661	16555
Revolutions.....	900	1120	1440	1880	2460	3240	4260	5640	7380	9720	12600	16200	20700	27000	35100	45000	58800	77400	101100	130500	167400

Head.	SIZE OF WHEEL.	6	8	10	11	13	15	17	20	23	26	30	35	40	44	48	52	56	61	66	74	84	96
16	Horse Power.....	1.6	2.2	2.7	3.7	4.8	6.4	8.4	11.0	14.0	18.0	23.0	30.0	39.0	50.0	62.0	77.0	97.0	123.0	155.0	195.0	245.0	305.0
	Cubic Feet.....	85	117	150	194	250	320	410	520	660	840	1060	1340	1700	2150	2700	3350	4150	5100	6200	7500	9000	10800
	Revolutions.....	1.7	2.4	3.0	4.1	5.3	7.1	9.2	11.8	15.0	19.0	24.0	31.0	40.0	51.0	63.0	78.0	97.0	121.0	150.0	185.0	225.0	270.0
17	Horse Power.....	1.9	2.6	3.3	4.5	5.9	7.8	10.2	13.2	17.0	21.0	27.0	35.0	45.0	57.0	71.0	87.0	107.0	132.0	163.0	200.0	245.0	295.0
	Cubic Feet.....	89	123	159	207	270	358	469	600	760	950	1180	1460	1810	2250	2780	3420	4200	5150	6250	7500	8900	10600
	Revolutions.....	2.0	2.8	3.5	4.7	6.1	8.0	10.4	13.4	17.4	22.4	28.4	36.4	46.4	58.4	72.4	88.4	108.4	133.4	164.4	201.4	245.4	295.4
18	Horse Power.....	2.1	2.8	3.6	4.9	6.4	8.5	11.1	14.5	18.5	23.5	30.5	39.5	50.5	63.5	78.5	95.5	116.5	143.5	177.5	218.5	265.5	315.5
	Cubic Feet.....	88	121	158	203	268	354	464	595	755	945	1175	1455	1805	2245	2785	3435	4235	5185	6285	7535	8935	10635
	Revolutions.....	2.2	3.0	3.8	5.1	6.6	8.7	11.3	14.9	19.5	25.1	31.7	40.7	51.7	64.7	79.7	96.7	117.7	144.7	178.7	219.7	267.7	322.7
19	Horse Power.....	2.3	3.1	3.9	5.3	6.9	9.2	12.0	15.7	20.0	26.0	33.0	42.0	53.0	66.0	81.0	98.0	119.0	145.0	177.0	216.0	261.0	312.0
	Cubic Feet.....	73	103	134	172	221	284	369	482	620	780	960	1170	1420	1720	2070	2470	2920	3520	4270	5170	6220	7430
	Revolutions.....	947	1258	1620	2090	2710	3510	4540	5840	7440	9340	11540	14140	17240	20940	25240	30140	35640	42840	50840	60540	71940	85040
20	Horse Power.....	2.5	3.3	4.2	5.7	7.5	10.0	13.0	17.0	22.5	29.5	38.5	49.5	62.5	78.5	96.5	117.5	143.5	175.5	214.5	260.5	313.5	374.5
	Cubic Feet.....	75	101	127	164	214	280	360	460	580	720	880	1060	1260	1490	1750	2040	2370	2850	3390	4000	4680	5440
	Revolutions.....	931	1229	1590	2070	2710	3510	4540	5840	7440	9340	11540	14140	17240	20940	25240	30140	35640	42840	50840	60540	71940	85040
21	Horse Power.....	2.7	3.6	4.5	6.2	8.1	10.7	14.0	18.3	24.0	31.0	40.0	51.0	64.0	79.0	96.0	116.0	141.0	172.0	209.0	253.0	304.0	362.0
	Cubic Feet.....	77	103	130	170	220	280	360	460	580	720	880	1060	1260	1490	1750	2040	2370	2850	3390	4000	4680	5440
	Revolutions.....	934	1232	1593	2073	2713	3513	4543	5843	7443	9343	11543	14143	17243	20943	25243	30143	35643	42843	50843	60543	71943	85043
22	Horse Power.....	2.9	3.9	4.9	6.6	8.6	11.5	15.0	19.6	26.0	34.0	44.0	56.0	70.0	86.0	104.0	124.0	149.0	180.0	217.0	261.0	312.0	370.0
	Cubic Feet.....	78	105	133	175	225	290	370	470	590	730	890	1070	1270	1500	1760	2050	2380	2860	3400	4010	4690	5450
	Revolutions.....	970	1278	1639	2119	2759	3559	4589	5889	7489	9389	11589	14189	17289	20989	25289	30189	35689	42889	50889	60589	71989	85089
23	Horse Power.....	3.1	4.1	5.2	7.1	9.2	12.0	16.0	21.0	27.0	35.0	45.0	57.0	71.0	87.0	105.0	125.0	150.0	181.0	218.0	262.0	313.0	371.0
	Cubic Feet.....	81	108	136	181	241	321	417	545	705	885	1085	1305	1545	1815	2115	2445	2825	3365	3965	4635	5385	6215
	Revolutions.....	998	1306	1667	2147	2787	3587	4617	5917	7517	9417	11617	14217	17317	20917	25217	30117	35617	42817	50817	60517	71917	85017
24	Horse Power.....	3.3	4.4	5.6	7.5	9.6	12.5	16.5	21.5	28.0	36.0	46.0	58.0	72.0	88.0	106.0	126.0	151.0	182.0	219.0	263.0	314.0	372.0
	Cubic Feet.....	82	111	139	185	245	325	421	549	709	889	1089	1309	1549	1819	2119	2449	2829	3369	3969	4639	5389	6219
	Revolutions.....	1019	1327	1688	2168	2808	3608	4638	5938	7538	9438	11638	14238	17338	20938	25238	30138	35638	42838	50838	60538	71938	85038
25	Horse Power.....	3.5	4.7	5.9	8.0	10.1	13.1	17.1	22.1	29.0	37.0	47.0	59.0	73.0	89.0	107.0	127.0	152.0	183.0	220.0	264.0	315.0	373.0
	Cubic Feet.....	84	113	142	189	250	330	426	554	714	894	1094	1314	1554	1824	2124	2454	2834	3374	3974	4644	5394	6224
	Revolutions.....	1040	1348	1709	2189	2829	3629	4659	5959	7559	9459	11659	14259	17359	20959	25259	30159	35659	42859	50859	60559	71959	85059
26	Horse Power.....	3.7	5.0	6.3	8.4	10.5	13.6	17.6	22.6	29.5	37.5	47.5	59.5	73.5	89.5	107.5	127.5	152.5	183.5	220.5	264.5	315.5	373.5
	Cubic Feet.....	85	115	144	191	252	332	428	556	716	896	1096	1316	1556	1826	2126	2456	2836	3376	3976	4646	5396	6226
	Revolutions.....	1061	1369	1730	2210	2850	3650	4680	5980	7580	9480	11680	14280	17380	20980	25280	30180	35680	42880	50880	60580	71980	85080
27	Horse Power.....	3.9	5.3	6.6	9.0	11.2	14.3	18.3	23.3	30.0	38.0	48.0	60.0	74.0	89.0	107.0	127.0	152.0	183.0	220.0	264.0	315.0	373.0
	Cubic Feet.....	87	117	146	200	261	341	437	565	725	905	1105	1325	1565	1835	2135	2465	2845	3385	3985	4655	5405	6235
	Revolutions.....	1081	1389	1750	2230	2870	3670	4700	5990	7590	9490	11690	14290	17390	20990	25290	30190	35690	42890	50890	60590	71990	85090
28	Horse Power.....	4.1	5.6	7.0	9.5	12.0	15.5	20.0	25.0	32.0	40.0	50.0	62.0	76.0	91.0	108.0	128.0	153.0	184.0	221.0	265.0	316.0	374.0
	Cubic Feet.....	88	119	148	203	264	344	440	568	728	908	1108	1328	1568	1838	2138	2468	2848	3388	3988	4658	5408	6238
	Revolutions.....	1101	1409	1770	2250	2890	3690	4720	6010	7610	9510	11710	14310	17410	20910	25210	30110	35610	42810	50810	60510	71910	85010
29	Horse Power.....	4.3	5.9	7.4	10.0	12.5	16.0	20.5	26.0	33.0	41.0	51.0	63.0	77.0	92.0	109.0	129.0	154.0	185.0	222.0	266.0	317.0	375.0
	Cubic Feet.....	90	121	150	205	266	346	442	570	730	910	1110	1330	1570	1840	2140	2470	2850	3390	3990	4660	5410	6240
	Revolutions.....	1120	1428	1789	2269	2909	3709	4739	6029	7629	9529	11729	14329	17429	20929	25229	30129	35629	42829	50829	60529	71929	85029

Price List of Turbine Water Wheels.

For further particulars send for Illustrated Water Wheel-Circular.

SIZE IN INCHES	AMOUNT OF WATER EACH VENTS.	MATERIAL	PRICE OF "LEFFEL"	PRICE OF "VULCAN"	PRICE OF GLOBE CASE EXTRA.	Approximate Weight.
6½	4 ⁹ / ₁₀ sq. in.	Brass				
7½	6½ "	"				
8¾	8½ "	"				
10	11¼ "	"	\$90 00	\$110 00	\$70 00	
11½	14 ² / ₃ "	"	100 00	120 00	75 00	
13¼	19¾ "	Brass Gates.	75 00	80 00	85 00	
15¼	26 ¹ / ₆ "	" "	80 00	90 00	95 00	
17½	34½ "	" "	90 00	100 00	100 00	
20	45 "	Iron	90 00	110 00	110 00	550
23	59½ "	"	100 00	125 00	115 00	800
26½	79 "	"	120 00	150 00	140 00	1000
30½	104 "	"	140 00	180 00	180 00	1500
35	137 "	"	180 00	210 00		2000
40	180 "	"	225 00	260 00		2800
44	217 "	"	260 00	300 00		3400
48	259 "	"	300 00	340 00		4000
52	338 "	"	340 00	410 00		5550
56	441 "	"	450 00	500 00		
61	518 "	"	575 00	650 00		
66	624 "	"	625 00	750 00		
74	769 "	"	900 00			
84	991 "	"	1300 00			
96	1295 "	"	1500 00			

WITH SUN
RIGHT HANDED

AGAINST SUN
LEFT HANDED

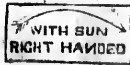
TABLE OF DIMENSIONS
of James Leffels Improved Turbine Water-Wheels.

All Measurements below are in inches or fractions of an inch. Larger sized Wheels on application.

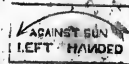
Approximate Weight.	A	B	C	D	E	F	G	H	I	J	K	L	M
SIZE OF WHEEL.	Diameter of Cylinder passing through floor of flume.	Diameter of entire casting.	Internal diameter of flume.	Length of shaft from flange to flange of pipe to centre of casting.	Diameter of bore in upper half of cylinder.	Length of Cylinder passing through floor of flume.	Depth of pit from end of cylinder to bottom of pit.	Diameter of hole in the bottom of flume for wheel.	Distance from centre of gate rod to centre of wheel shaft.				Cross section of entrance for water to penstock.
10	11 1/2	14 1/2	30 to 38	16 1/4	1 1/8	2 1/2	20 to 23	12	6 1/2				24 by 38
11 1/2	12 3/4	16 1/2	32 to 40	17 1/4	1 1/8	3	20 to 23	13	7 1/2				29 by 40
13 1/4	15	19 1/4	34 to 43	18 1/4	1 3/8	3 1/2	21 to 24	15 1/2	8 1/2				28 by 43
15 1/4	16 1/2	21 1/4	38 to 46	21 1/4	1 7/8	3 3/4	24 to 24	17 1/2	10 1/2				30 by 40
17 1/2	19	24 1/2	42 to 50	24	2	4 1/2	22 to 25	20	11 1/2				33 by 50
20	21 1/2	28	46 to 54	27 1/4	2 1/8	4 1/2	22 to 25	22 1/2	11 1/2				35 by 54
23	25 1/4	33	50 to 59	31 1/4	2 3/8	5 1/2	23 to 27	25 1/2	15 1/2				38 by 59
26 1/2	28 1/4	38 1/4	54 to 65	37 1/2	2 7/8	7	24 to 28	30	16 1/2				42 by 65
30 1/2	32 1/4	43 1/2	65 to 72	38 1/2	3 1/8	7	25 to 30	33 1/2	19 1/2				46 by 72
35	37 1/4	50	72 to 79	44 3/8	4 3/8	7 1/2	27 to 32	38 1/2	22 1/2				50 by 79
40	42 1/4	56 1/2	79 to 90	46 1/2	4 3/8	9 1/2	29 to 34	43 1/2	25 1/2				54 by 90
44	47	60	90 to 99	50 1/2	4 3/8	9 1/2	31 to 37	48	27 1/2				56 by 99
48	50 1/2	67 1/2	99 to 108	57 1/2	5 3/8	11	33 to 40	51 1/2	30 1/2				60 by 108
52	54 1/2	72	108 to 118	60	5 3/8	11 1/2	35 to 41	55 1/2	32 1/2				63 by 118
56	60 1/2	80 1/2	118 to 128	68	5 7/8	12 1/2	37 to 45	61 1/2	36				66 by 128
61	63 1/2	85	128 to 140	68	5 7/8	12 1/2	40 to 54	64 1/2	37 1/2				68 by 140
2000	69	89	137 to 152	76	5 7/8	8	43 to 58	66 1/2	40 1/2				70 by 152

Globe cases furnished to order on all wheels up to 26 1/2 in. diameter. For sizes over that the cases when ordered are made with flat top and bottom and vertical sides of Boiler Iron.

In ordering wheels don't fail to state which way they must run, WITH or AGAINST the sun, right or left handed.



When writing about Wheels, answer the following questions:



Question 1. What is the head of water when at rest; or the vertical distance from surface of head water to surface of tail water;

Question 2. If the stream is small what quantity of water can be relied upon?

Question 3. What kind of machinery do you wish to run? stating all the particulars you can.

Question 4. State kind of work to be done, and daily or hourly amount, or the power you suppose you need or are using.



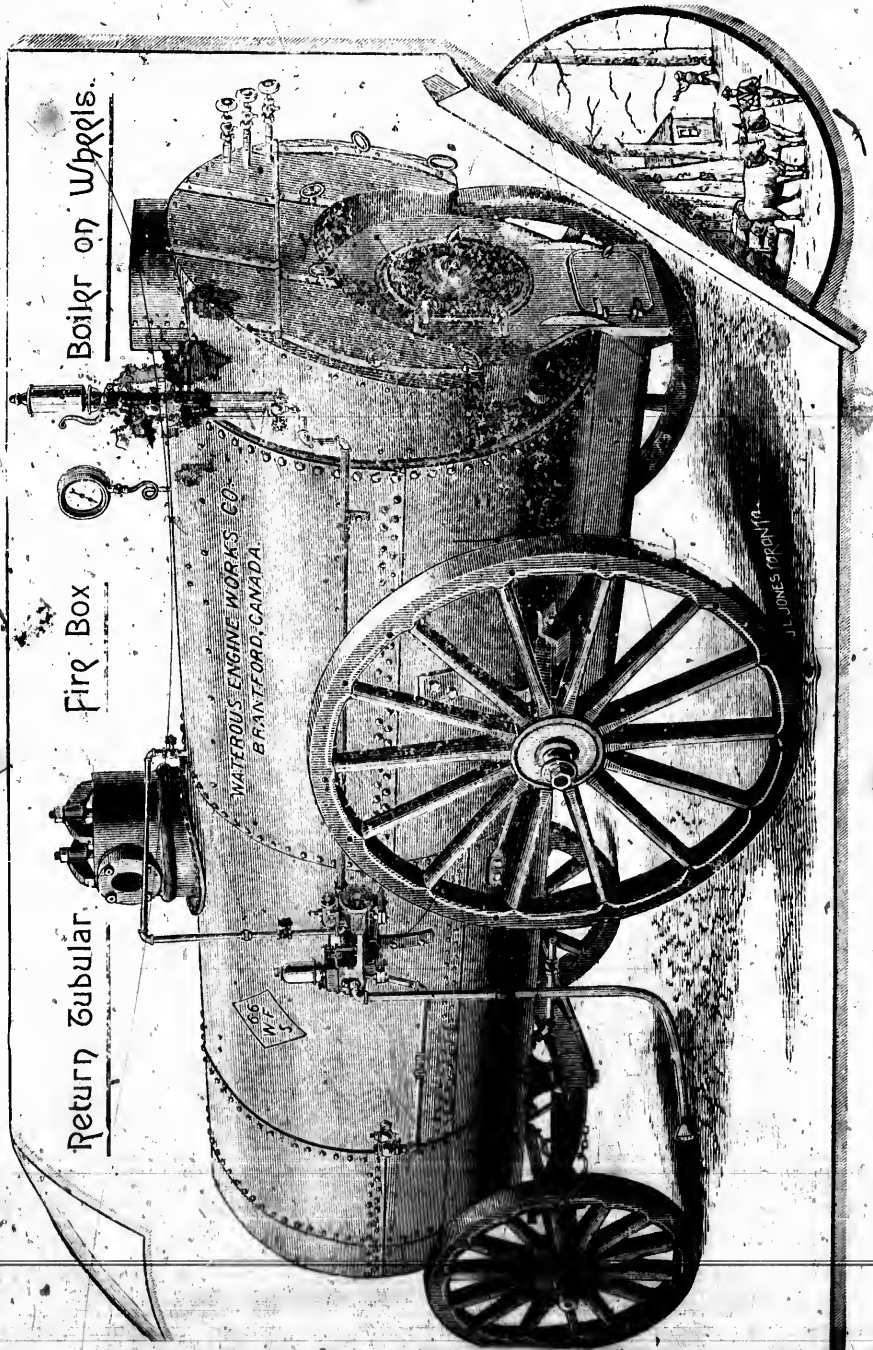


Extract from the American Mail.

The Saw Mill engraving opposite illustrates very clearly a portable saw mill at work. These mills are specially useful for cutting ties, bridge timber and lumber for railways, being easily moved and erected, keeping pace with the extension of the road; also for new districts where the small demand for lumber will not warrant a greater outlay; or for old well-settled districts where the only remaining timber is in farmers hands, two or three of whom will form together in different places and skid up 70,000 to 100,000 feet in one place near their home. This small mill is then moved from place to place, cutting up these small lots, and procuring in this way a good season's work.

It pays the farmer in saving of haulage of logs to the stationary mill and hauling lumber back; also in saving to him of the refuse, such as slabs, edgings, etc. The mill, being the latest improved machinery, cuts the lumber perfectly true, and cuts the last board one inch or three-quarter inch thick if desired. In the old fashioned stationary mills, found in settled districts, the irons are so constructed that the last board has invariably to be 2 inches thick; the track and carriage are generally out of line, so that true lumber is the exception in place of the rule.

These mills are made with Return Tubular Horizontal Boilers on skids or wheels, as well as the upright boiler as shown in the cut. The engine can, when horizontal boiler is used, be placed on the top of the boiler, or as is more generally the case, on a piece of timber at one side of it.



See Page
59 for cut of
12 H. P.
and 61 for
Prices.

NEW PATTERNS STATIONARY CHAMPION

**16, 20, 25 and 30 Horse-Power,
SUITABLE FOR ANY PURPOSE.**

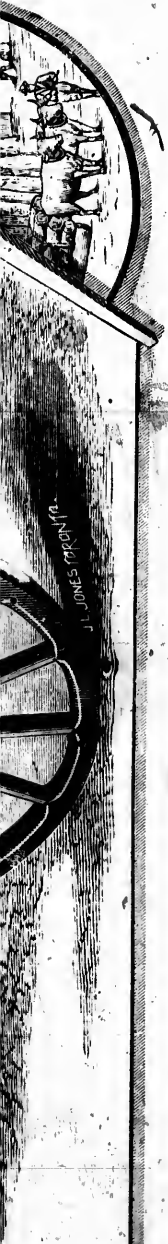
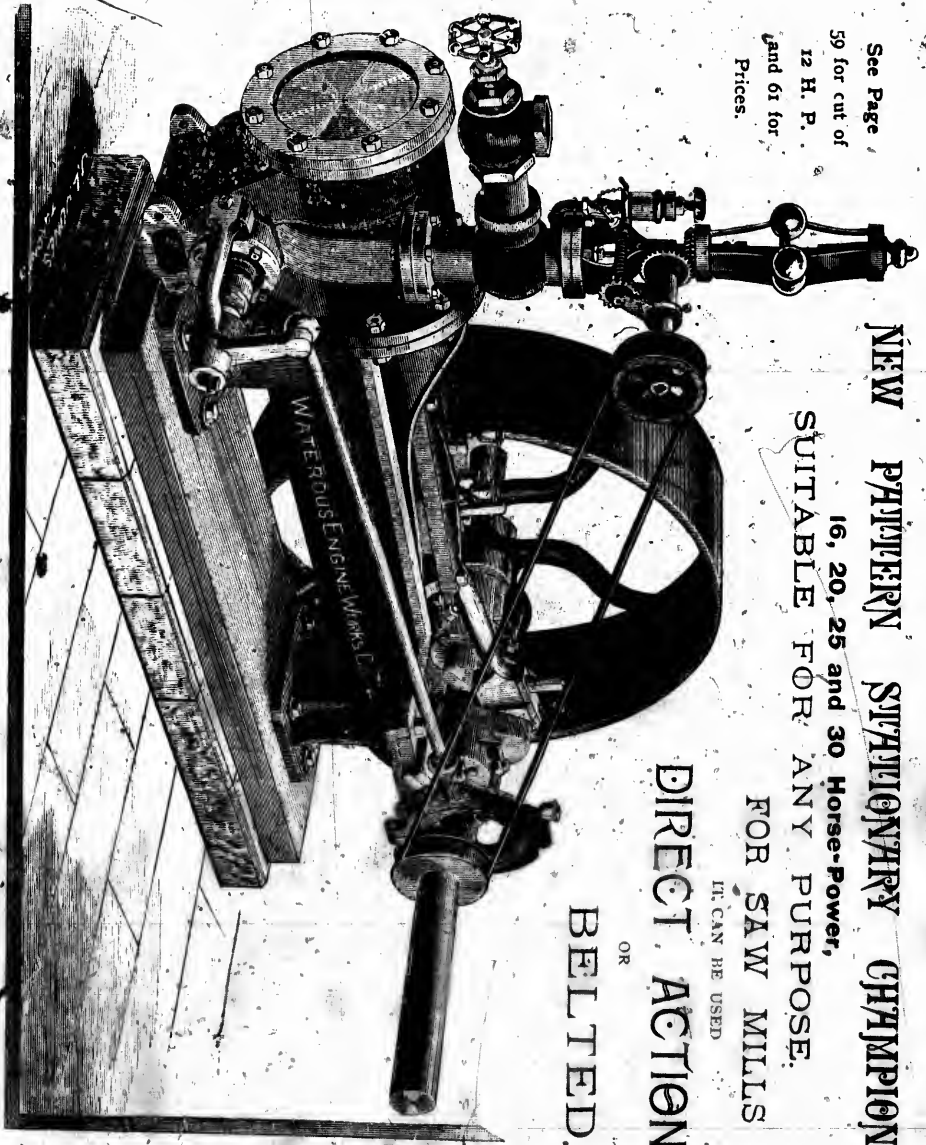
FOR SAW MILLS

IT CAN BE USED

DIRECT ACTION

OR

BELTED.



STATIONARY CHAMPION ENGINE

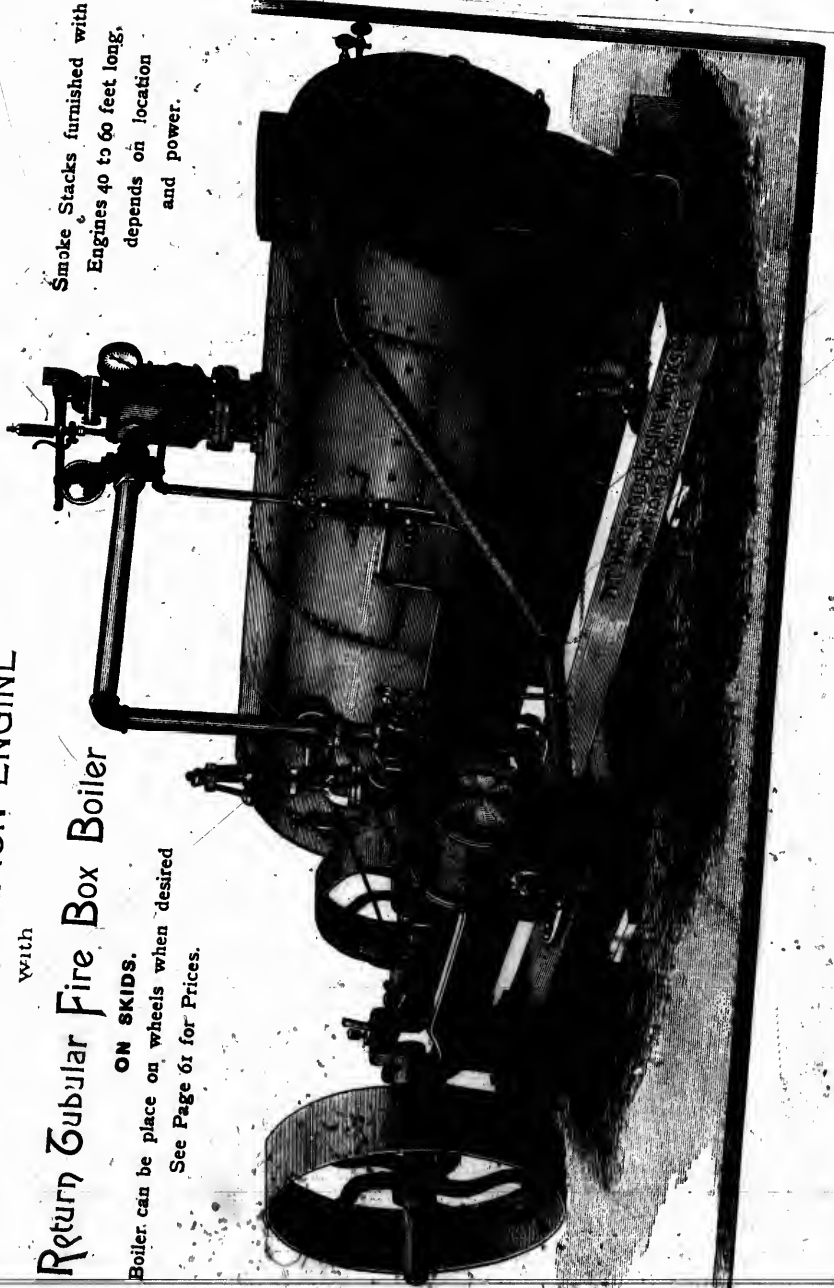
with

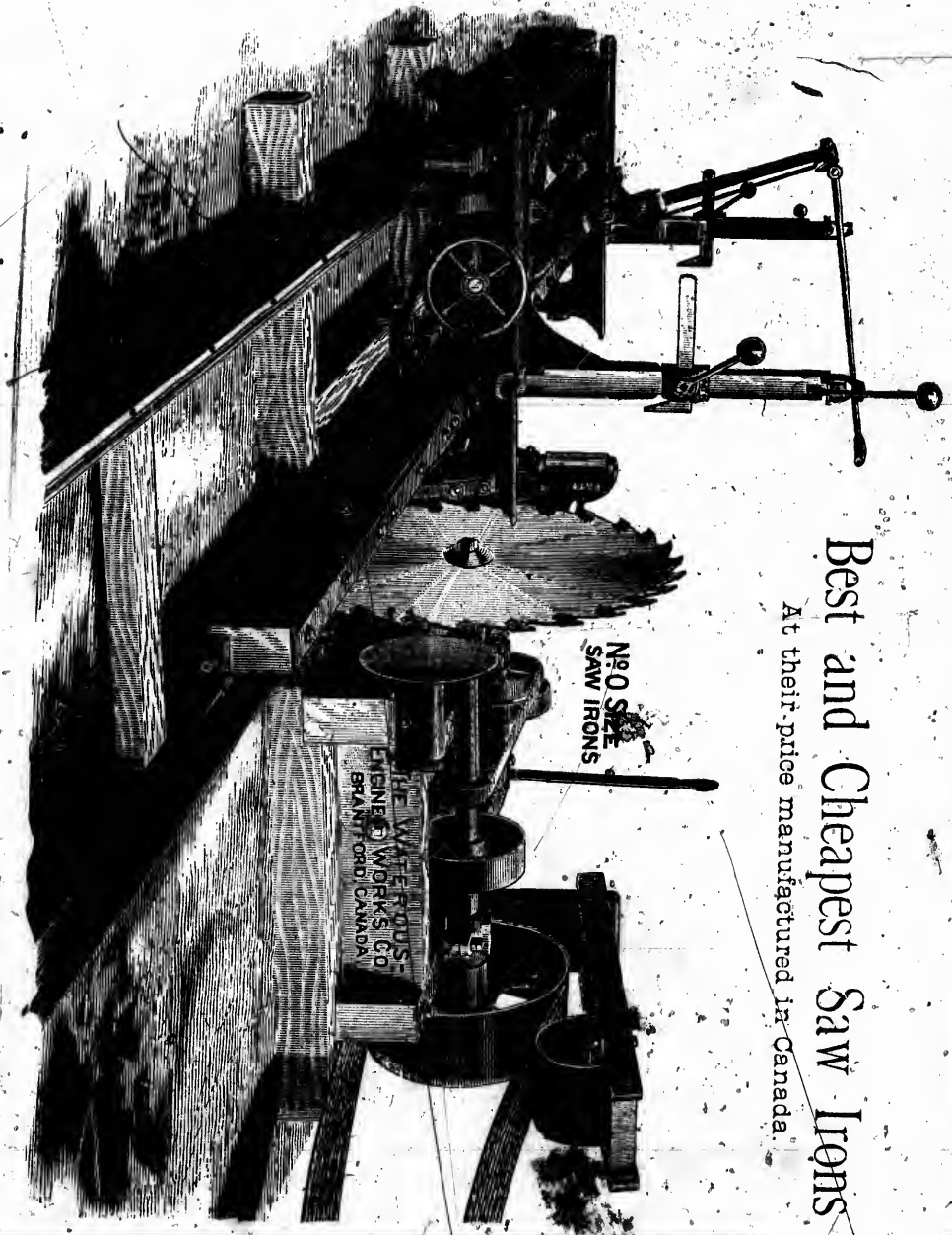
Return Tubular Fire Box Boiler

ON SKIDS.

Boiler can be placed on wheels when desired
See Page 61 for Prices.

Smoke Stacks furnished with
Engines 40 to 60 feet long,
depends on location
and power.





Best and Cheapest Saw Irons
At their price manufactured in Canada.

NO. 0 S&E
SAW IRONS

THE WALTER FROST
ENGINEERING WORKS CO.
BRANTFORD, ONTARIO, CANADA

WATEROUS ENGINE WORKS, CO.,

TIMBER GAUGE

used on

No. 0 SAW IRONS.

Simple,

Efficient,

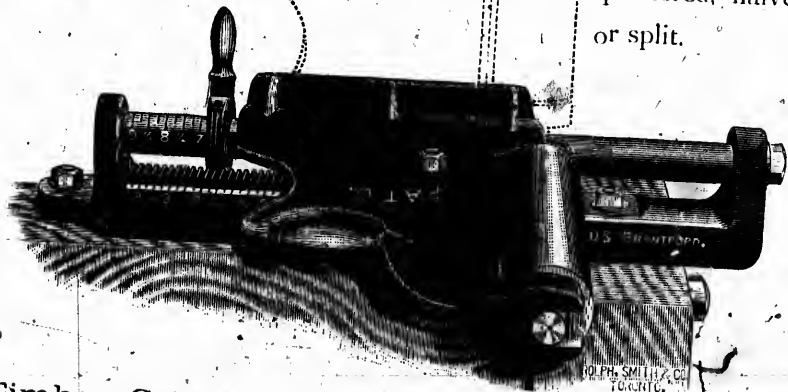
Durable.

**OPERATION**

The grooved stop is turned handle up as in lower cut. Moved to any desired size to be cut, turned down there, gauge roller seized by handle, and brought up to stop.

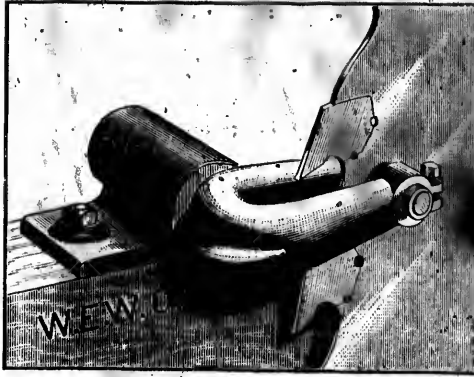
When not in use gauge roller can be, by releasing catch, be turned down out of the way.

This is of special advantage when logs are to be quartered, halved or split.

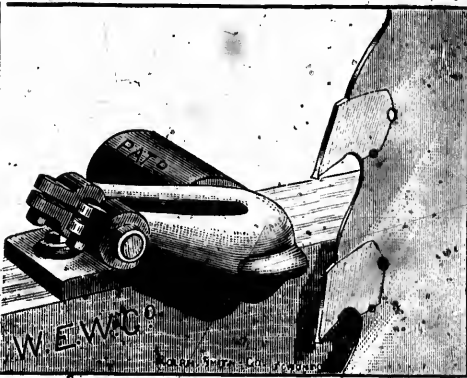


Timber Gauge Roller Turned down. Can be instantly adjusted.

No. 0 Saw Irons.



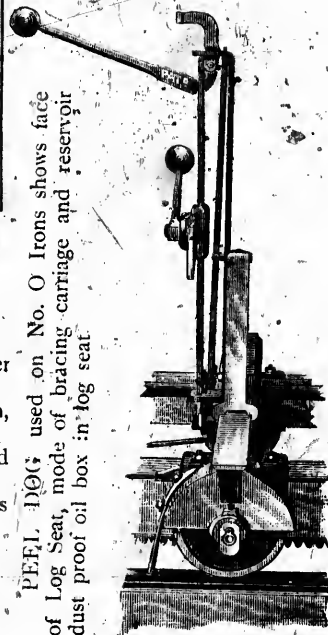
Saw Guide in position, used with No. 0 Saws.



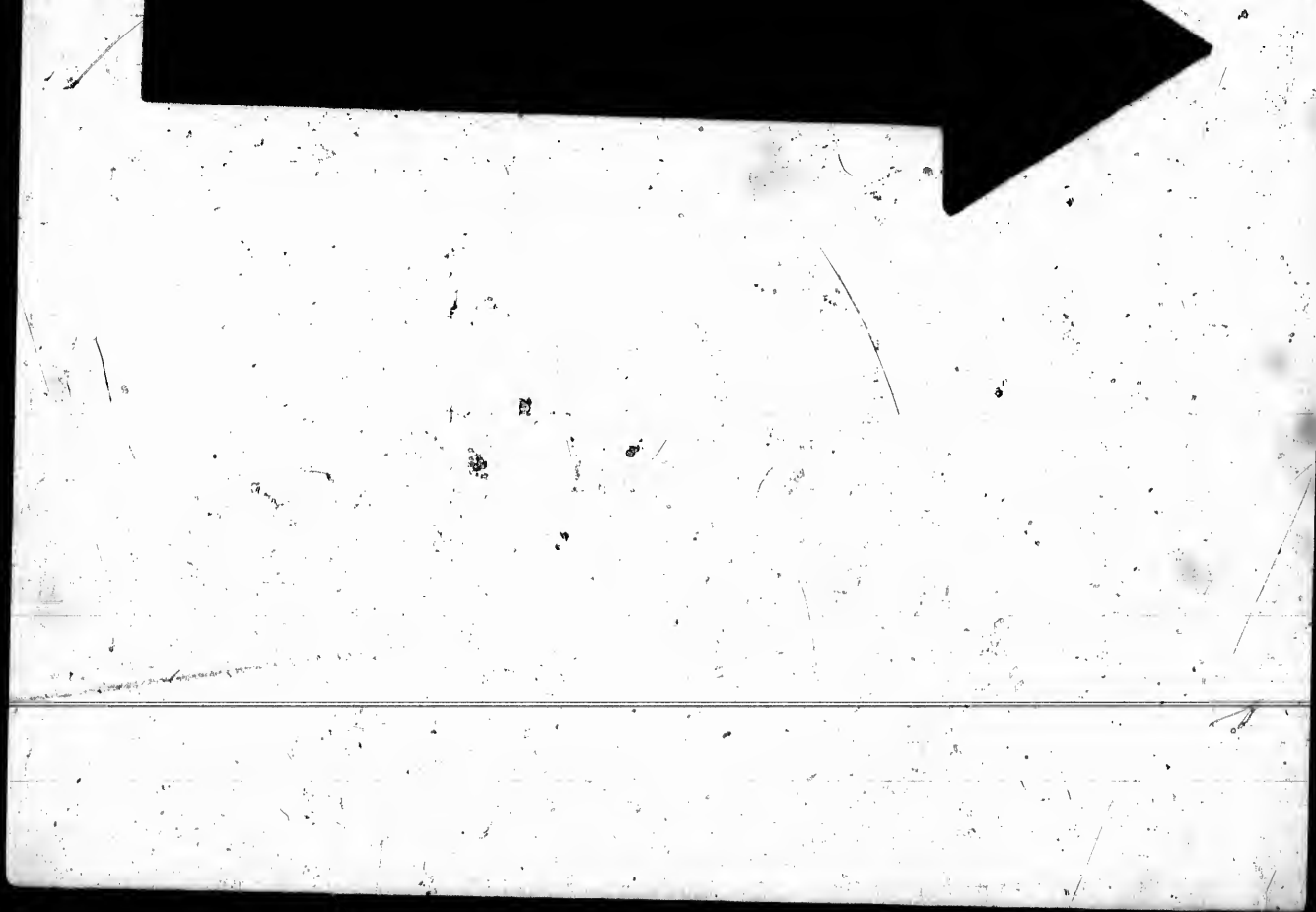
Saw Guide turned back permitting saw to be removed without disturbing the Guide.

The carriage, log seat, saw guide, timber gauge, and other portions are of new design, handsome and serviceable. They are designed for small logs, using a saw from 40 to 50 inches in diameter.

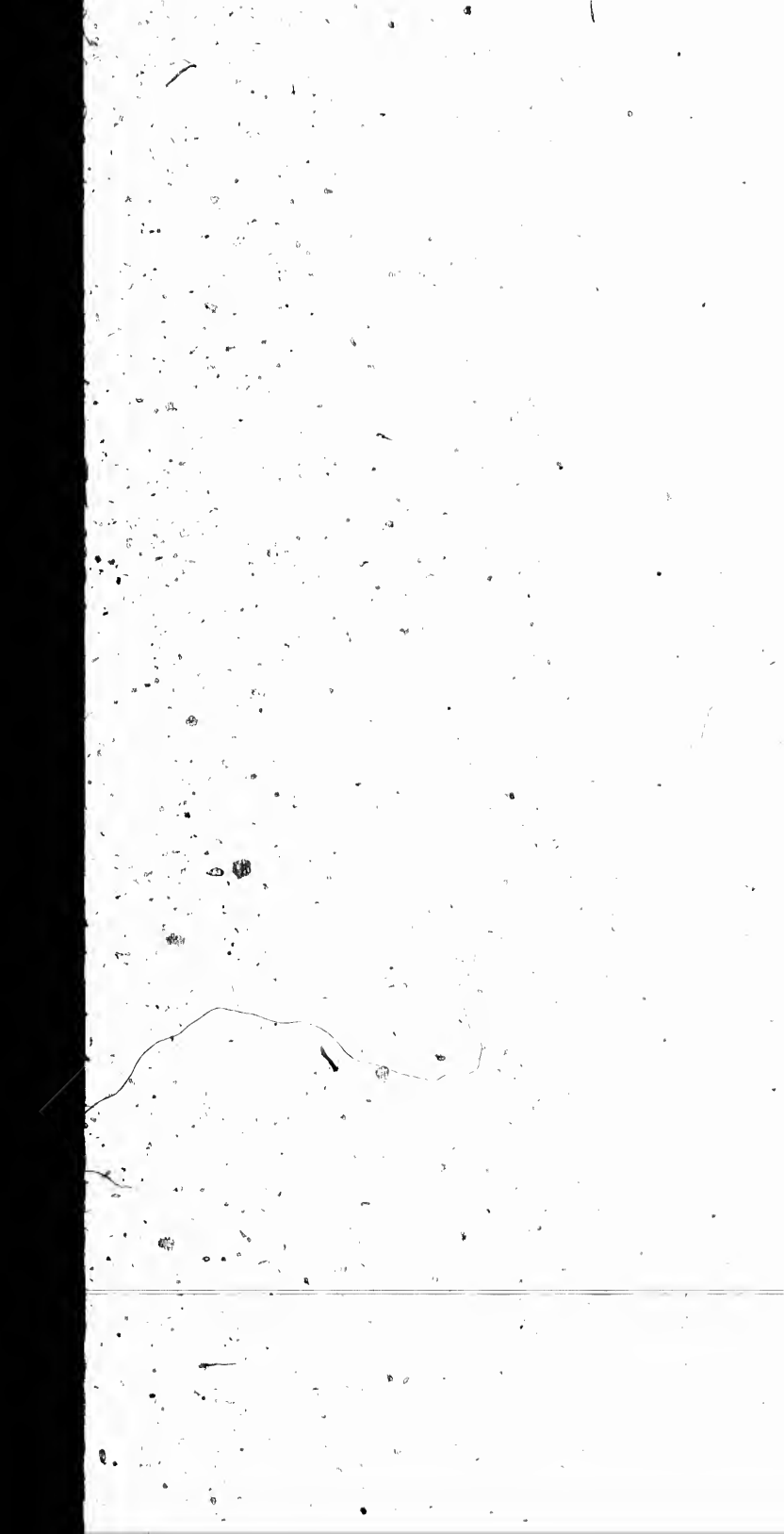
This new frame and carriage illustrated on page 87, has been designed to meet a long felt want of a saw mill attachment for use on or with a steam engine or threshing engine which would come within the reach of farmers and threshers, and at the same time be capable of manufacturing lumber equal in quality to any circular machinery built.



PEEL LOG used on No. 0 Irons shows face of Log Seat, mode of bracing carriage and reservoir dust proof oil box in log seat.







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New Pattern No. O Saw Irons.

A Strictly First-Class Mill in every particular.
Takes any Saw to 50 inches Diameter.

No. O Irons complete as shown in cut, wooden frame, patent saw guide, patent timber gauge, 2 feeds, feed belt, pulley 24x10 with tightener, carriage with log seats 10 feet apart, with reservoir dust, proof oil boxes, solid knees, 2 peel dogs that grab a round log on top or a square log top and bottom, patent friction set works setting over log, working carriage either way, extra pinion on dog shaft for cutting shorter stuff, wood-work of carriage, 26 feet of rack stick, 35 feet of steel V track iron and flat track and screws. No main belt, no saw, and no frame work under track iron..... \$400 00

Track ribbon and sills as shown in cut, framed in 12 foot sections with splicing plates arranged to be taken up and readily reset, 75 c/s per foot 27.00

EXTRA FOR SAWS.

Diameter of saws	40 in.	42 in.	44 in.	46 in.	48 in.	50 in.
Canadian Solid.....	\$25	\$30	\$36	\$42	\$50	\$55
American Solid.....	30	35	42	50	55	65
Emerson's Clipper.....	50	57	62	70	80	88
Emerson's Planer.....	75	80	85	95	105	115
Hoe Chisel Tooth.....	85	90	95	105	120	140
American Brooke Bit..	60	65	70	75	90	100
Disston Chisel Tooth..	75	80	85	95	100	110

Extra length of Carriage costs as follows :

Each extra log seat, knee piece and slide, wheels, boxes and pinion.....	\$ 35 00
Peel Dog, complete, each one, smallest size.....	15 00
Segment, each 3 feet long by 1 3/4 wide round tooth, and bolts.....	2 75
Track, V steel track planed true in 10 lengths, per foot and screws.....	75
Flat track, drilled and counter sunk with screws, per foot.....	10
Woodwork of carriage for each extra foot in length.....	1 00
Dog Shaft, turned, includes couplings, per foot.....	75
Patent Timber Gauge, small size same as used on No. O Irons.....	25 00
Patent Timber Gauge, same style, large size.....	35 00
Patent Saw Gauge, adjustable as shown on page 89.....	8 00

w Irons.

particular.
meter.

nt saw guide,
th tightener,
roof oil boxes,
quare log top
king carriage
ff, wood-work
iron and flat
work under
\$400 00

sections with
c/s per foot 27 00

48 in.	50 in.
\$50	\$55
55	65
80	88
105	115
120	140
90	100
100	110

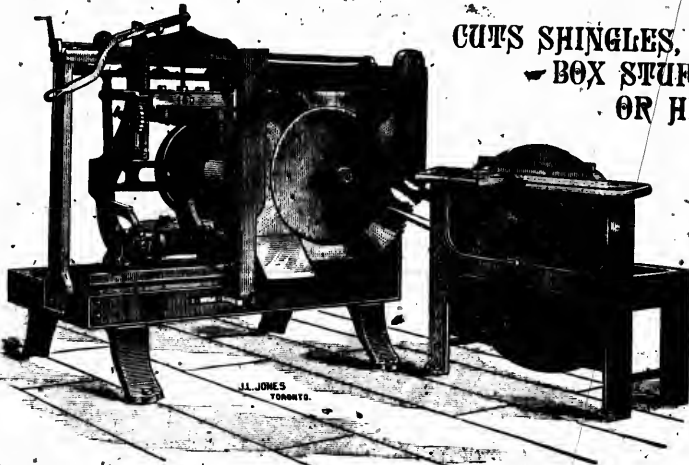
on	\$ 35 00
	15 00
	2 75
ews	75
	10
	1 00
	75
	25 00
	35 00
	8 00

Self-acting Shingle Machines

NO RACK OR GEAR FEED, BUT PATENT

Lever Feed, Slow Feed to Saw,
Quick Return.

CUTS SHINGLES,
BOX STUFF,
OR HEADINGS.



No. 1 Machine uses 36 and 38 inch saws. Cuts 14 to 18 inches long by 14 wide; weight, including jointer, 2,200, as shown in cut. Pulley, 12x8½; should run 1,400 to 1,600 revolutions per minute.

No. 2 Machine uses 40 to 42 inch saws; cuts 14 to 20 inches long with 40 inch saw, and 14 to 22 inches with 42 inch saw, by 24 inches wide. Weight, including jointer, 2,800, as shown in cut. Pulley, 12x8½, should run 1,400 to 1,700 revolutions per minute.

New Attachment—To stop and start carriage, a friction clutch is attached to cone pulley, which obviates throwing feed wheel and pinion in and out of gear, saves wear and breakage.

Smallwood's No. 1 (Small Size) Patent Self-acting Lever Feed Shingle Mill, with jointer attached. Cost of machine complete, with jointer and belt to jointer as shown in cut, with 36 in. saw capacity 10,000 to 20,000 per day, weight 2,200 lbs. \$230 00

No. 1 Machine with 38 inch saw, including jointer and jointer belt. 240 00

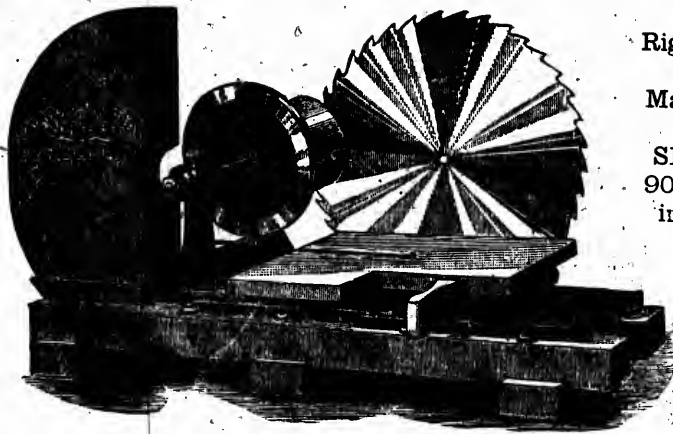
Smallwood's No. 2 (Large Size) Patent Self-acting Lever Feed Shingle Mill, with jointer attached, same as No. 1, but much larger, heavier, and with larger blocks of much greater capacity, 15,000 to 30,000 per day. Uses 40 inch saw, taper ground to 14, 15 or 16 gauge at rim. 100 teeth. Includes belt to jointer, weight 2,800 lbs. 285 00

No. 2 Machine with 42 inch saw, including jointer and jointer belt. 300 00

"The Boss," or House's Patent Shingle Mill using 40 inch saw. The principle of this machine is much the same as the "Smallwood" except that carriage is fed to saw by rack and pinion (to many a very objectionable feature) and returned by weights. Its special advantages are, first, to instantly shorten the travel of carriage to suit width of shingle block to be cut; second, an arrangement to enable several butts or points to be cut continuously at either end as desired to escape defects in the timber. Weight of machine only 2,000; speed, 1,400 to 1,600; pulley, 12x8½. Price including jointer.... \$330 00
Capacity of machine, 15 to 40,000 per day.

Smallwood Jointer , illustrated page 91; Iron frame, Wood braces, weight, 400. Used with House machine also.....	35 00
Single Knot Saw Jointer ; two 14 inch saws. One carriage and one saw. Preferred by many to knife jointer.....	40 00
Double Knot Saw Jointer . Two carriages and Saws, including 4 saws.....	55 00
Shingle Packers , 18, 20, 22 or 25 inches wide.....	20 00

Champion Knee Bolter and Sapper.



Right
Hand
Machine.

SPACE
90 by
inches

Champion Knee Bolter and Sapper . Includes 50 inch saw.....	200 00
Champion Drag Saw , two saws 6½ ft et x12 inch and tightner, with out carriage. See illustration opposite.....	140 00
Jack Works, or Carriage , for champion Drag Saw. With plain straight linked chain. See illustration opposite.....	90 00
The same with No. 600 Giant Chain.....	120 00
The Waterous Drag Saw Rig , with carriage and fast and loose pulley 6 to 6½ foot saw.....	90 00
The Bruce Drag Saw , includes carriage and fast and loose pulley, 5 to 5½ foot saw.....	70 00

THE CHAMPION DRAG SAW

uses 6 1/2 foot

Left Hand
Machine

SIZE

16in. by 5ft.
without the
Saw.

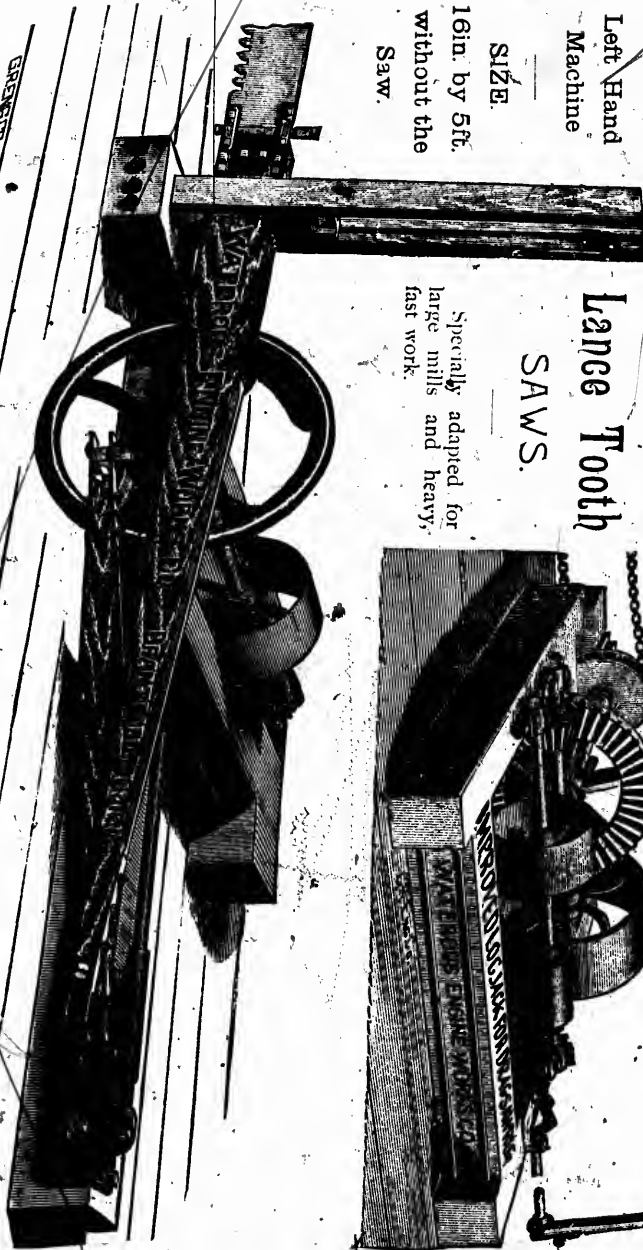
Lance Tooth SAWS.

Specially adapted for
large mills and heavy,
fast work.

Jack Works or Carriage

For Champion Drag Saw. Can be used
for any machine.

Left Hand.

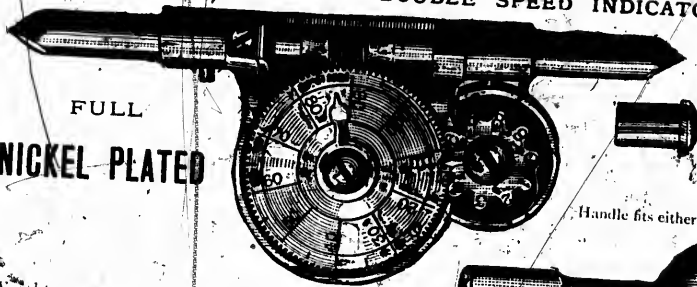


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WATEROUS ENGINE WORKS CO.,
 CHURCH'S IMPROVED DOUBLE SPEED INDICATOR.

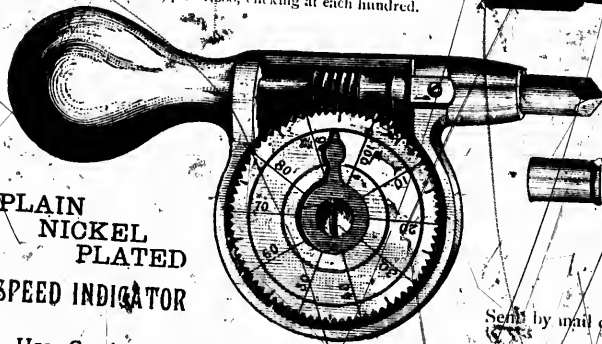
FULL
 NICKEL PLATED



Handle fits either end securely.

Weight, 4 oz., price \$2.00
 Mailed to any address for 2 1/2
 Counts the hundreds, up to 1,000, clicking at each hundred.

PLAIN
 NICKEL
 PLATED
 SPEED INDICATOR



With end protected
 by Cap, and mark to
 indicate by pressure of
 thumb each time 100
 is reached.

Sent by mail on receipt of price, \$1.00

Use Gandy for Fast Speed. Ewart Link Belt for Slow Positive Motion.
 Sizes marked & kept in stock.

BELTING LIST.

Other sizes and endless procured promptly.

GANDY PATENT COTTON BELTING FOLDED AND STITCHED.

Width.	Best Leather Belting.	Best Rubber Belting.		GANDY PATENT COTTON BELTING FOLDED AND STITCHED.							
		3 ply.	4 ply.	4 ply.	6 ply.	8 ply.	10 ply.	Width.	6 ply.	8 ply.	10 ply.
1 inch	\$0 07 1/2			\$10 08 1/2				22 inch			
1 1/2 "	0 11 1/2			30 12 1/2				24 "	\$2 46	\$1 63	\$4 00
2 "	0 15	30 17		30 17	\$0 22	\$0 28		26 "	2 95	3 36	4 36
2 1/2 "	0 20	0 22		30 21	30 28	0 42		28 "		3 64	4 73
3 "	0 25	0 30		30 25	30 34	0 35		30 "		4 29	5 10
3 1/2 "	0 30	0 30		30 30	0 39	0 49		32 "		4 48	5 46
4 "	0 35	0 34	\$0 35	30 34	0 45	0 56		34 "		4 76	5 82
4 1/2 "	0 40	0 39	0 42	30 38	0 50	0 63		36 "		5 04	6 55
5 "	0 45	0 43	0 47	30 42	0 56	0 70		38 "		5 32	6 90
6 "	0 55	0 52 1/2	0 52	30 50	0 67	0 84	\$1 00	40 "		5 60	7 28
7 "	0 65	0 60	0 62	30 59	0 78	0 98	1 27	42 "		5 88	7 64
8 "	0 75	0 70	0 73	30 67	0 89	1 12	1 45	44 "		6 16	8 00
9 "	0 85	0 80	0 84	30 77	0 99	1 26	1 63	46 "		6 44	8 38
10 "	0 95	0 90	0 95	30 85	1 12	1 40	1 82	48 "		6 78	8 73
11 "	1 00	1 00	1 01		1 25	1 54	2 00	50 "			9 10
12 "	1 20	1 08	1 30	\$1 00	1 45	1 68	2 18	52 "			9 46
13 "	1 30	1 18	1 42		1 55	1 82	2 30	54 "			9 82
14 "	1 44	1 28	1 54	\$1 20	1 57	1 96	2 54	56 "			10 20
16 "	1 70		1 78		1 79	2 24	3 27	58 "			10 50
18 "	1 95		2 02		2 00	2 52	3 72	60 "			10 90
20 "	2 26		2 10		2 44	2 86	3 94				10 90

Endless Belt, same price, but charged 3 feet extra for splice. Write for discounts and samples.
 Send for samples of different qualities of Rubber Belting and discounts.

Following Endless Belts kept in stock: 7 8 and 9 inch, and 6 ply, 40 to 50 feet long, 12 and 14 inch, and 6 ply, 50 feet long. Also Thresher Belts.

TABLE OF LOGS.

Reduced to Board Measure.

Showing the Number of feet in Log from 10 to 24 feet long and from 12 to 50 inches in diameter, (measured at the small end,) will produce when sawed into square-edge inch Boards.

DIAMETER OF LOG IN INCHES.	LENGTH OF LOG IN FEET.							
	10	12	14	16	18	20	22	24
12 inches	49	59	69	79	88	98	108	118
13 "	61	73	85	97	109	122	134	146
14 "	72	86	100	114	129	143	157	172
15 "	89	107	125	142	160	178	196	214
16 "	99	119	139	159	178	198	218	238
17 "	116	139	162	185	208	232	255	278
18 "	133	160	187	213	240	267	293	320
19 "	150	180	210	240	270	300	330	360
20 "	175	210	245	280	315	350	385	420
21 "	190	228	266	304	342	380	418	456
22 "	209	251	292	334	376	418	460	501
23 "	235	283	336	377	424	470	518	566
24 "	252	303	353	404	454	505	555	606
25 "	287	344	401	459	516	573	631	688
26 "	313	375	439	500	562	625	688	750
27 "	342	411	479	548	616	684	753	821
28 "	363	436	509	582	654	728	800	873
29 "	381	457	533	609	685	761	838	914
30 "	411	493	575	657	739	821	904	986
31 "	444	532	622	710	799	888	976	1065
32 "	460	552	644	736	828	920	1012	1104
33 "	490	588	686	784	882	980	1078	1176
34 "	500	600	700	800	900	1000	1100	1200
35 "	547	657	766	876	985	1095	1201	1314
36 "	577	692	807	923	1038	1152	1268	1380
37 "	644	772	901	1029	1158	1287	1415	1544
38 "	669	801	934	1068	1201	1335	1468	1602
39 "	700	840	980	1120	1260	1400	1540	1680
40 "	752	903	1053	1204	1354	1505	1660	1805
41 "	795	954	1113	1272	1431	1590	1749	1908
42 "	840	1007	1175	1343	1511	1679	1847	2015
43 "	872	1046	1222	1396	1571	1745	1919	2193
44 "	925	1110	1295	1480	1665	1850	2035	2220
46 "	1038	1249	1462	1669	1878	2084	2292	2499
48 "	1112	1338	1564	1790	2012	2338	2560	2782
50 "	1262	1512	1767	1983	2275	2525	2777	3029

CATOR.

ts either end securely.

h end protected
up, and mark to
te by pressure of
each time 100
hed.

pt of price, \$1.00

ive. Motion.

procured promptly.

STITCHED.

ply.	8 ply.	10 ply.
\$7.68	\$4.60	
3.36	4.36	
3.64	4.73	
3.92	5.10	
4.20	5.46	
4.48	5.82	
4.76	6.18	
5.04	6.55	
5.32	6.90	
5.60	7.28	
5.88	7.64	
6.16	8.00	
6.44	8.38	
6.72	8.73	
	9.10	
	9.46	
	9.82	
	10.20	
	10.59	
	10.99	

STANDARD CHOPPING MILLS,

Using best French Burr Stones.



SIZES MADE.

12-inch	Capacity, 8 to 40 bushels per hour.	All Irons Cases. Wood Frames.	Price with any Elevator	\$ 70
20-inch				175
30-inch				250
36-inch				325
42-inch				375
Extra cost of the Double Elevator attachment as shown in cut.....				125

Requiring 2 to 20 Horse Power.

This cut shows 24 inch Mill ready for work, with

IMPROVED ELEVATOR ATTACHMENT.

Grain is emptied from bags into hopper on the right, elevated to the mill hopper, ground, discharged into second elevator, elevated and bagged, bag being hung from spout.

This convenient and labor saving attachment will be readily appreciated by purchasers.

We generally have these mills in stock ready for immediate shipment.

Roller and Drive Tube Expanders

Outside diameter of tube.....	1 1/2	1 3/4	2	2 1/4	2 1/2	3	3 1/2	4	4 1/2
Roller or Drive on Ring or Drive Ex- pander, Prosser	\$14.00	\$15.00	\$16.00	\$16.00	\$18.00	\$22.00	\$28.00	\$34.00	\$40.00
	12.00	14.00	16.00	17.00	20.00	29.00	39.00	43.00	50.00



Drive Expander.

When ordering give thickness of tube sheet. Tubes put in with Drive Expander are expanded both sides of plate, and serve as braces of most efficient kind.

When in want of any particular machinery send for special circulars:

- No. 9.—Belting Circular.
- No. 10.—Grist and Chopping Mills.
- No. 11.—Wood-working Machinery.
- No. 12. Saw and Saw Mill Furnishings.
- No. 13.—Fire-Proof Champion Engine.
- No. 14.—This Saw Mill Circular.
- No. 15.—(In press). Ewart Chain, Elevating and Conveying.
- No. 16.—(In press). Water Wheel Circular.

CO.,
MILLS,

ench Burr Stones.

S MADE.

All Irons	\$ 70
Cases	175
Wood	250
Frames	325
Electric Elevator attachment	375
Electric Elevator attachment	425

20 Horse Power.

Mill ready for work, with

TOR ATTACHMENT.

m bags into hopper on the mill hopper, ground, disintegrator, elevated and bagged, etc.

labor saving attachment used by purchasers.

These mills in stock ready for

xpanders

3 1/2"	4"	4 1/2"
\$28.00	\$34.00	\$40.00
39.00	43.00	47.00

When ordering give thickness of tube sheet. Tubes put in with Drive Expander are expanded on both sides of plate, and serve as braces of most efficient kind.

and circulars.

eying.

Terms for Mills and Machinery.

Amounts under \$500, half cash, balance three months, with 7 per cent. interest; from \$500 to \$1,000, half cash, balance six months, with 7 per cent. interest; over \$1,000, half cash, balance twelve months, with 7 per cent. interest; 10 per cent. of cash payment due on giving order. A liberal discount will be allowed on credit payments when made before shipment; and when security is unquestionable, we try to meet our customers views by modifying terms. When Simple notes are given, purchaser or his endorsers must own unencumbered property worth, jointly, \$5,000 to 10,000. We wish, however, persons who want long time, or who doubt whether or not their security would suffice, but who object to ask any one to endorse for them, to write us, stating fully just what time they need, what they own, number of acres, value, description, and if encumbered, how much; we can then, no doubt, if there is a fair margin, arrange matters satisfactorily.

Synopsis of our Conditions and Terms of Sale in all Cases.

Any renewals or lapse of time from contract terms, 10 per cent. interest is charged, while 10 per cent. interest per annum is allowed on all payments made before due. In all cases satisfactory security is required, either by mortgage and insurance policy for 2/3 of amount remaining unpaid, endorsed notes or otherwise. We do not hold ourselves responsible for delays caused by accidents, fire, disturbance among employees, or defective saws. In sales of saw mills and grist mills we require a first mortgage on machinery and mill and the two acres immediately surrounding mill. When mill is placed on land previously mortgaged, we invariably require the two acres immediately surrounding the mill released, so that our mortgage on mill is the first. No exceptions to this rule. When machinery is put on rented property, landlord must release all claim on the machinery for rent.

Conditions Embodied In or understood to be part of all our contracts where we Erect.

Purchasers to pay for boxing when necessary, owing to distance or frequent transshipment, transportation of machinery, fare of man or men from Branford to mill and return, board of same while at mill, furnish all buildings, foundations, timber, dressed lumber, brick, stone and mason work, and water convenient to boiler; also, all digging and laborers' work that may be required; and in grist mill contracts, all nails, screws, and fuel for millers' dress in stones. Also the condition and terms mentioned above.

CAUTION.—Customers will bear in mind that we do not hold ourselves responsible for any statements or promises of Agents or others in connection with orders for machinery or goods we sell, unless such statements or promises are enumerated on the orders, which are in all cases subject to our approval. No money is to be paid to agents or others, on our account, without our special order. All agents or others empowered to collect money will be furnished with written authority.

This does not prevent or apply to the giving of orders or promissory notes payable to our order to agents when sales of engines or machinery are made. All orders received through our agents will have our careful and prompt attention, but are subject to our approval and acceptance.

TERMS OF SAW WARRANTY.

We do not make saws, but in case they do not work satisfactorily, we hold the makers as far as possible, responsible under their warranty.

Each saw is warranted perfectly true—as true as it is possible to make it—and free from flaws and seams, and if found to be defective in either of these particulars, a new one will be given in exchange, if returned, or notice given within a reasonable time.

Filing the throats of circular saws to square corners annuls the guarantee.

All packages charged for, and goods delivered free of charge to railroad.

Goods shipped at purchaser's risk unless otherwise directed.

All goods invoiced at current rates when shipped.

