ESTABLISHED 1861

JOHN BERTRAM & SONS'

ILLUSTRATED

CATALOGUE

—OF—

MACHINISTS' TOOLS

—AND—

WOOD-WORKING MACHINERY.

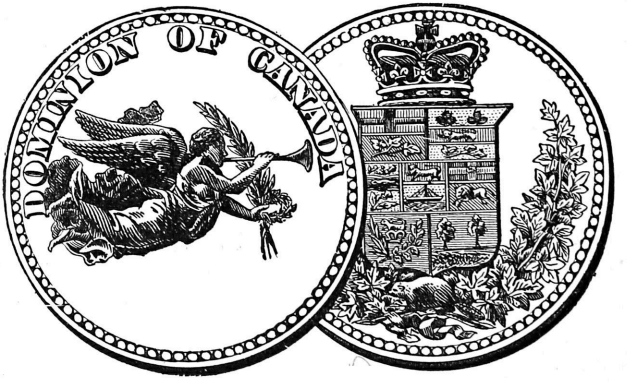
MANUFACTORY,

CANADA TOOL WORKS

DUNDAS, ONT.

DUNDAS:
PRINTED AT "THE TRUE BANNER" OFFICE.
1888.


NATIONAL EXHIBITION
AWARDED BY
NITED STATES
ENTENNIAL
COMMISSION
DELPHIA, MDCCCLXXVI


DOMINION OF CANADA

Introduction.

WE take this opportunity to express to our friends and customers our sincere thanks for the very liberal patronage they have bestowed on us for the last twenty-seven years. During this period we have been engaged in manufacturing Machine Tools and Wood Working Machinery, and constantly adding to and improving our machines to meet the new and increasing wants of the public. It has been our aim and ambition, as the pioneers of this branch of business in Canada, ever to stand foremost among the numerous competitors for public favor and patronage. How we have succeeded in accomplishing this is not for us to say; we leave it to the judgment of a public which we have ever found fully appreciative of our endeavors to meet the demands of the trade. With our long experience and our practical personal knowledge of the business, added to the fact that we have always in our employ talent second to none in the country, constantly engaged in perfecting and improving the different machines, we can with confidence recommend our goods as complete in every respect, and unsurpassed either in improvements or workmanship. We are bold to make this statement, strengthened as we are, and always have been, by the testimony of some of the most practical men in the country.

EVERY machine we build is what it is represented to be. Each machine is put together and tested on the work it is designed to do before leaving the shop, thus giving us the best evidence, that of actual use, that it is perfect.

WE use none but the best of material in the construction of our machinery: the Castings are made of Scotch and Canadian Pig Iron which insures strength and durability, and all fast running spindles are made of the best English Steel.

WE have great pleasure in drawing the attention of our friends and customers to the fact of our success at the International Exhibition at Phlladelphia, our firm being awarded a diploma and Bronze medal for our Wood Working Machinery and Machinists' Tools. Also a Canadian Diploma and Silver Medal awarded by the British judges for Engineers' tools. At the Colonial and Indian Exhibition, London, Eng., the tools of this firm on exhibit merited the attention of Engineers there, and were selected for illustration by the leading mechanical journal in London.

TO keep up with the advance of all improvements in Canadian Machinery, the firm have made a radical change in all their standard machine tools.

LATHES with inverted V shears, having large bearing surface, wide cones and gear, heavy spindles and frames.

PLANERS with heavy standards, double-belted, with reverse motion 3 to 1.

SHAPERS, new designs, with perfect automatic movements.

DRILLING Machines of the latest American stvle, and a line of Wood Working machinery, improved up to the standard of rapid and smooth work, as well as a long list of Special Machinery adapted to the requirements of the modern machine shop.

THE late Improvements we have made in all our new machinery having placed it in advance of anything in the market, which is acknowledged by all, we are warranted in confidently recommending them to our Canadian customers for finish, durability, and the quality of work they turn out, and as practice is the true test of every machine, parties desirous of purchasing can have any of them put in operation at our factory.

WE beg to draw attention to our list of Locomotive and Car machinery of new and improved patterns, specially adapted to the construction of all Railroad and Car machinery, and of which photographs with description can be forwarded.

WE further assure our friends and customers that we intend in the future, as we have done in the past, to give our undivided personal attention to the manufacturing of our machinery, so that the work shall be done in the most thorough manner, such improvements being made, from time to time, as will add to the efficiency of our machinery, and enhance its value to our customers.

JOHN BERTRAM & SONS.

Correspondents should be careful to give their names and addresses plainly and in full.

Parties ordering machinery should give shipping directions with care; and name route by which they wish it sent, and if they have any preference; otherwise we shall ship it by route considered most expepitious and safe.

RULES

FOR

CALCULATING THE SPEED OF DRUMS OF PULLEYS.

PROBLEM I.

The diameter of the driven being given, to find its number of revolutions :

Rule—Multiply the diameter of the driver by its number of revolutions, and divide the product by the diameter of the driven ; the quotient will be the number of revolutions of the driven.

PROBLEM II.

The diameter and revolutions of the driver being given, to find the diameter of the driven that shall make any given number of revolutions in the same time :

Rule—Multiply the diameter of the driver by its number of revolutions and divide the product by the number of revolutions of the driven ; the quotient will be its diameter.

PROBLEM III.

To ascertain the size of the driver :

Rule—Multiply the diameter of the driven by the number of revolutions you wish it to make, and divide the product by the revolutions of the driver ; the quotient will be the size of the driver.

RULES

FOR

CALCULATING THE PITCHES OF SCREWS TO BE CUT, ETC,

1st—Ascertain the ratio of any series of wheels thus: Multiply the whole of the driven wheels together, which will give the total number of teeth in the series. Then divide the result by the driving wheels multiplied into each other. The quotient will be the number of times the first wheel will revolve to the last. Suppose a wheel of 20 teeth to be driving a wheel of 100 teeth, to which is attached a wheel of 30 teeth driving a wheel of 150 teeth, and the ratio of the series be required,

$$\frac{100 \times 150}{20 \times 30} = 25 \text{ revolutions, the ratio of the series.}$$

This rule applies to single as well as compound gear.

2nd—To find the number of threads a series of wheels will cut: Multiply the ratio of wheels by the pitch of the leading screw.

A difficulty frequently arises in finding the number of threa s to the inch or foot when a particular pitch or fractional number has to be matched. This can be easily ascertained by applying a scale to the screw, and by counting onward find what number of threads corresponds with an exact number of inches. Suppose 15 threads on the screw match 4 inches on the scale, consequently if 15 be divided by 4 it gives 3.75, the number of threads per inch; against that number on our screw-cutting tables will be found the wheels to cut it.

Wood-Working Machinery.

WE beg to draw attention to the fact that in this line of Machinery we have made many valuable and important improvements, and are constantly remodelling, designing and adding to the general utility of this class of Machinery. All our Wood Planing Machines are fitted with a

Solid Steel Forged Cylinder

which has four slots, thereby allowing special sets of knives to be attached for doing Mouldings, etc.; this of itself on these Machines being a noteworthy feature.

Another improvement in our Planing Machines, is the adjustable pressure bars on each side of the cylinder. These can be moved to and from the knives, and as they hold the stuff close to the knives and move up and down in a circle central with the cylinder, work of any kind can be done on them—moulding, beading, and chamfering. In the Nos. 1 and 2 machines, the matcher heads can be removed without disturbing the spindles, and as the matchers run in frames securely gibbed to the base of cylinder bed, there is no complication by slides to affect their stability. The cylinder beds are made extra heavy and solid, as it is apparent that this should be so, in relation to the weight of cylinder, so that smooth work will be insured. We would also draw attention to our new roller expansion gear which we have lately added to these machines.

In Moulding Machines we have added a number of improvements. The front ends of all main spindles run in brackets secured to the tables, and running down to the base, always keeping up the alignment o spindle. The tables of all our machines are solidly gibbed on the frame, and have an extra binder to keep it in place, solid below the pressure rolls. All the upright heads can be shifted while the machine is in motion, and all run in bronze bearings at the bottom, requiring on

babbiting, some having run thirteen years without renewing. A feature in all these Moulders is the length of the belts, insuring smooth working. All the heads are made of good brass, and are 4-slotted to guages.

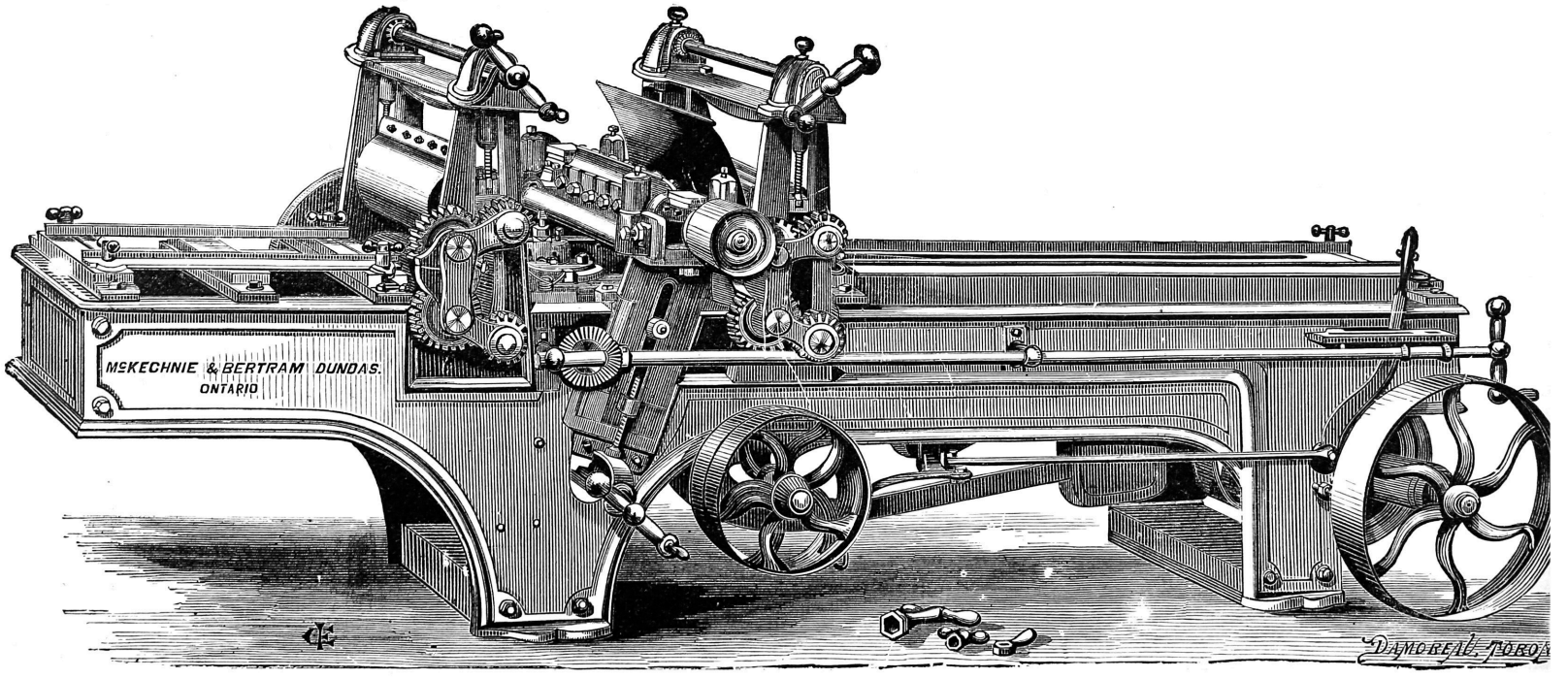
We also draw attention to our improved Whitney Surfacer, which we have lately added to our list, and which is an indispensable machine in the Cabinet and Organ factory. This machine is powerfully geared and heavier than any in the market.

In Mortisers, we make two sizes. The sash and door Mortiser is of the latest type, with the crank shaft at the base, and can be run at a higher speed than the old style. Our Car Mortiser has a powerful positive stroke, and when working in hardwood makes no jar on the foot.

In Band Saws we have always made the pattern adopted by the best makers in England and the United States. In all these machines the frame is of hollow, or cored section, giving great rigidity, and in this respect has no comparison with the slim webbed frame. The tension on the saw is maintained by counter balance weight.

Along with the above machines, our list in Wood Working Machinery comprises Tenoning Machines, Shapers, Scroll Saws, and a special line of Car Machinery, such as Timber Dressers, Gaining Machines, Car Tenoners, Mortisers, Rip and Cross Cut Saws, Swing Cutoff Saws, Boring Machines, and Dimension Planers; all of new patterns, iron frames of heavy build, with all the latest modern improvements; and we have, therefore, every confidence and great pleasure in recommending to the general public our Wood Working machinery, which has earned for itself a world-wide reputation, being awarded medals and diplomas both at home and abroad.

Illustrations and Particulars of Wood-Working Machinery.



No. 1 Single Cylinder Planer and Matcher.

Weight, [illegible] - 6,500 Lbs.

No. 1 Single Planer and Matcher.

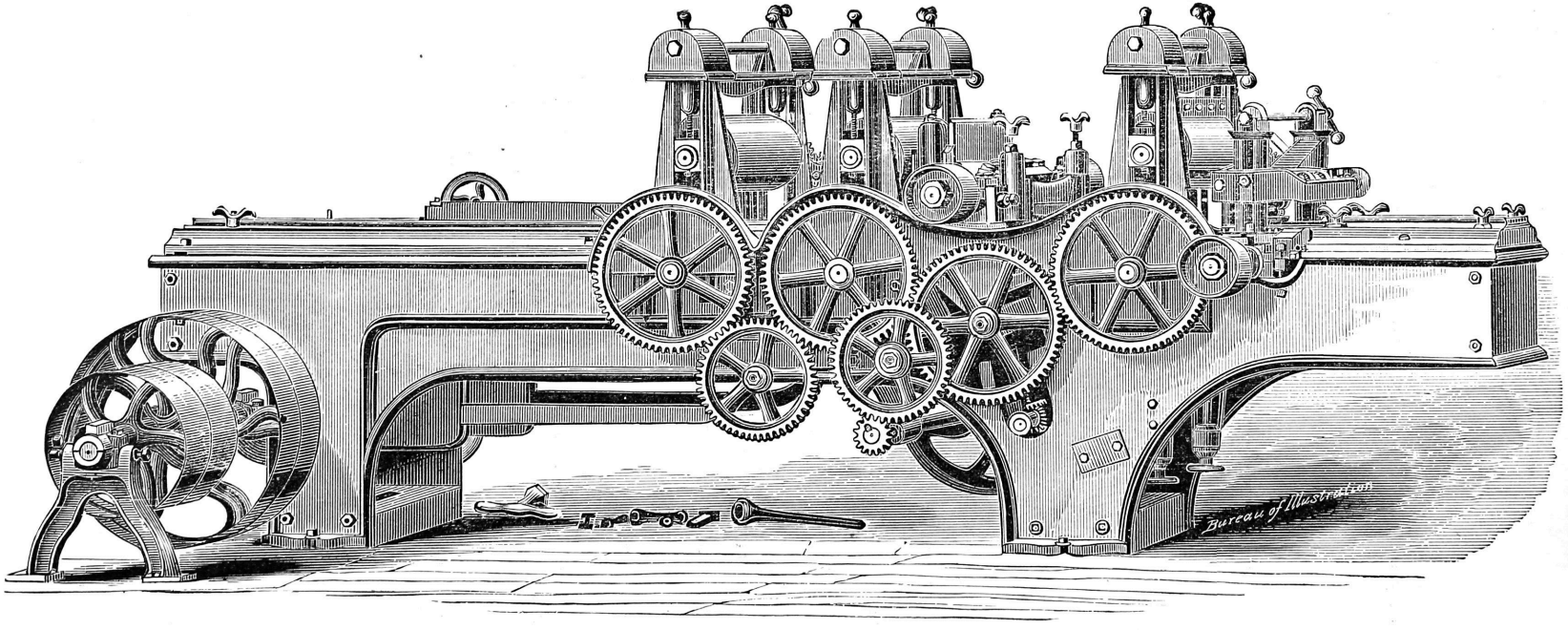
This is a heavy, strong and effective machine, and in the arrangement of its different parts cannot be equalled for durability and finish. The frame is 12 feet long, heavy and substantial, the rollers are eight inches in diameter and are connected with heavy extension gear. The cylinder is made from a solid steel forging, being slotted on all four sides, which allows of special cutters being attached for doing mouldings, etc.; it has large arbors running in extra long self-oiling bearings, and is driven by two 5-inch belts.

It has adjustable Pressure bars on each side of the cylinder.

The matcher spindles are of steel with long bearings, and the tops that carry the matchers can be removed in a few seconds for surfacing. The matcher heads are of bronze and carry 3 sets of knives each. The movable matcher is adjusted to any required width of board by a crank at the feeding end of machine in connection with a graduated scale.

The machine will surface 24 inches wide and match 12 inches wide and any thickness, up to 5 inches. The countershaft has tight and loose pulleys 15 inch diameter and 7 inch wide, and should revolve at 800 per minute.

Length of Belts for Cylinder, two of 17¾ feet, 5 inch face.
" " Matcher, two of 18 " 4 " "
" " Feed, one of 14¾ " 3 " "



Large Size No. 1 Double Cylinder Planer and Matcher.

Weight, - 8,000 Lbs.

With Beading Attachment and Three Sets of Feed Rollers.

Large Size No. 1 Double Cylinder Planer and Matcher.

WITH

Beading Attachment and Three Sets of Feed Rolls.

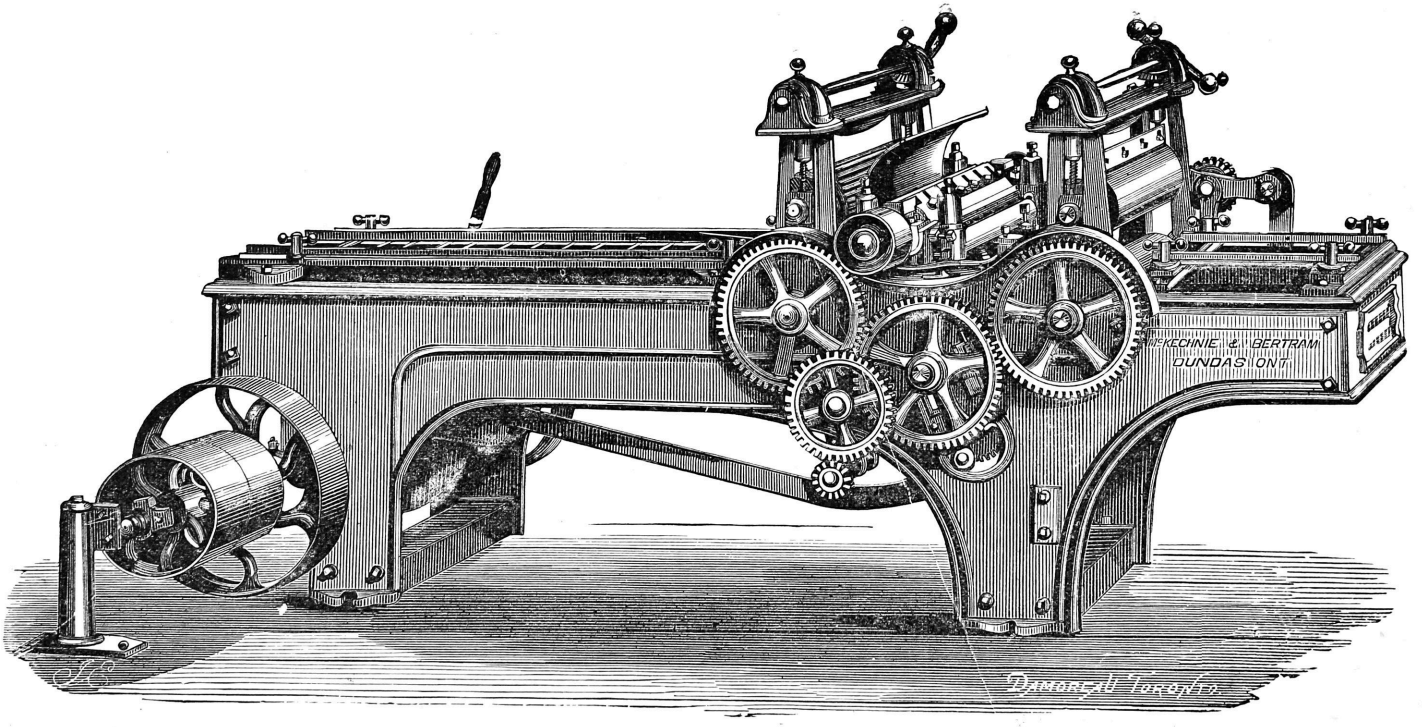
This machine has been perfected to meet the wants of large planing factories, and is confidently recommended to the public as the most powerful and complete machine made.

It has adjustable Pressure bars on each side of cylinder.

The Upper Cylinder is made from a solid steel forging, being slotted on all four sides, which allows of special cutters being attached for doing mouldings, etc., it has large arbors running in extra long self-oiling bearings and is driven by two 5 inch belts. The thickness of cut is regulated by a graduated scale from $\frac{1}{8}$ up to 5 inches. The Under Cylinder has 2 knives and has $2\frac{1}{4}$ inch steel spindle with long self-oiling bearings. The matcher spindles are of two inch steel, and have removable tops, when the machine is used as a surfacer. The matcher heads are bronze, and each carries 3 sets of knives—a patent chip-breaker of the most improved construction prevents slivering. The machine has 6 feed rollers, 8 inches diameter, weighted with levers and adjustable weights. The movable matcher is operated by crank and graduated scale at feeding end of machine ; this with our improved feed belt tightner, and all the shifting operations of the machine are within easy reach of the workman. The countershaft has 15 inch tight and loose pulleys ; 7 inch face ; and runs at 800 revolutions per minute.

This machine is made with two sets of feed rolls if required; surfaces 24 inches wide, and matches 12 inches wide.

Upper Cylinder	Belts	two of	$17\frac{3}{4}$	feet of	5	inch	Face.
Under	"	"	one of $22\frac{1}{4}$	"	"	"	"
Matchers	"	"	two of 18	"	4	"	"
Feed	"	"	one of $14\frac{3}{4}$	"	3	"	"



No. 2 Planing and Matching Machine.

Weight, - 4,5000 Lbs.

No. 2 Planing and Matching Machine.

This machine, specially constructed for the wants of general workshops, has earned a deserved popularity while our firm has been before the public.

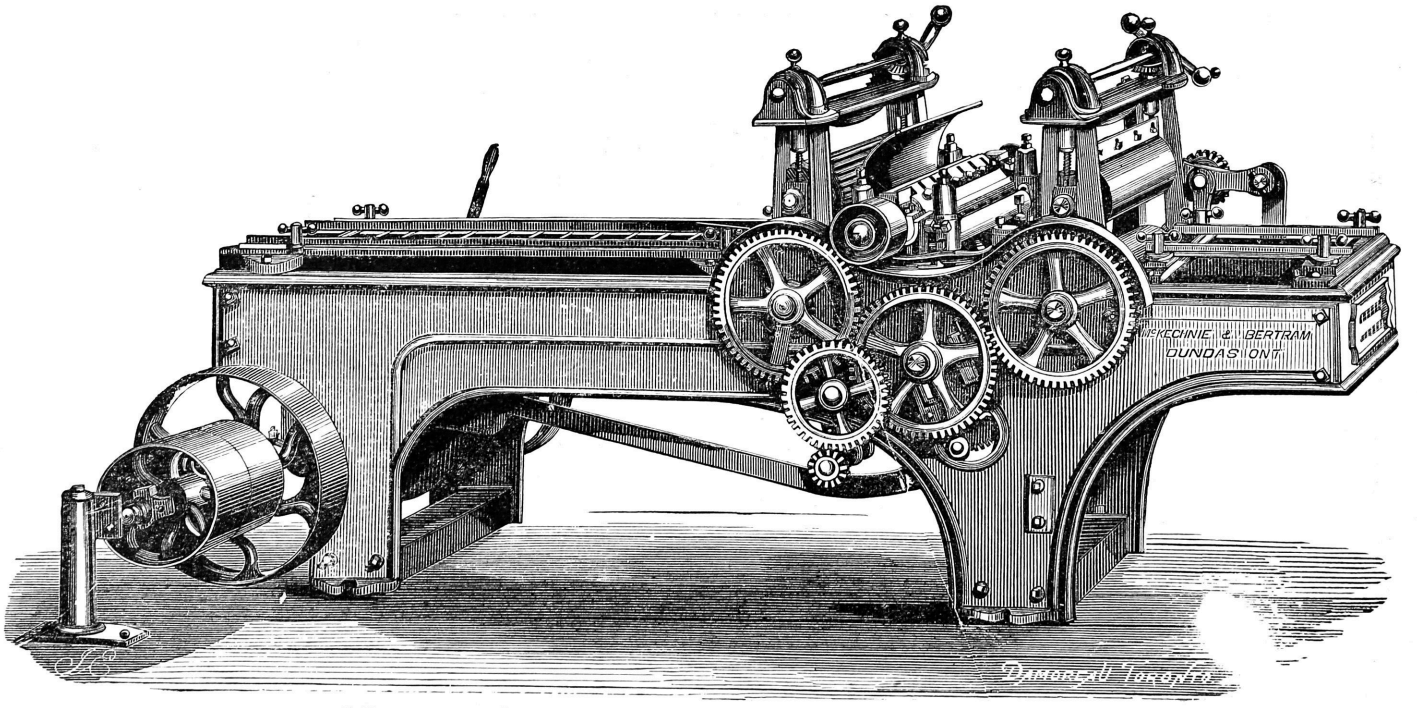
It has a strong and substantial frame. The cylinder is made from a solid steel forging, being slotted on all four sides, which allows of special cutters being attached for doing mouldings, etc.; it has large arbors running in long self-oiling bearings, the covers of which have adjustable screws which keep them up to the work while preserving rigidity in the bearing.

It has adjustable Pressure bars on each side of cylinder.

This machine planes 24 inches wide and matches 12 inches.

The matcher heads are of bronze, the spindles have long bearings which can be lowered instantaneously for surfacing. The movable matcher is operated by a crank and index at the feed end of machine. It has our improved feed belt tightener, 4 weighted feed rollers 6 inches diameter, patent chip-breaker and graduated scale on cylinder-slide to guage the thickness of stuff from $\frac{1}{8}$ inch to 4 inches. The countershaft has tight and loose pulleys 12 inches in diameter and 6 inches face and should make 800 revolutions per minute.

Length of Belts for	Cylinder,	two of	$15\frac{1}{3}$	feet	4	inch face.
" "	Matcher,	two of	$15\frac{1}{3}$	"	$3\frac{1}{2}$	"
" "	Feed,	one of	$13\frac{2}{12}$	"	3	"



No. 3 Planing and Matching Machine.

Weight, - 3,200 Lbs.

No. 3 Planing and Matching Machine.

This machine has been constructed to meet the wants of a large class of purchasers in Canada—carpenters and builders, small planing mill owners, who do not wish to incur the expense of larger machines. From the fact that a great number of these planers are running in sections of the country where no pine is used, and effectually competing with American machines of a heavier build in the production of hardwood flooring of every description, we are safe in saying that for durability and rapidity of work, combined with its low price, this machine has no superior. It comprises nearly all the improvements of our larger machines.

The cylinder is double belted, and is made from a solid steel forging, being slotted on all four sides, which allows of special sets of cutters being attached for doing mouldings, etc.; has large arbors running in long self-oiling bearings, and is truly balanced. A graduated scale for thickness of stuff, from $\frac{1}{8}$ to 3 inches, is provided, and has adjustable pressure bars on each side of the cylinder.

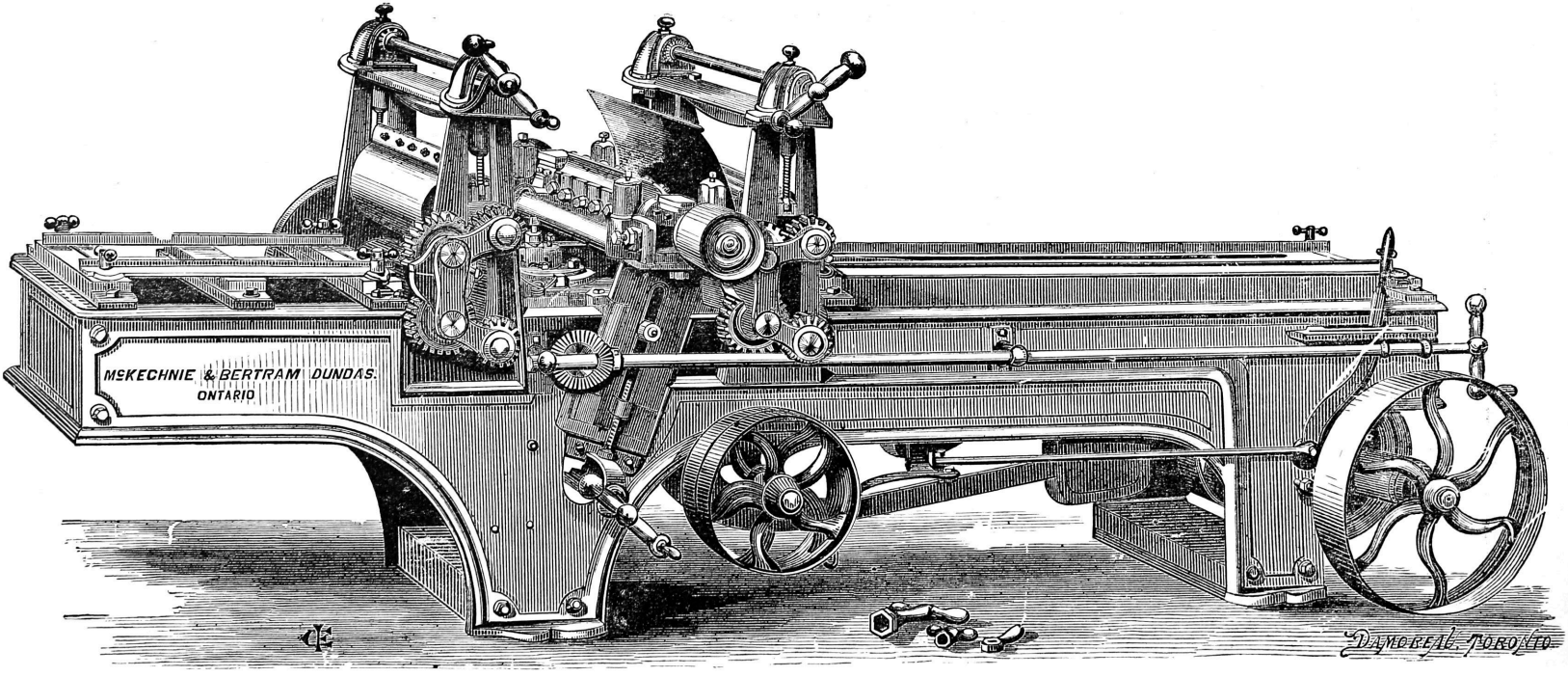
It has four feed rollers 5 inches in diameter, driven by expansion gearing and weighted with levers.

The matcher spindles are steel, with long bearings. All the bearings are lined with first quality babbit metal and are self-oiling.

This machine has improved feed belt tightner, and all the shifting operations are within easy control of the operator.

It planes 24 inches wide and matches 12 inches. The countershaft has 12 inches fast and loose pulleys; revolutions per minute, 800.

Length of Belts for Cylinder, two of $13\frac{6}{12}$ feet, $3\frac{1}{2}$ inch face.
" " Matcher, two of $13\frac{10}{12}$ " $3\frac{1}{2}$ " "
" " Feed, one of $11\frac{6}{12}$ " $2\frac{1}{2}$ " "



No. 1 Surface Planer.

Weight, - 6,500 Lbs.

No. 1 Surface Planer.

This machine has the same weight and build of frame as described on page 11. It has the advantage, for all kinds of heavy surfacing, over the generality of machines of this class, of having a long frame containing all the attachments requisite for a complete machine.

The cylinder is steel, four slotted, and has bearings two inches diameter, with self-oiling bearings, and is driven by two belts four inches wide.

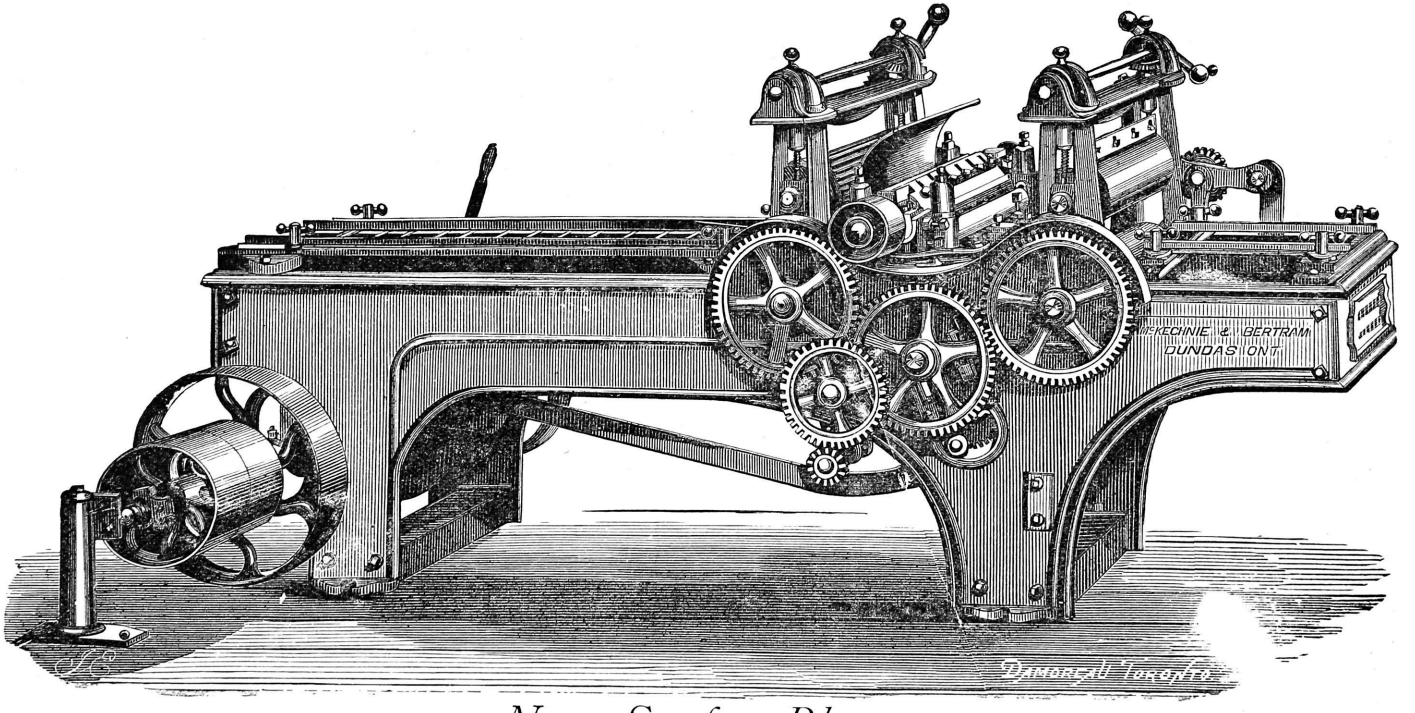
There is a pressure bar on each side of the cylinder, and there are two sets of feed rollers 6 inches diameter with powerful gearing and weighted with levers which give a strong feed to the machine, and our improved feed belt tightener gives the operator perfect control over its work.

It planes 24 inches wide, and a graduated scale from $\frac{1}{8}$ inch to 4 inches regulates the thickness planed.

This machine is made with three sets of feed rolls if required.

The countershaft has tight and loose pulleys 12 inches diameter and should run at 800 revolutions per minute.

Cylinder belts, two of $15\frac{4}{12}$ feet and 4 inches wide
Feed " one of $13\frac{2}{12}$ " 3 "



No. 2 Surface Planer.

Weight, - 2,600 Lbs.

No. 2 Surface Planer.

This machine has the same proportions as our No. 2 Planer and Matcher described on page 15. With all the improvements of that machine, it forms for all kinds of surfacing the best offered to the public, while its comparatively low price places it within the reach of all.

It has a long frame and long driving belts, the frame containing the countershaft, a great advantage over most surfacers.

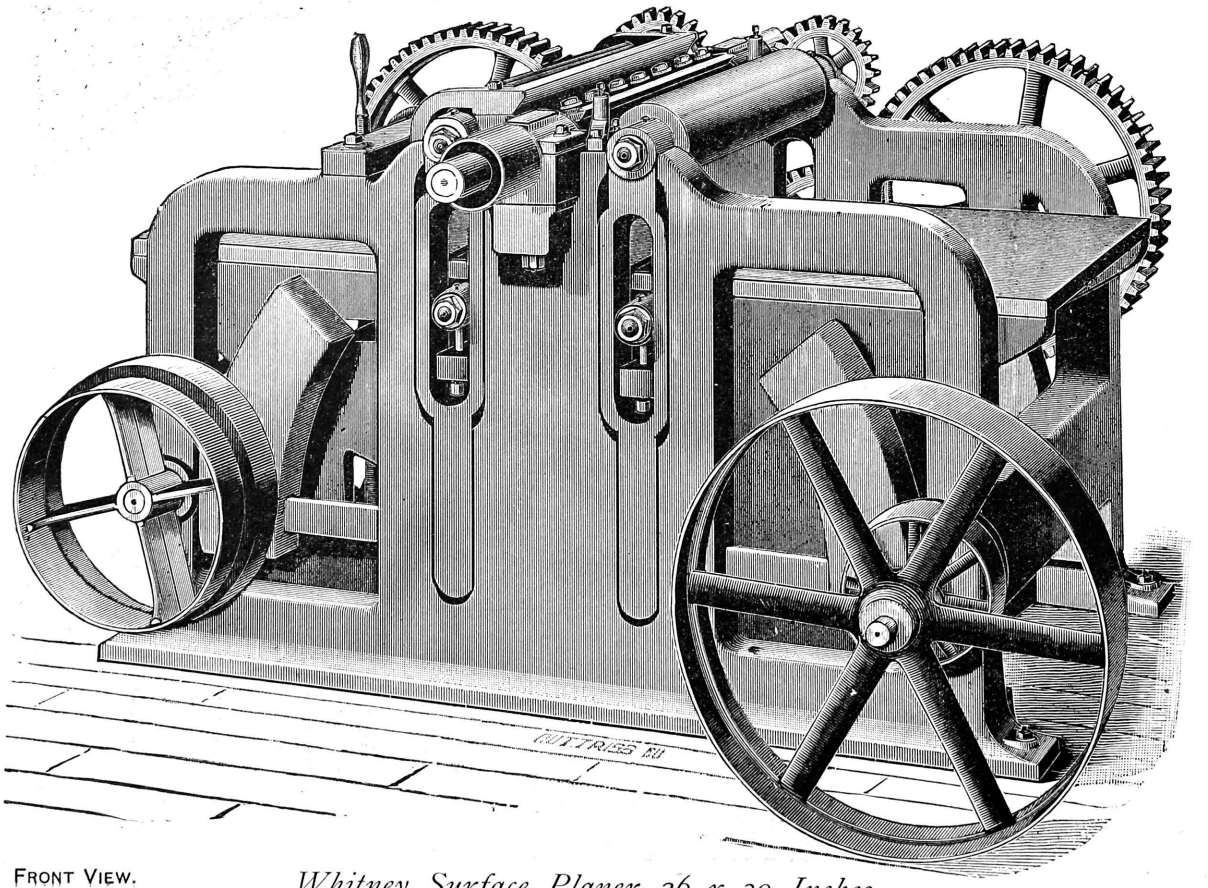
The cylinder has 2 knives, is double belted, and has $1\frac{3}{4}$ inch steel spindle with long self-oiling bearings, and has adjustable Pressure bars on each side.

This machine is made with either one or two sets of feed rolls as required; these are 5 inches diameter and are weighted with levers.

A graduated scale shows the thickness of cut from $\frac{1}{8}$ to 3 inches, Along with all our other planers the cylinder rises at right angles with the countershaft, thus keeping the belts the same length in any thickness of cut.

The countershaft has fast and loose pulleys 12 inches diameter and 6 inch face, and should revolve at 850 per minute.

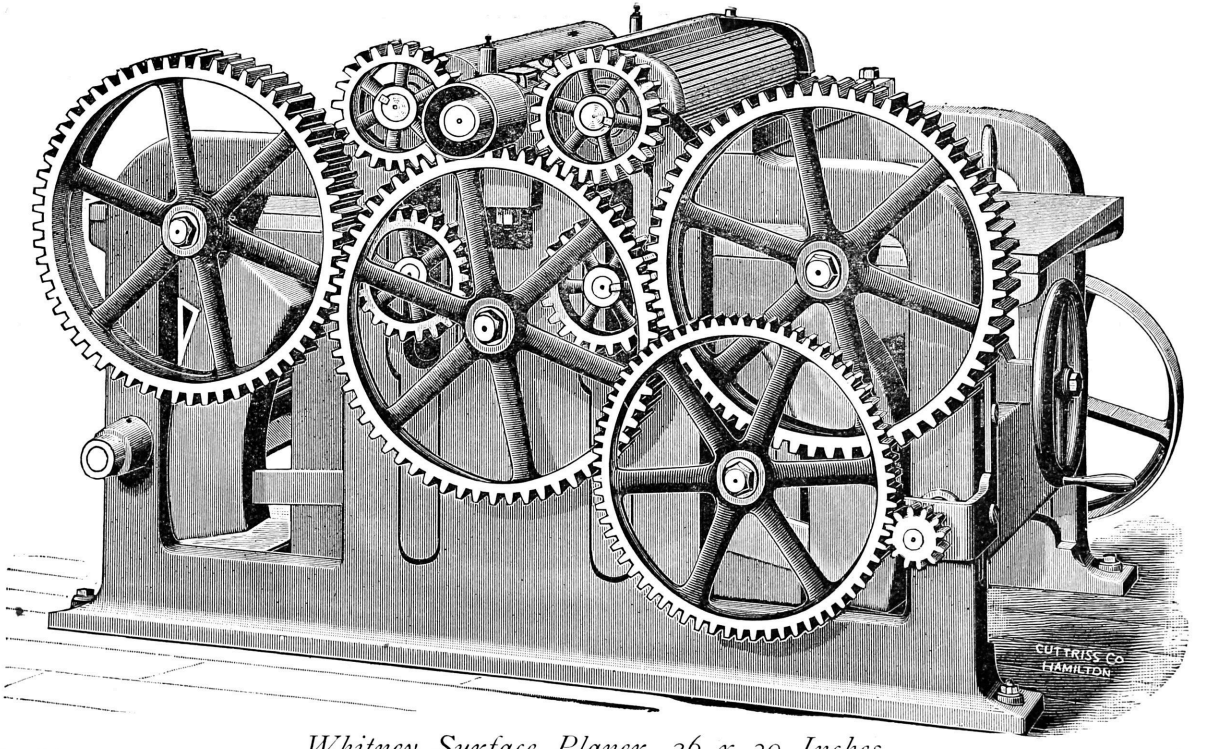
Length of Cylinder Belts, two of $13\frac{1}{2}$ feet, $3\frac{1}{2}$ face.
" Feed " one of $11\frac{1}{2}$ " $2\frac{1}{2}$ "



FRONT VIEW.

Whitney Surface Planer, 26 x 30 Inches.

Weight, - 4,500 Lbs.



REAR VIEW.

Whitney Surface Planer, 26 x 30 Inches.
Weight, 4,500 Lbs.

Whitney Surface Planer.

This machine, which has long held the first place as a Surfacer, has been lately improved.

We make two sizes, a 26 inch and 30 inch.

The frame is extra heavy and solid, and all the driving gear is powerful and large diameter, giving strong feeding power. The main gearing runs on bronze bushings. The table extends the length of machine, and is raised and lowered, by a frame having inclined planes, making the table always solid where it is set.

The cylinder is steel forged out of solid stock, and can be run over 4,000 per minute. It is double belted, and can be driven with countershaft, either from overhead or below.

The pressure bars raise and lower centrally with cylinder, and come close to the knives, so that pieces 5 inches long can be planed easily.

Both sizes take in 5½ inches deep.

The top rollers are weighted at both ends. The countershaft has fast and loose pulleys 12 inches diameter and 6 inches face, and should make 750 revolutions per minute.

An extra feed pulley is provided, which, with the cones, gives a great range of feed.

Weight, 4500lbs.

Dimension Planer.

Wood & Gray's Pattern.

This Planer has been perfected for the surfacing of thin lumber up to 24 inches wide, as well as for planing out of wind all kinds of heavy timber, and having the combined qualities of a Daniels Planer and Woodworth Surfacer, it is particularly valuable for agricultural implement makers.

It has been lately improved by making all the frame of cast-iron, which is planed true throughout, making it strong and substantial. The carriage is made of hardwood strips glued and bolted together.

The feed rollers work in a frame which swings on a hinge on the side of the bed, and can at any time be turned aside while the carriage is used for square stuff. They are heavily geared to the feed shaft and are connected by expansion gear. A plate on the carriage serves as a bed for surfacing. The end of the board is supported by a frame and roller while surfacing, and can be swung down out of the way while the carriage is used. When the machine is used for planing stuff out of wind as with a Daniels Planer, the dogs, which are operated by a screw and hand-wheel, fasten the lumber down on the carriage so that it can be planed straight and out of wind, varying from $\frac{1}{2}$ inch to 16 inches in thickness. The dogs are so arranged that stuff with oblique ends, or two pieces of unequal length, can be held as firmly as if the stuff were square or of equal length. The carriage is so arranged that the feed can be stopped at any point. The side standards of cast-iron which carry the cylinder have planed sides inclined at right angles to the countershaft to allow the same length of belt for any thickness of stuff planed.

The countershaft has tight and loose pulleys 12 inches diameter and 6 inch face, and should revolve at 800 per minute.

No. O Large Inside Moulding and Matching Machine.

Weight - 3,500 lbs.

This machine is specially adapted to turn out all kinds of flooring and ceiling and every description of moulding, from the most complicated down to the smallest, with the greatest rapidity and accuracy.

The upper cylinder or cutter head, which is slotted on 4 sides, is 12 inches long and of the best bronze, cast-steel spindle 1¾ inches diameter and is driven by two belts 5 inches wide.

The side spindles are 1⅜ steel, with self-oiling bearings. The heads are slotted on 4 sides and both spindles raise and lower and turn to any angle.

The under cylinder is 4 slotted and of bronze, with cast-steel spindle and self-oiling bearings, and can be adjusted by screws and slides to any required cut; it is driven by a 5 inch belt. The end table can be raised, and lowered with a screw to correspond with the cut of the cylinder, and the table can be removed for the adjustment of cutters.

A circular saw is placed here, if required, for splitting, when two lines of moulding are stuck at one operation.

The feed rollers are 4 inches diameter, and geared together with expansion gear, and weighted with levers and weights. It has five changes of feed, ranging from 15 to 41 feet per minute. It planes flooring, ceiling, and all descriptions of car work on four sides.

The tight and loose pulleys are 12 inches diameter and 6 inch face, and should make 900 revolutions per minute, giving the heads 4,000.

Universal Horizontal Boring Machine

WITH

Radial Adjustable Table.

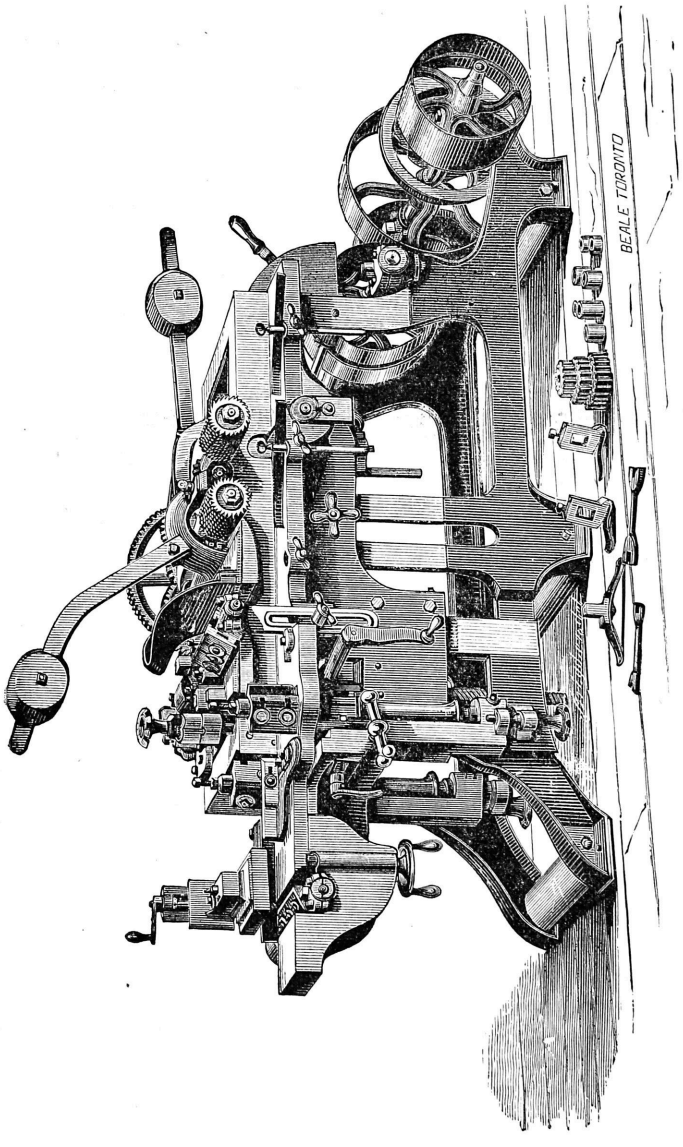
This machine, specially adapted for car shops and ship yards, is a strong and substantial machine. It consists of a frame cast in one piece, making it very rigid. The front slide carrying the table is adjusted vertically with a screw. The table swings to any required angle, and is slotted for the guide-bar, which can be adjusted radially for any class of work. The steel boring spindle is brought forward by a treadle, which is counterbalanced by weight, giving a quick backward motion, and it has wrenches and five augur bits. The machine carries its countershaft, which has fast and loose pulleys 8 x 3 inches, and should make 1000 revolutions per minute.

Radial Horizontal Car Boring Machine.

This machine is adapted for boring timber of any capacity. It can bore straight, angular, or end holes without moving the timber; this is effected by a radial movement of the frame carrying the boring spindle. The spindle has a traverse of 24 inches. It is raised and lowered vertically with a hand-wheel and screw, and all the movements can be effected by the operator on the front of machine. The tension of the belt is kept by a weighted pulley. The timber operated on is easily moved on the front carriage, which is provided with rollers and guide.

The countershaft has fast and loose pulleys 10 x 5 inches, making 500 revolutions per minute.

Photographs on application.



No. 1 Moulding Machine.

To Work Three or Four Sides. Weight. 2,800 Lbs.

No. 1 Moulding Machine, to Work Three or Four Sides.

By a reference to the accompanying cut it will be seen that this machine is of entirely new design, and differing in many respects from the class of moulding machines hitherto used. It has a compact and substantial frame of extra length, and the table is gibbed to the front in such a manner as to secure great rigidity to the machine.

The upper head has 1¾ steel spindle running in self-oiling bearings, while a bearing outside the cutter head and which is fitted in a recess on front of the table extending down to the frame prevents all vibrations. The table is raised and lowered by a crank in front, thus effectually enabling the operator to shift the same while the machine is in motion without danger as in other machines.

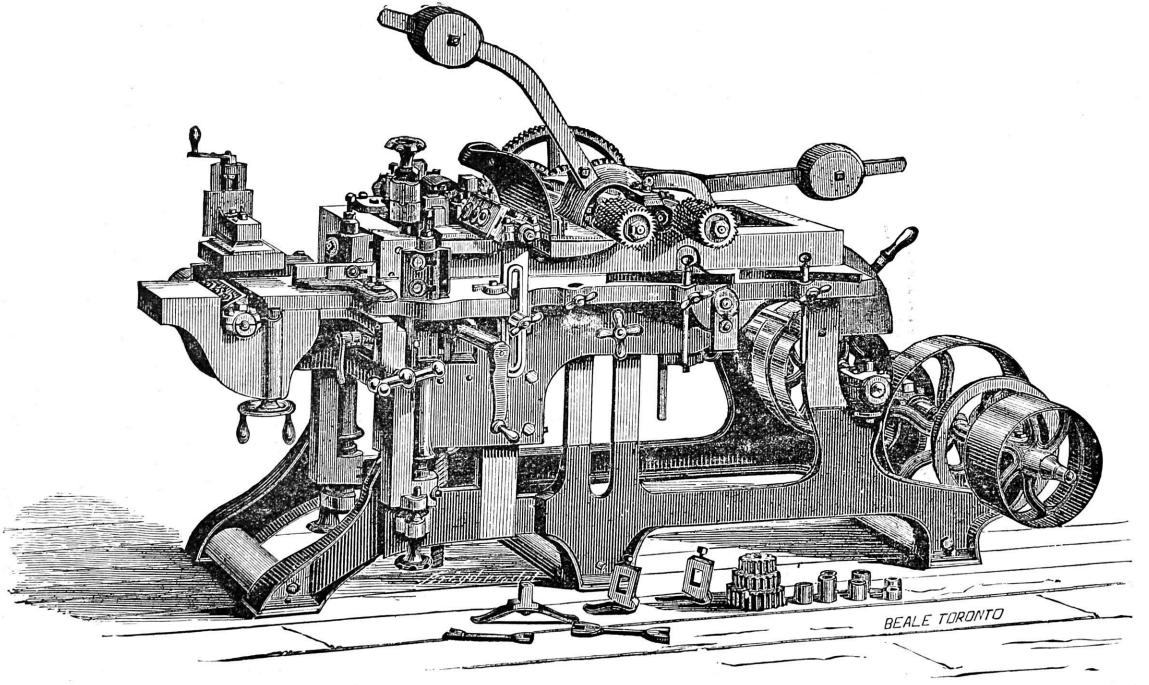
The under cutter head runs in a frame which can be raised and lowered to take any depth of cut. The slide spindles are of 1⅜ steel running in long bearings, the lower being bronze with adjusting screw to take up end play ; both spindles can be raised and lowered while running to adjust the cutter to the moulding. They run in heavy brackets gibbed to the table and can be swung to any angle and set to any width of stuff while in motion.

The upper rollers are four inches in diameter, and in inch sections, while blanks are provided to work any single section when required. The under roller is geared to the upper with expansion gearing, and the latter raise and lower parallel with the table and are weighted with adjustable lever and driven with heavy gear. The feed has four changes and is thrown out of gear by a belt tightener. Plattens and springs are provided to press on any class of work.

This machine comprises the following advantages over all others :— The frame is 10 feet long, admitting of long belts. All the adjustable parts can be shifted while the machine is running ; it is powerful enough for general tongueing and grooving, heading, ceiling, as well as mouldings 8 inches wide any thickness on all sides. All the cutter heads are of bronze and four-slotted.

Tight and loose pulleys on countershaft, 10 inches diameter and 6 inch face, and should revolve at 850 per minute.

Weight of machine complete, 2,800 lbs.



No. 2 Moulding Machine.

To Work Three or Four Sides. Weight, 1,800 Lbs.

No. 2 Moulding Machine, to Work Three or Four Sides.

This machine is an exact counterpart of our No. 1 Moulding Ma chine described on page 29, and considering its capacity to take in 8 inches wide and 12 inches deep, it becomes a necessity to general builders and sash and door factories.

It has an extra long frame planed and fitted substantially together, a rigid table gibbed to the front with a deep slide and a binder in the centre for extra security while turning out a long run of heavy work It raises and lowers by crank on the front.

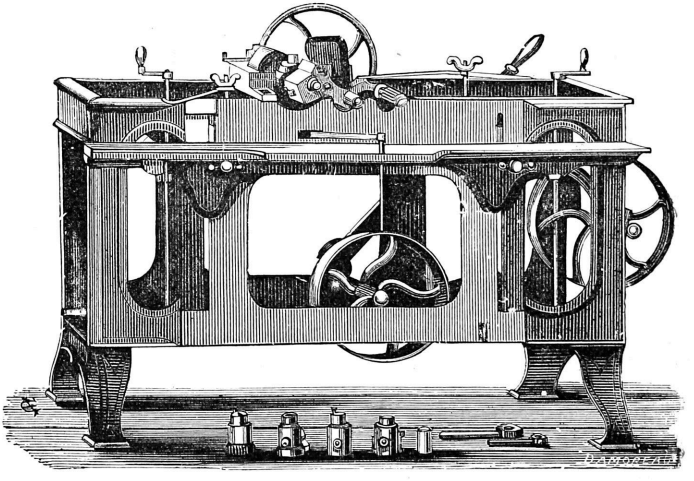
The feed rollers are driven by strong gearing, having four changes of feed. They raise parallel with the table, and with the under roller geared constitute a strong feed. They are in $\frac{3}{4}$ inch sections, with corresponding blanks to adapt them to any class of work.

The main cutter head spindle is $1\frac{1}{8}$ inch steel, with long bearing and four-slotted bronze head and outside bearing attached to the table front. The spindle runs in a frame gibbed to the top of machine and has adjusting screws to move it endways, to shift the position of cutters.

The size heads are bronze and slotted. The spindles are steel with long bearings, the lower one being bronze with adjusting screw. They can be swung to any angle.

This machine has the following advantages: A long frame and table, long belts, and all the shifting parts to set the machine to any size of stuff. Can be altered while it is in motion.

The countershaft has tight and loose pulleys 10 inches diameter and 5 inch face, which should make 850 revolutions per minute.



No. 3 Sash and Moulding Machine.

Weight, - 550 Lbs.

No. 3 Sash and Moulding Machine.

This machine has been long and favorably known to the public, and has earned a first-class reputation in the sash factory. While its cheapness brings it within the reach of the smallest business in the country, it is at the same time indispensable in the large establishment as an auxiliary for special lines of moulding along with larger machines.

It has a strong iron frame planed on all the depth of front; the table is raised and lowered by two screws.

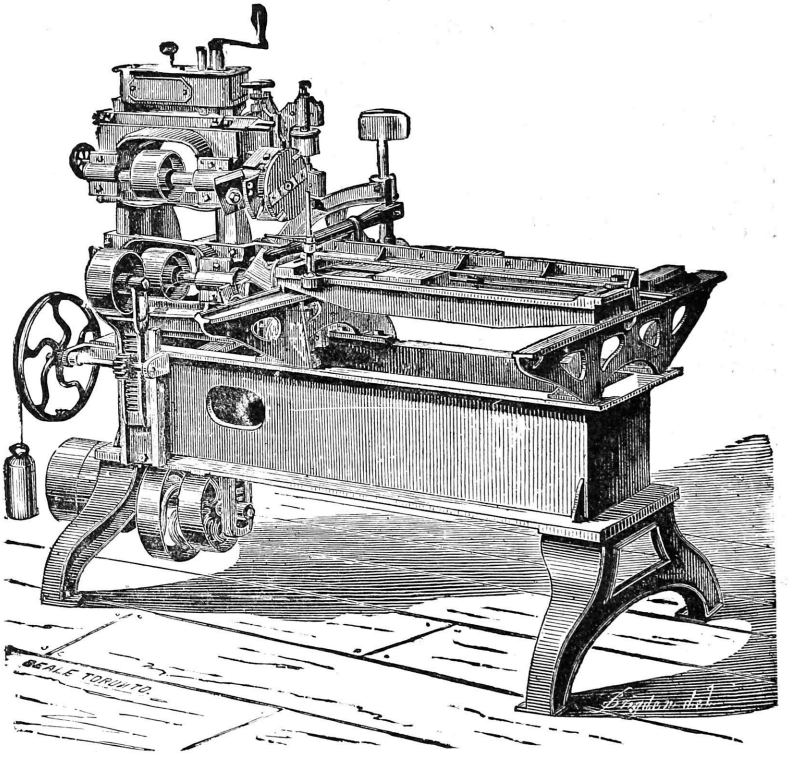
The rollers are in sections, grooved and case-hardened, and there are three changes of feed.

The cutter head spindle is of 1½ steel, and has screw for end adjustment. With this machine are furnished 5 heads, viz.: a planing head with 8 inch knives, two moulding heads 2¼ inches, one 2½ and one 4 inches, with brass caps and case-hardened set screws, and ten sets of cutters to suit the various heads.

To this machine has been recently added a number of valuable improvements. A weighted platten in front of the cutter head which can be swung back for the adjustment of cutters on the same style as our Nos. 1 and 2 Moulding Machines.

It has a new style of pressure spring which can be shifted to press on any part of the moulding as it passes from the cutter head. It has also the usual side springs, wrenches, etc.

The countershaft has tight and loose pulleys 8½ inches in diameter and 3½ inch face, and should revolve at 850 per minute.



Iron Frame Tenoning Machine.

Weight, - 1,200 lbs.

Vertical Car Tenoning Machine.

This machine will cut single, double, or triple tenons on either end of a piece of timber without turning end for end. The peculiar style of this machine consists in a vertical movable head, which cuts with the downward stroke when the timber is clamped on the left-hand table; the cutters having passed below the surface of table, the timber is passed over to the right hand, and the other end is tenoned by the upward stroke of the cutter-head.

The cutter-heads are gun metal, fixed on a 2½ steel shaft running in a frame, which is gibbed to a vertical column, and is operated by a hand-wheel and rack; and having a wire rope and counterbalance works easily. The cutter-heads have collars between, which give accurate sizes to the tenons. The belt has an equal tension at all times. The countershaft is over-head, with fast and loose pulleys, 12 x 8 inches, making 700 revolutions per minute. The machine is heavy and substantial, and for car shop work is a great labor saver. Photographs on application.

Iron Frame Tenoning Machine.

For Sash and Door Work.

This tenoning machine, specially adapted for sash, door and blind makers, combines all the latest improvements on this class of machines.

The cutter heads both raise and lower simultaneously or independently. Each head has four knives so adjusted as to cut a tenon 6 inches long at one operation.

The spindles are steel, fitted so as to prevent end play. They run in frames gibbed securely to the uprights, and have end adjusting screws.

The cutter heads have saws insteads of spurs. The machine has double copes which can be set to any required position. The belt which drives the cutter head spindles when once laced together requires no alteration, as a binding pulley operating against the loose side with a weight keeps the same strain on it in any position of the cutter head.

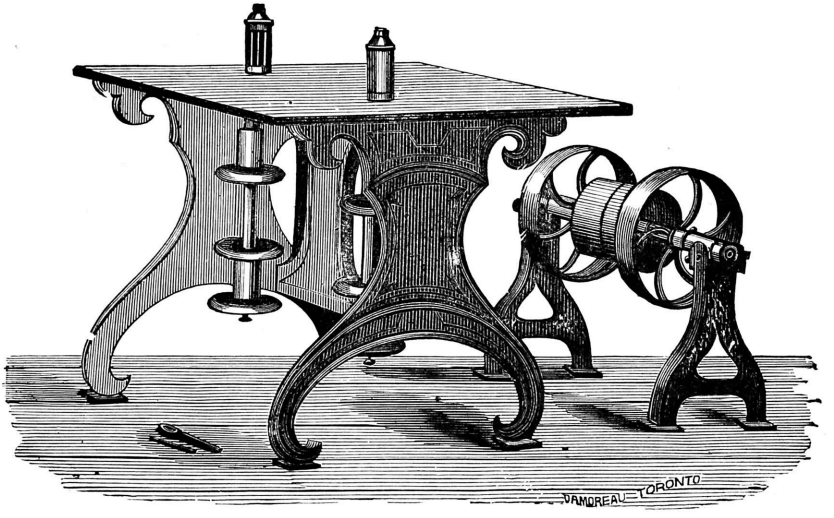
The carriage contains a wrought-iron slide, with attachments, which can be adjusted to any length of tenon. The carriage frame and upright standards are plain and substantial, and divested of the useless ornamentation so usual on these machines.

The fast and loose pulleys are 9 inches diameter and 4 inch face, and should make 800 revolutions per minute.

Large Automatic Car Gaining Machine.

This is a heavy and substantial machine. Timbers up to 24 inches by 16, can be gained to any depth up to 4 inches. A series of stops on the table enables the operator to duplicate any class of timber. The table moves on rollers in a heavy bed, which is set low and is operated by a hand-wheel and rack. The bed is secured to a large hollow cast frame, planed on top to receive the cutter-slide ; this consists of a horizontal bar carrying on its front the vertical slide and cutter-head. The horizontal movement of the bar is automatic, and has a positive equal motion either backward or forwards ; the length of stroke is regulated by stops, and the motion can be reversed at any time. The cutter-head is lowered to the depth by a lever, and a series of 4 stops regulates for different sizes of gain. A heavy spring throws the slide up ; while a vertical screw regulates the position of the lever. The countershaft is placed in such a position as gives proper tension to the belt in any position of the cutter-bar. Countershaft, fast and loose pulleys, 15 x 8 inches, and should make 575 revolutions per minute. Photographs on application.

Upright Shaper or Moulding Machine.



This machine is calculated to perform work that can be done by no other machine now in use, cutting straight moulding, as well as the most irregular forms. It is an indispensable machine for saving labor in railroad, carpenter and machine shops, also in agricultural and cabinet factories.

A great many improvements not represented in the above cut have been added lately.

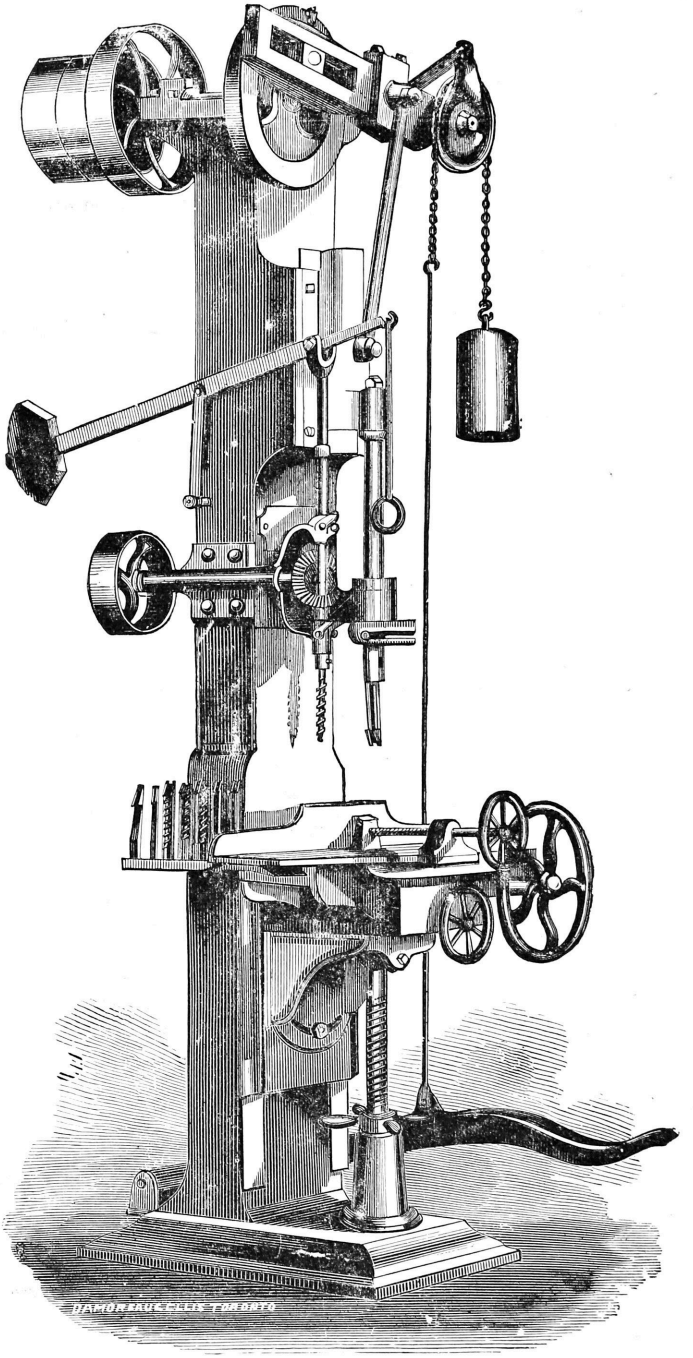
The spindles are steel with deep self-oiling boxes secured in an upright slide gibbed to the frame and capable of being raised and lowered by a hand-wheel on each side.

It has brass guards for operating with plain knives, which can be removed when moulding knives are used. In addition to this there is an adjustable safety guard over the heads, which can be set to any thickness of stuff.

The frame is strong and substantial with cast-iron table planed smooth on the top.

The spindles are perfectly true and balanced, and can be run as high as 5,000 revolutions per minute.

The tight and loose pulleys are 6 inches diameter and 5 inch face, and should make 950 revolutions per minute. Weight 600 lbs.



Large Car Mortising and Boring Machine

With Automatic Boring Attachment.

Large Car Mortiser and Borer

with

Auxiliary Boring Attachment.

This machine, specially adapted for car and agricultural implement shops, possesses great power and capacity and in these respects has no equal in the market.

Recently an important improvement was effected on this mortiser, which is not shown in the accompanying cut, by connecting the outer end of the top lever to the crank plate by a rod having brass boxes, and which imparts to the chisel bar great power.

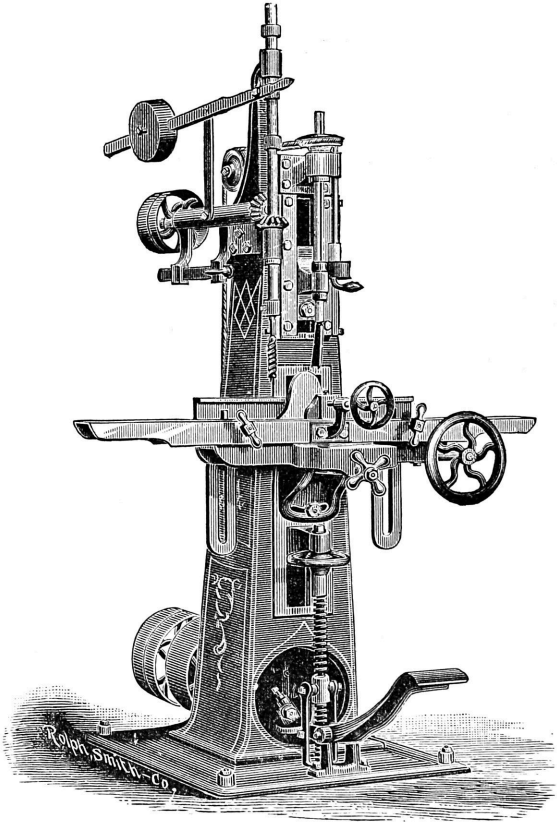
The chisel bar is drawn up and brought to rest by a weight acting on a movable slide on the top lever which brings the chisel bar connecting rod to the dead point, when a slight pressure of the foot on the treadle throws the slide and rod directly over the chisel and gives it a positive motion working without jar to the foot in the hardest timber.

The table is raised and lowered by a screw directly under the chisel and receives the shock of the blow on the bed plate. The column is heavy and rigid, which gives the machine perfect solidity. All the boring spindles, top shaft and chisel bar are steel.

When ordered the auxiliary boring attachment is gibbed to the right hand side of the column and is moved to any point of the table by a hand wheel. The table can be set to any angle required.

We furnish with this machine patent lip chisels as follows: $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 inch, $1\frac{1}{4}$ and $1\frac{1}{2}$, the same number and sizes Jennings bits for entering, and one set of long boring bits for the auxiliary attachments.

The tight and loose pulleys are 12 inches diameter and 5 inch face, and should revolve at 320 per minute. Weight 3,000 lbs.



New High Speed Sash and Door Mortiser.

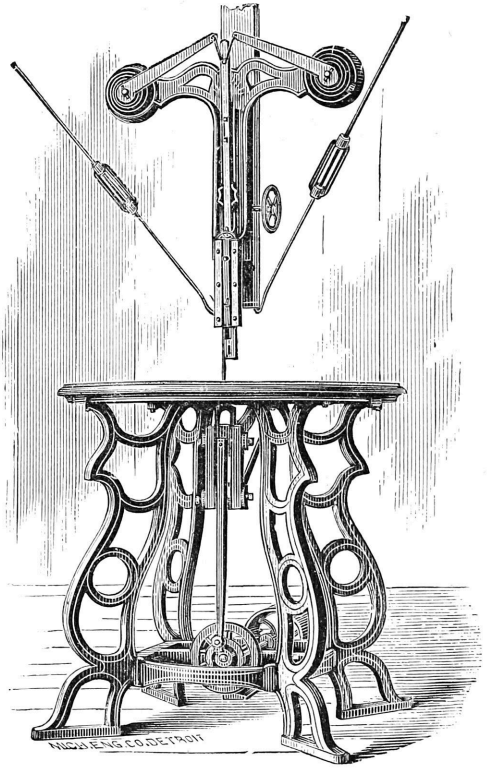
Weight, - 1, 0 lbs.

New High Speed Sash and Door Mortiser.

This machine is of a new and improved pattern and is admirably adapted to meet the requirements of sash and door, cabinet and other similar shops. The main frame is cast in one piece in the shape of a hollow box ; the crank which operates the chisel bar being located close to the base plate of the machine, thereby by this style of construction distributing the gyration to foundation on which it stands. This machine when securely bolted to a foundation does away with all overhead bracings.

The chisel bar has a uniform stroke of five inches and is automatically and instantaneously reversed by power. A very complete boring attachment is provided when required. The machine mortices from $\frac{1}{4}$ inch to $\frac{3}{4}$ inch ; is constructed with great care and accuracy, as all reciprocating machinery should be, and is the most durable and efficient machine of the kind known at this time.

Fast and loose pulleys 12 inch x 4 inch, and should run at 450 revolutions per minute. Weight 1300 lbs.



Scroll Sawing Machine.

Dowling's Patent.

Weight, 500 Lbs.

Scroll Sawing Machine.

Dowling's Patent.

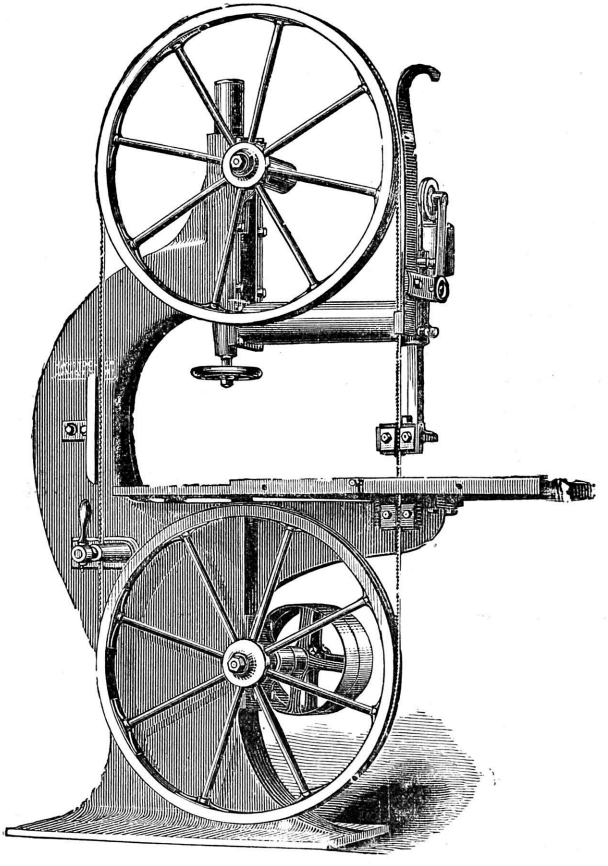
The scroll sawing machine is of recent invention, and is pronounced by firms of long experience now using it as the best in use.

Having purchased the exclusive right to manufacture this machine in the Dominion, we can confidently recommend it to the public as the most durable and effective machine of its class.

The saw has a constant strain through its whole stroke. This is effected by two spiral springs acting on steel levers which are attached to the upper slide direct, and all the reciprocating parts of this movement being made of steel-plate enables the machine to run at a high rate of speed with great smoothness. The slides are long and run in bronze.

The frame is heavy and solid, with wood top made of seasoned ash and walnut. The top slide can be raised and lowered to any thickness of stuff. A handle on the tension allows the operator to remove the saw instantaneously while cutting intricate work. The advantages of this machine are apparent, as it is adapted to the heaviest or lightest work.

The tight and loose pulleys are 7 inches diameter and 3 inch face, and should make 1,000 revolutions per minute.



No. 1 *Band Saw.*

With 34-Inch Wheel.

No. 1 Band Sawing Machine.

This cut represents our No. 1 Band Saw ; as shown it has a tilting table, but can be made without if desired.

The wheels are of high-quality cast-iron, 34 inches diameter, evenly balanced and faced on rim with rubber bands.

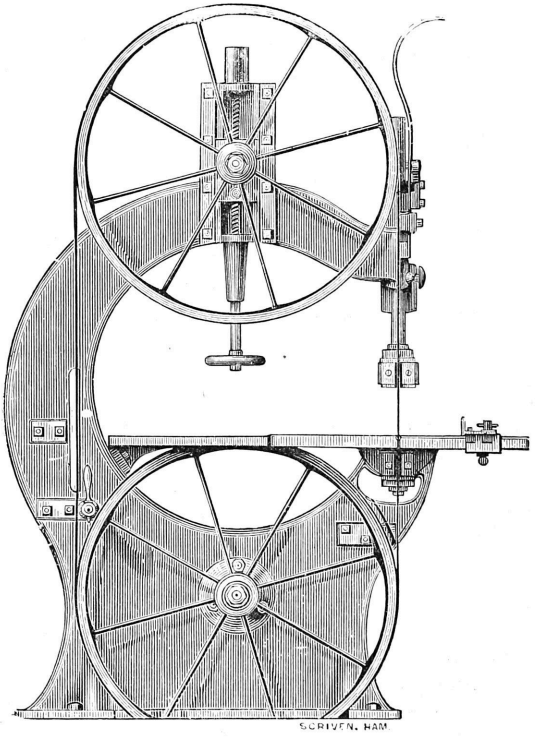
The frame is of hollow or cored section and is very heavy, thus giving greater rigidity than any other form ; the top wheel bearing has weighted lever, thereby preventing breakage of saws. This machine is of improved and substantial patterns ; is of first-class workmanship, material and finish, and is of invaluable service to all wood workers.

Fast and loose pulleys are 14 x 4 inches and should run at 400 revolutions per minute. Weight, 1,500 lbs.

Railway Cutting--off Saw.

This machine is specially adapted for cross-cutting all kinds of lumber, and consists of a heavy iron frame cast in one piece, having a table bolted on top, which with the guide-bar is all planed true. The saw arbor moves in a frame which is gibbed to and slides on planed ways and can be moved to and from the work by a handle on top of machine. The swinging frame is provided with a counterbalance for bringing back the saw to any position. The saw arbor is of steel and all the bearings are self-oiling and best quality babbit metal. The saw dust is thrown out to rear of machine with a spout cast in frame.

The fast and loose pulleys are 10 x 5 inches and should make 600 revolutions per minute. Photographs on application.



No. 2 Band Saw.

With 40-Inch Wheel.

No. 2 Band Sawing Machine.

This machine is constructed specially for car and railroad shops.

The frame of the machine is massive and cast with cored section and has a tilting table. All the improved features of the No. 1 machine are carried out in this.

The tension of saw is maintained by a weighted lever.

The wheel is 40 inches diameter and is built on the same plan.

The fast and loose pulleys are 15 x 4 inches, and should run at 150 revolutions per minute.

Large Ripping and Cross-Cut Saw

with

Elevating Mandrill.

This machine is specially adapted for ripping, cross-cutting, beveling and mitreing, in car-shops and ship-yards. It consists of a heavy cast iron frame with table planed true on top. The table is slotted on the left-hand side for a separate table with mitreing guide. The saw mandrill runs in a swinging frame which is raised and lowered by a worm-wheel operated by a hand-wheel at feeding end of machine. The ripping guide bar can be set to any bevel and traverses in a slot on front of table. The saw arbor is of steel and runs in self-oiling boxes. The countershaft has fast and loose pulleys, 12 x 5 inches, and should make 450 revolutions per minute. Photographs on application.

PRICES

of

Extras for Wood Machinery.

Cylinder knives, 24 inch, each	$ 4 00
" " 22 " "	3 75
" " 20 " "	3 50
" " 16 " "	3 00
" " 12 " "	2 25
" " 8 " "	1 75
Moulding machine knives, per inch face	50
No. 1 matcher heads (brass), per pair and 3 set cutters	32 00
No. 2 " " " " " 2 "	26 00
No. 3 " " (Iron), " " 2 "	22 00
No. 1 jointer heads (Brass), and 3 set 4 inch cutters	23 00
No. 2 " " 2 4 "	28 00
No. 3 " (Iron), 2 4 "	24 00
Matcher setter	8 00
Grinding machine for planer knives	12 00
Moulding machine heads, brass, 4 slotted, 8 inch	14 00
Side heads, brass, (each) 2 slotted	8 00
" " 4 "	10 00
Moulding heads with brass caps, 2 to 2¼ inches wide	6 00
" " 3 to 4 "	7 00
" " 5 to 6 "	8 00
Panel heads with knives	7 00
Patent lip mortiser chisels, (each), ⅜ to ½ inch	2 00
" " ⅝ to ¾ inch	2 50
" " ⅞ to 1 inch	3 00
" " 1¼ to 1½ inch	3 50

Saw Arbors.

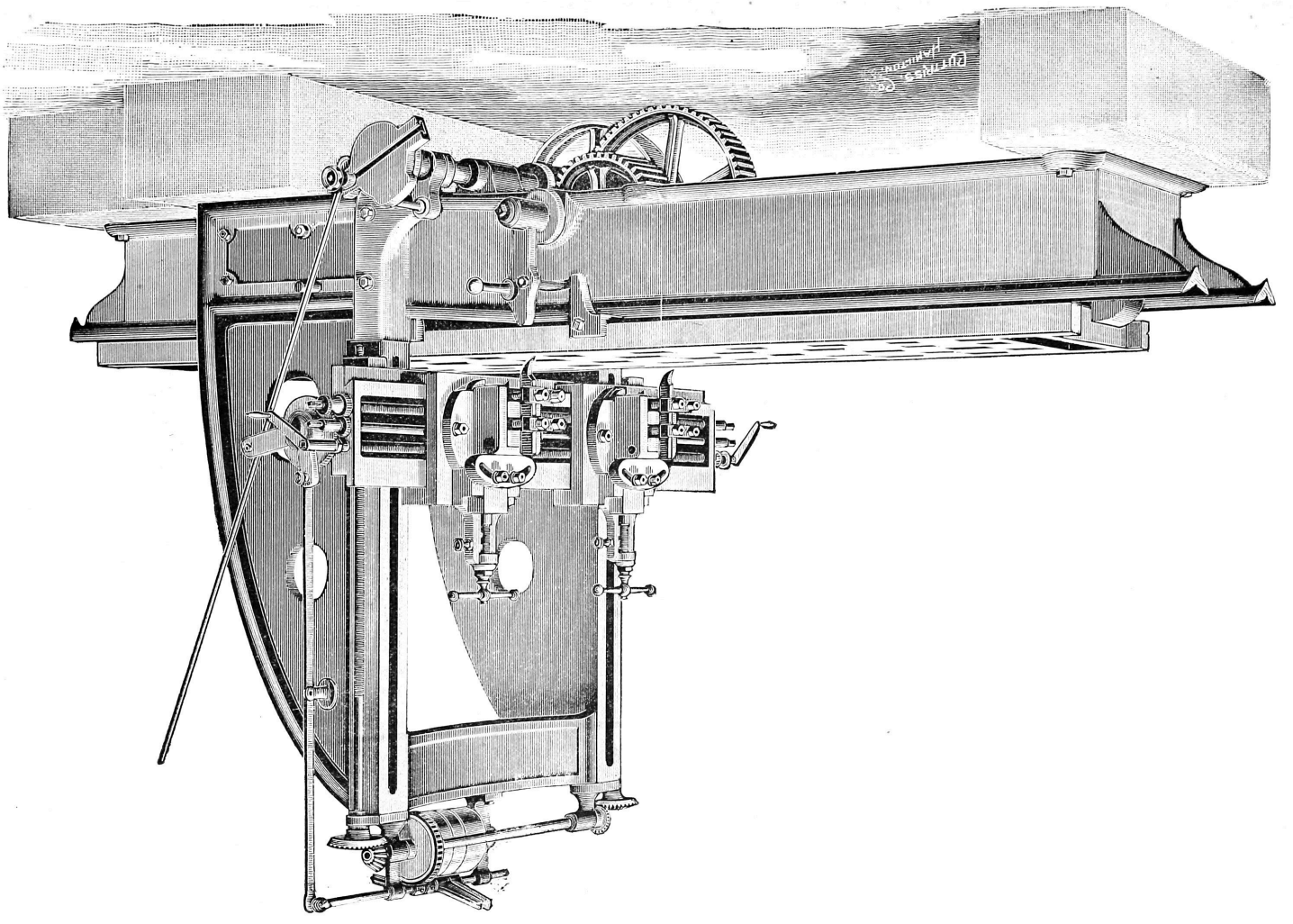
Length over bearings.	Diameter of Pulleys.	Hole in Saw.	Diameter of Saw.	
20	4½	1	12	10 00
20	5	$1\frac{1}{16}$	16	12 00
24	5	$1\frac{3}{16}$	20	14 00

Iron Planing Machinery.

Next to the self-acting lathe, the Planing Machine has always been an important tool in the engineer's shop, and upon its accuracy depends to a great extent the reduction of labor in fitting up machinery, and a planer that will not turn out true and smooth work is an absolute loss in a shop.

These machines have with us come in for a large share of improvement during the last year. The most important is the driving mechanism. All are double-belted, giving a back motion of 3 to 1, operated by an automatic belt shifter, one shifting before the other, effectually preventing the jarring and shrieking so common to the single belt style, and producing a positive and uniform motion under any change of speed in the driving power, and as the differential motion is made in the countershaft all users of these machines can change the rate of speed to suit the class of work operated on. All these machines are made with down cross and angular feeds, and all from the 12 feet (36 x 36) have the cross slide raised and lowered by power. The cross slides are made extra heavy, the top being square gibbed, and all are scraped to perfect bearings. All screws are steel, and nuts case-hardened and milled to standard guages. The upright standards are all made in the backing of parabolic form, and the cross bracing coming below the lift of the cross slide gives great rigidity to the machine while planing the full capacity. The beds are made deep and are all connected by cross girts of cored section, and the ways have large bearing surface. Foundation plans are furnished when requisite.

We have also introduced the Sellars style of planer, commencing with our 72 in. x 72 in., 20 feet bed. By this mode of driving mechanism, in which the driving shaft with worm gears directly into the rack, thus producing a uniform and powerful motion, and as only one cut wheel and pinion is required the work turned out is smooth. The worm runs in a box filled with oil, effectually protected from chips; and self-lubricating devices in the ways keep them always supplied with oil. The feed is distinct from the belt-shifting motion, and though of the friction style, only operates positively when required. The belt shifting is our latest device, one belt moving before the other. On this machine two tools can be put on the cross slide and one on each standard, having separate and independent feeds. All the cross girts in the bed are hollow or cored section. This planer, and all sizes from the 52 inch, have their countershafts parallel with the ways, thus having the machines placed on the floor in line with main shafting.



Twelve and Sixteen Feet Iron Planers.

This cut represents our 12 feet 36 x 36 inch and 16 feet 44 x 44 inch iron planer, extra heavy, with two tool blocks and with down, cross and angular feeds and quick return motion on table.

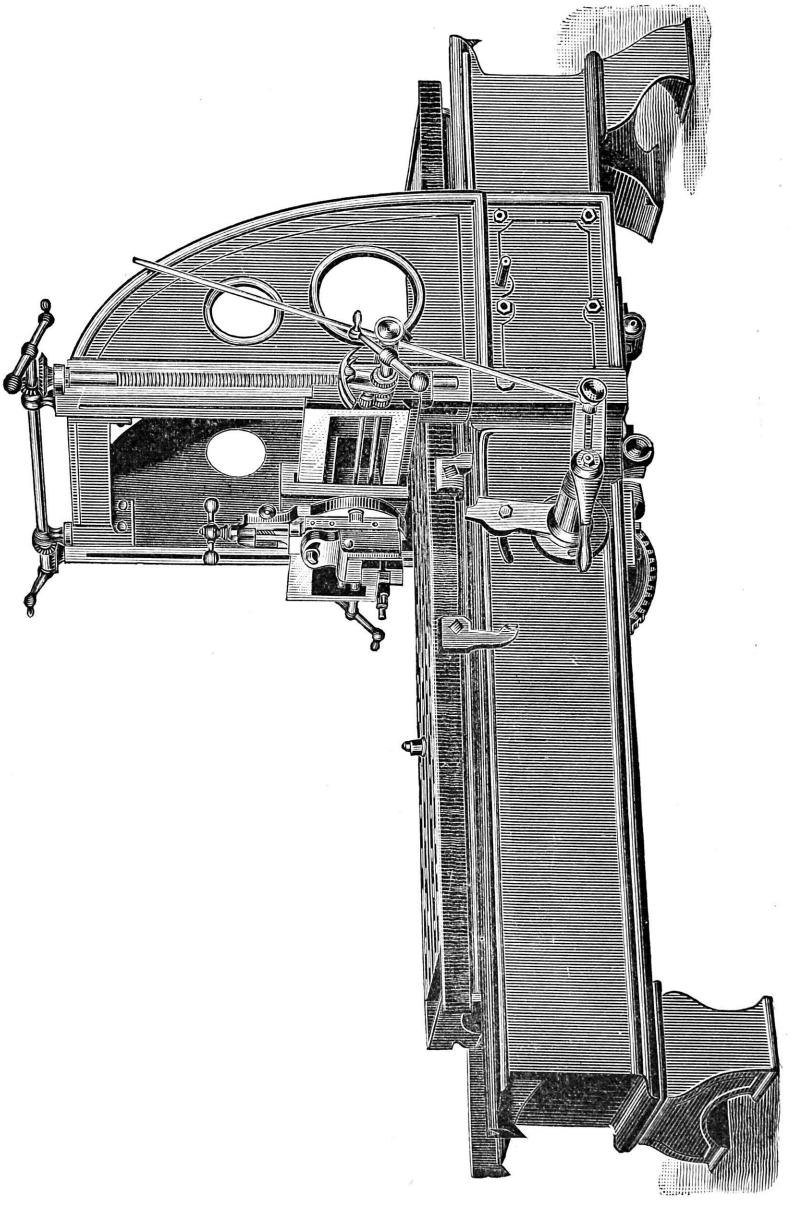
The gears are all cut, of large diameter and wide face. The feed gear is worked from a friction-plate and is conveniently situated in rear of cross slide leaving a clear way for the tool block. The reversing motion is positive, noiseless and without jar.

This machine is double-belted, back motion 3 to 1. All the ways and slides are scraped to true bearings. The cross slide is square on top, and having the tool block returned over it effectually prevents spring in heavy cut; the belts have automatic shifters.

The shafts carrying the working gear are heavy, giving no possibility of spring. All the screws, the bolts and nuts on cross slide and tool rests are case hardened, as well as all parts subject to wear.

On these planers two tool blocks can be worked if so ordered, and each with cross, down and angular feed, working independently. All the parts of these machines are heavy and substantial, the whole weighing 12,000 and 15,000 lbs. With them are sets of wrought iron wrenches, over-head pulleys and hangers.

The tight and loose pulleys are 21 inches diameter and 5 inch face, and should make 150 revolutions per minute. Weight, 12,000 and 15,000 lbs.



Seven and Eight Feet Iron Planers.

24 x 24 and 30 x 30 Inches.

Weight, - 4,500 and 5,500 Lbs.

Seven and Eight Feet Iron Planers.

24 x 24 and 30 x 30 Inches.

These planers have heavy cut gear with extra wide face. The cross slide is square on top with the tool rest gibbed on top and back.

All the screws, bolts and nuts on the cross slide and tool rest are steel. All the shafts are of large diameter.

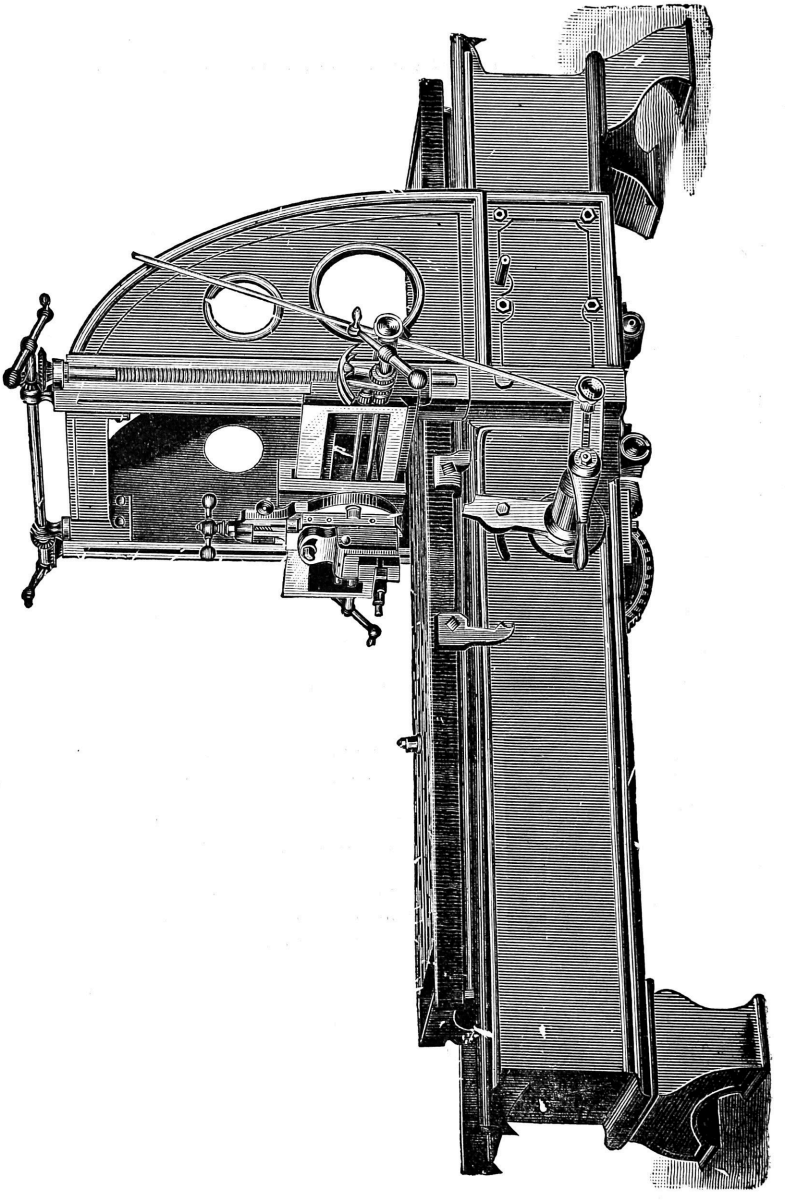
These planers have quick return motion on table, and automatic belt shifters. Are double belted, back motion 3 to 1.

The ways, slides and bearing surfaces are scraped to true bearings. The reversing motion is positive, noiseless, and without jar.

The bed is heavy and has hollow or box ribs, a feature in all our planers securing rigidity to the machine. With them are the usual wrought iron wrenches, countershaft and hangers.

Automatic feeds in all directions are attached when so ordered.

The tight and loose pulleys are 15 inches diameter and four inch face, and should make 150 revolutions per minute. These machines weigh 4,500 and 5,500 lbs.



Nine and Ten Feet Iron Planers.

30 x 30 and 36 x 36 Inches.

Weight, - 6,600 and 8,000 Lbs.

Radius Link Planer Attachment.

This attachment is made for our nine foot 30 x 30 inch iron planer, is used for planing curves of any radius, and perfectly parallel curves as applied to the ordinary planer. It is quickly attached, easy of operation, and does accurate work.

Planer Vises---Planer Centers.

We can supply for any of our planers a very handy and convenient vise; we also manufacture and can attach, if so ordered, on any of our machines, a pair of planer centres.

Nine and Ten Feet Iron Planers.

30 x 30 and 36 x 36 Inches.

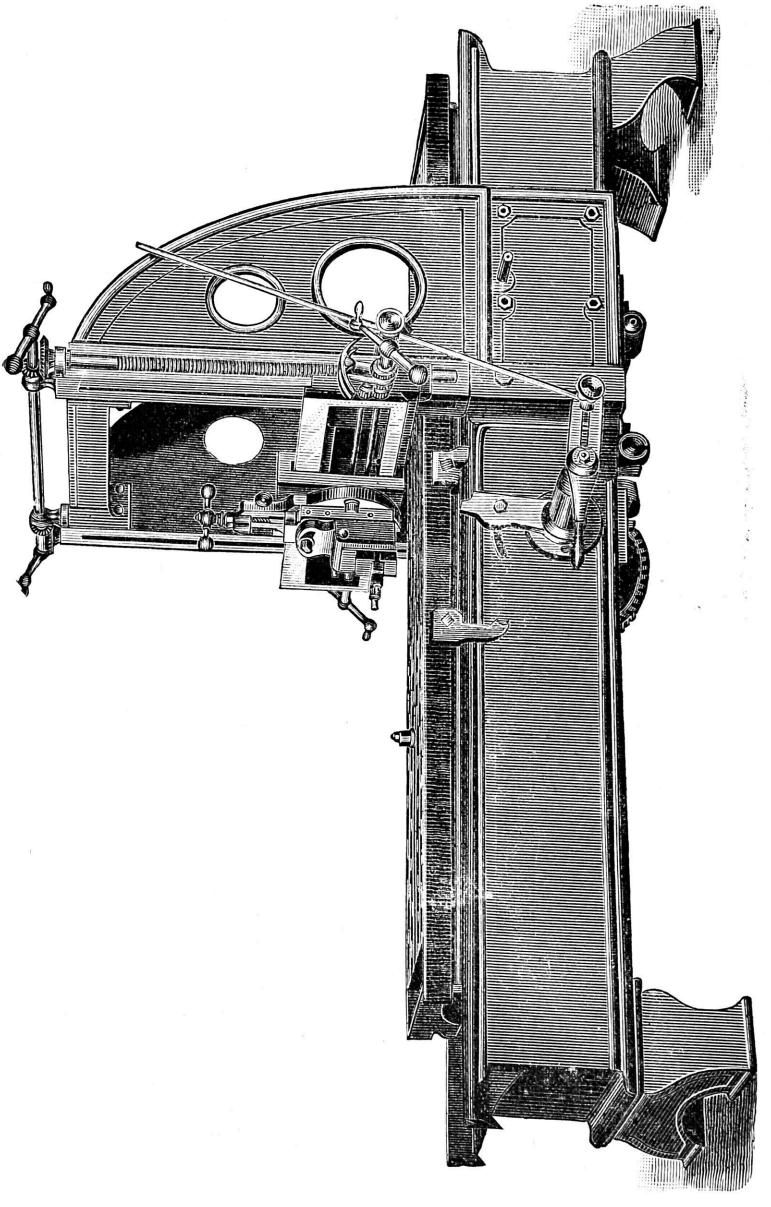
These planers have heavy cut gear with extra wide face. The cross slide is square on top with the tool rest gibbed on top and back. All the screws, bolts and nuts on the cross slide and tool rest are steel. All the shafts are of large diameter.

These planers have quick return motion on table, and automatic belt shifters. Are double belted, back motion 3 to 1.

The ways, slides and bearing surfaces are scraped to true bearings The reversing motion is positive, noiseless, and without jar. The bed is heavy and has hollow or box ribs, a feature in all our planers securing rigidity to the machine. With them are the usual wrought iron wrenches, countershaft and hangers.

Automatic feeds in all directions are attached when so ordered.

The tight and loose pulleys are 18 x 4½ inches, and should make 150 revolutions per minute. Weight, 6,600 and 8,000 lbs.



Five and Six Feet Iron Planers.

Weight, - 2,700 and 3,200.

Five and Six Feet Iron Planers.

20 x 20 and 24 x 24 Inches.

This cut represents our 5 and 6 feet iron planers. They have the same style of pattern and mode of action, with strong and accurately cut gear, and rack wheel of large diameter.

Machines have quick return motion on table, and automatic belt-shifters.

The cross slide is solid and heavy, with all the screws, bolts and nuts of steel.

All the ways and slides are scraped to true bearings, reversing motion is positive, noiseless, and without jar. They are double belted, back motion 3 to 1.

All these planers are tested, and the tables planed smooth and ready for work before leaving the shop.

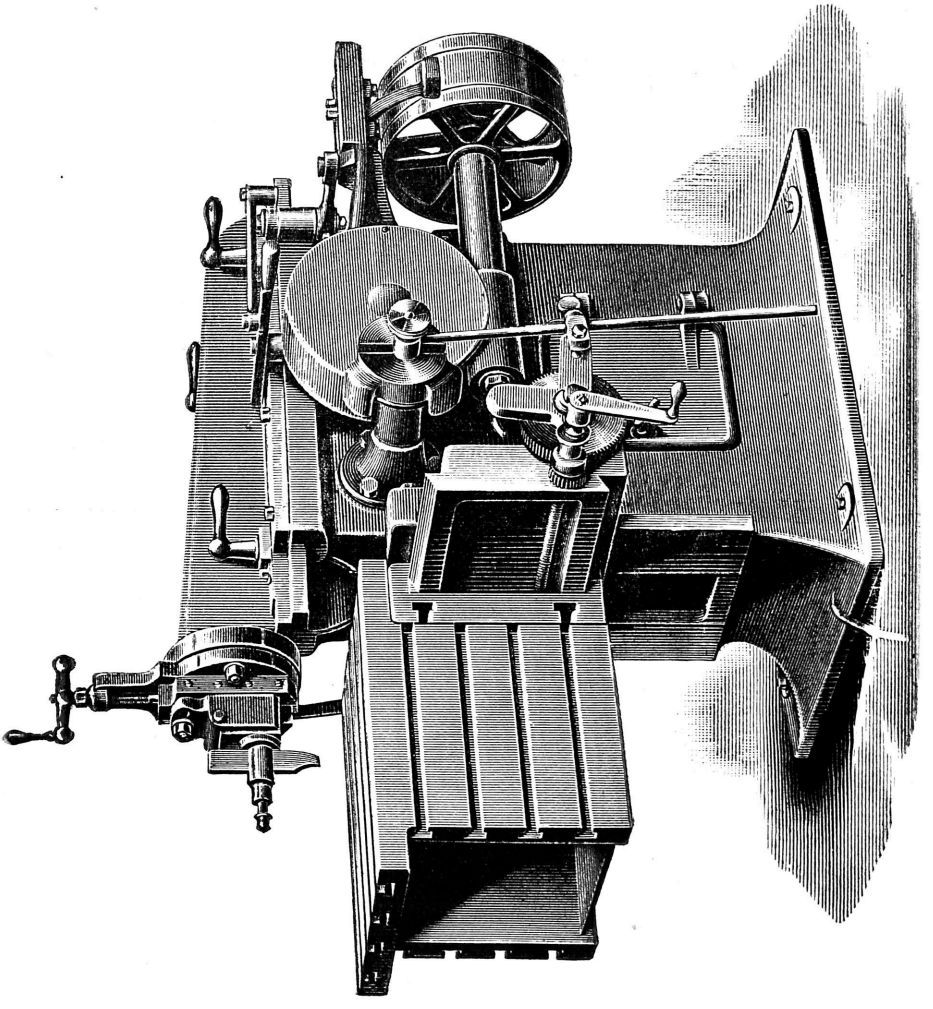
Automatic feeds in all directions are attached when so ordered.

Wrought iron wrenches, countershaft and hangers furnished.

Tight and loose pulleys on 5 feet planer, 11 inches diameter and 4 inch face, and should make 175 revolutions per minute.

Tight and loose pulleys on 6 feet planer, 10 inches diameter and 4 inch face, 175 revolutions per minute.

Weight of 5 feet planer, 2,700 lbs. Weight of 6 feet planer, 3,200 lbs.



Improved 24-Inch Shaper.

Weight, - 3,300 Lbs.

Iron Shaping Machines.

Improved 24-Inch Shaper.

We have in this machine an addition to our high-class tools which combines all the new and improved mechanical motions necessary to make this machine superior to anything in this line yet produced. Machine has a stroke of 24 inches, cross feed of 26 inches, and will plane a piece 15 inches high ; it is operated by a worm and worm wheel, has quick return motion, is double belted, has automatic belt-shifters, stroke of ram can be altered while machine is in motion, and when so ordered has automatic and independent down, cross, angular, and circular feeds. Machine is of a hollow box construction, will cut a key-way in a 3½ inch shaft of unlimited length, and is provided with a vise, countershaft and wrenches, etc., all complete. Fast and loose pulleys on countershaft 14 in. x 4 in., and should make 250 revolutions per minute. Weight, 3,300 lbs.

Improved 16-Inch Shaper.

This machine is of the same design and construction as our 34 inch. It has a stroke of 16 inches and a traverse of 20 inches.

Weight, 2,500 lbs.

Countershaft has fast and loose pulleys 12 in. x 4 in., and should make 250 revolutions per minute.

Shaper, 12 x 42 Inches, with 2 Tables.

This machine is of the latest and best approved style, has a stroke of 12 inches, traverse of 42 inches, and is provided with automatic cross and circular feeds, and vise, countershaft and wrenches, etc., all complete. Countershaft has 2 sets of fast and loose pulleys, 12 x 4, and should make 380 revolutions per minute, and 18 x 4, and should make 135 revolutions per minute. Weight, 3,400 lbs. Photo. on application.

Shaper, 16 x 66 Inches, with 2 Tables.

Same as the above machine with all latest improvements; but having a stroke of 16 inches and traverse of 66 inches, furnished all complete with fast and loose pulleys same as above. Weight, 5,500 lbs. Photograph on application.

Drilling and Boring Machinery.

No machine tool admits of greater variety of form than drilling and boring machinery. From the vertical drill used twenty years ago has sprung the endless number of improved machines now in use, among which we may instance radial, horizontal, upright, and multiple, car wheel borers, turret borers, and engine cylinder boring machines.

Of these our list shows a complete assortment of vertical drills. We have four sizes, with sliding headstocks and balanced spindles, with quick return motions. Steel spindles and racks cut from solid stock. Two sizes of radial drills, two upright turret borers, two sizes of horizontal boring machines, one cylinder borer, one four spindle drill, one six spindle drill, and one car wheel borer.

In all these machines great care is exercised in having the alignment of the spindles perfect, balanced cones and cut bevels. The columns are all backed with a frame, rising from the foundation plate, to prevent spring. The bed plates are all slotted and planed for use, while the table is moved to one side for the reception of large pieces.

No. 1 Radial Drill,

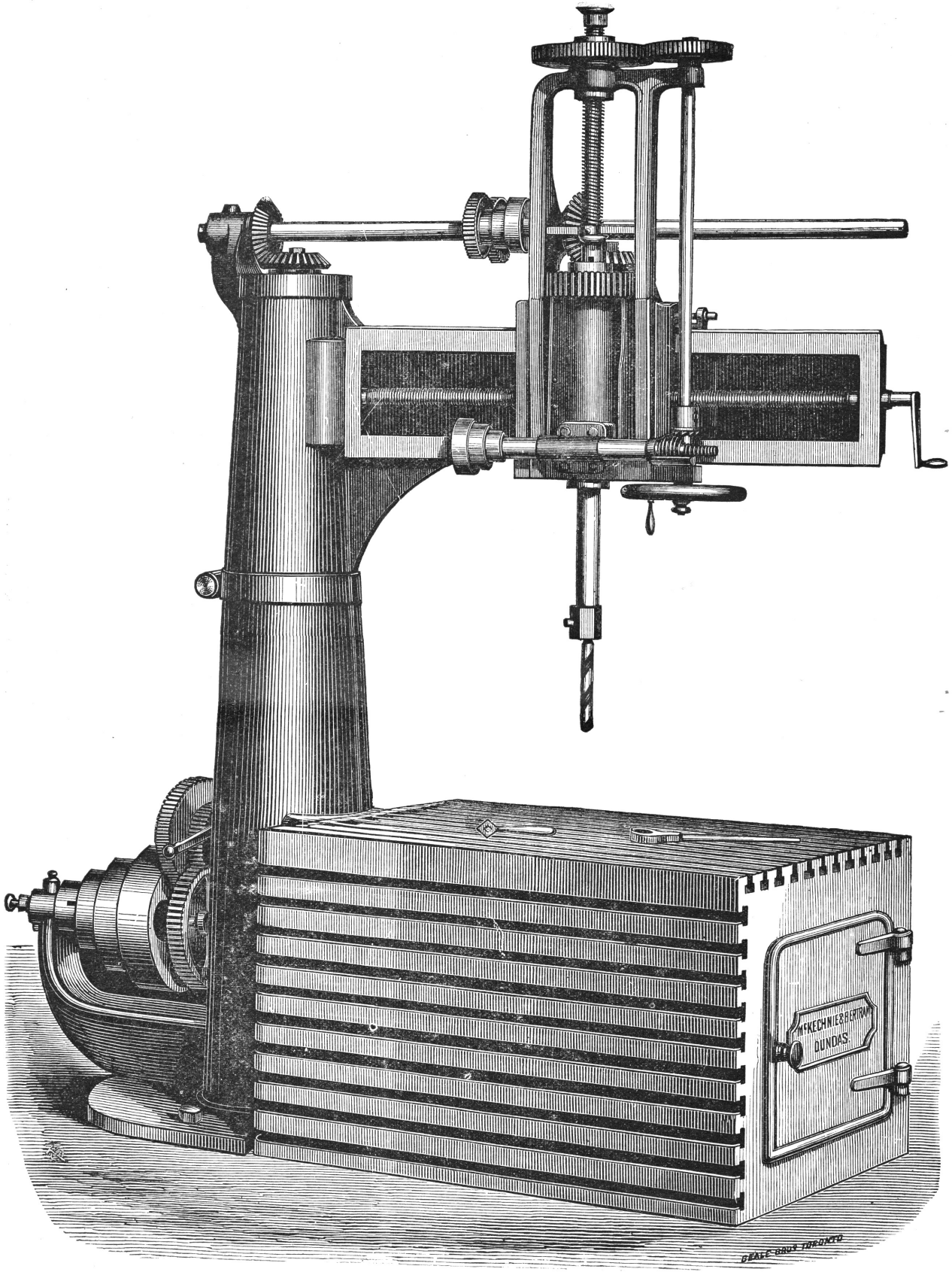
To Bore in a Radius of Five Feet,

With Self-Acting Feed.

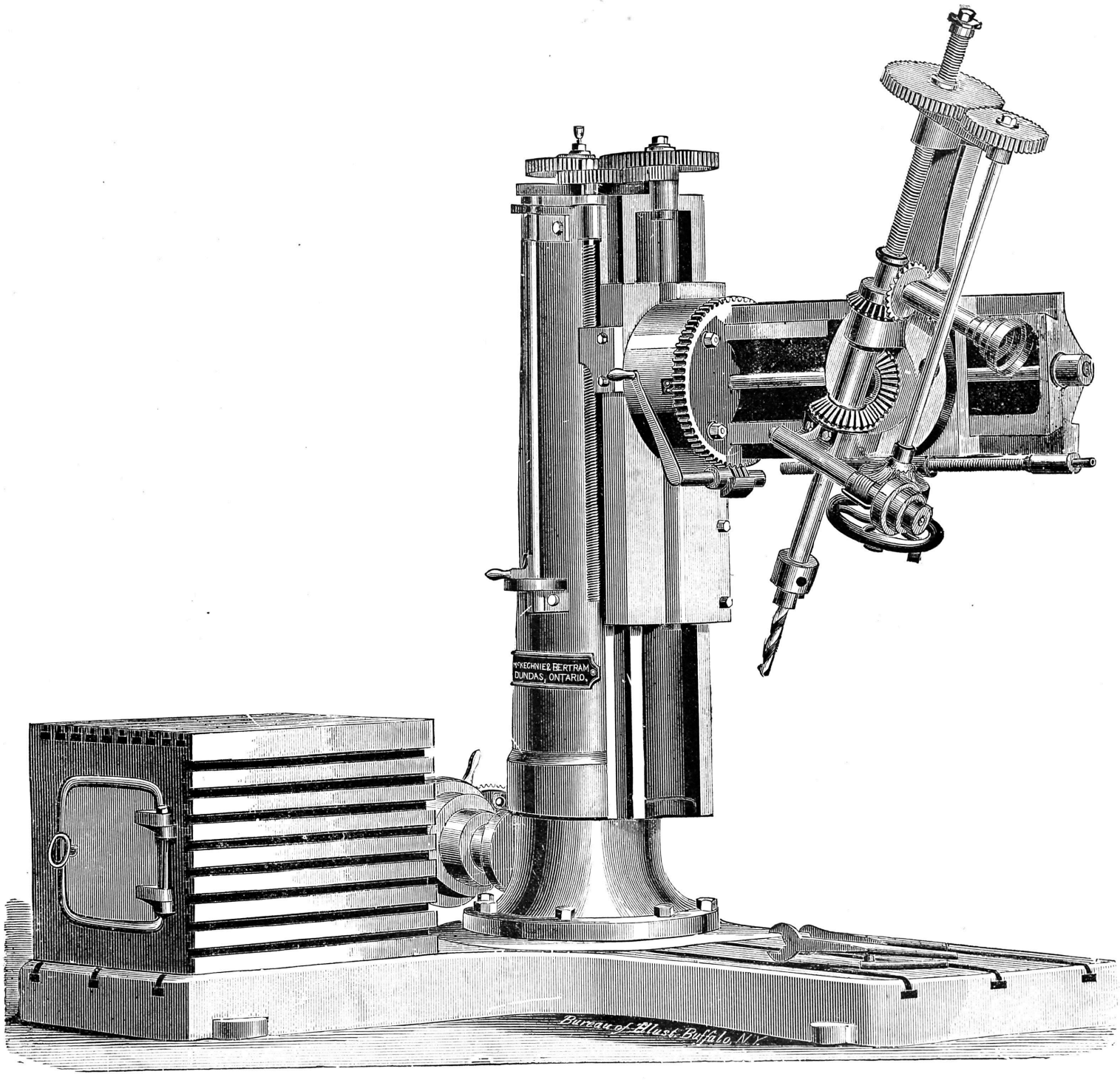
From the accompanying cut it will be seen that this drill is specially suited for locomotive and engine shops. The motion can be changed from double to single gear instantaneously. The radial arm swings on a heavy column and has a deep bearing on the same with binder. It bores holes in a radius of 5 feet.

The drill spindle is driven by a large spur gear of wide face, giving it great power when working without the back gear. The important bearings are bushed with bronze. The spindle and top screw are steel with bronze nut. All the wearing parts here subjected to pressure are bronze and cupped for oil.

This and all our drilling machines are socketed for Morse taper. The bed is an oblong box slotted on 3 sides with door and shelves for tools. This machine is extra heavy, weighing 8,000 lbs. Countershaft, hangers and wrenches are provided. Fast and loose pulleys 18 inches by 5 inches; should make 150 revolutions per minute.



No. 1 Radial Drill, to Bore in a Radius of Five Feet,
With Self-Acting Feed.



No. 1½ Radial Drill, to Bore in a Radius of Five Feet.

No. 1½ Radial Drill,

To Bore in a Radius of Five Feet.

This drill, lately designed and perfected by this firm, has advantages over any other machine of its class manufactured.

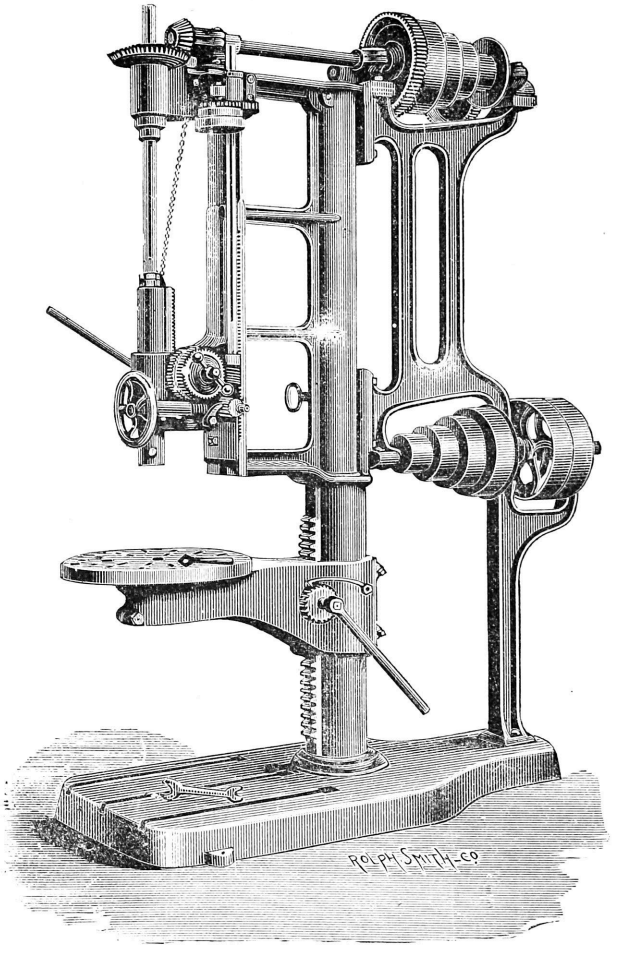
The bed is L shaped, having the two wings slotted for the reception of heavy work. On one of these is placed a movable box slotted on three sides similar to that on No. 1 drill. On the centre column is a sleeve extending its whole depth, having an upright slide on front, and on this side is a movable block carrying the radial arm. An upright screw operated by reversing gear raises and lowers the movable block and arm to any required point. The radial arm is fitted into a socket in the movable block and can be turned completely round to any angle by heavy worm gear. Independently of this the drill stock can be turned to any angle on the radial arm.

A graduated scale on these separate movements enables the operator to drill any conceivable angle, or change instantly to the squar

The machine is back-geared and self-acting. The drill spindle and top screw are steel, with the wearing parts subjected to pressure of bronze.

It bores in a radius of five feet, and has the advantage of operating on heavy work on the bed plate, when the arm can be changed momentarily to the slotted box for light work as required. The box has door and shelves for tools.

The various movements on this machine render it the handiest made for all classes of work. Weight, 9,230 lbs. Countershaft and hangers furnished. Fast and loose pulleys 18 inches by 5 inches, and should make 150 revolutions per minute.



No. 2 Iron Drilling Machine.

Bores to Centre of Four Feet.

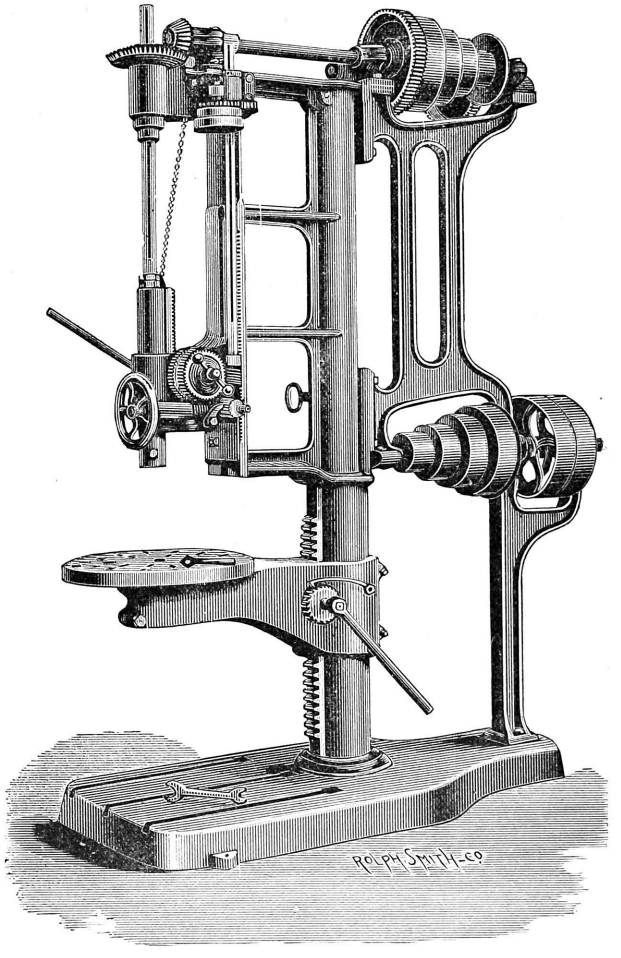
Weight, - 3,040.

No. 2 Iron Drilling Machine.

Bores to centre of 45 Inches.

This new and improved tool combines many excellent qualities which specially adapt it to the requirements of either large or small shops. It consists of a heavy column and foundation plate; this extends out on the back to carry the frame containing the countershaft, cones and gear; this frame being attached to the column gives it great rigidity in boring work on the foundation plate. The bevel gears on top are cut. The headstock carrying the drill bar can be raised and lowered to suit any work. The drill bar is 2½ in. steel, is fed by wrought-iron rack, steel pinion and friction worm gear, which can be changed at pleasure to lever on hand feed. The bar can be thrown up quickly by the lever and is counterbalanced by chain and weight. The table swings on a heavy arm which can be raised and lowered by a rack and pinion; it can be thrown to one side or brought to any position and fastened with binding screws. The cones are large diameter and wide face.

The fast and loose pulleys are 15 x 4 in. and should be run at 150 revolutions per minute. Weight, 3,040 lbs.



No. 3 Iron Drilling Machine.

Bores to Centre of Three Feet.

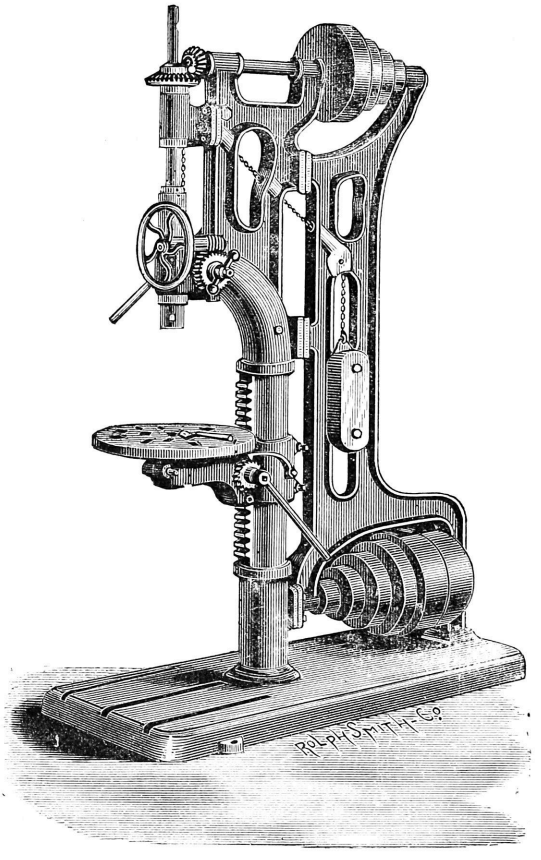
Weight, - 2,130 Lbs.

No. 3 Iron Drilling Machine.

Bores to centre of 32 Inches.

This new and improved tool combines a great many excellent qualities, which specially adapt it to the requirements of either large or small shops. It consists of a heavy column and foundation plate ; this extends out on the back to carry the frame containing the countershaft, cones and gear ; this frame, being attached to the column, gives it great rigidity in boring work on the foundation plate. The bevel gears on top are cut. The head-stock carrying the drill-bar can be raised and lowered to suit any work. The drill-bar of 2¼ inch steel is fed by wrought-iron rack, steel pinion and friction worm gear, which can be changed at pleasure to lever or hand feed. The bar can be thrown up quickly by the lever, and is counterbalanced by chain and weight. The table swings on a heavy arm, which can be raised or lowered by a rack and pinion. It can be thrown to one side, or brought to any position and fastened with binding screws. The cones are large diameter and wide face.

The fast and loose pulleys are 15 x 4 in. and should run at 150 revolutions per minute. Weight, 2,130 lbs.



Improved No. 4 Drilling Machine.

Weight, - 1,400 Lbs.

Improved No. 4 Drilling Machine.

This cut represents our new No. 4 Drill. This machine, when so ordered, is arranged with back gear and automatic power feed. It is furnished with 1½ inch steel spindle, and the feed is operated by a wrought cut rack fed with a hand, wheel and worm which can be detached at will and the spindle run quickly up and down, with a counterbalanced lever. The bevel gears on top are cut. Cones have wide face. The foundation plate extends in front and is slotted for work. The drill bores to the center of 22 inches and is a substantial and rigid machine. Weight, 1,400 lbs.

Pulleys on countershaft 12 inches diameter and 4 inch face; 150 revolutions per minute.

Improved Lever Drilling Machine.

This drill is specially adapted to agricultural implement shops, but can be used to great advantage in many other factories. It consists of a cast frame planed in front for the table, which is gibbed on.

The drill spindle is stationary, and the table is raised and lowered by a lever which has a lock attachment by which it can be run up or down to any position. It can bore holes up to ¾ inch diameter, has countershaft and hangers with 4-speed cone. Photograph can be had on application.

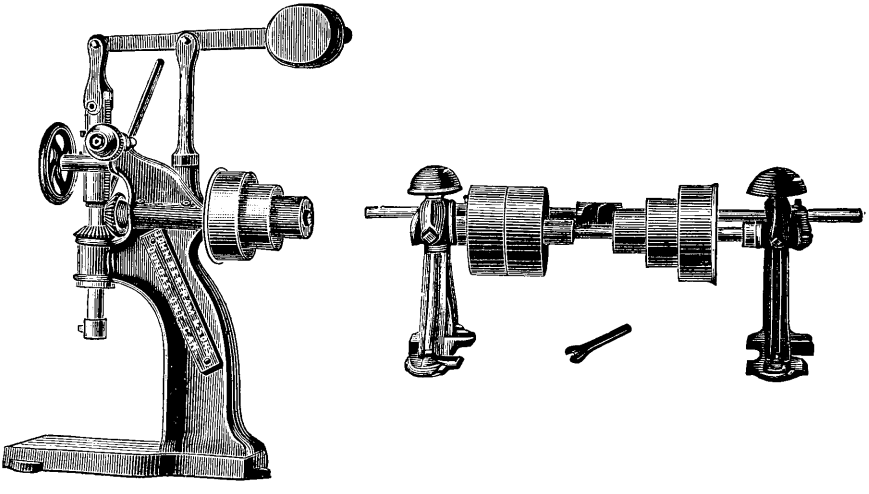
Fast and loose pulleys 10 x 2½ inches, and should run at 150 revolutions per minute. Weight, 550 lbs.

Suspension Drill.

This drill is a powerful tool compared with its low price.

The spindle is 2¼ diameter and is pressed down with 2 screws connected with cut gear. It has a stroke of 18 inches. Without the back gear it will bore from 2 inches down. With back gear attached it is largely used by boiler makers for head sheet drilling, and has ample power for anything that way. Photo can be had on application.

Tight and loose pulleys 11 inches diameter and 3 inch face. Revolutions, 150 per minute. Weight, 600 lbs.



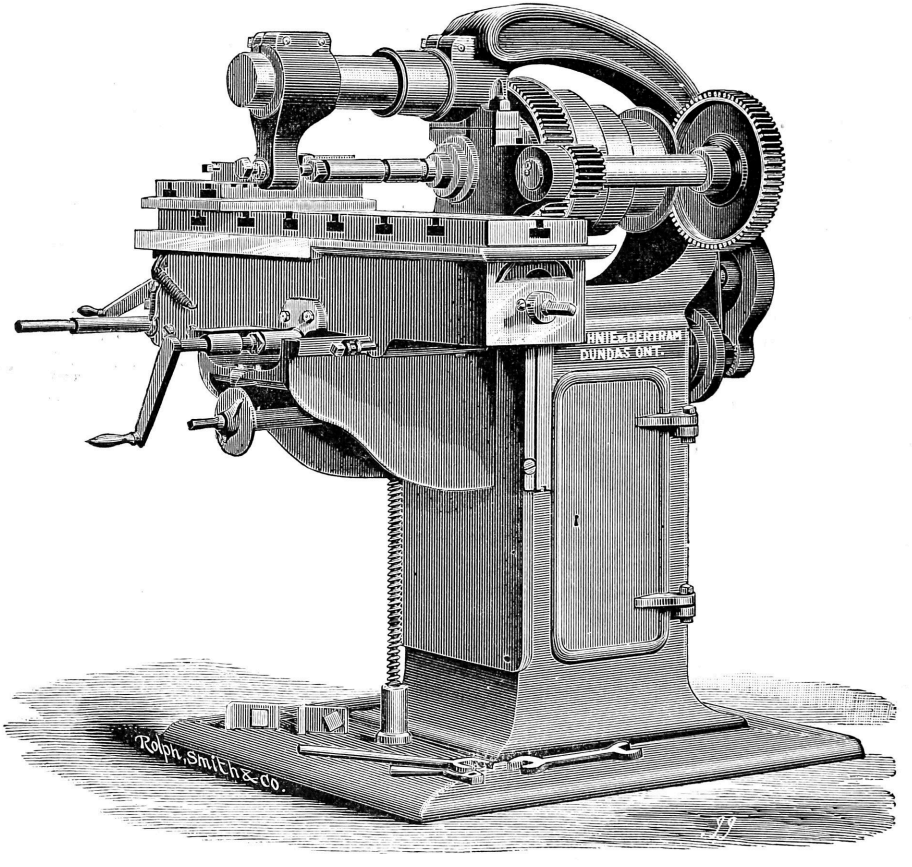
Bench Drill with Lever or Hand Feed.

Bench Drill with Lever or Hand Feed.

This represents our bench drill for small work. It has steel spindle and sleeve with rack motion for quick operation and worm hand feed if required. The mitre gear is cut and the spindle counterbalanced so that the high speed enables this machine to bore small holes. It is fitted with Morse taper and has countershaft with fast and loose pulleys 9 in. x 3 in., and should make 175 revolutions per minute. It bores to the centre of 14 inches and the greatest distance from spindle to base is 13 inches, and drills from $\frac{3}{4}$ in. down.

Four Spindle Drill.

For locomotive work, such as frames, head sheets, furnace rings, etc., has four steel spindles, 2 3-16 in., with a vertical automatic movement of 10 in., and can close to 14 inches. Each spindle can be adjusted independently, or the whole can be moved horizontally by a screw. The machine is powerfully geared, and has a bed plate planed on top and a gap in centre for rings, and an angle plate for securing work. Distance between standards, 8 feet 6. Countershaft, fast and loose pulleys 18 x 6, and should run at 175 revolutions per minute. Weight, 11,000 lbs. Photograph on application.



Nos. 1 *and* 2 *Universal Milling Machines.*

No. 1 Universal Milling Machine.

This machine is of a substantial and heavy construction and is almost an indispensable tool in the machine shop. The table has a longitudinal travel of 36 inches, and can be brought out from the face of the machine 9 inches, has automatic stop feed, and the slots in all directions milled out. The spindle is of cast-steel, extra heavy, runs in bronze bearings, has compensating adjustment in case of wear, and is bored throughout its entire length for driving out the arbors. The nut or main slide is capable of adjustment for wear ; the elevating screw is furnished with index plate. Cones have wide face, and machine throughout is of the best workmanship, material, and finish. Machine is furnished with a suitable vise, countershaft and wrenches all complete. Fast and loose pulleys on countershaft 12 x 4 inches and should make 150 revolutions per minute. Weight, 3,500 lbs.

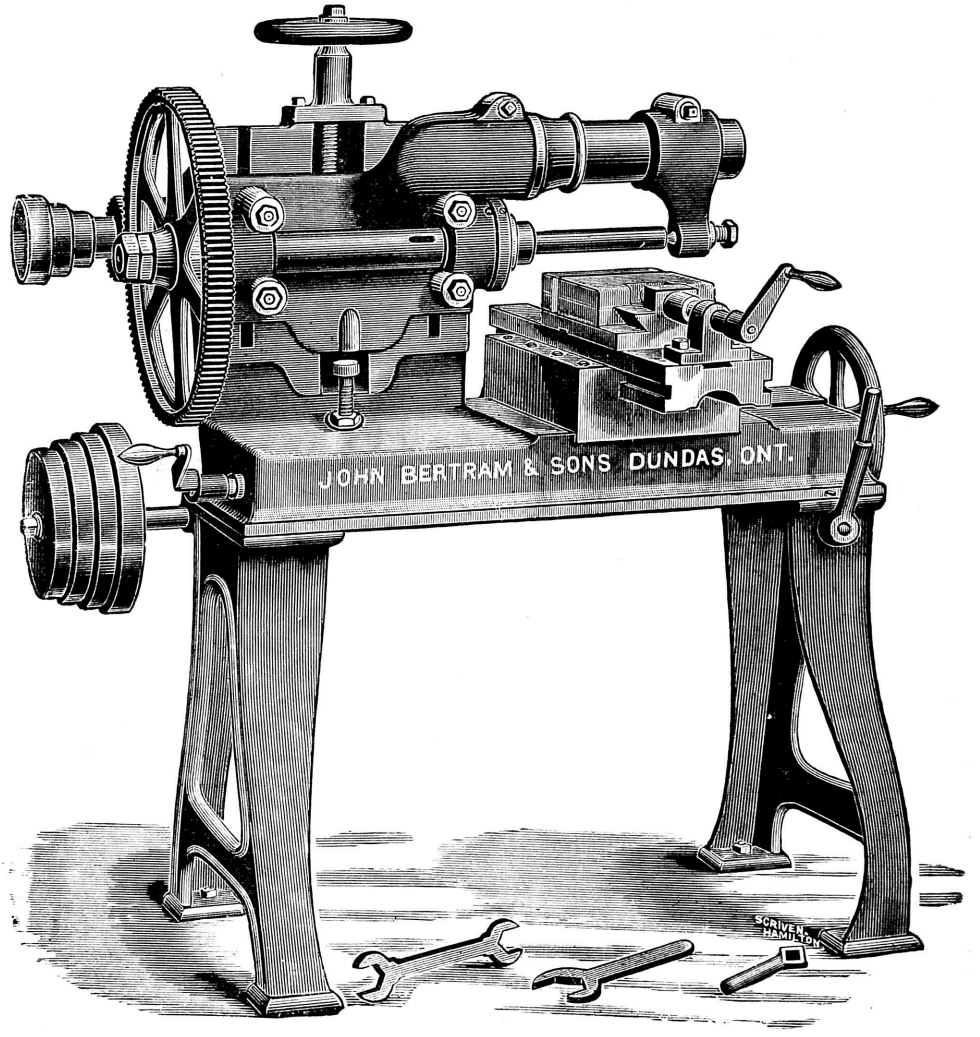
No. 2 Universal Milling Machine.

This machine is an excellent counterpart of our No. 1 machine, being somewhat of a lighter construction. The table has a longitudinal travel of 24 inches and can be brought out from the face of machine about 7 inches. Machine is furnished with a suitable vise, countershaft and wrenches all complete. Fast and loose pulleys on countershaft 10 x 4 inches and should make 150 revolutions per minute. Weight, 2,000 lbs.

ATTACHMENTS.—We can attach to the Nos. 1 and 2 universal machines, if so ordered, any of the following : Spiral cutting attachment, dividing head-stock with index plates for cutting gear, etc., and milling centres. Photographs of these can be had on application.

No. 1 Plain Milling Machine.

This machine is an exceptionally strong, heavy and substantial tool, and is particularly adapted for all kinds of heavy locomotive work, etc. Fast and loose pulleys on countershaft are 18 x 6 inches, and should make 150 revolutions per minute. Weight, 3,500 lbs. Photographs on application.



Horizontal or Plain Milling Machine.

Medium Size.

Weight - 1,400 Lbs.

No. 2 Horizontal or Plain Milling Machine.

Medium Size.

This machine is specially designed to meet a want long felt in all engineers' shops and factories; being placed at a moderate cost it is within the reach of all. It consists of a strong frame cast in one piece, with upright standard having the spindle carrier operated by a screw and four clamping bolts. The spindle is steel, running in bronze bearing, having Schiele's anti-friction curve. A strong arm projecting from the top of this carries the outside centre and the machine can be made with an outside centre and tail stock if so ordered. The cross slide is 27 in. long and has a stroke of 2 in. with a capacity of 10 in. wide and 7 in. high. The feed is automatic with stop motion, also a quick motion with hand wheel. It has a vice which can be swung to any angle, and the back gear having link motion and being thus always in proper adjustment the machine is easily operated. A gear cutting attachment can be put on which will cut all numbers up to 75 and all even numbers to 150.

Fast and loose pullies on counter 10 x 3, and should make 175 revolutions per minute. Weight, 1,400 lbs.

Self-Acting Lathes.

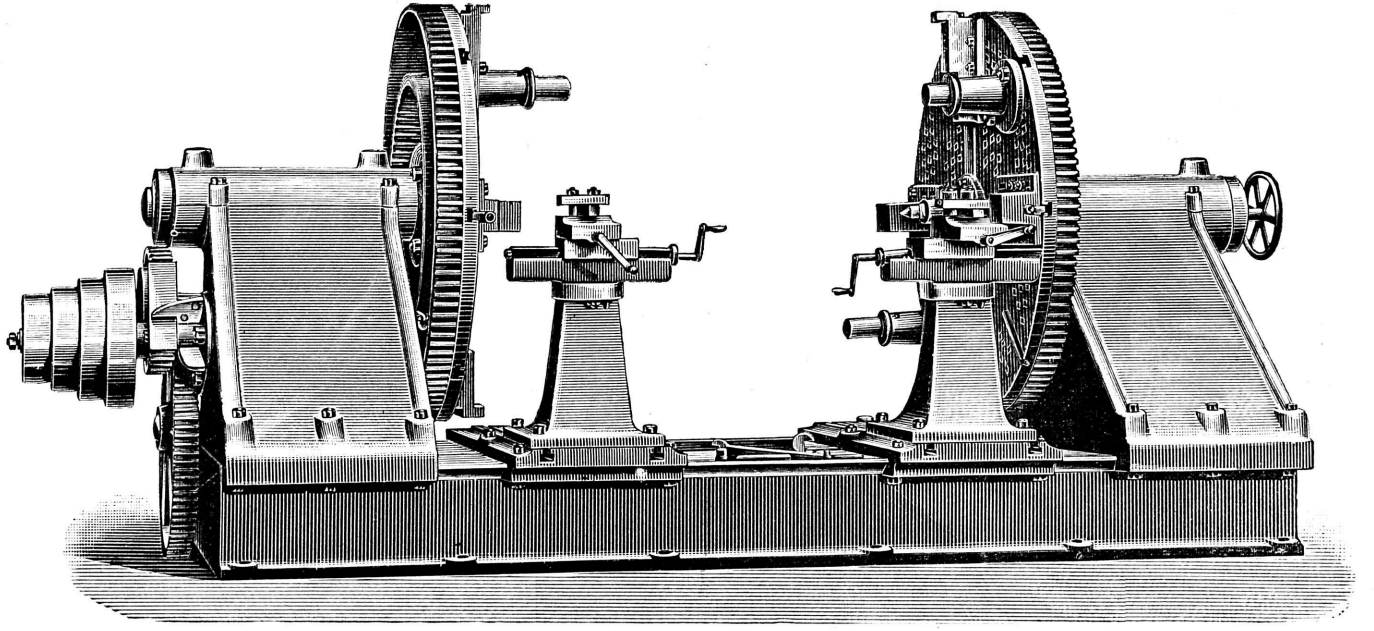
No machine tool occupies such an important position in the workshop as the lathe. Being the first invented, and the most useful, considerable attention has been paid to its improvement. The various standard sizes of lathes made hitherto by this firm have undergone considerable improvement. Up till the present year a demand has arisen for a heavier and more efficient tool than any hitherto made in Canada or the States.

To meet this new demand we have added to our list of tools a complete new line of self-acting lathes, made with all the latest modern improvements. The form of our live headstock being cored from the bottom presents on the top a close surface arched up to the back housing to meet the end strain, with heavy work in the centres. The back arbor bearing is solid in the head and carries the swing plate for reversing gear. The housings carrying the back gear are heavy to resist strain in cutting large diameters. The cones of all lathes up to 24 inch swing have four speeds, above that five speeds; and all are guarded to effectually prevent the belts running into the gear. The spindles are steel and are all proportioned to the different standard sizes, and to show the increase of size over the old pattern we give one example: The 36-inch new standard has front bearing 4½ in. diameter and 7 in. long, while the old was 3 in. diameter and 4½ in. long. The front boxes are made of bronze. All the centres are made of uniform taper to guages. The saddle has long bearing on the ways, that of the 36 in. being 48 inches long. The cross-slide block is made in all cases to carry a common tool block, which can be removed and a compound rest substituted if so required. The cross-feed can be completely detached. The leading screws are steel, and are 4 threads per inch in all lathes up to 20 in. swing, and over that 2 threads per inch. A spindle running through the saddle operates the nut from the front. The swing plate carrying change gear is set by a quadrant and binder, so that a change can be made rapidly. The rod feed is driven by a steel chain and change gear, distinct from and independent of the screw gear. The rod feed has friction disks, the worm and wheel being steel and bronze. The tail stock is double bolted and projects over the centre spindle for rigidity. The bed is made in all our lathes with inverted V shears. The two

sides are connected by hollow cross girts, which is superior to the single girt, giving more rigidity to the bed and preventing torsion. They are all planed to proof guages, and all the working parts are scraped to bearings and the alignment of centres for boring, turning, and cross-facing made correct.

When a lathe is made of the gap style that part of the bed below the gap is made hollow or cored section, and in the largest class is flanged for bolting on the foundation piers, and all the bed round the gap is cast extra heavy, and a piece is fitted in the gap in such a manner as to always insure a fit for the carriage when in place, making it a plain lathe. When a lathe for shafting is required, we supply an attachment having one tool on back and two on front, the latter being made to elevate for a fine adjustment. This attachment fits on the cross-slide, the base being a pan for conveying the water from the working parts.

Since the above changes were made in the designs and get-up of our lathes, this firm have been pushed to their utmost capacity to supply the demand, 18 of one size alone being shipped during eight months of 1887.

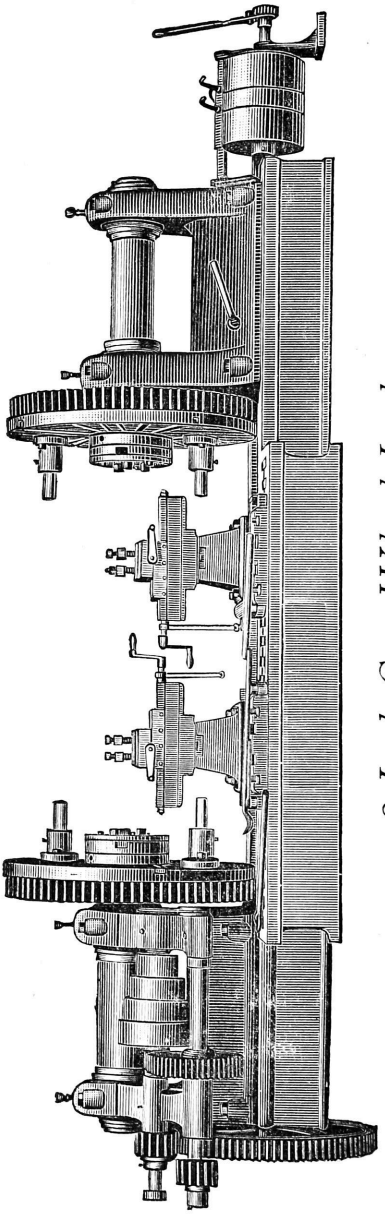


79--Inch Locomotive Wheel Lathe.

Weight, - 34,000 Lbs.

79 Inch Locomotive Wheel Lathe.

This cut represents our Wheel Lathe of new and approved design. The head-stocks are powerfully geared, the first motion being cut giving a high belt velocity for turning steel tires. They are so arranged that one face plate can be changed to fast speed for boring. The head-stocks and rest-saddles are gibbed to the top surface of the bed, and can be moved to admit 8 feet 6 inches between face plates. The lathe swings 79 inches in diameter. The two compound slide-rests are fitted on cross-saddles, which allow them to be quickly set to any position within the range of the lathe. They are operated by ratchet feeds worked from overhead rockshaft. This lathe has great solidity while turning any diameter as the pressure of the cut always falls within the bed. The cone pulley is of large diameter, wide face, and has four grades of speed. Countershaft, fast and loose pulleys 24 in. diameter and 7 in. face, making 140 revolutions per minute. Weight 34,000 lbs.

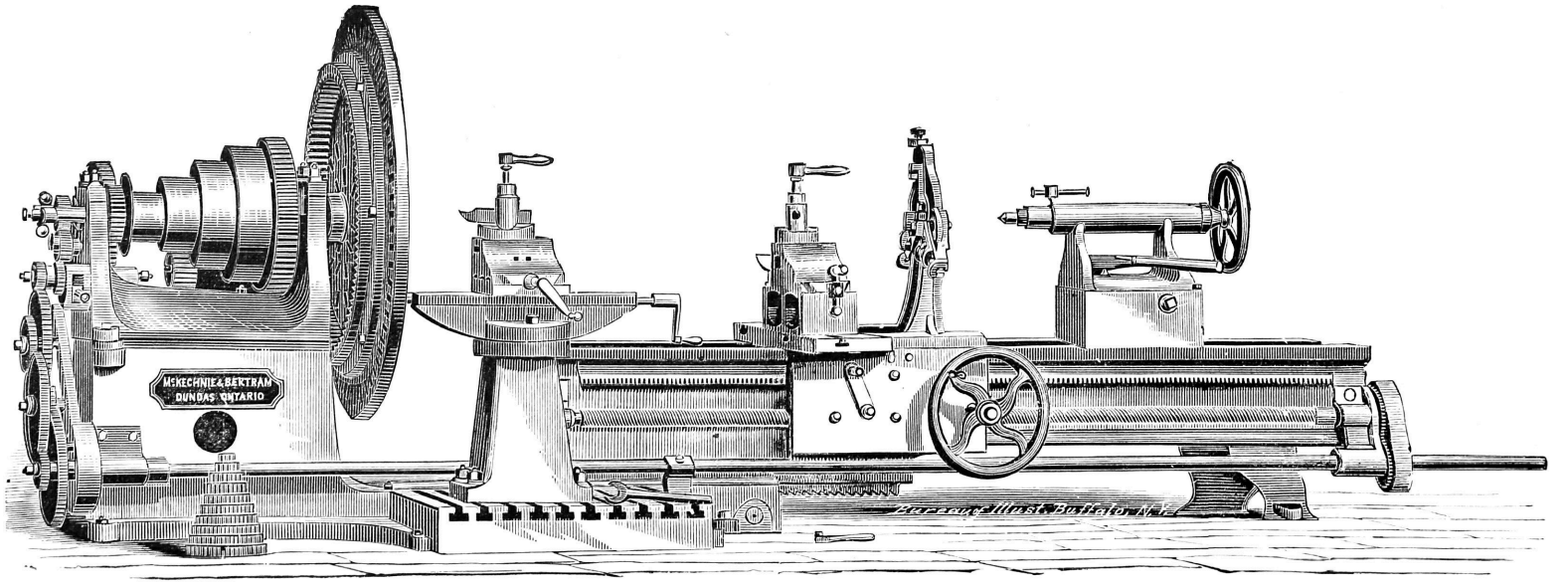


48-Inch Car Wheel Lathe.

Weight, - 26,000 Lbs.

48-Inch Wheel Turning Lathe.

This lathe is specially adapted for turning wheel tires, and is extra powerfully geared. Two pinions on the outside of head-stock serve for changing to double or triple gear. No centres are used. The axle is gripped close to the hub of wheels by two universal chucks with steel dogs, thus ensuring true work and complete absence of vibration so common when centres are used, and allowing heavier feed and more rapid work. The movable head-stock is operated by a screw and reversing belt for quick removal of the work. Fast and loose pulleys on countershaft, 24 x 6, and should make 130 revolutions per minute. One set gripping dogs furnished. Weight, 26,000 lbs.



Nos. 1 and 2 Break Lathes.

Weignt, [illegible] No. 1, 16,500 Lbs.; - No. 2, 14,300 Lbs.

No. 1 Break Lathe.

This cut represents our No. 1 Break Lathe.

The foundation plate is cast in one piece, and extends below and supports the main head, the sliding bed, and the pedestal and rest for turning pulleys. The main head is treble geared, the last motion being an internal gear on the back of face plate. This can be changed rapidly from treble to single gear when required.

The spindle is 5½ inches diameter and steel. The sliding bed is moved to and from the face plate by a rack to suit any width of pulley. On the saddle of this is a compound slide rest. The foundation plate is extended out in front of the brake, and is slotted for a heavy pedestal, the height of which coincides with that of the carriage, so that the compound rest can be shifted from one to the other as required.

The motion is transmitted to the leading screw by a heavy shaft, extending from the main head to the end of the bed where the shaft and screw are connected by heavy spur gear.

The brake can be extended to turn a pulley 7 feet diameter and 36 inches wide. The lathe swings 42 over the bed.

Countershaft, steady and follow rests, and a full set of screw cutting gear and wrenches are furnished.

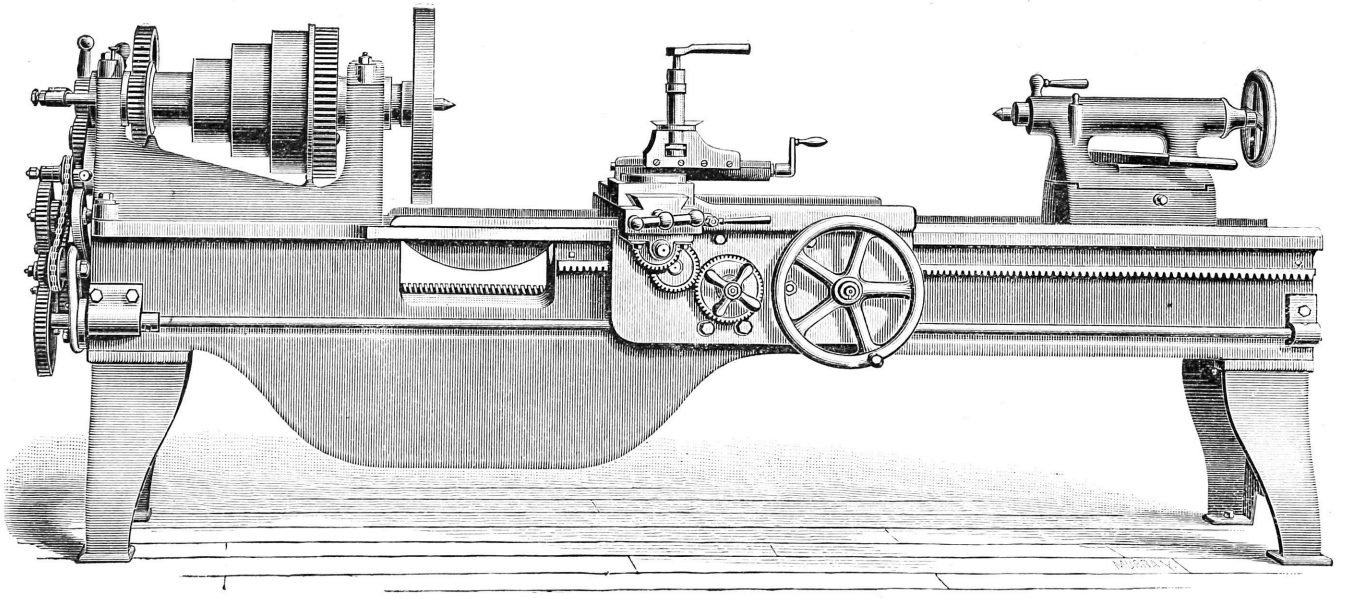
Tight and loose pulleys on countershaft 24 inches diameter and 5½ inches face. Revolutions per minute, 70. Weight of lathe, 16,500 lbs.

No. 2 Break Lathe.

This lathe is similar in style and pattern to that on above, and all the parts correspond to description, but are of reduced size.

The spindle is cast steel, 4½ inches diameter. The head is treble geared, with all the shifting appliances of No. 1 Lathe. The foundation plate is the same, carrying the sliding bed, main head and pedestal, with compound slide rest.

The leading screw is geared from the head as in No. 1 Lathe. The bed is shifted to and from the face plate by a rack and lever. The brake swings 6 feet in diameter and admits 36 inches in width. The swing over bed is 36 inches. This lathe has the advantage for general machine shops of boring and turning pulleys at one and the same time. Weight, 14,300 lbs.



36 Inch and 40 Inch Gap Lathes.

Weight, - 4,000 and 5,500 Lbs.

No. 3 Break Lathe.

This lathe swings 5 feet 2 inches in brake and over bed as No. 2, but without the pedestal and rest in front. The foundation plate extends below and carries the main head and sliding bed, which is shifted in the same manner as above.

The head has the ordinary single or back gear. The gear is of large diameter and wide face, giving this lathe strong turning capacity.

The cones are extra wide face. The spindle is of cast steel.

The slide rest can be removed, leaving the carriage plain on top for boring cylinders. On all the above lathes, countershaft, steady and follow rests, change gear and wrenches are furnished.

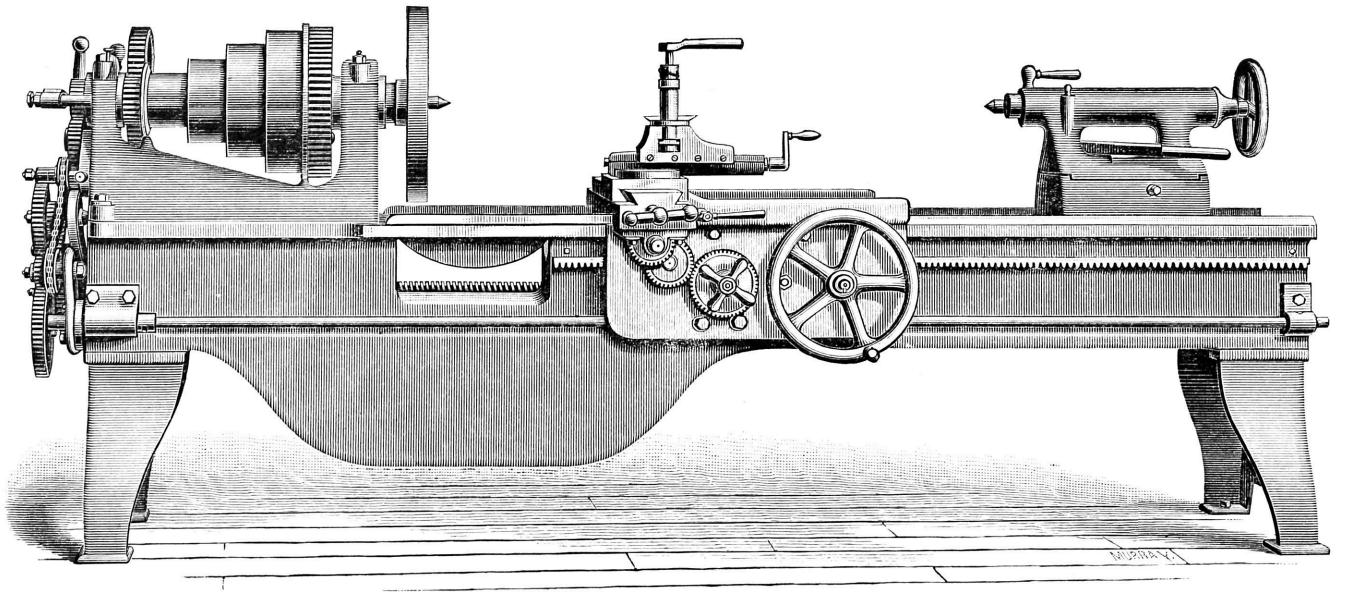
Tight and loose pulleys on countershaft of the above lathes, 18 inches diameter, 5 inch face, 100 revolutions per minute. Weight, 9,050 lbs.

36 In. and 40 In. Gap Lathes.

This represents our improved style of Gap Lathe. The headstocks are strong and massive, with bronze bearings and large spindle, wide cones and powerful gear. The saddle has long bearing on the ways, and is slotted for bolting on pieces for boring. The bed is cored with box ribs, and the piece below the gap is double, making this part of the bed strong and rigid. A piece is fitted in the gap making it a plain lathe, which can be removed and put in place perfectly without altering the alignment of ways. The general design of lathe otherwise is the same as our 24 in. pattern. With it are a large face plate for gap, a medium and cross to use when gap is closed, a steady and follow rest, countershaft, fifteen changes of screw gear, and wrenches.

36 in. Gap 10 ft. bed. Countershaft pullies 12 x 3 inches, 150 revolutions per minute. Weight, 4,000 lbs.

40 in. Gap 12 ft. bed. Countershaft pullies 15 x 3½ inches, 150 revolutions per minute. Weight, 5,500 lbs.



50 *Inch Gap Lathe.*

Weight, - 7,300.

50 Inch Gap Lathe.

This lathe is made heavy and solid. The bed below the gap extends back to the end of bed. The gap is 50 in. swing and 18 inches wide. The cones, which have 5 steps for 4 in. belt, and gear are large diameter and wide face. The front bearing is bronze and is 4 inches diameter and 6½ inches long. It has, like all our Gaps, a piece fitted in, making it a plain lathe. It is well adapted for all classes of heavy work—pulleys and shafting, engine work—being always made with our style of cross feed, which can be completely detached at any time. The tailstock is double bolted. The saddle is heavy and has long bearing on the ways. The driving mechanism of rod and screw feed are separate and distinct, but having the advantage of reversing direction.

The pulleys on countershaft are 18 in. diameter and 5 in. face, and should make 100 revolutions per minute.

Countershaft and hangers, steady and follow rests, wrenches, and complete changes of screw cutting gear are furnished. Weight, 7,300 lbs. Photograph on application.

60 Inch Gap Lathe.

This lathe, being the largest Gap that we make, is made massive and powerful. The bed below the gap extends to the foundation and to the end of bed, and is flanged for bolting to stone piers.

The spindle has front bearings $4\frac{3}{4}$ inches diameter and 7 inches long, with bronze bearings. The cones are 5 steps for $4\frac{1}{2}$ inch belt. The saddle has 48 bearing on the ways. The compound rest can be removed for cylinder boring, and with the cross feed can face 60 inches diameter. The tailstock is double bolted, like all our lathes from 24 inches up, and is made very heavy. The rod and screw feed are independent. The cross feed can be completely thrown out for security.

The countershaft has fast and loose pulleys 21 inches diameter and 5 inches face; steady and follow rests, wrenches are furnished, with complete changes of screw gear.

All screws and spindles are steel and all nuts case hardened. Weight, 8,500 lbs.

Lathes With Conical Bronze Bearings.

V or Flat Shears.

A necessity has arisen, from the rapid increase of the railway system of Canada, for a class of tools specially adapted to the machine and locomotive shop.

With a view to this end we have lately added to our list of manufactures a style of lathe equal in weight and solidity to the English, but having smooth, accurately cut gear, and all the movements of the rest and feed of a handier style.

A description of the No. 2 pattern will answer for the rest. The gear on head is 3 inches and 2½ face. Cone for 4½ inch belt, smallest speed, 8 inches diameter. Bearings conical and of bronze.

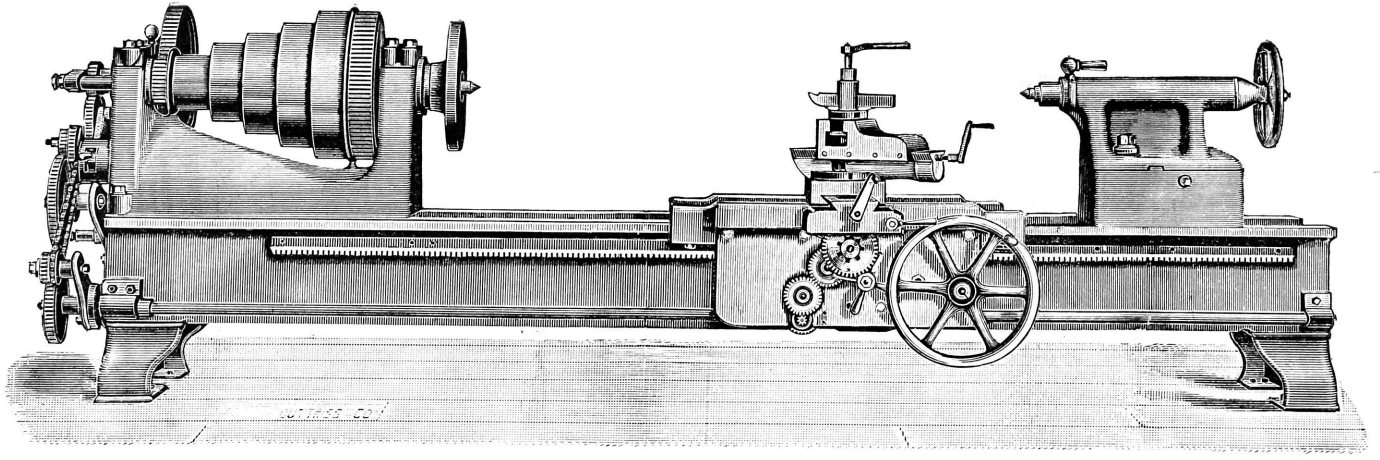
The back journal on spindle is movable, with lock nuts for adjustment, with a back centre and bridge to secure the whole from end play. Reversing gear and attachment for shifting same secure and strong. The leading screw is 2 threads to the inch.

The rod feed is independent of screw. All the changes from rod feed to screw cutting, or from either to cross feed, can be effected momentarily by the operator from the front of the rest.

All the small gear and all parts subject to wear are made of steel. The bed is cast with hollow or box ribs, and all these lathes are made with or without compound slide rests as required.

Countershaft Pulleys		No. 1,	24	in. diameter,	5	in. face,	100 revolutions.
"	"	No. 2,	18	"	4½	"	120 "
"	"	No. 3,	12	"	4	"	150 "
"	"	No. 4,	10	"	3	"	150 "

Weight, No. 1, 8,500.
Weight, No. 2, 5,800.
Weight, No. 3, 3,000.
Weight, No. 4, 2,000.



36 Inch and 42 Inch Lathes.

Weight, - 9,500 and 12,000 Lbs.

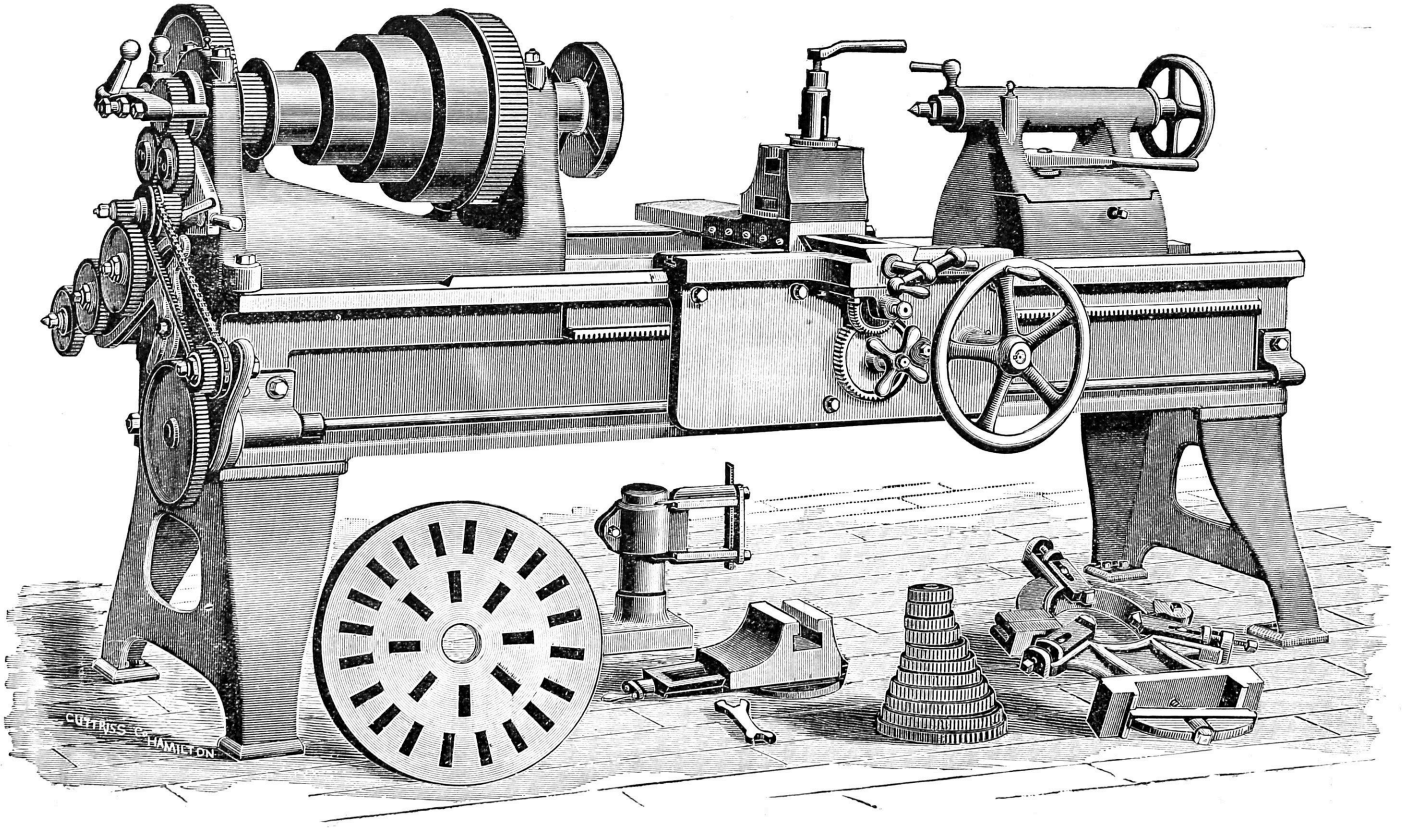
Engine Lathes, New Style.

36 In. and 42 In. Lathes V or Flat Shears.

These lathes are specially adapted for heavy engine work. They have five speed cones, of large diameter and wide face. The 36 in. takes a 4¼ in. belt. The front bearing of spindle is 4¾ in. diameter and 7 in. long. The headstock is of cored section built up to take the end thrust, having guards to prevent the belt from running into the gear. The bearings are bronze. The saddle is heavy, having a bearing of 48 in. on the ways. All feeds, longitudinal and cross, are automatic, with friction discs. The tailstock has two binding bolts, is extra heavy, and projects over the front to defend the centre bar from spring while at short work, enabling the operator to work from the front of tool rest, which is the handy feature in all our lathes. The 42 in. lathe has cones for 5 in. belt, front bearing of spindle is 6¼ in. diameter and 8 in. long, with bronze bearings, and has all the main features described in the 36 in. lathe.

36 in. Lathe 14 ft. bed. Countershaft, 100 revolutions per minute. Weight, 9,500 lbs.

42 in. Lathe 14 ft. bed. Countershaft, 75 revolutions per minute. Weight, 12,000 lbs.



26 Inch Engine Lathe.

Weight, - 5,500 Lbs.

Engine Lathes, New Style.

24 and 26 Inch, with V or Flat Shears, 26 Inch Swing

This represents our new style of Engine Lathes. They have all the latest modern improvements to make them heavy, strong and durable. All are made with compound rests, for which an ordinary tool block can be substituted. The running heads are unusually heavy, the spindle bearings large with bronze front bearings and cones of wide face.

The cross feed can be completely thrown out of gear when not required, and will face off the full swing of the lathe.

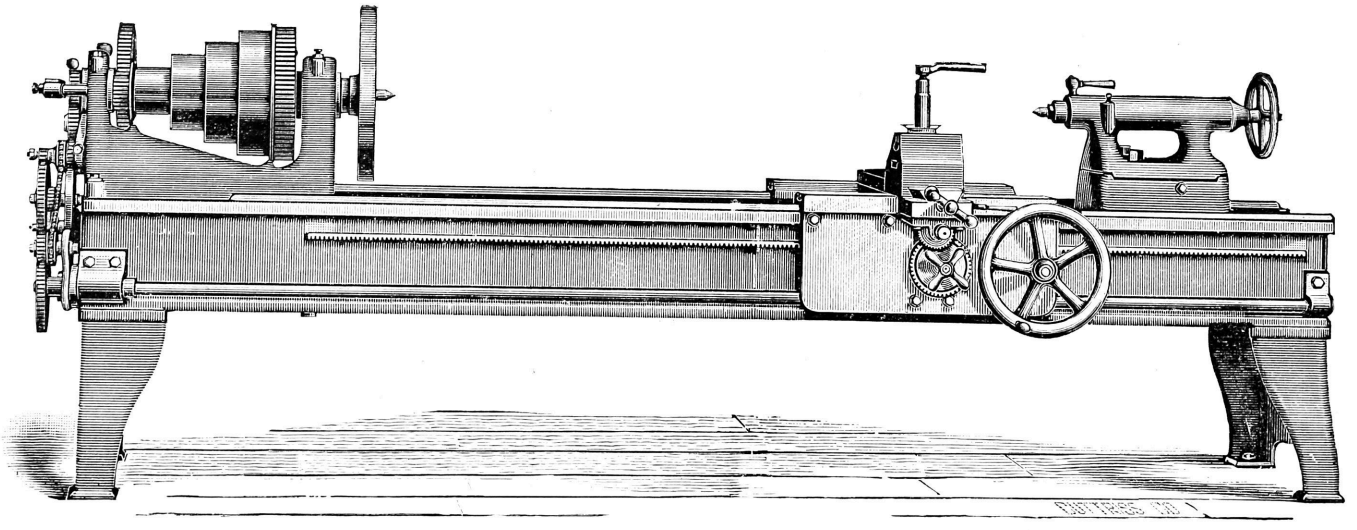
The carriage has long bearings on the V's, which have large surface. The feed gear is simple, having phosphor bronze worm wheel and steel worm.

The leading screw is steel and all the working surfaces are scraped, and being worked with templates, jigs and standard guages make them interchangeable.

A steady head and follow rest with set of wrenches are always furuished, but a 3 tool rest for shafting can be supplied if required, which can on the 30 in. lathe run 200 feet of 2½ in. shafting per day.

26 in. lathe 12 ft. bed. Countershaft 15 in. x 3½ in., 150 revolutions per minute. Weight, 5,500 lbs.

These lathes are made with gap to swing 36 in., 40 in. and 50 in.



20 *Inch and* 24 *Inch Engine Lathe.*

Weight, - 3,600 and 5,000 Lbs.

Engine Lathes, New Style.

With V or Flat Shears, 20 and 24 Inch Swing.

This represents our new style of Engine Lathes. They have all the latest modern improvements to make them heavy, strong and durable. All are made with compound rests, for which an ordinary tool block can be substituted. The running heads are unusually heavy, the spindle bearings large with bronze front bearings and cones of wide face.

The cross feed can be completely thrown out of gear when not required, and will face off the full swing of the lathe.

The carriage has long bearings on the V's, which have large surface. The feed gear is simple, having phosphor bronze worm wheel and steel worm.

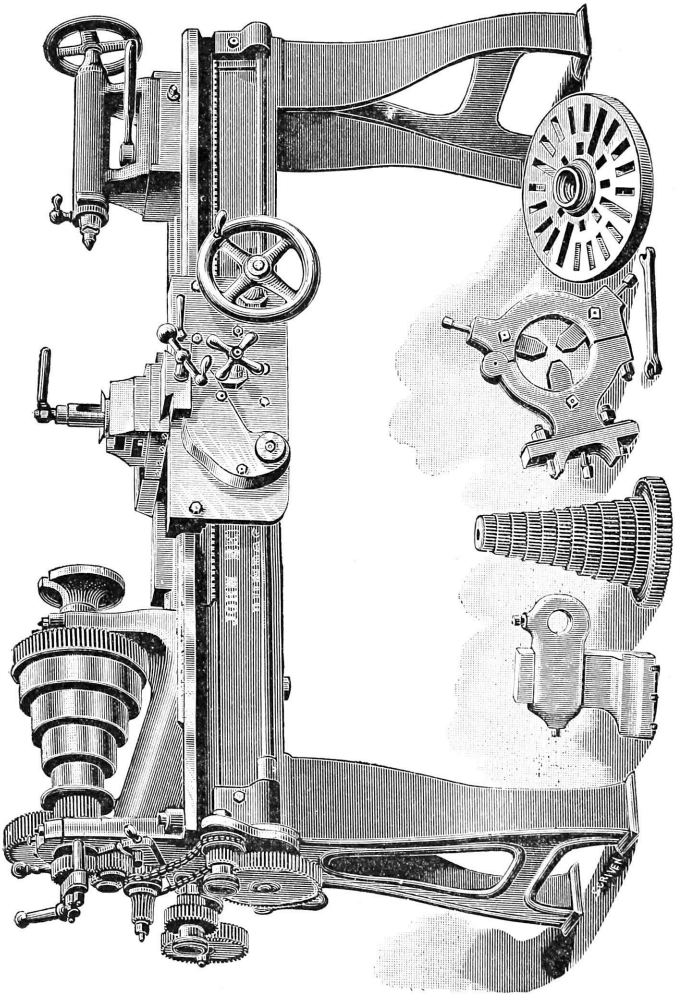
The leading screw is steel and all the working surfaces are scraped, and being worked with templates, jigs and standard guages make them interchangeable.

A steady head and follow rest with set of wrenches are always furnished, but a 3 tool rest for shafting can be supplied if required, which can on the 30 in. lathe run 200 feet of 2½ in. shafting per day.

20 in. lathe 10 ft. bed. Countershaft 12 in. x 3 in., 150 revolutions per minute. Weight, 3,600 lbs.

24 in. lathe 12 ft. bed. Countershaft 15 in. x 3½ in., 150 revolutions per minute. Weight, 5,000 lbs.

These lathes are made with gap to swing 36 in. and 40 in.



16 *Inch Lathe.*

Weight, - - 2,000 Lbs.

16 Inch Lathe.

This cut represents our 16 inch lathe with inverted V shears. The design of this lathe is new. The live headstock has wide cones and gear, bronze front bearings, 2 1-16 inches diameter and $3\frac{1}{2}$ inches long. The headstock is pivoted below the front housing for alignment.

The carriage has long bearings on the bed, and all the changes from screw to rod and cross feed are made from the front. The screw and rod driving mechanism have separate connecting gear. The gear in apron has steel worm and bronze wheel, and pinion in rack is large diameter and brass.

Steady and follow rests, conntershaft and 15 changes of screw cutting gear, with wrenches, are furnished. Fast and loose pulleys on countershaft are 11 inches diameter and $2\frac{1}{2}$ inches face.

Weight, 2,000 lbs. Standard length of bed, 8 feet. Swing over bed, 16 inches. Over carriage, 10 inches. Between centres, 5 feet.

13 Inch Lathe, V Shears.

This lathe, the smallest we manufacture, and whlch has been got up in the most approved style, has found a ready sale in all classes of machine shops for light work.

The spindle is of cast steel, $1\frac{13}{16}$ inches diameter, with bronze bearings.

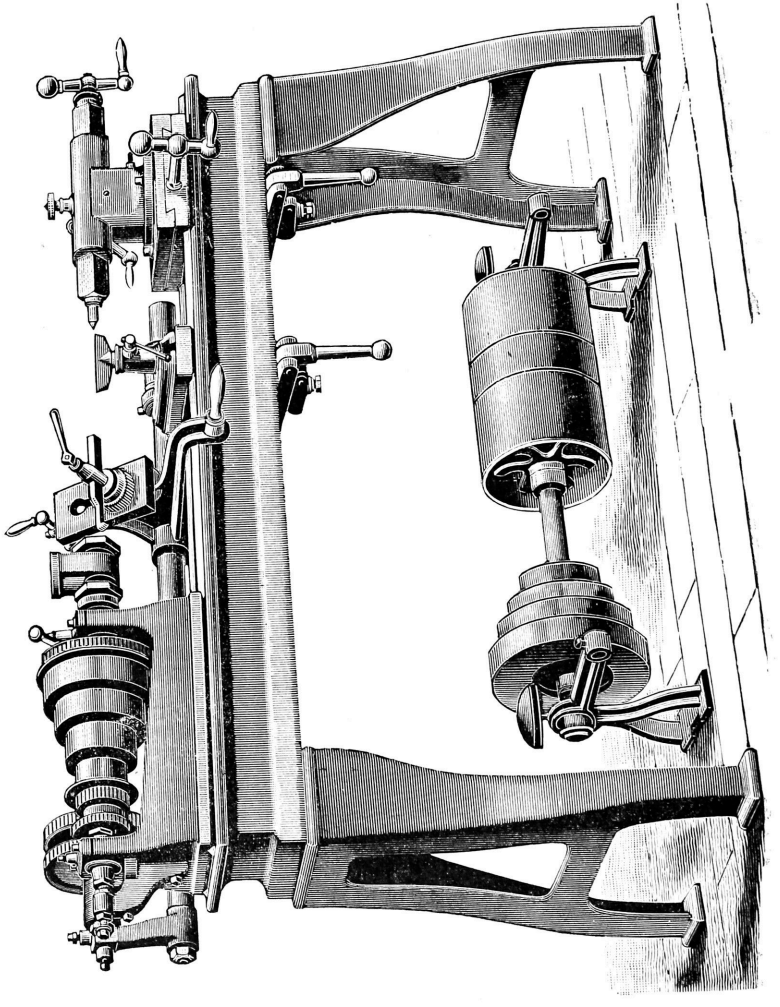
The cone has wide face, giving good belt power. It swings 13 inches.

Therod and screw feed with the gear is on the same principle as our No. 4 Lathe. It has countershaft, steady and follow rests, with suitable wrought-iron wrenches, and all work subject to wear case-hardened.

Fast and loose pulleys 10 in. x $2\frac{1}{2}$ in., should make 180 revolutions per minute. Weight, 1,200 lbs.

Cross Feed.

Cross feed is attached to all our lathes when so ordered.



Fox or Brass Finisher's Lathe.

Weight - 1,150 Lbs.

Fox or Brass Finisher's Lathe.

This lathe is specially adapted for brass work of all descriptions; turning, boring, and chasing any piece with great rapidity. The tail-stock has a square cast-steel arbor, which can be used with a centre as an ordinary lathe; or by swinging the block to any angle it can bore tapers; and having a slide with cross-traverse can do facing off as well. The square arbor can be detached momentarily from the screw and thrown back quickly, It is furnished with a compound tool rest; hand rest for hand finishing; swinging rest for chasing and 6 hubs, with chasers, 8, 10, 11, 14, 16 and 18 threads per inch. The hubs are provided with a spring which allows the operator to cut thread close up to a shoulder with great precision. The lathe is strongly built, has steel spindle and gun metal bearings, and is all finished in first-class style. Countershaft has large cone, and has fast and loose pulleys, 12 x 3 inches, with 150 revolutions per minute. Weight, 1,150 lbs. Photo on application.

18 Inch Turret Lathe, 6 Feet Bed.

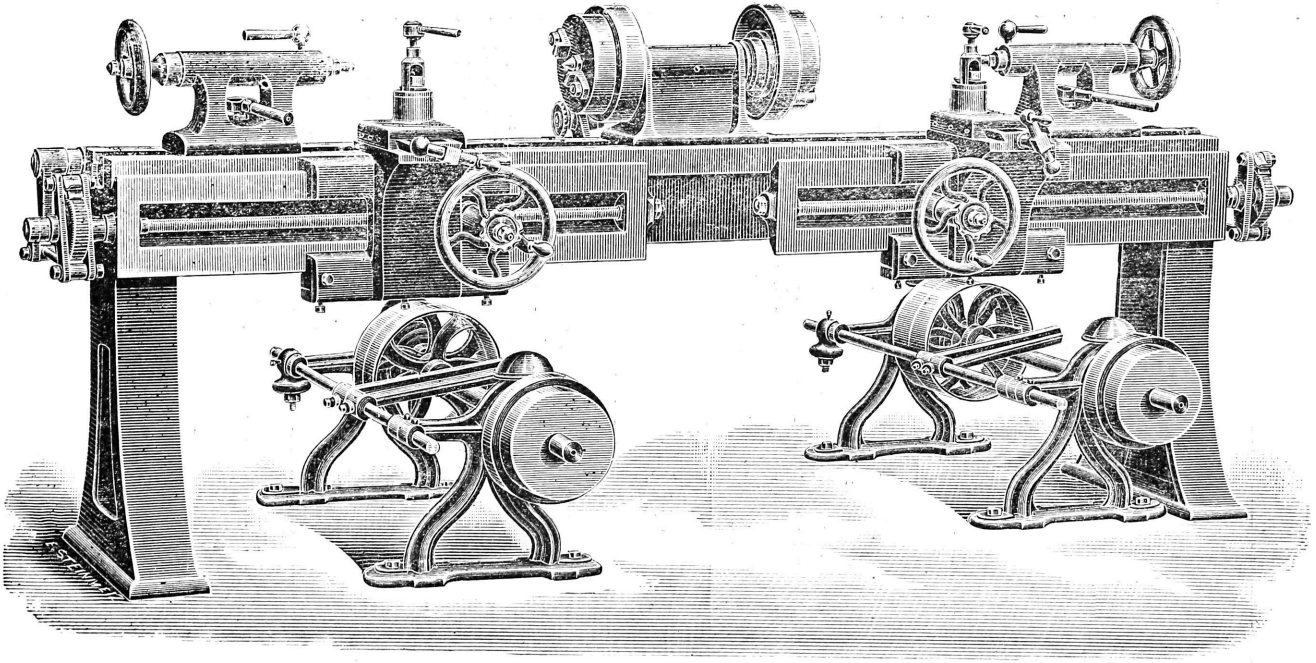
This machine is our latest improved pattern of Monitor Turret Lathe, with back gear. The main spindle is $2\frac{3}{4}$ in. at the front bearing and has a $1\frac{3}{8}$ in. hole clean through. The cone has 4 steps, large diameter, and wide face. The turret has 6 holes, bushed with steel, is 8 in. diameter, and can be operated with screw or lever. The chasing attachment has 4 hubs. The cutting off attachment is adjustable in all directions, one tool having a fine adjustment.

The fast and loose pulleys on countershaft are 10 inches diameter and $2\frac{1}{2}$ in. face, and should make 150 revolutions per minute. Weight, 1,800 lbs. Photographs sent on application.

Monitor Turret Lathe.

This lathe is the same size and swing as the above. The Monitor is Pratt & Whitney's style, with or without self-revolving attachment. The turret has 6 holes, bored to standard guages. With this lathe is added, if required, hand rest, slide rest, and chasing attachment. Weight, 1,500 lbs.

Counter has large cone, the fast and loose pulleys are 12 in. x 3 in. face, and should make 150 revolutions per minute. Photo on application.



Double Bolt Lathe.

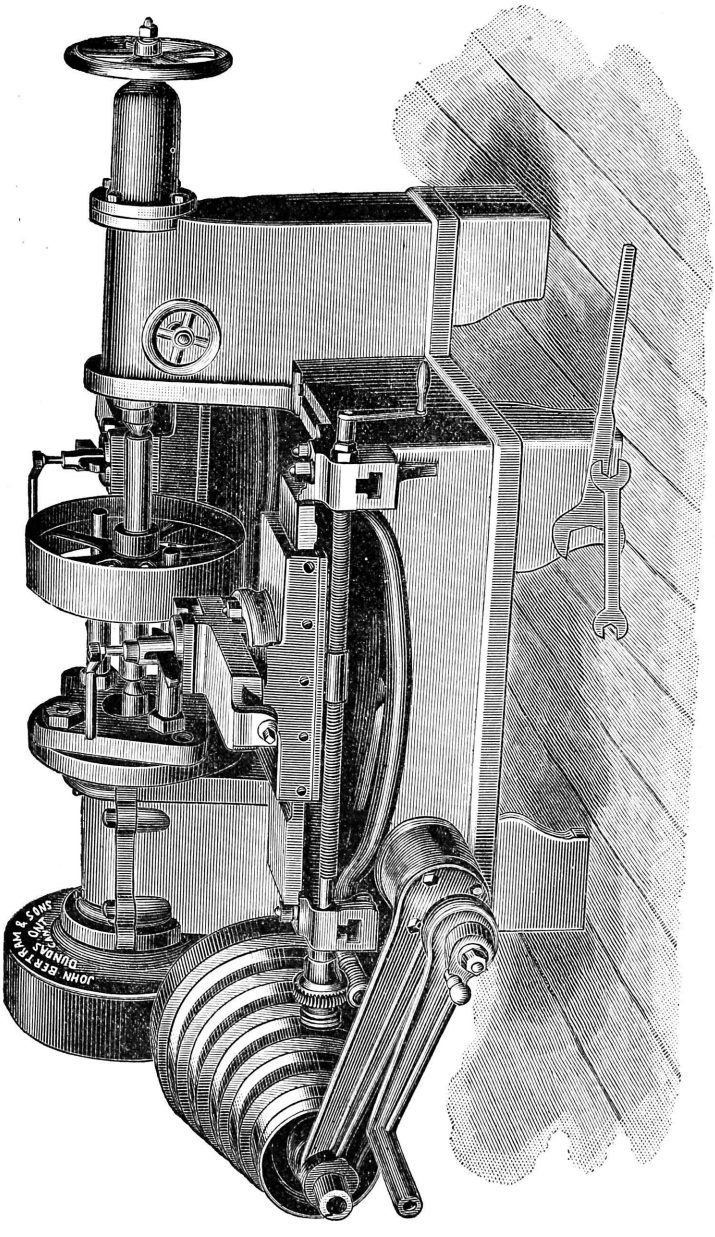
Weight, - 2,125 Lbs.

Double Bolt Lathe.

This machine is of a new and improved construction and is specially adapted for turning bolts in locomotive and engine shops The work operated on revolves on two fixed centres, thereby securing at all times true work. The feed screw is operated on by an eccentric motion, pawl and ratchets, and the rest can be moved by hand to any position. The revolving cone chucks have dogs for closing on the bolt heads. Two countershafts, shippers and set of wrenches are furnished. Fast and loose pulleys 12 in. x 4 in., and should make 100 revolutions per minute, Weight, 2,225 lbs. Photo on application.

Car Axle Lathe.

This machine is made from new and extra heavy patterns. It has bronze boxes and cast-steel spindle 4 inches diameter, with adjustable driver; spindle gear 30 inches diameter, and 3 inch face; cone pulley 19 inches diameter and 4 inch face; tailstock spindle 3¼ inches diameter. There are two graues of feed, 10 and 16 to the inch. The lathe admits between centres 8 feet 2 inches, is furnished with adjustable tool post, wrenches, countershaft and hangers. Weight, 5,000 lbs. Fast and loose pulleys 18 inches diameter and 6 inch face: 150 revolutions per minute.



Fifty-Inch Pulley and Gear Turning Machine.
Weight, - 7,920 Lbs.

Fifty Inch Pulley and Gear Turning Machine.

With Two Tools.

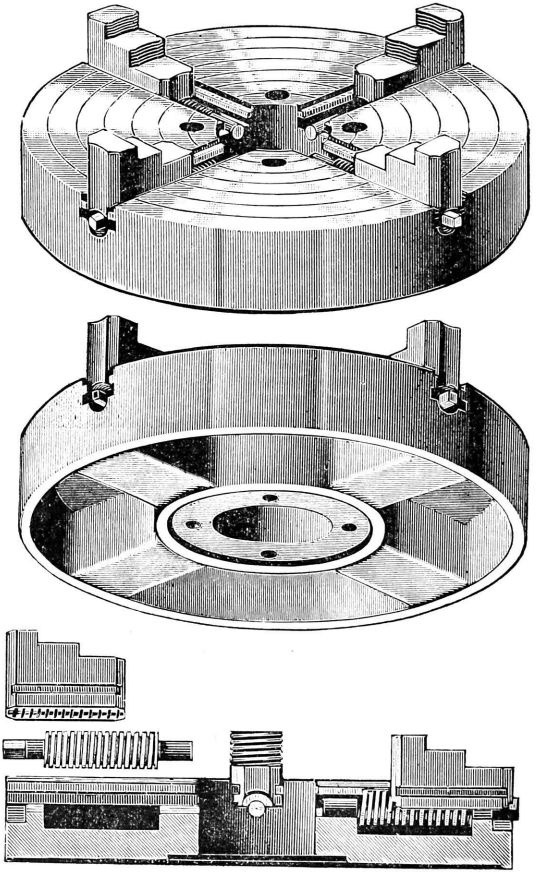
This machine has been designed specially for turning rapidly all diameters of pulleys and spur or bevel gear up to 50 inches. The frame is cast in one piece. The main spindle is driven with steel worm and gear cut 1¼ pitch, giving a uniform smooth motion. On front and back are two cross slides, which can be set square or tapering by graduated scales for crowning pulleys.

These are operated by powerful friction feeds, and the feed for both can be momentarily adjusted from ¼ inch down. On front of main spindle is an adjustable plate with drivers to bear evenly on the arms of pulleys. The smallest cone is 11 inches and the largest 24 inches, having 6 changes for 4¼ belt.

The cone shaft is bored for mandrels for polishing, a rest being provided for this purpose.

The machine cuts smoothly and with great power.

Fast and loose pulleys on countershaft are 24 inches diameter and 6 inches face, and should make 120 revolutions per minute. Weight, 7,920 lbs.



Independent Four-Jaw Lathe Chucks.

Independent Four-Jaw Lathe Chucks.

These chucks are made with 4 independent jaws, as this style has from long practice proved the most efficient in the machine and engine shop.

As castings seldom come out perfectly true, great difficulty is experienced in working with the universal chuck, while the independent jaw can be adapted to any piece however eccentric in shape. Another advantage is that this chuck takes a very fine hold of a casting, and with a very small catch can turn pieces projecting considerably from the face plate, which would be impossible with any other chuck.

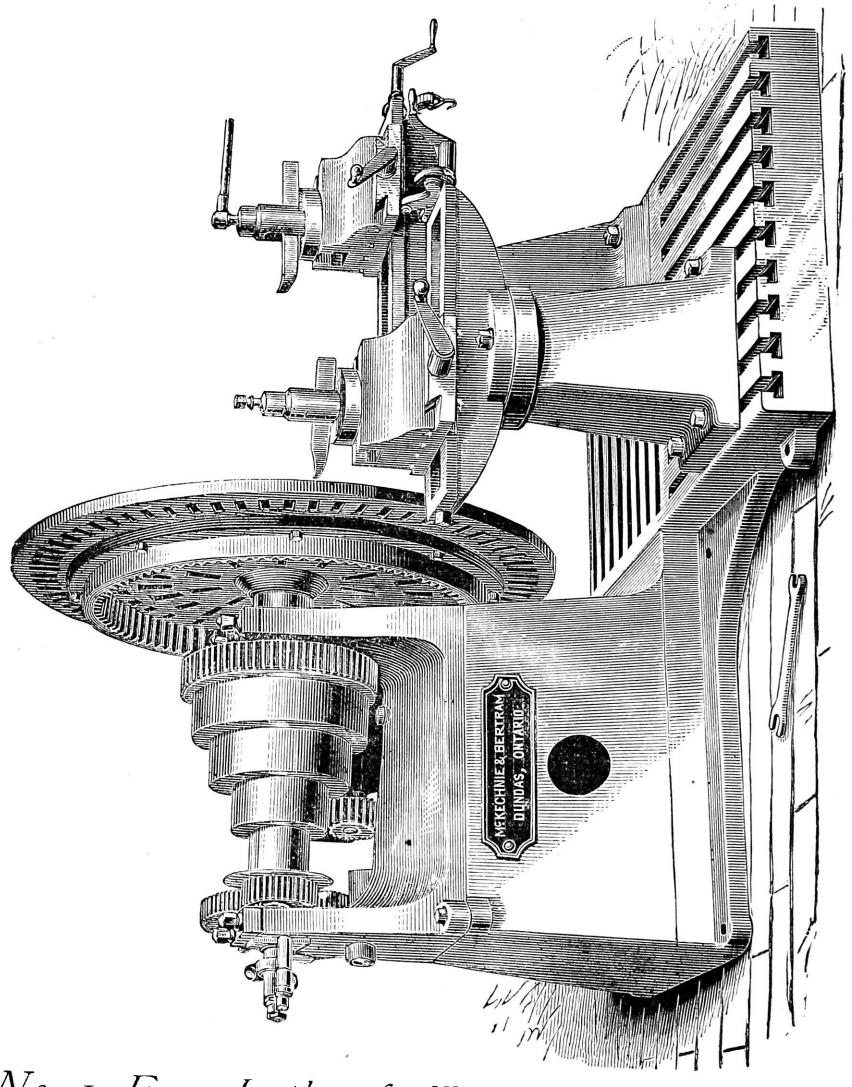
The chucks are heavy and solid to prevent spring. They can be made to fit any of our lathes, or left blank in the screw if so ordered. We make the following sizes :

Independent 4-Jaw Chucks with reversable jaws :

For	36	in.	Lathe, to take in	30	inches.
"	30	"	" "	26	"
"	24	"	" "	20	"
"	20	"	" "	16	"
"	16	"	" "	12	"
"	13	"	" "	9	"

The jaws of these chucks will extend over the diameters above.

The jaws of these chucks are fitted in slots and have a thread on the back chased the whole length. Any jaw can be taken out and reversed, and being case-hardened make a very durable chuck. The face of chuck is lined to inches for convenience of centering.



No. 1 Face Lathe, for Turning and Boring Pulleys.

Weight - 11,900 Lbs.

Wood Turning Lathes.

These lathes are very much improved over the old styles of wood lathe. They are finished in the best possible manner and well balanced, so as to run at a high speed.

The headstocks are strong and heavy. The swing is 20 and 24 inches.

The spindle is steel, running in bearings at both ends with compensating screw at back. The running and tail block spindles are bored tapering for the reception of centres when a mandrel is used.

We furnish with each lathe one face plate, one bell chuck, one pair of centres, a socket with rests, countershaft and hangers, with iron cone to match that on head balanced, and bolts for headstocks and rest socket.

These lathes are made for wood shears, but can be made with iron shears.

Face Lathes for Turning and Boring Pulleys.

These lathes, of which we have two sizes, are specially adapted to the turning and boring of pulleys, facing, and turning large pistons and rings, and no machine shop is complete without such a lathe suited to its capacity. No. 1 consists of a foundation plate cast in one piece and carrying the main head and pedestals with compound slide rests. They can be made with foundation extended on back with two pedestals for two tools for pulleys.

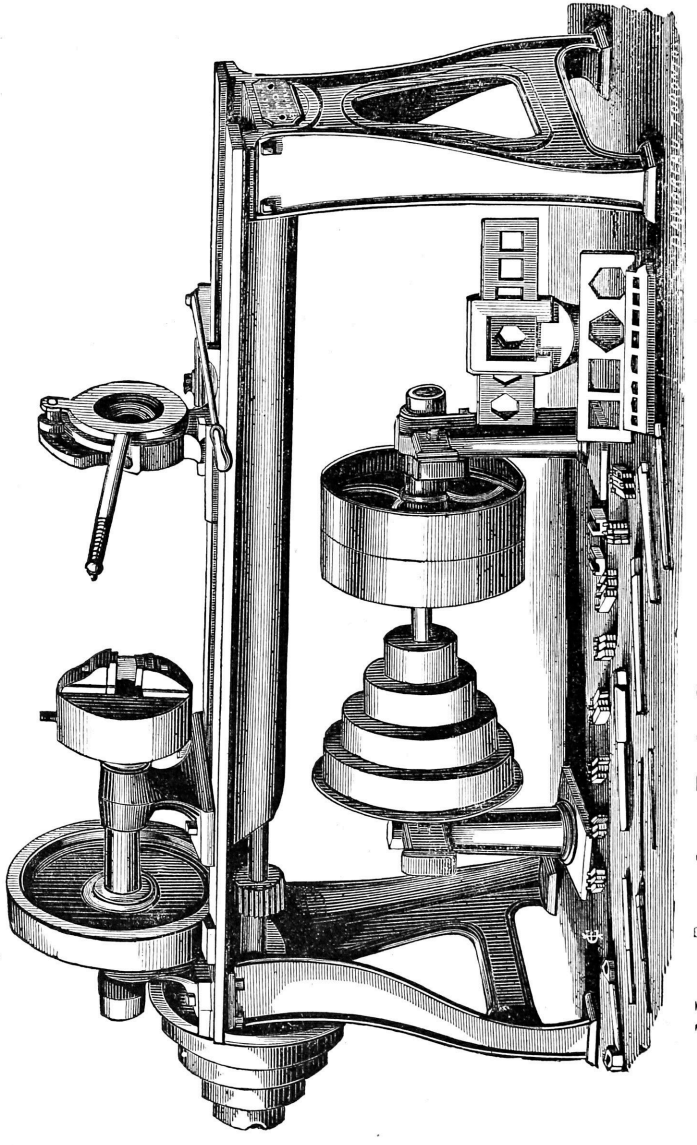
The head is triple geared, the last working into an internal gear on the face plate and imparting strong turning power. The motion can be momentarily changed from triple to single gear.

The spindle is cast-steel, 6½ inches diameter.

The foundation plate is slotted in front of the face plate, and suitable places are provided round it for bolting to stone foundation. Apparatus is furnished for imparting feed motion to the slide rests. This lathe turns a pulley 7 feet diameter and 24 inch face. Weight, 11,000 lbs.

No. 2 is of the same style and description as No. 1, working with an internal gear, and turns a pulley 6 feet diameter and 20 inches face. Weight, 6,000 lbs.

Pulleys on countershaft No. 1, 24 in. diam., 6 in. face, revolutions, 70
" " No. 2, 18 " 5 " " 100



No. 2 and 3 Bolt Cutters, With Expanding Dies.

Weight, 1,200 Lbs.

No. 2 and 3 Bolt Cutters, With Expanding Dies.

The superiority of this bolt cutter consists in the perfectly clean cut of the thread, with one passage over the iron, the rapidity and ease of its action, uniformity of its work, simplicity and durability.

The arrangement of the dies is such that as soon as they begin to cut they will close as far as the stop will allow them, and the bolts will be cut the same size, any length.

As soon as the bolt is cut its required length, the dies are opened, by the lever and the bolts taken out WITHOUT THE NECESSITY OF RUNNING BACK OFF THE THREAD.

The action of the dies is the same as a lathe tool, taking a clean chip which leaves the thread firm and strong.

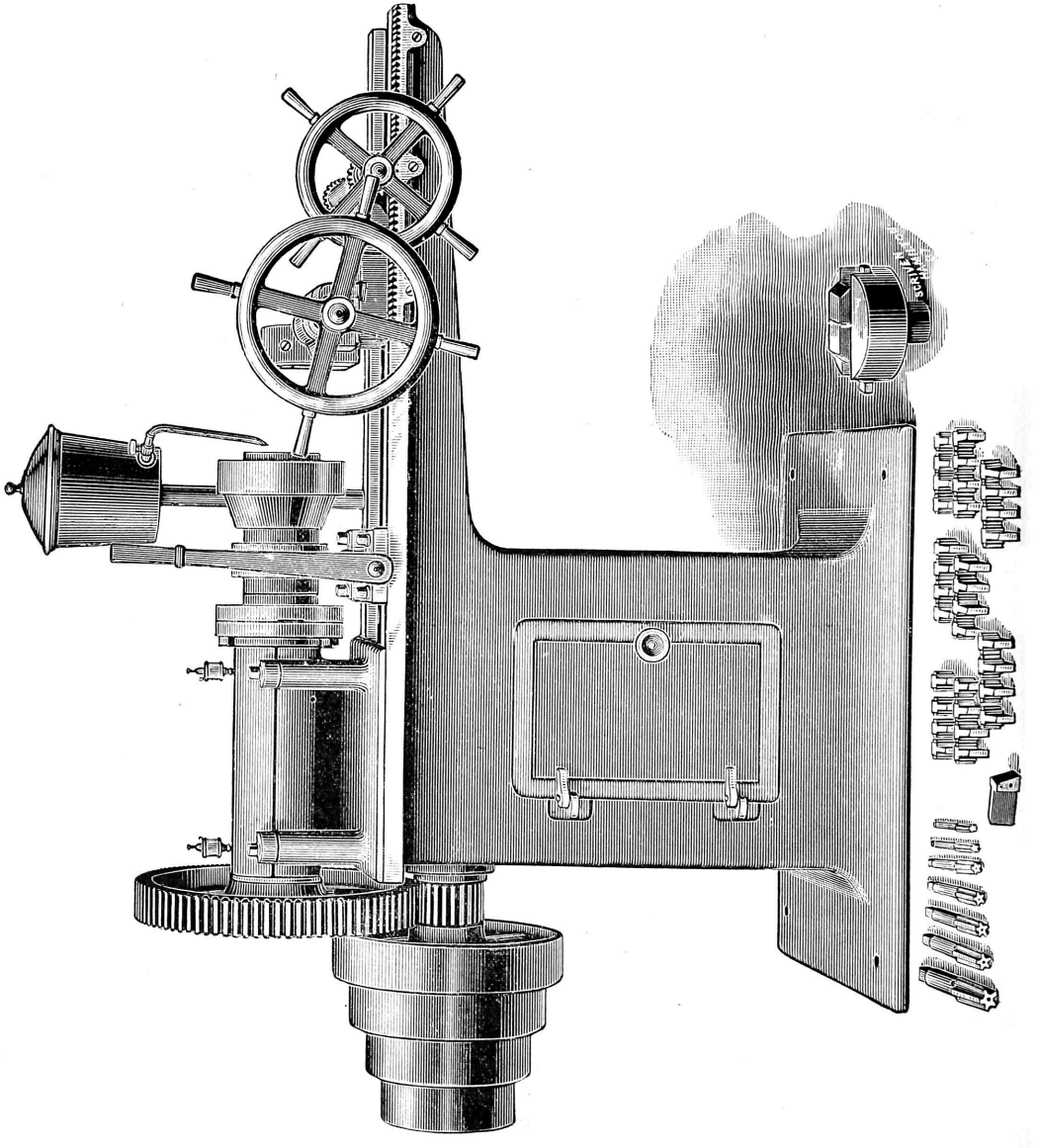
The dies can be sharpened by grinding. When too much worn, they can be taken out of the head, re-fitted, re-tempered and re-cut with master taps. In cutting short bolts, we furnish, when ordered, a plug socket, which is placed in the jaws, and which will admit the head of the bolt. In using the socket, it is not necessary to stop the machine to take out or replace the bolt. One socket will answer for all bolts that will admit the head and not allow it to turn.

Besides the ordinary V shaped thread, the machine will cut coach screws, and square threads, double and single, such as vice, piano stool, letter-press and cider mill screws.

The machine will also tap nuts of corresponding sizes to bolts cut.

With it is furnished 8 sets of dies and taps, from $\frac{3}{8}$ to $1\frac{1}{2}$ inch, inclusive, and by ordering an additional centre for wider dies it will cut square threads from $\frac{3}{8}$ to $1\frac{1}{4}$ inches. Countershaft and hangers, wrenches and nut holders are provided. Fast and loose pulleys 15 inches diameter and 4 inch face, with 150 revolutions per minute. Weight, 1,200 lbs.

No. 3 cuts from $\frac{1}{2}$ inch to 2 inches, and has fast and loose pulleys 18 inches diameter and $4\frac{1}{2}$ face. Revolutions per minute, 150. Weight, 1,800 lbs.



Acme 1½ Inch Single Bolt Cutter.

Acme 1½ Inch Single Bolt Cutter.

This machine is especially adapted for MACHINISTS' and RAILROAD SHOPS where fine, true work is required. The dies can be changed in less than one minute, and set to cut a fit at once by index. It will cut any size or shape of thread up to and including 1½ inches in diameter. The main gear is 18 inches in diameter and cut from the solid. The cone is 8, 10, 12 and 14 inches diameter for 3 inch belt.

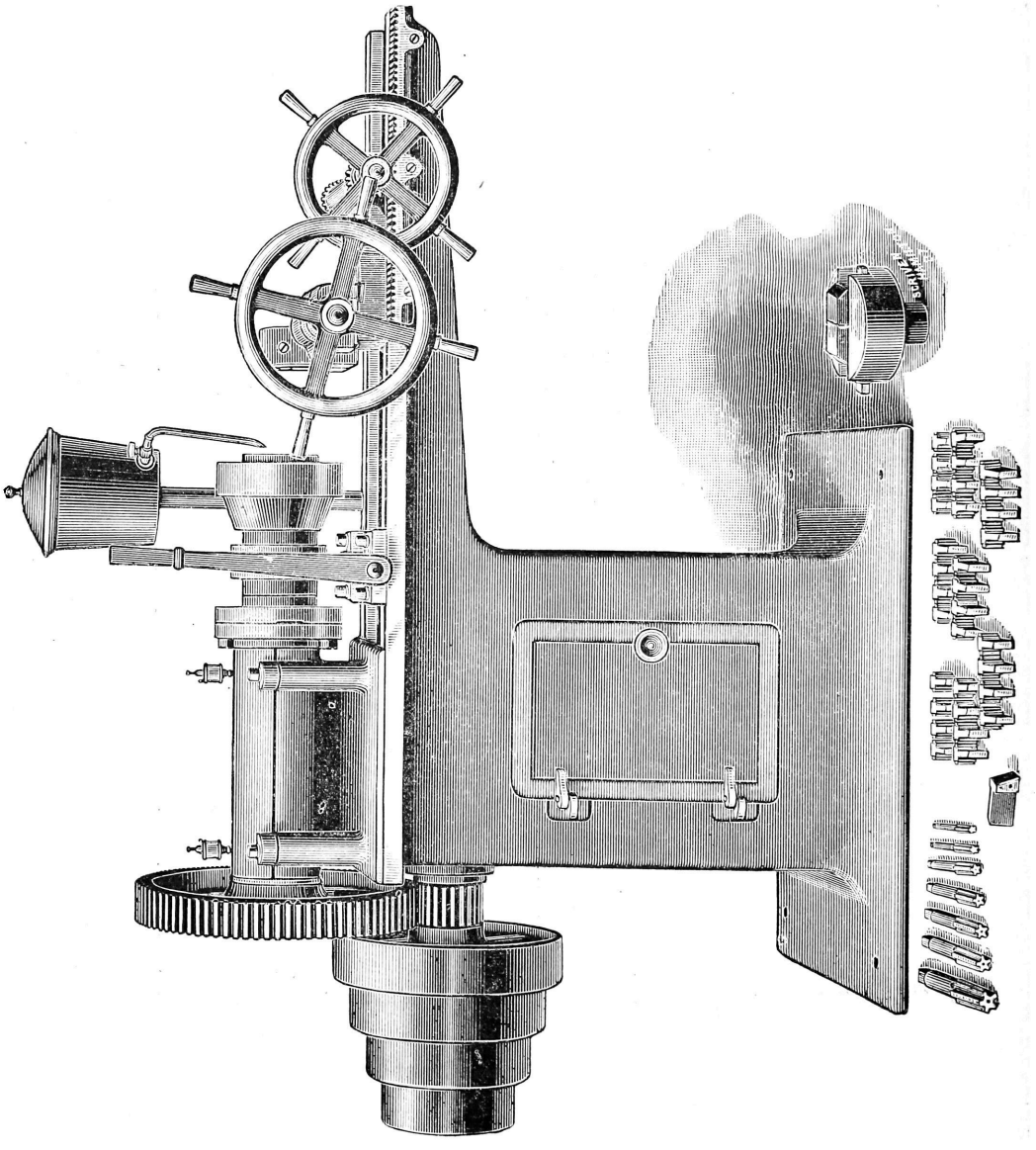
Price of machine with head pump, countershaft and wrenches	$334 00
Nine sets of cap dies, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, at $3.50 per set	31 50
Nine nut taps, as per dies	24 50
One adjustable tap chuck and stop die	10 00
Price of machine as above	$400 00

Weight, 1,500 lbs. Speed of countershaft with 16 x 4 in. pulley, 250 revolutions per minute.

Extra dies, $1.50 per set. Extra hardened caps, $2.00 per set.

ADVANTAGES OF THE ACME HEAD OVER ALL OTHERS.

- Large bearing on top of dies by using cap.
- Fine adjustment by differential screw.
- Positive toggle lock.
- Die ring connected to barrel.
- Positive motion.
- Every part exposed to view—no clogging.
- Quickness of changing dies.
- No springs used.
- Index on head, so a fit can be cut at once.
- Cheapness of dies.
- Advantage of plain and not the disadvantage of lace dies.
- Reversible dies.
- Even number of dies and a head of centre.
- All wearing parts tempered steel, made to jigs and standard guages interchangeable.
- Dies cut in one head, will fit any other, and where more than one head is used this is an important point.



Acme 2 Inch Single Bolt Cutter.

Acme 2 Inch Single Bolt Cutter.

This tool will cut up to and including two inches in diameter. Has a 25½ inch main wheel. The cone is 8, 10, 12, 14 and 16 inches in diameter for three inch belt. Is very handy for machinists, bridge builders, etc. The finger shaft, vice screw and rack pinion shaft are steel. It has pumps for oil.

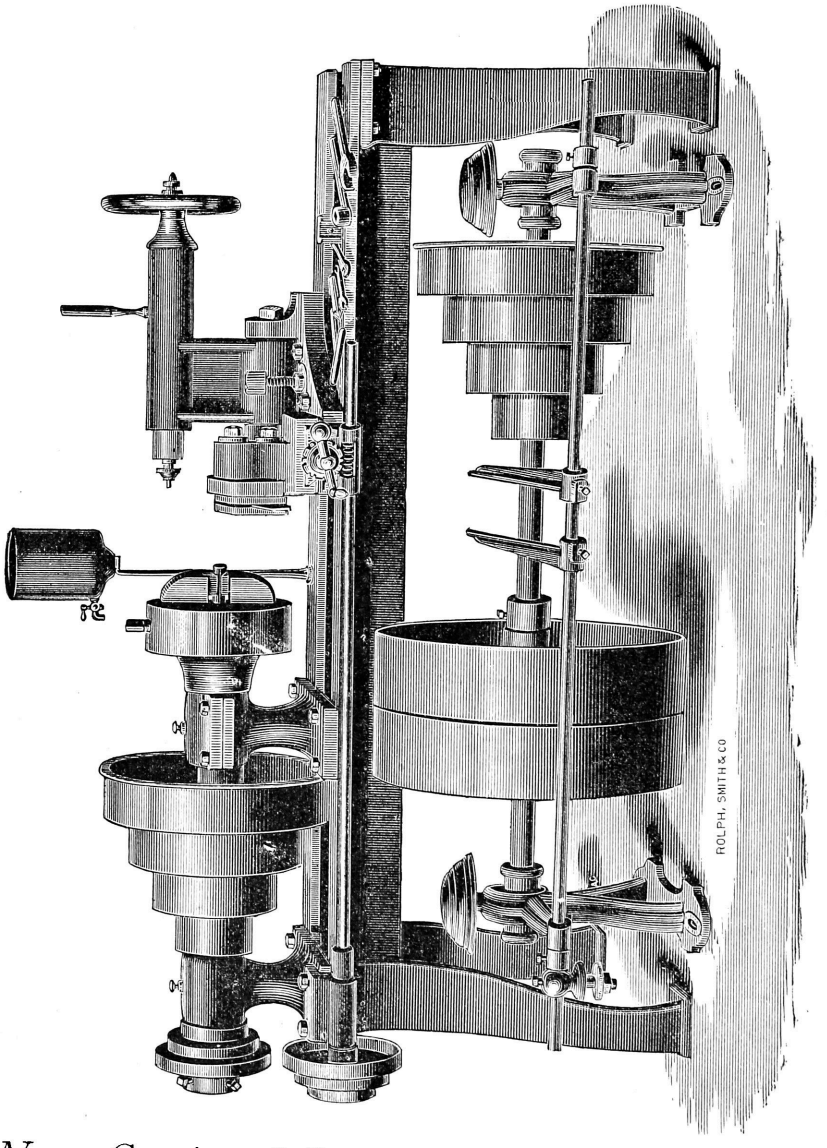
Price of machine with head pump, countershaft and wrenches	$450 25
Eleven sets of cap dies, ½, ⅝, ¾, ⅞, 1, 1⅛, 1¼, 1⅜, 1½, 1⅝, 2, at $4.25 per set	46 75
Eleven nut taps, as per dies	38 00
One adjustable tap chuck and stop die	15 00
Price of machine complete as above	$550 00

Weight, 2,000 lbs. Speed of countershaft with 16 x 4 in. pulleys, 250 revolutions per minute.

Extra dies, $1.75 per set. Extra hardened steel caps, $2.50 per set.

ADVANTAGES OF THE ACME HEAD OVER ALL OTHERS.

Large bearing on top of dies by using cap.
Fine adjustment by differential screw.
Positive toggle lock.
Die ring connected to barrel.
Positive motion.
Every part exposed to view—no clogging.
Quickness of changing dies.
No springs used.
Index on head, so a fit can be cut at once.
Cheapness of dies.
Advantage of plain and not the disadvantage of case dies.
Reversible dies.
Even number of dies and ahead of centre.
All wearing parts tempered steel, made to jigs and standard guages and are interchangeable.
Dies cut in one head, will fit any other, and where more than one head is used this is an important point.



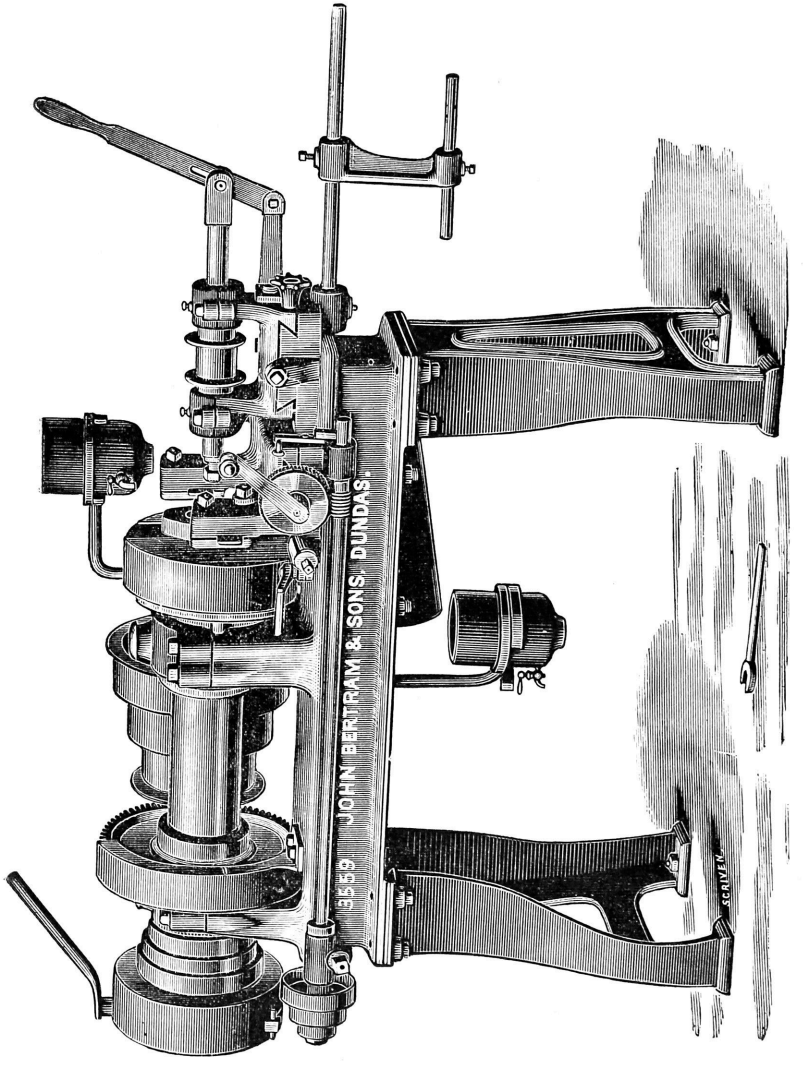
No. 1 Cutting Off and Centering Machine.

Weight, 1,600 Lbs.

Cutting Off and Centering Machines.

No. 1 Cutting Off Machine.

The want has long been felt in the workshops of a good handy machine for cutting off and facing the ends of spindles, and centering the same true. What we now offer to the public after a service of 16 years has proved itself the greatest labor-saving machine in the workshop. It can cut rapidly steel and iron bars from 2¼ down. It faces the ends and centres true of all classes of work ready for the turner. It consists of a bed and headstocks with a hollow spindle and universal chuck, having steel-faced jaws for holding the bar true while it revolves. A carriage similar to that of a lathe with an improved tool-holder containing a tool for cutting off, which is planed to give clearance, and requires no dressing; is fitted in wrought-iron clamps, and which can be easily raised or lowered to suit the size of bar being cut off. In connection with this is a tailstock having the centering attachment, which can be swung back out of the way and brought back instantly to the centre when required for drilling. The machine is made with or without self-acting feed. All the parts of this machine are heavy and strong; the cones on countershaft and spindle are of large diameter and wide face. Weight of machine, 1,600 lbs. Fast and loose pulleys 18 inches diameter; revolutions per minute, 150.



No. 2 Cutting Off and Centering Machine.

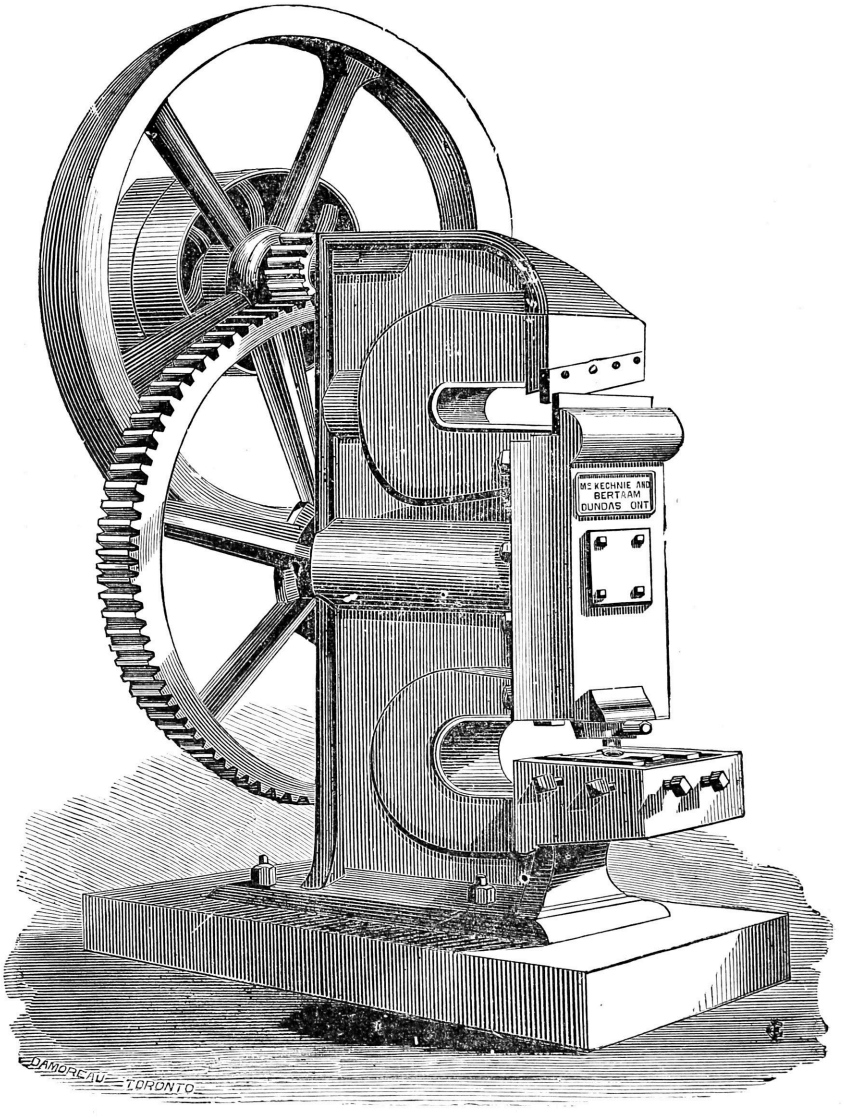
Weight, - 2,100 Lbs.

No. 2 Cutting Off Machine.

This machine can cut off and centre steel and iron bars from 3½ inches down. The two tools are set in sockets in the rests so as to cut close to the revolving jaws on hollow spindle. The frame and headstocks are cast in one piece and the hollow spindle is provided with a universal chuck at each end. The tools feed to the centre automatically and can be adjusted from the front while running, a stop motion throwing the feed out at any point. The centering device can be thrown back while cutting off, the tools are planed with the proper clearance. Countershaft has fast and loose pulleys 14 x 3½ inches, and should make 80 revolutions per minute. Weight, 2,100 lbs.

Seven Inch Cutting Off and Centering Machine.

This machine is of ponderous and extra heavy construction and is capable of cutting off and centering steel or iron bars from 7 inches diameter down to 2 inches. It is arranged with a universal chuck at each end of spindle, has automatic feed motion on tool and is provided with centering and countersinking attachment all complete. Fast and loose pulleys on countershaft 24 x 6 inches, and should make 100 revolutions per minute. Weight, 6,300 lbs. Photo on application.



No. 1 Punch and Shears.

Weight - 3,500 Lbs.

Punching and Shearing Machines.

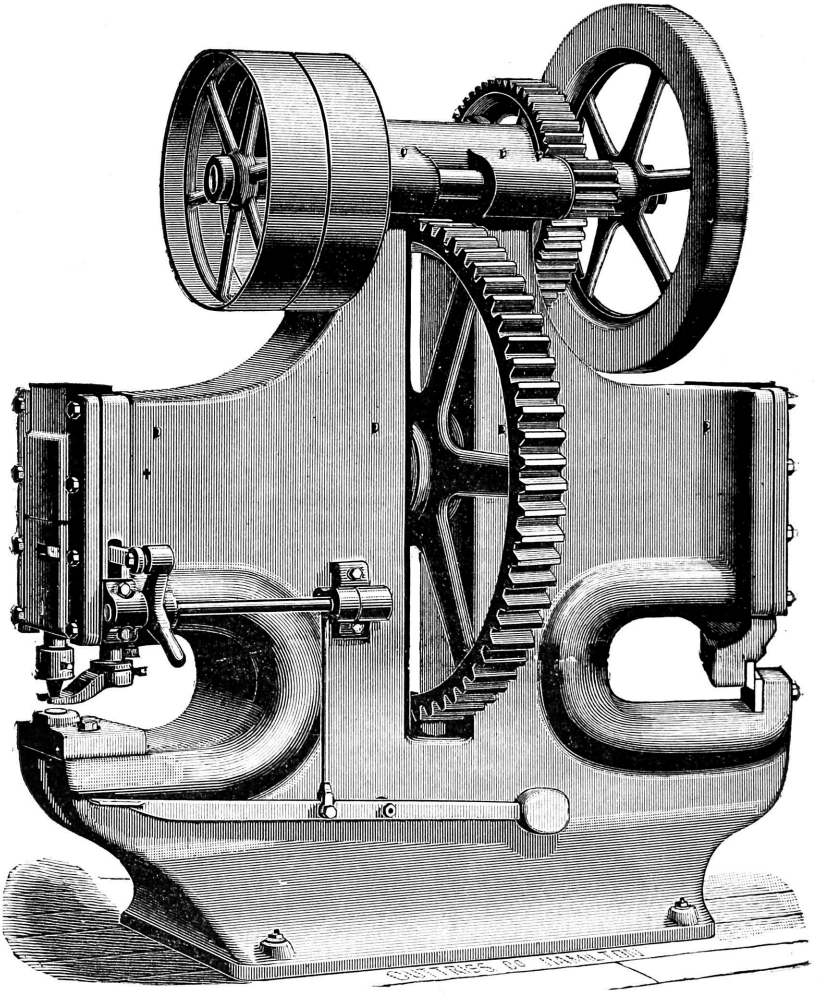
We manufacture in this line of machinery quite a variety of different styles and shapes, both of single and combined machines. If required, photograph of any of these may be had on application.

No. 1 Punch and Shears.

The accompanying cut represents our No. 1 Combined Punch and Shears. It is single geared and can be worked by hand or power. The frame is massive and strong and of cored section. The eccentric works with a bronze box.

All the parts of this machine are made heavy, to prevent the possibility of spring. It can be made with die block as in the cut, for implement makers, or otherwise for the boiler shop. It cuts and punches $\frac{5}{8}$ in. holes and $\frac{1}{2}$ in. plate.

Fast and loose pulleys 24 in. diameter, $5\frac{1}{2}$ in. face, revolutions, 60. Weight, 3,500 lbs.



Nos. 2 and 3 Punch and Shears.

Weight - 6,900 and 6,700 Lbs.

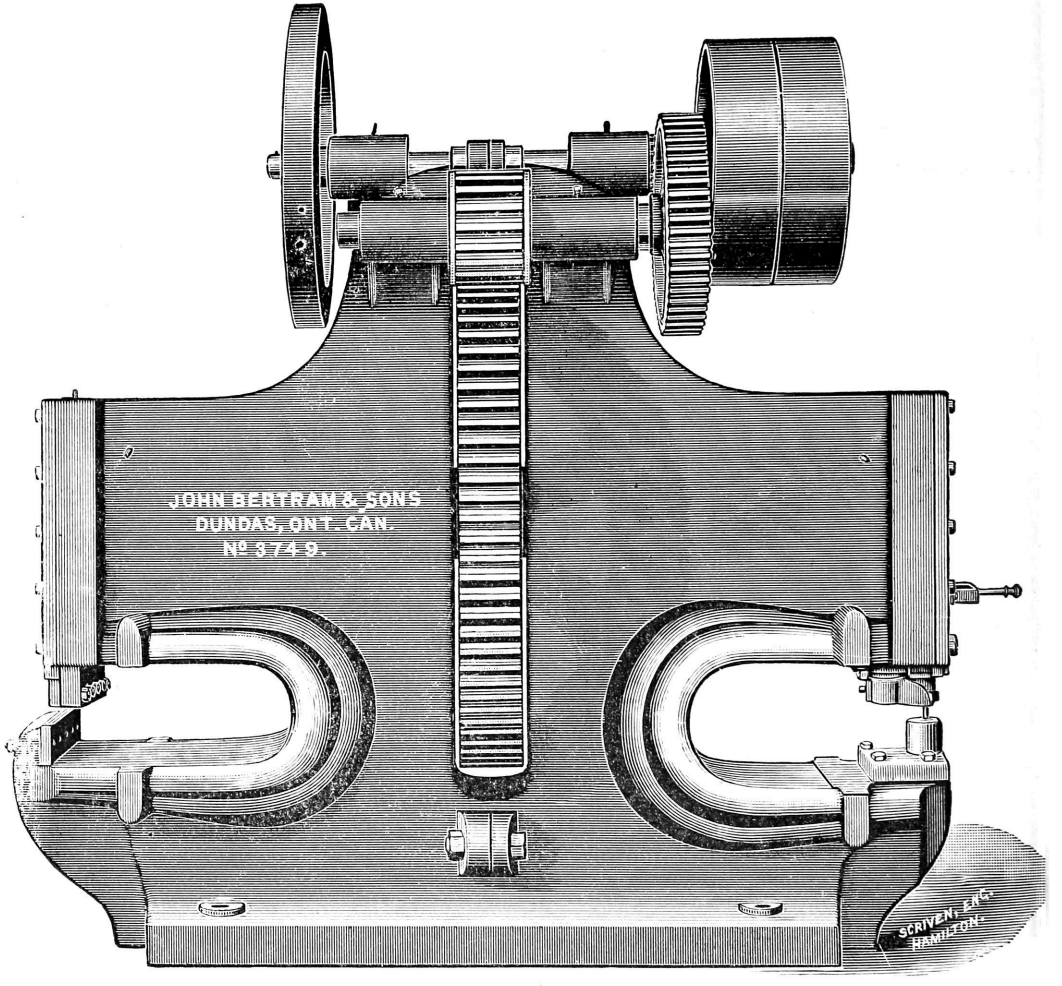
Nos. 2 and 3 Combined Punch and Shears.

This cut represents our Nos. 2 and 3 Combined Punch and Shears. The frame is a hollow cored casing. The driving gear of No. 2 is single, enabling it to punch $\frac{3}{4}$ inch holes in $\frac{1}{2}$ inch plate, and shear $\frac{3}{4}$ inch plate. The shear can be angled for cutting bars of any length. There is a treadle to operate the punch. The punches are Richards' patent, and any size can be secured to the plunger with a nut cap. Holes can be punched $1\frac{1}{4}$ inches from the face of a head sheet. The shear and punch are 18 inches from the floor. The gap takes in 12 inches.

The No. 3 machine takes in gap 16 inches, and is the same in style as cut with double gear, and punches $1\frac{1}{8}$ inch holes in $\frac{1}{2}$ inch plate, and shears 1 inch plate. The above machines are specially adapted for boiler makers and agricultural implement makers.

No. 2.—Fast and loose pulleys 24 inches in diameter and 6 inches face. Revolutions per minute, 125. Weight, 6,000 lbs.

No. 3.—Fast and loose pulleys 21 inches in diameter and $4\frac{1}{2}$ inches face. Revolutions per minute, 180. Weight, 6,700 lbs.



No. 4 Combined Punch and Shears.

Weight - 11,300 Lbs

No. 4 Combined Punch and Shears.

This cut represents our No. 4 Combined Punch and Shears. The frame is two sections, cast hollow and strengthened around the jaw, which has a gap 20 in. from shear or punch, the throat being 24 in. wide. It is double geared, main wheel being large and heavy. The plunger is operated from the front, and is provided with Richard's patent interchangeable punches.

Flanges can be punched 1¼ in. from the face; it will punch 1 in. holes in ¾ plate, and shear 1 in. plate.

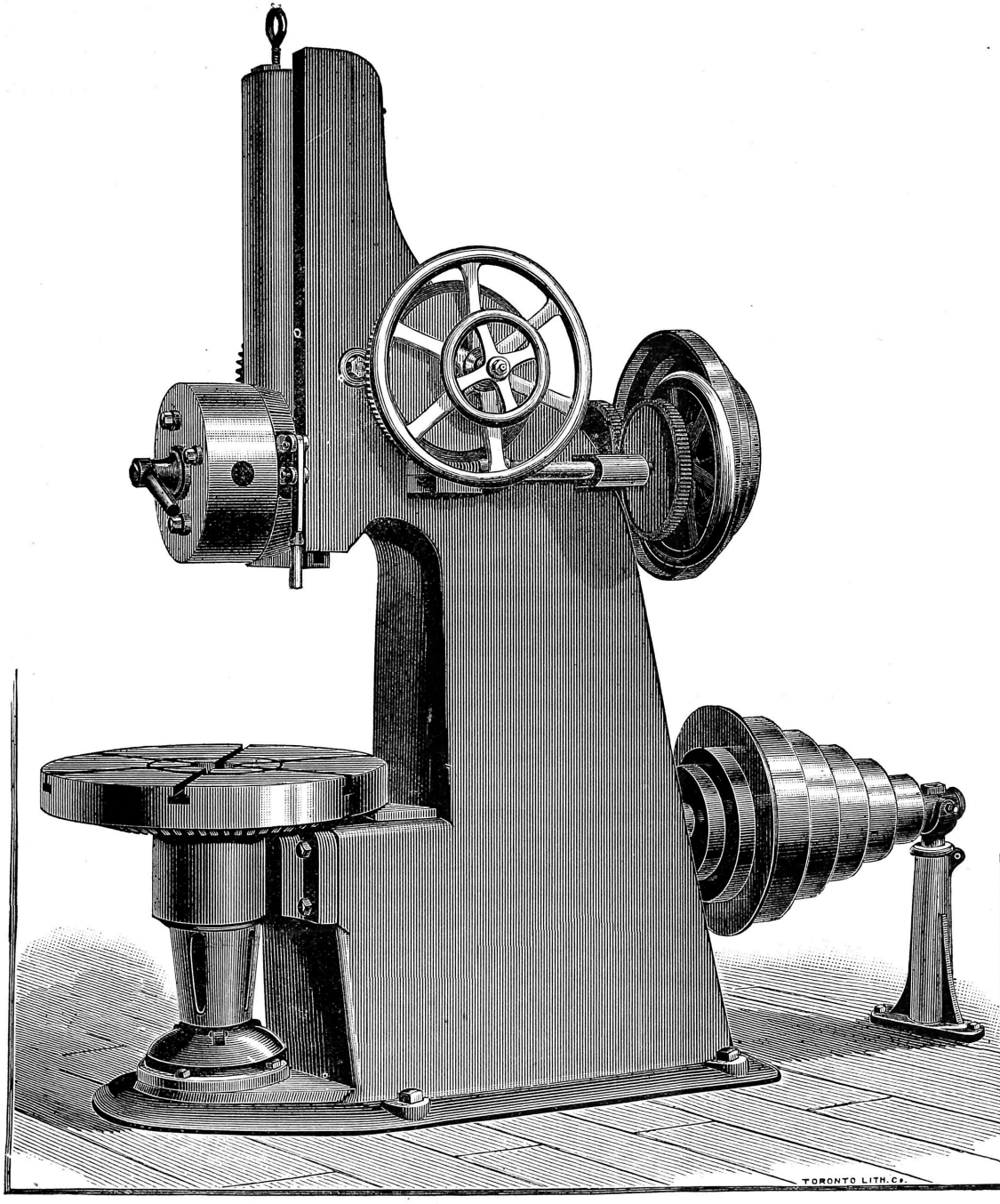
Fast and loose pulleys 24 in. diameter and 5 in. face. Should make 240 revolutions per minute. Weight, 11,300 lbs.

Upright Turret Pulley and Wheel Boring Machine.

36 Inch Diameter and 24 Inch Deep.

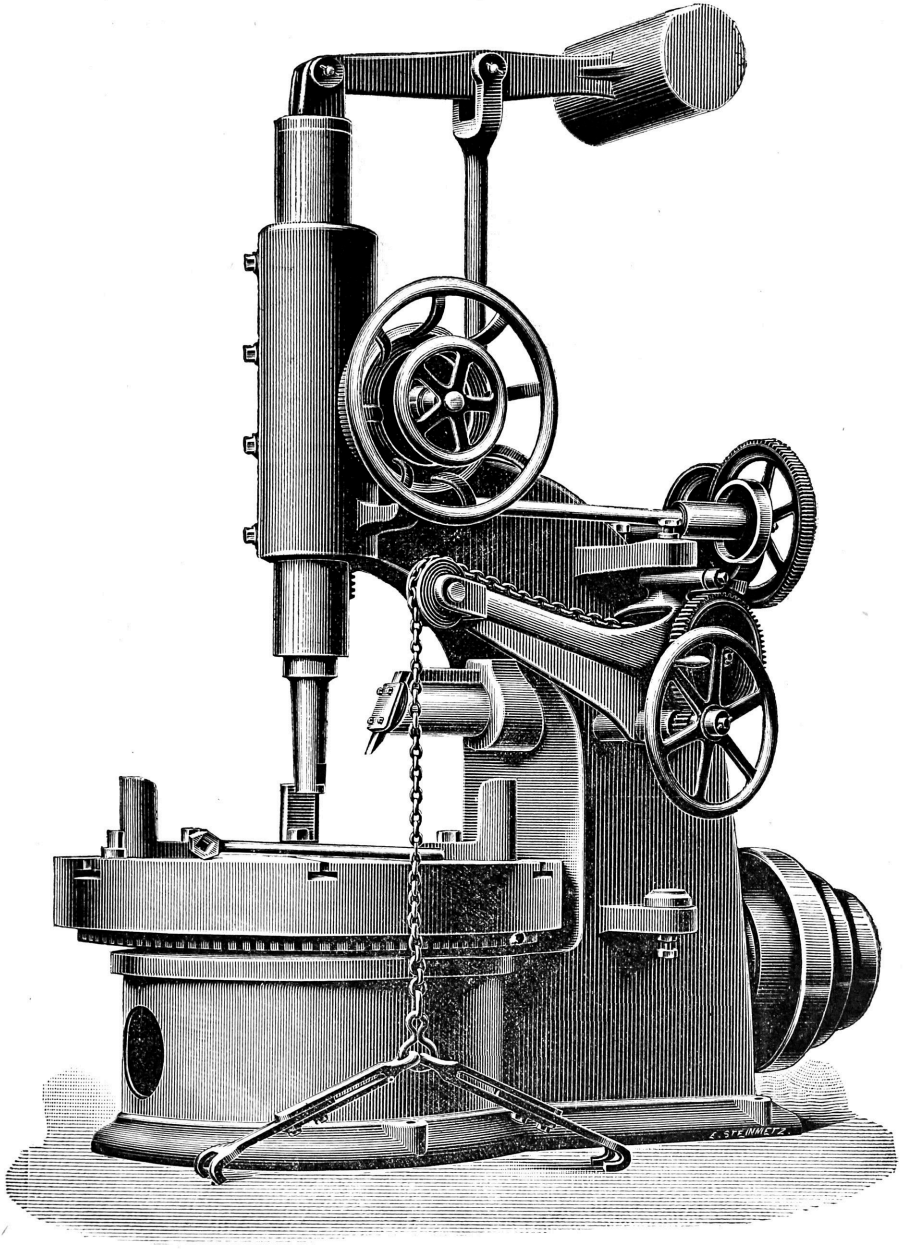
This represents our 36 inch Upright Turret Pulley and Wheel Boring Machine, with four changes for bars. It takes in 36 diameter and 24 in. depth. It consists of a heavy frame with hollow or cored section. The cone has 5 changes, large diameter and wide face. The Turret takes in 2¼ in. bars, which are locked with wedges and screws, keeping all true. The ram has large bearing surfaces, and has three changes of feed; by releasing main friction it can be raised and lowered rapidly, while the back friction allows it to be operated slowly by hand. The table revolves in a large bronze bearing and steel bottom step. This machine can bore pulleys, gear, couplings, and a great variety of machine work.

The fast and loose pulleys are 24 in. diameter and 5 in. face, and should make 100 revolutions per minute. Weight, 5,000 lbs.



Upright Turret Pulley and Wheel Boring Machine.

36 Inch Diameter and 24 Inch Deep.



42 Inch Car Wheel Boring Machine.

Weight - 9,300 Lbs.

Forty--two Inch Car Wheel Boring Machine.

This machine is specially adapted for boring rapidly all classes of car wheels at one cut.

It consists of a strong universal chuck revolving horizontally in a bed piece; from the back of this rises a massive frame of hollow or cored section, carrying a vertical boring bar over the centre of the chuck.

This bar has a cast-steel rack for imparting the feed. The point of this is steel, fitted in a taper socket for carrying the cutters. The movement of the bar is perfectly under the control of the workman, and, being balanced on the top by a lever and weight, the feed can instantly be detached and started at any point.

The feed is of the friction class and is very powerful, finest 1-10 inch, and coarsest ¼ inch. The chuck runs in the Schiele anti-friction bearing.

When required we make this machine with attachment for facing hubs. This consists of a heavy horizontal bar in the frame and operated by an automatic rack feed motion, which can be run out of the way while changing wheels.

Attached to the side of frame is a crane for lifting wheels. The cones are large diameter and 5½ inches face. Revolutions per minute, 83. Fast and loose pulleys on countershaft, 24 in. diameter, 6 in. face, should make 85 revolutions per minute. Weight, 9,300 lbs.

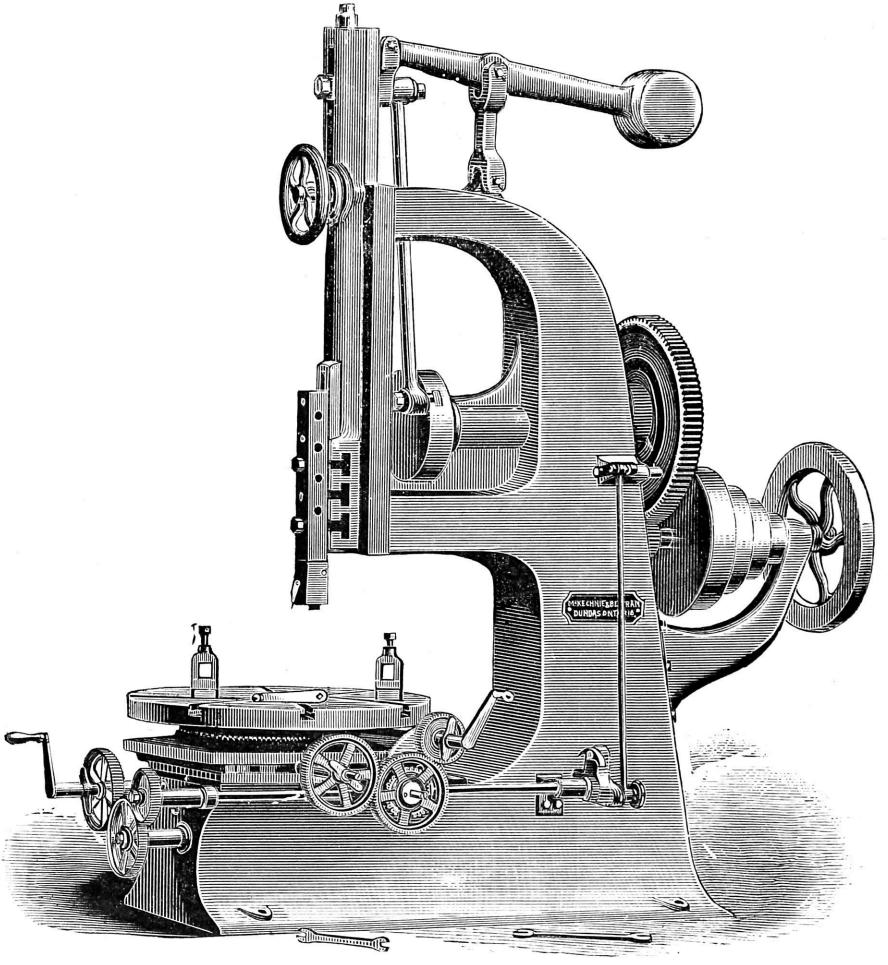
Iron Slotting Machines.

Eight Inch Machine.

This machine is an excellent tool. Machine has a stroke of 8 inches, will take in 40 inches in diameter and 18 inches in depth, and has automatic feeds in all directions. Fast and loose pulleys on countershaft 18 x 4½ inches, and should make 140 revolutions per minute. Weight, 3,900 lbs. Photo on application.

Sixteen Inch Machine.

This machine is similar to the above machine, but of much heavier construction, being particularly adapted for doing locomotive and other heavy work. Machine has a stroke of 16 inches, will take in diameter 70 inches and in depth 26 inches, and has automatic feeds in all directions. Fast and loose pulleys on countershaft 30 x 6 inches, and should make 120 revolutions per minute. Weight, 13,600 lbs. Photo on application.



Iron Slotting Machine.

12 Inch Stroke.

Weight - 8,000 Lbs.

Twelve Inch Slotting Machine.

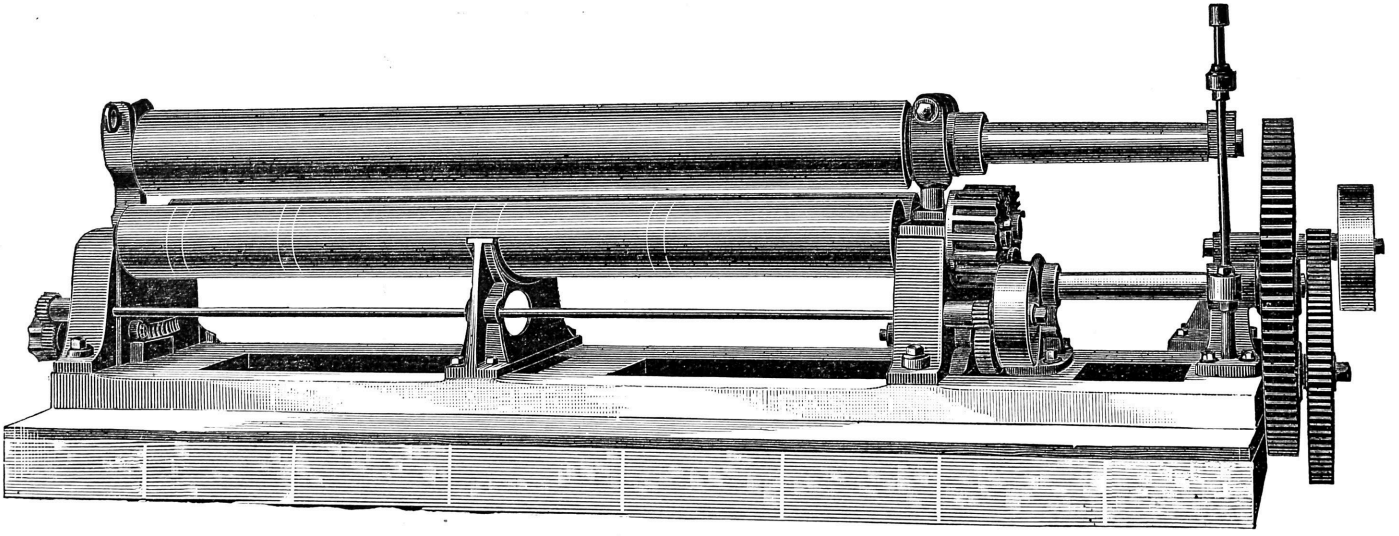
This slotter is of a new design and is a strong and substantial tool.

The frame consists of a hollow casting with the bed piece all in one. It takes in 52 inches diameter and 18 inches deep. The stroke is 12 inches, and has Whitworth's quick return motion, only one cut wheel and pinion being used.

The ram is balanced by a lever and weight on top. It has compound slide and circular movement in the table, which are self-acting.

The ram is raised and lowered by a hand wheel and screw within easy reach of the workman, and the length of the stroke can be altered by a screw in the crank plate. All the movements in the table can be made from one side. All the gear on motion and feed are cut.

Countershaft pulleys 21 inches diameter and 4½ face. Revolutions per minute, 120. Weight, 8,000 lbs.



Power Bending Rolls---6, 7, 8 or 10 Feet Long.

Plate Bending Machines.

Power Bending Rolls.

6, 7, 8 or 10 Feet Long.

These rolls are arranged in pyramidal form, all of cast iron, and each having a wrought iron bar cast in its centre throughout its entire length for bearings; bar through top roll extends out at one end about 4 feet, forming a lever, which, being pressed upon by a screw, takes the weight off the roll, while the knuckle-joint bearing at the opposite end is thrown off, leaving the roll free for the removal of a ring or flue. The two ends of the top roll have a vertical adjustment, separately or together, by hand or power. Both lower rolls have a central bearing when made upwards of 8 feet in length, are driven positively by gear, and run in either direction; the top roll is loose and acts as an idler, accommodating itself to the speed of the inside surface of the sheet, thereby, by this principle of construction, avoiding the frictional resistance common in machines of other construction where the roll on the inside of the sheet is rigidly geared to the roll on the outside. Two countershafts are included with machine. Weight of 10 feet rolls, 19,220 lbs.

Diameter of rolls for 8 and 10 feet machines—Top Roll, 13 inches; Lower Rolls, 11 inches.

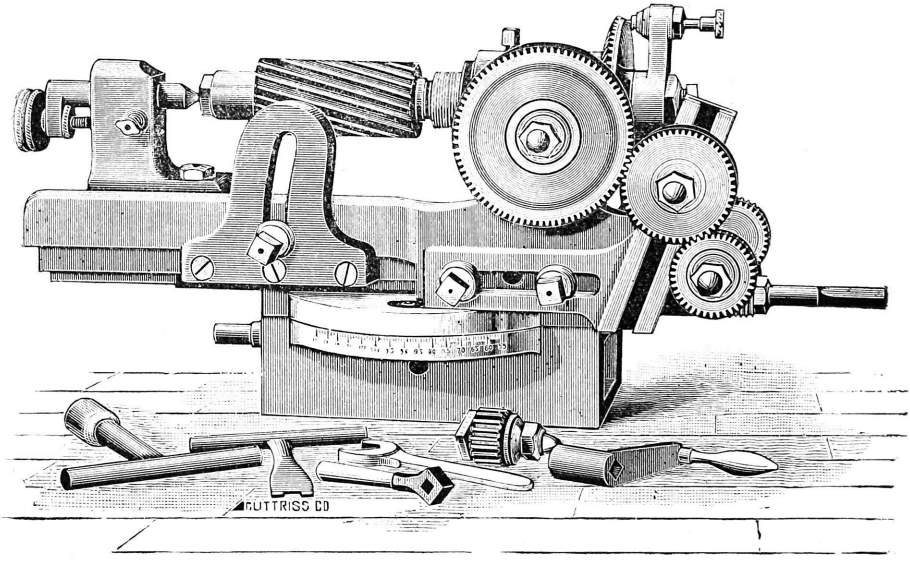
Diameter of rolls for 6 and 7 feet machines—Top Roll, 11¾ inches; Lower Rolls, 10½ inches.

Fast and loose pullies on main countershaft 24 x 5 inches, and should run at about 150 revolutions per minute.

Fast and loose pullies on small countershaft 18 x 5 inches, and should run at about 300 revolutions per minute.

Hand Power Bending Rolls.

This machine is of invaluable service to all boiler-makers, etc., and is a very complete machine. The rolls are arranged in pyramidal form, are 6 inches in diameter and will bend ½ inch plates 6 feet in length. This machine is of first-class material, workmanship and finish, and will accomplish with ease a vast amount of work.



Automatic Spiral Cutting Attachment for Universal Milling Machine.

Automatic Spiral Cutting Attachment for Universal Milling Machine.

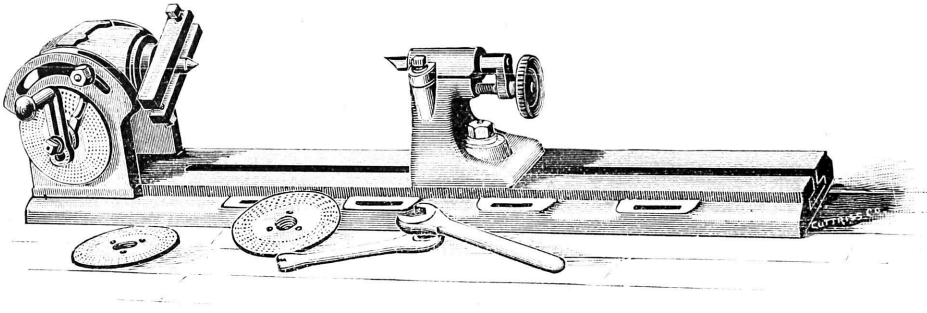
The cutting of spirals being a somewhat complicated matter, we herewith offer a few suggestions which may be of service to such of our customers as are not familiar with the process. As no part of a spiral is a straight line, the cutting mill, to cut smoothly, needs to be of a peculiar shape. An angle of 40° upon one side, and 12° on the other, being found in practice most suitable for blanks under 3 inches in diameter; when over 3 inches diameter angles of 48° and 12° are preferable.

The spiral cutting "device" needs to be set at a different angle with the face of machine for every variation of pitch or of diameter of piece to be cut, and while this may be accurately determined by the proper formula the formula itself is too abstruse for the average mechanic. A little practice will enable the operator to set the machine accurately and quickly, mount the work on centres and set the "device" approximately; adjust the height of work-table so that the centre will make a slight scratch on the work, then set the "device" so that the cutter will stand in the line of the proposed cut, which can be determined by sighting down or across the mill. Care should be taken that the angles of the mill run to the centre of blank to be cut.

The cut herewith represents our spiral cutting attachment with self-feed, capable of cutting long spirals either straight or conical, twist drills, reamers, etc.

We subjoin table of pitches that can be cut with the four gears included with the attachment.

WORM GEAR ARBOR. TEETH.	BEVEL GEAR ARBOR. TEETH.	PITCH IN INCHES.
64	20	4.38
64	30	6.56
40	20	7.
64	40	8.75
30	20	9.33
40	30	10.5
30	40	18.67
20	30	21.
40	64	22.4
20	40	28.
30	64	29.67
20	64	44.8



Universal Head.

With tailstock on extra table. This attachment very materially increases the value of the Milling Machine, and can also be used on the Planer, and by its use spur and bevel gear out. It has 3 dividing disks for cutting all numbers up to 75 and even numbers up to 360. Taps and reamers can be fluted, and a great variety of other work. The spindle has a taper hole clean through and can take mandrils and chucks of any size. The attachment has table independent of Milling Machine table.

EXTRA ATTACHMENTS FOR MILLING MACHINES.

Universal Dividing Head with three index plates for gear cutting	$135
Spiral Cutting Attachment for cutters	225
Centre Attachment for taps and reamers, tapering	50

Prices of Extras for Lathes.

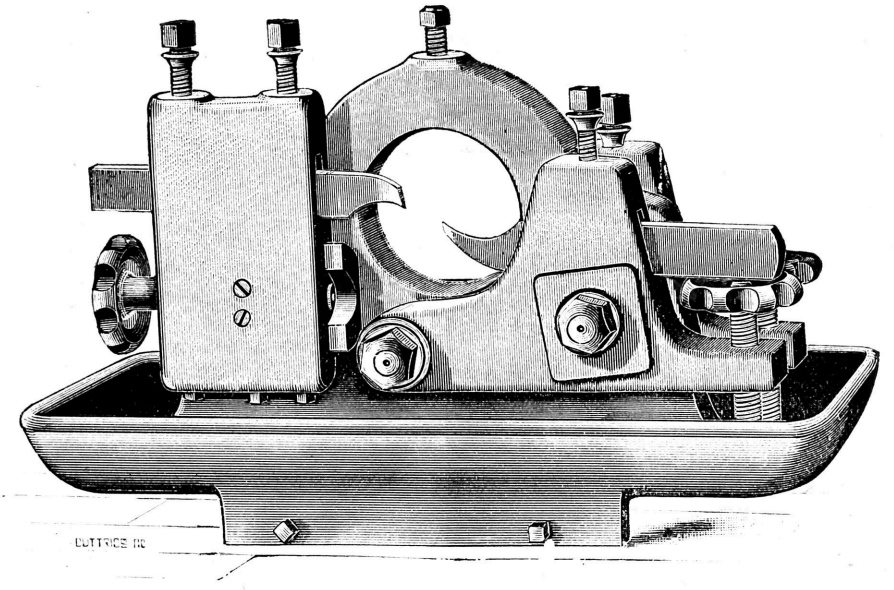
Three tool attachment for 20 in. back tool on slide, 2 front tool with fine adjustment	$50
Three tool attachment for 24 in. lathe same style as above	60
Three tool attachment for 30 in. lathe same style as above	70
One tool attachment for above lathes	15

CUT GEAR.

Finished to 14 Pitch 3½ cts. per tooth.

Gauges....	12	"	4	" "
	10	"	5	" "
	8	"	6	" "
	6	"	7	" "

3 *Tool Attachment for Shafting.*

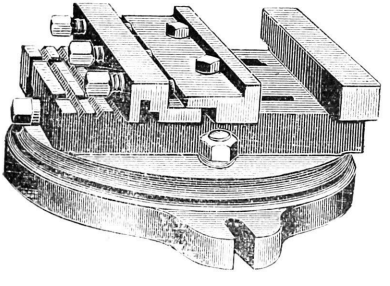


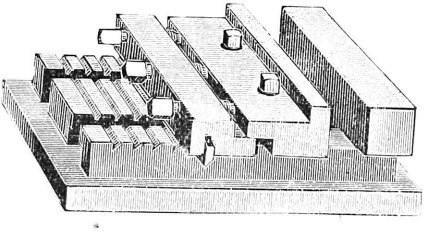
EXTRA ATTACHMENTS FOR PLANING MACHINES.

Planer Centres with dividers	$8.50
Prouty Planer Chucks 12 in. x 7 in. swivel	35
Prouty Planer Chucks, 17 in. x 10 in. swivel	50

EXTRA ATTACHMENTS FOR SHAPERS.

Shaper Centres to swing to any angle	55
Shaper Vises, 12 in. x 7 in	30
Shaper Vises, 14 in. x 12 in.	40
Shaper Vises, 20 in. x 10 in.	50





Steam Hammers.

Single Standard Automatic Steam Hammer.

Our 2,000 lb. Single Standard Automatic Steam Hammer is built on the latest most improved plans. The ram, which is made of wrought iron, is guided between the jaws of frame and has a stroke of 28 in. The piston and rod are forged in one solid piece. The frame is of hollow or cored section. Steam is admitted at both sides of piston, and is regulated by a throttle valve. By means of a hand lever the valve gear is operated to any desired stroke, giving either a succession of automatic blows or a single blow as required, and of any degree of force. The anvil block rests on a separate foundation, in order to reduce the concussion of blow on the frame; its weight is 7,000 lbs. (Plans of foundation furnished.)

Diameter of cylinder, 12 in. Lift or stroke, 28 in.

Weight of piston and hammer, 2,000 lbs. Will make 100 strokes per minute.

Diameter of shaft that can be easily forged, 10 in. Total weight of hammer, 24,000 lbs.

Our Single Standard 1,200 lbs. Automatic Steam Hammer is made on the same improved plan as the above. It has a stroke of 24 inches. All the parts of this machine are got up in the same style. It has separate anvil block on foundation. Diameter of cylinder, 10 in.

Will make 120 strokes per minute. Diameter of shaft that can be forged easily, 8 inches.

Weight of total, 16,000 lbs.

Three Cwt. Steam Hammer.

This hammer is of the latest and most approved style of construction, and is modeled principally on the Rigby plan.

It consists of a frame of hollow or cored section, with anvil seat of great weight.

Steam is admitted at both ends of the cylinder ; the piston rod and piston are forged of a solid piece of wrought iron ; the valve seat is brass lined, and the hammer head is of cast-steel.

All the parts of this hammer are heavy, well adapted to stand the strain of working, and in case of repairing can be easily removed.

We also manufacture a steam hammer of much larger capacity, viz., 7 cwt.

It is of the same construction as our smaller hammer, excepting the anvil block, which, instead of being cast solid on the frame, is a separate piece of itself, lying directly beneath the head of hammer, thereby preventing the shock of the blow from communicating itself to the main frame.

These hammers are simple and very effective and dispense with a very large amount of labor.

Weight of 3 cwt. steam hammer, 3,400 lbs. Weight of 7 cwt. steam hammer, 8,200 lbs. Weight of anvil block for 7 cwt. hammer, 3,800 lbs.

Locomotive and Car Machinery.

Besides the forgoing catalogue of tools, we append the following list of special locomotive and car machinery, of which photographs will be sent on application. This list comprises tools of the heaviest class and design, got up with the best material and workmanship, and suited to all the requirements of railway and car shops.

7 Inch Shafting, Cutting Off and Centering Machine.

This machine can cut off and centre steel or iron from 7 in. to 2 in. diameter; has a hollow spindle with universal chuck at each end; is powerfully geared. The tool works close to the dogs, and has an adjustable clamp to suit the cutting edge. It has an automatic feed movement; there are two centering drills, one twist, and one countersink, and either can be brought to centre or thrown out of the way while cutting off. Guage rods for cutting to any length. The machine has a hollow frame, and both it and the centering attachment are strong and substantial.

Countershaft has fast and loose pulleys, 24 in. x 6 in., and should make 100 per minute. Weight, 6,300 lbs.

Double--Head Locomotive Frame Slotting Machine.

The photograph represents the working parts of the above machine. The frame is 24 feet long, the standards admit 34 inches in width, and 18 inches in depth. The stroke is 16 inches, with quick return motion; the slotting bar is revolved by a worm wheel. The crossheads can be set at an angle; the saddles can be moved by hand or can be operated speedily by power. This machine has four countershafts, two for moving the saddles, the dimensions of which are, one with fast and loose pulleys 15 in. x 5 in., and should run at 150 revolutions per minute; the other two have fast and loose pulleys 30 in. x 6 in., and should make 120 revolutions per minute. Weight, 40,000 lbs.

Large Sized Combined Punch and Shears.

This machine will take in the shear end 28 inches, and also the same in punching end if required. Machine punches 1¼ holes through ¾ plate, and shears 1 inch thick.

Fast and loose pulleys 24 inches diameter by 5 inch face, and should run at 180 revolutions per minute. Weight, 18,000 lbs.

Cylinder Boring and Facing Machine.

For boring locomotive cylinders. This is a special tool, and bores and faces cylinders with great rapidity, six hours being a common average. It has a 6-inch steel bar driven at both ends of cylinder; slide rests independently worked on each face plate for facing of the ends of cylinders; six changes of feed, including one ⅛ pitch for finishing.

Wrenches and countershaft. Fast and loose pulleys 18 in. x 4 in., and should make 140 revolutions per minute. Weight, 14,000 lbs.

Radial Horizontal Car Boring Machine.

This machine is adapted for boring timber of any capacity. It can bore straight, angular, or end holes without moving the timber; this is effected by a radial movement of the frame carrying the boring spindle. The spindle has a traverse of 24 inches. It is raised and lowered vertically with a hand-wheel and screw, and all the movements can be effected by the operator on the front of machine. The tension of the belt is kept by a weighted pulley. The timber operated on is easily moved on the front carriage, which is provided with rollers and guide.

The countershaft has fast and loose pulleys 10 x 5 inches, making 500 revolutions per minute.

Universal Horizontal Boring Machine with Radial Adjustable Table.

This machine, specially adapted for car shops and ship yards, is a strong and substantial machine. It consists of a frame cast in one piece, making it very rigid. The front slide carrying the table is adjusted vertically with a screw. The table swings to any required angle, and is slotted for the guide bar, which can be adjusted radially for any class of work. The steel boring spindle is brought forward by a treadle, which is counterbalanced by weight, giving a quick backward motion, and it has wrenches and five augur bits.

The machine carries its countershaft, which has fast and loose pulleys 8 x 3 inches, and should make 1,000 revolutions per minute.

Six Spindle Drill.

Six Spindle Drill for car truck frames; the drill spindles are steel and have internal socket spindles, which can be adjusted to suit any length of drill, thus insuring simultaneous boring. The table is elevated by cams, operated by a worm wheel, the feed being detached by a clutch. The driving bevel gear are cast steel, and a pump and tank on top to convey water to all the drills is provided.

The countershaft has fast and loose pulleys 18 x 6, and should make 150 revolutions per minute. Weight, 6,500 lbs.

Boiler Plate Planer.

This machine is intended for bevelling the edges of boiler plates. It planes eight feet at one setting, and cuts both ways by revolving the tool. If the sheets are longer, they are shifted lengthwise, so that any length can be planed. A series of plates or pieces, to the depth of 12 inches, can be taken below the beam. It is double-belted, and an improved belt shifter allows a very short stroke. The carriage is traversed by a heavy steel screw of two inch pitch.

The countershaft fast and loose pulleys are 22 in. x 5 in., and should make 300 revolutions per minute. Weight of machine, 14,000 lbs.

Locomotive Guide Bar Grinder.

The above machine is specially adapted for grinding to a true surface guide bars of locomotives, and can finish all flat surfaces with great perfection. The work operated on, being previously planed, is chucked on the table, which has a ledge all round for water if required, and the wheel spindle having a lateral motion traverses over all the work. The countershaft is placed in rear of machine, thereby giving the belts always the same tension.

Countershaft has fast and loose pulleys 12 in. x 5 in., and runs at 500 revolutions per minute. Weight, 4,300 lbs.

Double Angle Shears.

Our Double Angle Shears are largely used in bridge works and ship yards. It will cut steel or iron angles 6 x 6 inches, and is so constructed that it can cut square or any angle up to 45 inches: it is provided with a stop motion, which allows the shears to be brought down to the mark by hand so as to cut accurately. The machine as shown is run by engine power direct, but if required it can be run by belt. This machine is strongly constructed and powerfully geared: all the important bearings being bushed with bronze.

Speed of engine, 300 revolutions per minute. Pulleys if so ordered 21 x 5 inches, 300 revolutions per minute. Weight, 9,500 lbs.

Large Automatic Car Gaining Machine.

This is a heavy and substantial machine. Timbers up to 24 inches by 16 can be gained to any depth up to 4 inches. A series of stops on the table enables the operator to duplicate any class of timber. The table moves on rollers in a heavy bed, which is set low and is operated by a hand wheel and rack. The bed is secured to a large hollow cast frame, planed on top to receive the cutter slide; this consists of a horizontal bar carrying on its front the vertical slide and cutter head. The horizontal movement of the bar is automatic, and has a positive equal motion either backward or forward: the length of stroke is regulated by stops, and the motion can be reversed at any time. The cutter head is lowered to the depth by a lever, and a series of 4 stops regulates for different sizes of gain. A heavy spring throws the slide up, while a vertical screw regulates the position of the lever. The countershaft is placed in such a position as gives proper tension to the belt in any position of the cutter-bar. Countershaft, fast and loose pulleys, 15 x 8 inches, and should make 575 revolutions per minute.

Large Car Sill Dressing Machine.

This machine is specially designed for the heaviest class of work in Railway and car shops. It planes on 4 sides at one operation 14 inches wide and 12 inches deep. The feed is powerful, consisting of revolving endless bed in conjunction with a pair of smooth rolls having expansion gear. The main cylinder head is moved up and down by power, and the pressure rolls are weighted separately. The side heads are steel and on steel spindles, extra heavy with long bearings, and require no top bearing. The handles for adjusting machine to any size of timber are on the working side, convenient to the operator. Two countershafts, one for upper cylinder and feed, and one for under cylinder and side heads. Fast and loose pulleys on countershaft are 14 in. x 8 in., and should make 850 revolutions per minute. Weight of machine 10,000 lbs.

Bar Shears.

For cutting off all sizes of square and round bars from 2½ inches down, and all flat bars from 7 x 1 inches, the upper shear cutting the former and the lower shear the flat bars. This machine is indispensable in railway, machine and blacksmith shops, bridge works, etc.; it is provided with stops for giving the length of bar to be cut; is strongly built and very powerfully geared. Fast and loose pulleys 24 x 6 inches, and should make 150 revolutions per minute. Weight of machine, 8,250 lbs.

Seventy-eight Inch Wheel Press.

For locomotive drivers and car wheels the pump is double-acting, ram receiving an impulse from each upward and downward stroke. The cylinder is copper lined and has a nine inch ram. It has a pressure gauge registering 200 tons; leather crimper; crane with elevating screw and block for taking off and pressing on car wheels. Fast and loose pulleys 24 x 5, and should run at 90 revolutions per minute. Weight 12,800.

Combined Straightening, Bending and Punching Machine.

This machine, as may be seen, is of massive and heavy construction, and is indispensable in bridge and iron works. It consists of a heavy frame with cored section. In line with the eccentric shaft is the ram, in two sections, consisting of steel 6 inches square. The stroke of the ram can be reduced or extended as desired, while the machine is in motion, by the lever and wedge, which is always under the control of the operator. The machine as shown has a punching attachment, which can be quickly removed, and removing the punching ram and replacing the other, makes it ready for bending and straightening. The abutments can be adjusted easily to any suitable distance.

The fast and loose pulleys are 20 inches diameter and 6 inch face, and should make 180 revolutions per minute. Weight, 9,600 lbs.

Large Ripping and Cross-Cut Saw With Elevating Mandrill.

This machine is specially adapted for ripping, cross-cutting, beveling and mitreing in car shops and ship yards. It consists of a heavy cast-iron frame with table planed true on top. The table is slotted on the left-hand side for a separate table, with mitreing guide. The saw mandril runs in a swinging frame, which is raised and lowered by a worm-wheel operated by a hand-wheel at feeding end of machine. The ripping guide bar can be set to any bevel and traverses in a slot on front of table. The saw arbor is of steel and runs in self-oiling boxes.

The countershaft has fast and loose pulleys 12 x 5 inches, and should make 450 revolutions per minute.

Hydraulic Car Wheel Press.

This machine is capable of pressing two car wheels upon the axle at one operation, and taking off as well. The cylinder is lined with composition metal, which effectually prevents the liquid from contact with the cast-iron. The extension bars are heavy, 6 x 1½ inches, and provided with slots for adjusting the cross-beam to any required length. The cross-beam travels with rollers on lower extension beam. The ram is 7½ inches diameter, with self-packing leather on the inner end, and is drawn back with chains and weights.

The pump is of gun metal and is double acting, giving an impulse by up and down stroke. The pressure gauge registers the number of tons on the ram; as also pressure per square inch in lbs. It is capable of pressing up to 150 tons, or 7,000 lbs. per square inch. It is provided with safety valve, and tank for containing liquid. The top extension bar carries a sling with screw for adjusting the axle to the proper height. Fast and loose pulleys 24 x 5 inches diameter, and should run at 90 revolutions per minute. Weight 7,200. lbs.

Special Iron Working Machines.

		Weight. lbs.	Price.
Emery Grinding Machine.	Emery Grinding Machine for guide bars of locomotives, steel or iron surfaces; 7 ft. table, 24 in. wide and 15in. deep; emery wheel, 12in. x 3in..	4300	
Hot Saw for bars, etc.	Saw for cutting off either hot or cold wrought bars, beams or angles....	3750	
Special doub'l Milling Machine.	Double Milling Machine for hot water furnace sections, mills both sides at once...	4900	

Conclusion.

Besides the many different machines enumerated and described in this Catalogue, we also manufacture and supply complete outfits of machinery for

Railway Machine Shops,

Locomotive Builders

Car Builders,

Implement Manufacturers,

Bridge Works,

Planing Factories, Etc.

besides many special and valuable tools hitherto not mentioned, photographs and descriptions of all of which may be had on application.

JOHN BERTRAM & SONS.

INDEX.

A

B

C

D

E

F

G

H

I

K

L

M

P

R

S

T

U

V

W