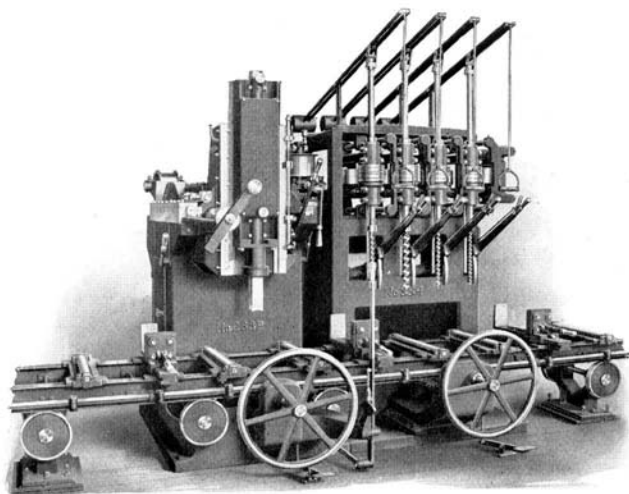
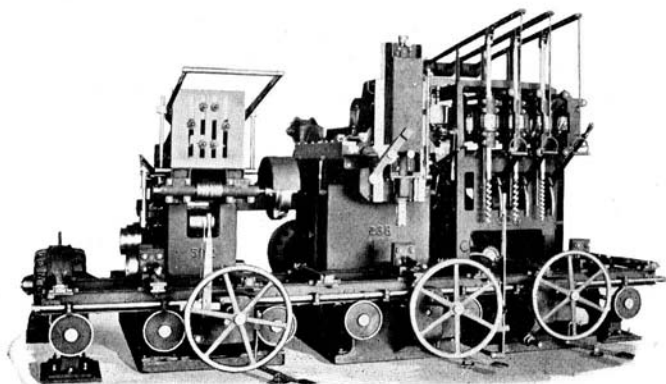
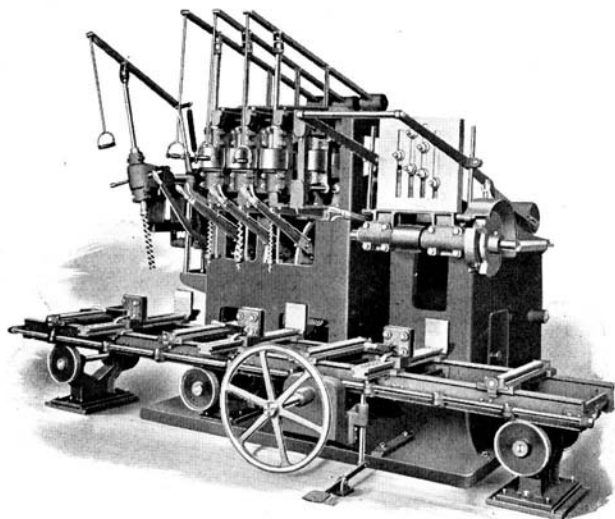




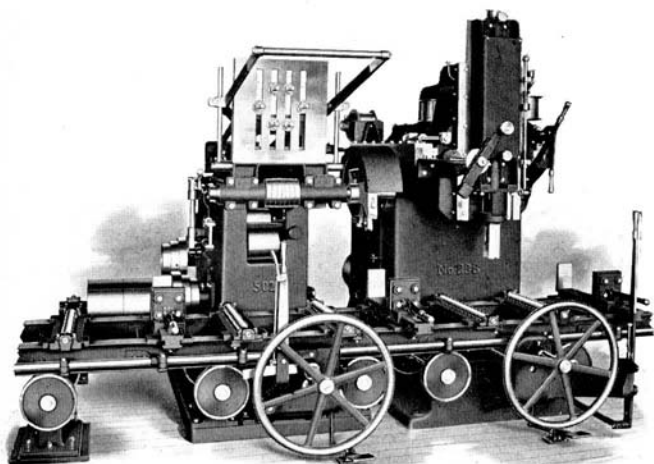
No. 238 Mortiser combined with No. 334 Car Borer



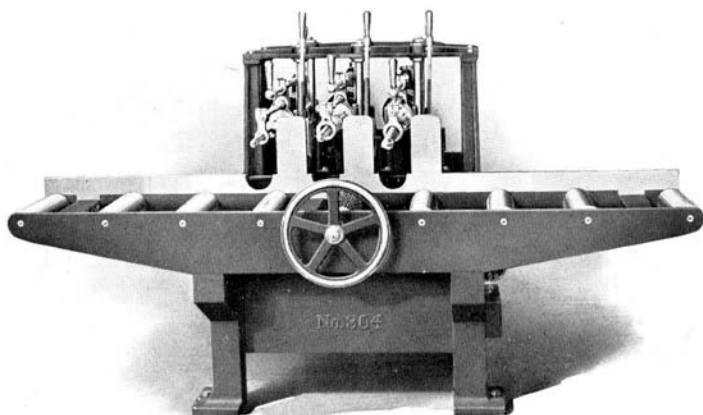
Combined No. 238 Mortiser, No. 502 Gainer and No. 328 Borer



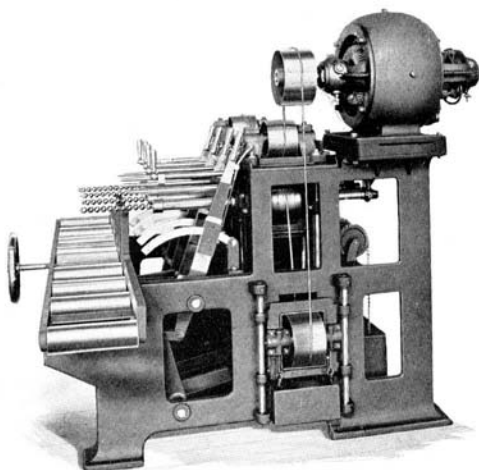
No. 502 Gainer combined with No. 329 Car Borer



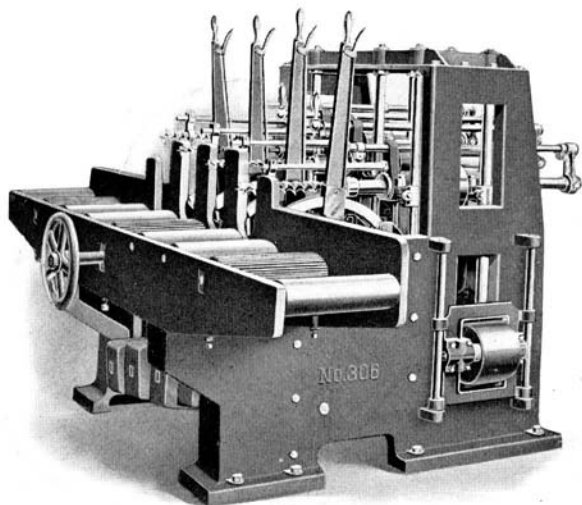
No. 238 Mortiser combined with No. 502 Gainer



No. 304 Three Spindle Horizontal Car Borer



**No. 305 Four Spindle Horizontal Car Borer
with Motor Mounted on Frame**



No. 306 Extra Heavy Four Spindle Car Borer

Standard and Extra Heavy 3, 4 and 5 Spindle Horizontal Car Borers

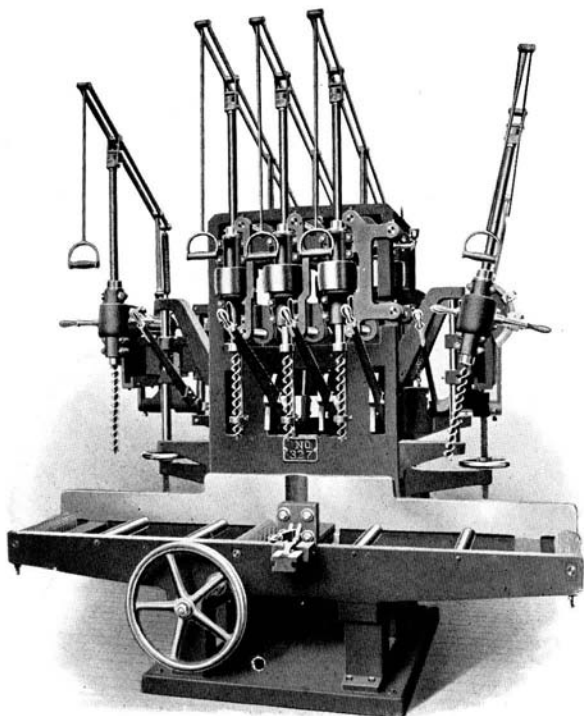
DESIGNED with range equal to Car Shop and similar timber boring work, these horizontal machines handle either light or heavy stock without clamping, the work is free from chips, lay-out gauges are used for duplicate work, and belted spindle drive prevents excessive tool breakage in difficult boring.

The **Spindle Carriages** are rigidly mounted on round steel guides and adjust easily for height by self locking levers. Stroke regulating stops and safety bit guards are furnished.

The **Range** of the No. 304 and 305 Borers is for 3-inch bits and 14-inch timbers. The No. 306 and 307 machines handle 4-inch bits and 16-inch timbers. Built for belt or motor drive.

No.	Style	Floor Space	Wt. in Lbs.	Code
304	3 Spindle Standard	6' 8" x 8'	3750	OBLIGE
305	4 Spindle Standard	6' 8" x 8'	4500	OBLIGATE
306	4 Spindle Extra Heavy	6' 8" x 8'	5400	OBLIVION
307	5 Spindle Extra Heavy	6' 8" x 8'	6100	OBLONG

Complete descriptive circular will be sent upon request

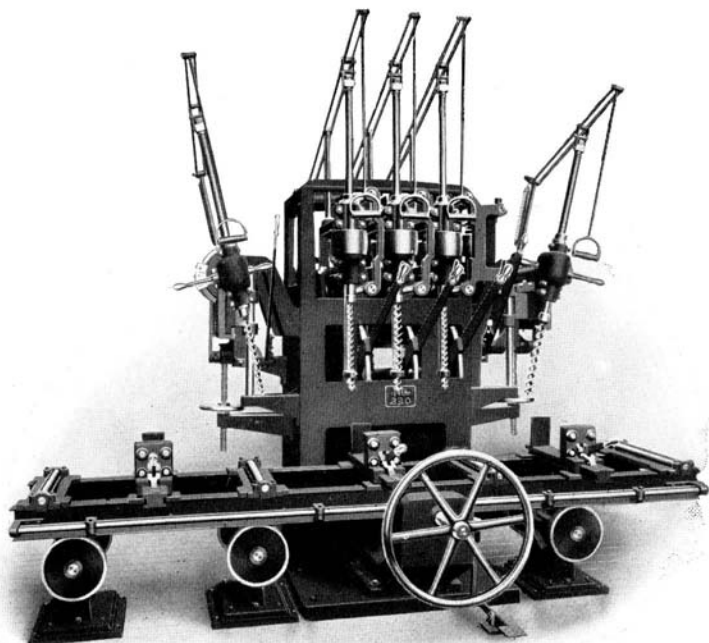


No. 327

Nos. 325 to 330 Standard Heavy Vertical Car Borers

HEAVERY Vertical Boring Machines either with or without Radial Spindles, and with stationary or traveling timber tables, are necessary types for well equipped car building or repairing shops. The required bit size is immediately available, angle boring is performed with the radial spindles, the stock lays face up, and proper protection is afforded by belt guards for the front pulleys and a safety bit guard for each spindle.

Improved Mounting of vertical spindle carriages on round steel guides secures perfect support in all positions and easy cross adjustment by the self locking levers. Belted spindle drive gives high bit speeds and thorough lubrication is provided.



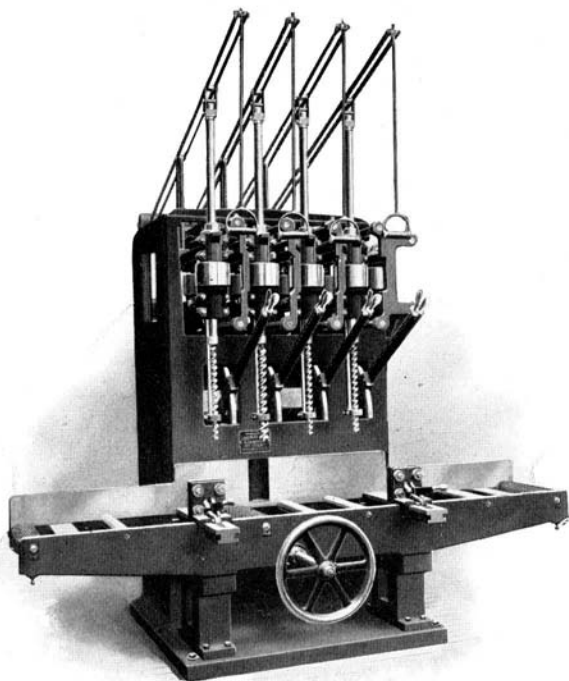
No. 330

The Radial Spindles can be fitted on either or both sides of the machines. They have lever transverse movement, angular adjustment to stops, and their carriages adjust vertically to allow proper use of extra short bits.

The Range is for 3-inch or larger bits, working 14-inch timbers, and the rear base countershaft is fitted with tight and loose pulleys for belt drive, or with flexible coupling for direct motor connection as specified.

No.	Spindles	Style of Table	Code
325	3 Vertical Spindles	Stationary	OILBAG
326	3 Vertical and 1 Radial	Stationary	OILBAG-ODIN
327	3 Vertical and 2 Radial	Stationary	OILBAG-ODYLE
328	3 Vertical Spindles	Traveling	OILGAS
329	3 Vertical and 1 Radial	Traveling	OILGAS-ODIN
330	3 Vertical and 2 Radial	Traveling	OILGAS-ODYLE

Complete descriptive circular will be sent upon request

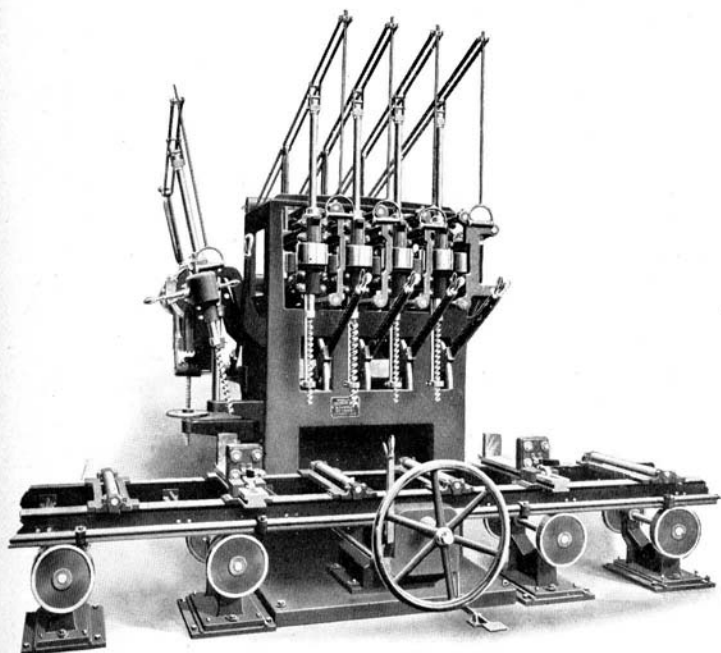


No. 331

Nos. 331 to 336 Standard Heavy Vertical Car Borers

THESE Heavy Borers are of the same general design and range as those on the preceding pages, but have one additional vertical spindle. They are built with or without Radial Spindles, and with either the attached stationary timber table or a traveling steel table, of any length, having hand or power feed. When fitted for the traveling table, any borer may be used in combination with mortising or gaining machines.

The Spindles are amply large, are ground to exact size and are double splined to insure perfect balance. Their pneumatic pulleys are carried on long sleeves through which the spindles feed. Front pulley shields and safety bit guards are furnished.



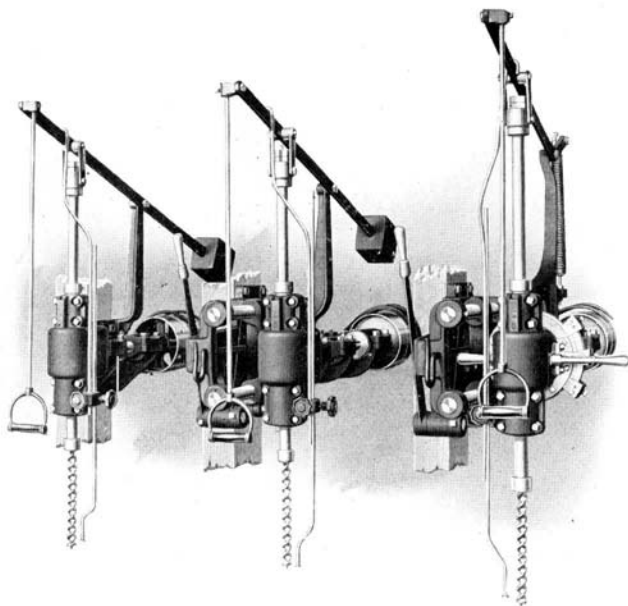
No. 335

The **Stationary Table** is firmly supported from the machine base and has connected fluted rolls operated by hand wheel. It also has idle rolls and ratchet lever timber clamps.

The **Traveling Steel Table** is carried on adjustable roller stands and has timber rolls, quick acting ratchet clamps and a lay-out stop rod. The usual length for separate machine is 14 feet, but tables up to 40 feet are furnished.

No.	Spindles	Style of Table	Code
331	4 Vertical Spindles	Stationary	OILBIRD
332	4 Vertical and 1 Radial	Stationary	OILBIRD-ODIN
333	4 Vertical and 2 Radial	Stationary	OILBIRD-ODYLE
334	4 Vertical Spindles	Traveling	OILGAGE
335	4 Vertical and 1 Radial	Traveling	OILGAGE-ODIN
336	4 Vertical and 2 Radial	Traveling	OILGAGE-ODYLE

Complete descriptive circular will be sent upon request



No. 350 Heavy Post Borers

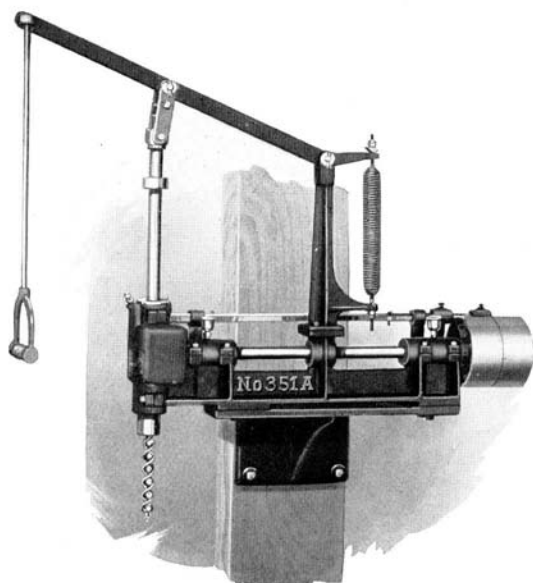
OUR Heavy Post Borers are built in three types as shown above. The plain machine has no adjustment for the housing while the universal borer has tilting adjustment to 35 degrees in addition to the 12-inch cross adjustment of the compound type.

The Range is for bits up to 3-inch diameter. Stroke is regularly 20 inches but can be increased or decreased as required.

Motor Size should be 3 to 5 H. P. according to work. Usually belted to tight pulley but can be arranged to couple at extra cost.

The Equipment includes one each $\frac{1}{2}$, $\frac{5}{8}$ and $\frac{3}{4}$ -inch by 12-inch twist machine bits, one $\frac{1}{2}$ -inch bit bushing, belt shifter, and 8x3 $\frac{1}{2}$ -inch tight and loose pulleys to run 1200 R. P. M. Bit guards, foot treadle for feeding No. 350-A, and wood top table with cast iron bracket can be furnished as extras.

No.	Style	Wt. in Lbs.	Code
350-A	Plain	350	OFFENSE
350-B	Compound	550	OFFENDER
350-C	Universal	600	OFFENSIVE



No. 351 Light Post Borer

THE Post Borer shown above is a real improvement over the old style belt driven machines still offered by some builders of woodworking machinery. The spindle housing encases the steel drive gears with an oil chamber and provides long bearings for the spindle sleeves. The feed is by overhead pull but a connecting rod and foot lever can be substituted at a small extra charge.

The Range is for ordinary boring work with bits up to $1\frac{1}{2}$ -inch diameter. The stroke is regularly 11 inches, regulated by an adjustable stop, but can be increased somewhat if required.

Motor Size should be 1 or 2 H. P. according to work. Usually belted to tight pulley but can be arranged to couple at extra cost.

The Equipment includes one each $\frac{1}{4}$, $\frac{3}{8}$ and $\frac{1}{2}$ x6-inch twist machine bits, belt shifter and 6x2 $\frac{5}{8}$ -inch tight and loose pulleys to run about 1200 R. P. M. A wood top table with a cast iron bracket can be furnished as an extra.

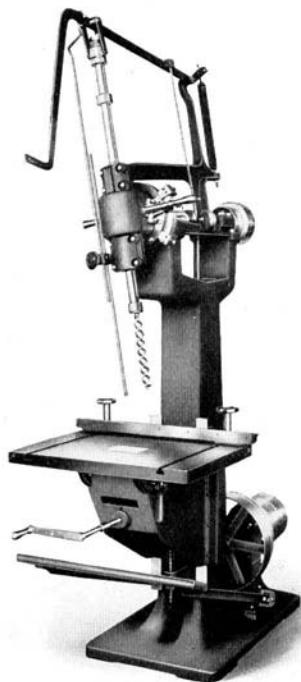
No.	Style	Wt. in Lbs.	Code
351	Plain	200	OFFERING



Nos. 352 to 353-B Universal Vertical Borers

THESE Vertical Borers have been modernized by replacing quarter turn belts by straight belts and gear driven spindles. They are built with one, two or three spindles and are designed for ordinary light and medium work, but have ample power for bits of 3-inch or larger diameter when occasion demands. The Single Spindle Machine is built with either a vertical or radial type of spindle and all have universal tables.

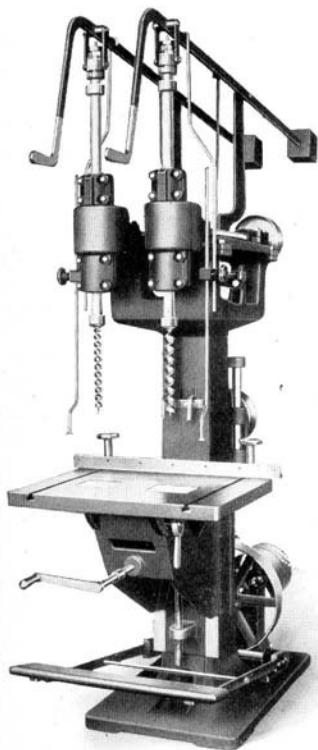
The Frame is a cored box section of wide face and with a base 24x40 inches. This size permits broad ways for the table support and its heavy construction insures freedom from vibration when running at high speeds.



No. 352-R

The Spindles are larger than usual, have ball bearing thrust and are double splined through long sleeves which are driven by planed bevel gears accurately fitted for the highest speeds. The stroke is regularly 22 inches on the Radial Spindle machine and 14 inches on the others, but can be made from 12 to 22 inches. The feed is by over-head pull and foot lever on all except the No. 353-B, which has over-head pull only. Sockets are for $\frac{3}{4}$ -inch shanks, but $\frac{1}{2}$ -inch bushings are furnished.

The Table is supported by a very rigid knee having vertical adjustment of 10 inches by a crank. The table mounting permits tilting forward or back and also to either side. The width is 30 inches on all except that of the No. 353-B machine. This has a 36-inch wide table and on all, the gauge will adjust back 26 inches from the front.



No. 353

Variable Speeds for the bits are obtained by a cone pulley on the single spindle and by different pulley sizes on the multiple spindle machines. These pulleys are quickly changed if further speed variation is desirable.

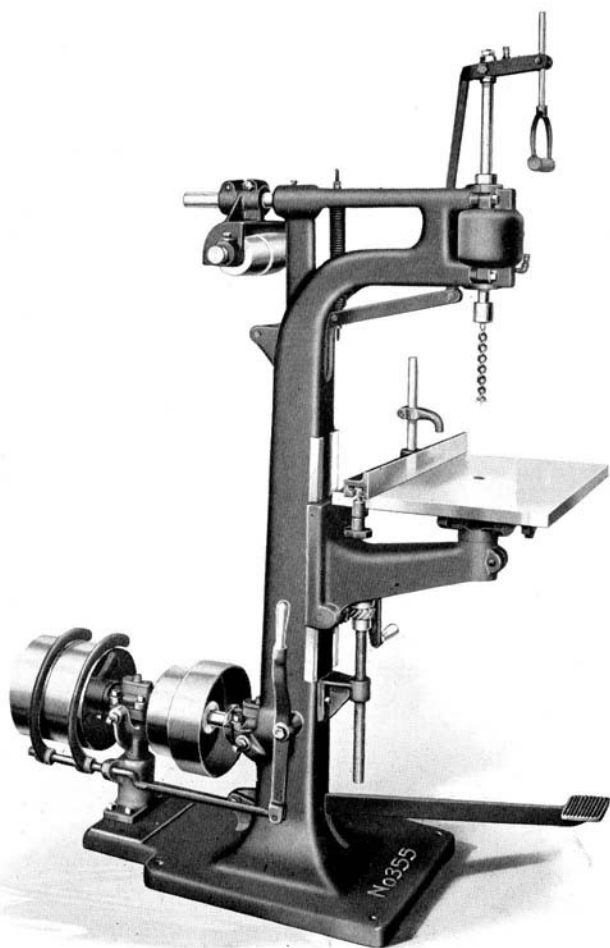
Stop Gauges are supplied to regulate the depth of boring, to check the upward return of the spindles at any point, and to hold down light stock on the table.

The Range is regularly for bits up to 2-inch or 3-inch diameter and 12-inch twist. Longer bits can be provided for, if the spindle is ordered of increased length, and the table lowers to 27½ inches below the spindle chuck. The center of the bit is 18 inches out from the face of the frame.

The Attached Counter-shaft has 10x4¼-inch tight and loose pulleys to run 850 R. P. M. When motor driven, an attached base bracket is furnished for mounting a direct connected motor of any speed up to 1200 R. P. M.

The Equipment furnished with each machine includes the gauges and stops, one each ⅝, ¾ and ⅞-inch machine bits in either 10 or 12-inch twist and with ½-inch shanks, unless otherwise ordered, and also one ½-inch bit bushing for each spindle. Bit guards can be furnished, but are extra.

No.	Spindles	Floor Space	Wt. in Lbs.	Code
352	One Vertical	2' 8" x 5' 4"	1650	OCARINA
352-R	One Radial	2' 8" x 5' 4"	1800	OCCIPUT
353	Two Vertical	2' 8" x 5' 4"	2250	OCCLUDE
353-B	Three Vertical	3' x 5' 4"	2650	OCCULT
Safety Bit Guards, extra				



No. 355 Single Spindle Vertical Borer



No. 355 Single Spindle Vertical Borer

THE demands of furniture, automobile body and cabinet shops, as well as industrial schools, were considered when developing this machine. It has sufficient range to accommodate average work in this class of shop and has proven to be a very useful and convenient tool.

The Frame is a cored single column with a base 20x32 inches. Double bracing at the top provides extra strength and rigidity at the boring head. The table knee is mounted on gibbed ways and has spiral geared screw adjustment, while the weight is carried on a ball thrust bearing which makes for easy movement.

The Table is 18 inches deep and 24 inches long. It is mounted on a double segment cradle on the knee which provides angular adjustment of 45 degrees. The cradle is on a trunion in the knee so that it may rotate, and with the angular adjustment permits tilting in any direction.

The Fence is 26 inches long, 2 inches high, and has a center hold-down for the work. It is attached to the table edges by two clamps which permits its use in any position. The greatest distance from the bit center to face of the fence is 9½ inches.

The Spindle is one inch in diameter, has 8-inch thrust for 6-inch twist bits, and is fitted with adjustable collars to regulate the stroke. The maximum distance between the table and bit chuck is 18 inches. The spindle feed is by foot treadle or an adjustable hand lever. A coil spring provides quick return.

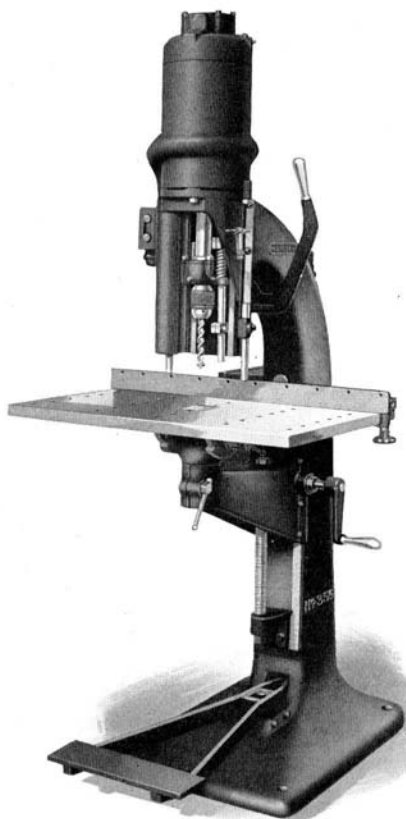
The Range is for bits up to 2 inches in diameter and of any length of twist up to 6 inches. The distance from the bit center to the machine column is 14½ inches.

The Countershaft is adjustably mounted on the rear of the base and is fitted with an 8½ and 10½-inch two step cone pulley which belts over idle pulleys to the 4-inch diameter spindle pulley. The tight and loose pulleys are 9x3½-inch.

When Motor Driven, the countershaft is omitted and an insulating bracket bolted to the base. A 1 or 2 H. P. motor, according to the work, of any speed up to 1800 R. P. M., is suitable to belt direct to the spindle pulley.

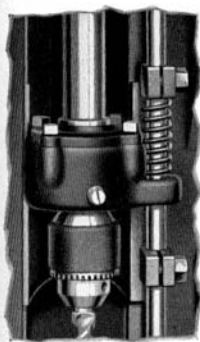
The Equipment includes the countershaft or motor bracket, wrenches, and one each ½ and ¾-inch by 6-inch twist machine bits.

No.	Style	Floor Space	Wt. in Lbs.	Code
355	Countershaft	4' 9" x 2' 2"	800	OCTANT
355-M	Motor Bracket	4' 3" x 2' 2"	720	OCTAVE



No. 356 Single Spindle Borer with Built-in Motor

THE design of this machine eliminates all belts and gears through the use of a 3600 R. P. M., alternating current, built-in motor for the drive of the spindle. The upper end of the spindle is splined and slides in a sleeve within the motor which is mounted in a stationary position at the top of the frame. It is easy to operate, very quiet running and the power consumption and cost of maintenance is reduced to a minimum. A very important feature of the design is the built-in blower which keeps the work free from chips and provides forced ventilation for the enclosed motor.

**Spindle Slide Bearing**

The Spindle runs in a thrust and supporting ball bearing mounted directly above the chuck and carried in a slide which is guided by planed ways on the front of the frame. Since the bearing moves with the spindle, perfect support is provided in all positions and accuracy of boring is insured. The upper end of the spindle has ten milled splines and slides in a broached sleeve within the motor. This construction permits the stationary mounting of the motor and makes the feeding movement exceedingly free and easy. The standard chuck is of the self-centering geared type with capacity for shanks up to $\frac{1}{2}$ -inch diameter.

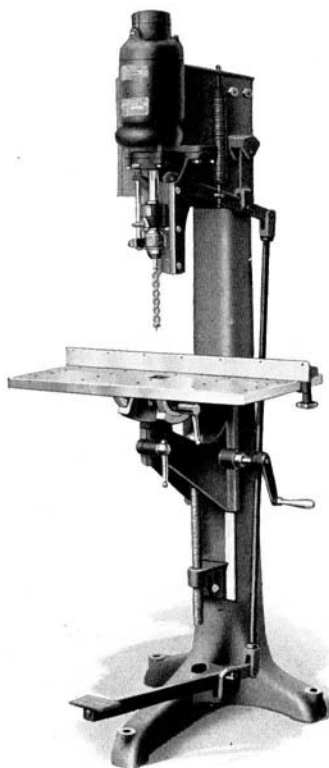
The Feed is by a light, strong foot lever with connections within the frame to the spindle slide. Two positions are provided for the fulcrum so that adjustment can be made to suit the stroke. An auxiliary hand lever is also provided, but this is readily removable. The length of stroke is regulated by means of a lug on the spindle slide which engages two adjustable stops on a stop rod alongside the spindle. This insures absolute accuracy in the length of stroke and perfect duplication in depth of boring.

The Table is 30 inches long and 22 inches deep. It is adjustable from 28 to 42 inches above the floor and can be tilted in any direction for angle boring. The fence can be adjusted over the entire table surface and is held in position by quick acting screw clamps. Adjustable stock hold-downs are carried from the spindle ways. Both the table and spindle are somewhat lower than on ordinary single spindle borers and this makes it especially convenient for handling average stock.

The Range is sufficient for the usual requirements of a single spindle borer in automobile body, furniture or similar work. It will readily operate bits as large as $1\frac{1}{2}$ -inch diameter in hard wood and its stroke is adjustable up to $8\frac{3}{4}$ inches. The spindle center is 16 inches from the face of the frame and the maximum distance from the table to the bit chuck is 23 inches.

The Equipment includes the motor with starting box and push button control mounted on the machine frame, wrenches and one each $\frac{3}{8}$, $\frac{1}{2}$, and $\frac{3}{4}$ -inch by 6-inch twist machine bits.

No.	Floor Space	Wt. in Lbs.	Code
356	2' 9" x 3' 5"	1000	OCTET



No. 357 Light Pattern Borer with Built-in Motor

Designed Especially for Chair Factories

THIS Borer is similar to the No. 356 type in having a 3600 R. P. M., alternating current, built-in motor for the drive of the spindle, also a built-in blower for chip removal and motor ventilation. It is somewhat lighter, however, and the ways for the spindle slide bearing are much narrower to permit working close to projections of irregular shaped pieces. It was designed especially for chair work, but is not limited to any particular class of boring. Arrangements are also made to furnish the head and various other parts for mounting on a post, as explained on the following page.



The Spindle has ten milled splines at its upper end to provide easy movement through a broached sleeve within the motor, which is mounted in a stationary position. Rigid support is provided for the spindle by running it in a thrust and supporting ball bearing mounted directly above the chuck and carried in a slide which is guided by planed ways. Since the bearing moves with the spindle, accuracy of boring is insured. The chuck is of the self-centering geared type with capacity for shanks up to $\frac{1}{2}$ -inch diameter.

The Feed is by a foot lever with two positions for the fulcrum to provide adjustment to suit the stroke. It is exceedingly easy to operate due to the light weight reciprocating parts. A lug on the spindle slide engages adjustable stops on the stop rod to insure absolute accuracy in the length of stroke and depth of boring.

The Table is 30 inches long and 16 inches deep. It is adjustable from 29 to 44 inches above the floor and can be tilted in any direction. The fence can be adjusted over the entire surface and is held in position by quick acting screw clamps.

The Boring Range is sufficient for the usual requirements of a single spindle borer in the manufacture of chairs or other furniture work. It will readily operate 1-inch or larger diameter bits in hard wood, and its stroke is adjustable up to 6 inches. The spindle center is 12 inches from the face of the frame on the standard machine, but this can be increased to 18 inches if required. The maximum distance from the table to the bit chuck is 22 inches.

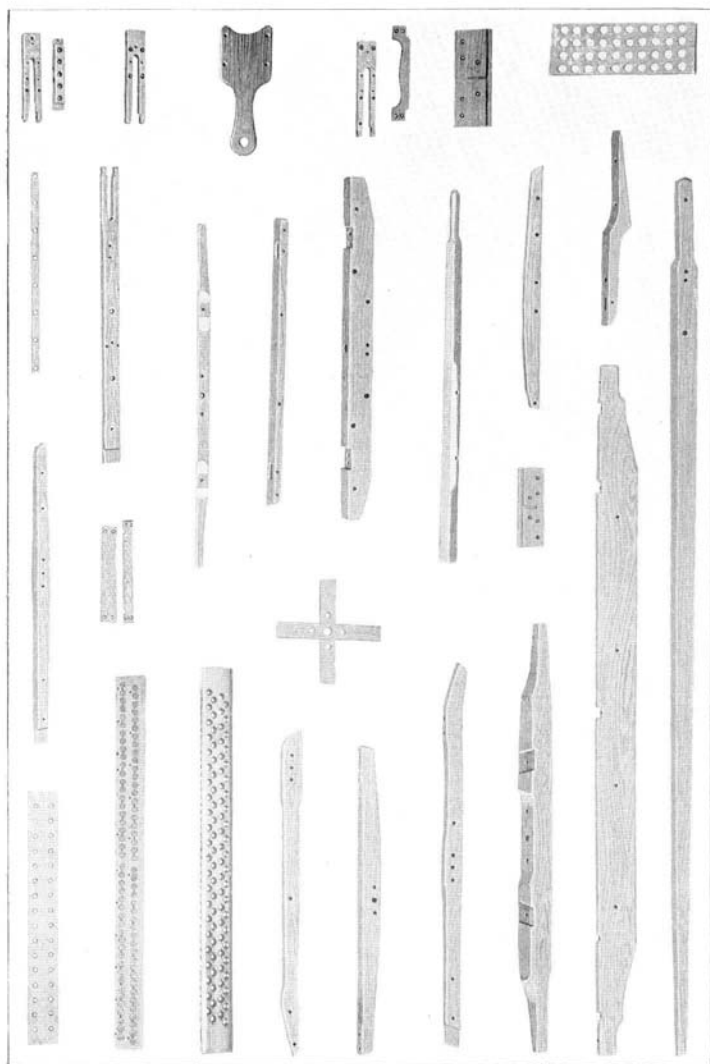
The Equipment includes the motor with an enclosed starting box and push button control mounted on the machine frame, wrenches, and one each $\frac{1}{4}$, $\frac{3}{8}$, and $\frac{1}{2}$ -inch machine bits.

No.	Floor Space	Wt. in Lbs.	Code
357	2' x 3'	850	OCTILLION

No. 357-A Post Borer

THE design of the above machine is such that the head with its foot lever and connections can be furnished separately from the rest of the machine as a post borer. The universal table, or a plain table, with knee piece and separate slides to be bolted to a post can also be supplied for use with the boring head. We can also furnish three separate cast iron feet, similar to those shown, for bolting to a wood column to form a base.

No. 357-A Post Borer with foot lever feed.	Code, OCTOPUS
Universal Table with knee piece and ways.	Code, OCTOROON
Plain Table with knee piece and ways.	Code, OCTUPLE
Separate Cast Iron Feet for a wood column.	Code, OCULAR



Some Examples of Gang Boring Work



Gang Borers

THE sample parts on the opposite page give some idea of the application of Gang Borers to products requiring the boring of pieces in quantity. Great economies are effected in time and labor, as all holes in a piece can usually be bored at one stroke, lay-out lines are eliminated and perfect duplication of work is obtained. It is a recognized fact that correctly designed Gang Borers are doing as much to place the woodworking industry on an economical basis as any other class of machinery on the market.

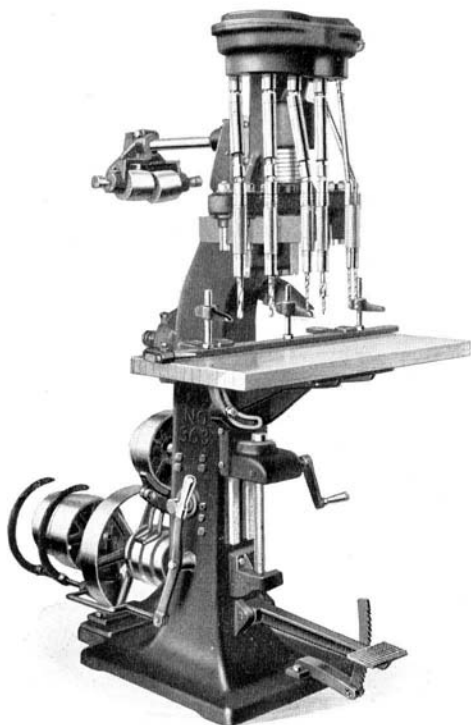
For many years we have made an intensive study of gang boring problems and of the design of machines to properly meet these requirements. As a result of our study and experience, we now offer a complete and high grade line of both vertical and horizontal machines. Modifications can be made for extreme demands.

Horizontal Gang Borers are best suited to edge boring in wide flat stock, although they are not limited to this class of work. Our No. 368 and 370 types are used extensively for various classes of work best adapted to the horizontal machine.

Vertical Gang Borers are used to a greater extent than the horizontal types, since average work is better adapted to this class of machine. The table directly takes the thrust of boring, the surface to be bored is always in plain sight and wide stock lies flat on the table. Our vertical machines are divided into two general classes, one using any of the Standard Heads shown on page 56, and the other having Universal Joint Spindles. The latter are better adapted to work requiring a greater range of cross adjustment and more frequent changes in set-up, although the cross range of the former can be increased to meet extreme requirements by using Cross Extension Brackets as shown on page 66.

Combined Horizontal and Vertical Gang Borers are used on parts requiring boring from two faces. For ordinary pieces such work is usually handled in two operations on a one-way borer, but when the production is high on such parts as wagon poles, reaches, railway car posts, etc., our No. 384 machine is offered.

In order that we may be of most service in the selection of a properly equipped Gang Borer, it is necessary that full information be given regarding the expected production and the size and location of holes. The latter can best be furnished by submitting samples, sketches, or blue prints of the parts to be handled. Our recommendations are based upon years of experience in the manufacture of machines and their boring tools and will be gladly furnished without any obligation on the part of the customer.



No. 363 22-inch Belt Driven Gang Borer

No. 363 Universal Spindle Vertical Gang Borers

OUR No. 363 Universal Spindle Machine is especially adapted to the boring and countersinking of small holes in blocks, cleats, battens, etc., where the centers are close and irregularly spaced. The bits feed to the work by power which permits the rapid and convenient handling of pieces on the stationary table.

Two Sizes are for 12 and 22-inch maximum lengthwise spindle spread. The 12-inch machine has cross adjustment of $2\frac{1}{2}$ inches for the spindles and the 22-inch machine provides cross adjustment of 4 inches. Increased cross range can be specially provided.



No. 363 22-inch
with Double Motor Drive

The Spindle Carriage is extra long and reciprocates in gibbed ways on the one piece frame. Its stroke is adjustable from $2\frac{1}{2}$ to 4 inches. The 12-inch machine will accommodate from 3 to 6 spindles while the 22-inch machine can be fitted with 8 or less.

Standard Spindles bore to $1\frac{1}{4}$ -inch centers and are rated for bits up to $\frac{5}{8}$ -inch diameter, although larger sizes can be used. Spindles for $\frac{3}{4}$ -inch centers can be furnished for very light or shallow close center work.

The Power Feed is controlled by the foot lever. A ratchet is provided to hold it down for continuous feeding, but a touch of the foot instantly releases the connection. Three speeds of 14, 20 and 28 strokes per minute are provided by cone pulleys.

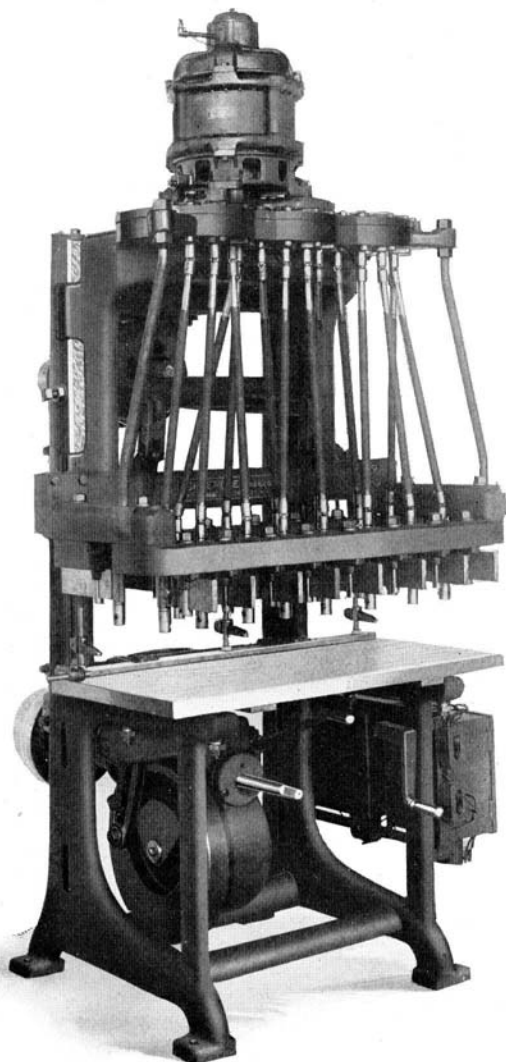
The Table is of hard maple, 18x36 inches and is mounted on a cast iron saddle having angular adjustment and vertical movement.

A back fence, an end stop and hold-down fingers are provided for locating and holding the piece while boring. A Built-in Fan Blower serves to keep the table free from the chips which would otherwise interfere with the rapid handling of pieces between the power feed strokes, as small pieces in quantity are usually bored with the spindle carriage feeding continuously.

The Countershaft is mounted on the machine base and has 10x4 $\frac{1}{4}$ -inch tight and step-down loose pulleys to run 800 R. P. M.

Motor Drive of the 22-inch machine is usually by mounting one motor on the spindle carriage and another at the base for the feed, as here illustrated. Either machine may, however, be driven by a 3 or 5 H. P. motor carried on an attached bracket at the rear and coupled to the base drive shaft which may run 1200 R. P. M. or less.

No.	Range	Floor Space	Wt. in Lbs.	Code
363	12"	3' x 4' 6"	1350	OMBER
363	22"	3' x 4' 6"	1450	OMEGA



No. 364 Universal Spindle Vertical Gang Borer



No. 364 Universal Spindle Vertical Gang Borer

THIS Gang Borer offers the distinct advantage over others of similar capacity in that the table is stationary, permitting rapid handling of the stock between the strokes of the reciprocating spindle carriage. Built-in motor drive is also provided, and ball and roller bearings are used throughout for the shafts and spindles. It is designed for work in which wide cross range is required, or where the holes are located irregularly and on close centers. Such work is met with in the manufacture of automobile bodies, furniture, cabinets and phonographs. The range is for 36-inch maximum outside spindle centers and cross adjustment of 15 inches.

The Spindle Carriage reciprocates on gibbed ways on the frame and its weight is counterbalanced by two compression springs. Its stroke is adjustable from 3 to 6 inches and the location of the stroke can be regulated to suit the thickness of stock. It will accommodate any number of spindles up to sixteen.

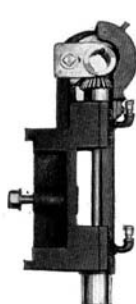
The Power Feed has three speeds of 14, 20 and 28 strokes per minute by means of cone pulleys and is controlled by a convenient hand lever below the table. The spindle carriage is reciprocated through connections from a bell crank operated by a cam which provides a uniform feed and a quick return.

Standard Spindles bore to 1¼-inch centers and are of the universal type with long connections between the joints to eliminate running them at sharp angles. They are driven through hardened steel gears and are mounted on the adjustable supporting rails by means of brackets having universal adjustment. Vertical adjustment of 2¼ inches is also provided for each spindle.

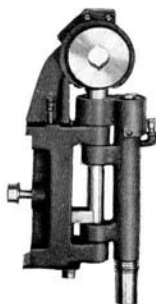
The Stationary Table is of built up hard wood and is 42x22 inches. It is 34 inches high and is regularly fitted with an adjustable back fence having an end stop and finger hold-downs. Spring Plunger Hold-downs similar to those used on our No. 386 type can be furnished for mounting on the spindle supporting rails.

The Drive can be by two motors as shown in the cut or by belt. A 7½ H. P. 1800 R. P. M. vertical motor is used for driving the maximum number of spindles and a 3 H. P. 1200 R. P. M. horizontal motor is sufficient for the feed. When belt driven, a shaft with tight and loose pulleys is substituted for the horizontal motor, and this drives the spindles through a geared vertical shaft with belt to pulleys substituted for the vertical motor.

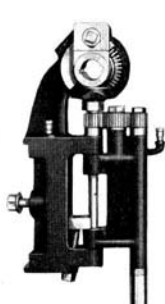
No.	Style of Drive	Floor Space	Code
364	Motor	4' x 5'	OMELET
364	Belt	4' x 5'	OMEN



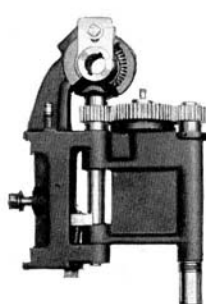
S-2



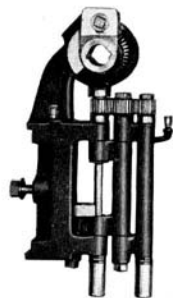
S-5



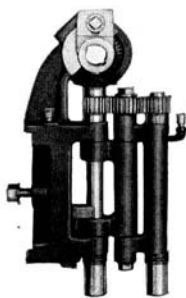
S-7



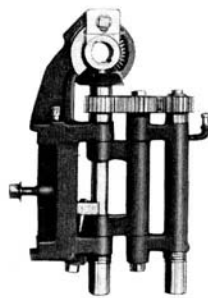
S-8 and S-9



S-11



S-12



S-13

Standard Spindle Heads

For Nos. 368, 369, 370 and 371 Gang Borers

OUR Standard Spindle Heads are offered in nine different patterns. These cover the great majority of boring requirements, but cluster heads or other special types can be furnished for extremely complicated or close center hole locations.

Correct Gear Mesh is maintained at all times by housing each drive gear with its mate so that both move together when the heads are adjusted on the rail. An adjustable retaining shoe, however, permits disengaging the drive of any spindle to allow it to stand idle. The bevel driving gears are of hardened steel, finished all over and have accurately planed teeth. All spindles are ground to size and are provided with ball bearings to take the thrust of boring. They are regularly fitted for $\frac{1}{2}$ -inch round shanks.

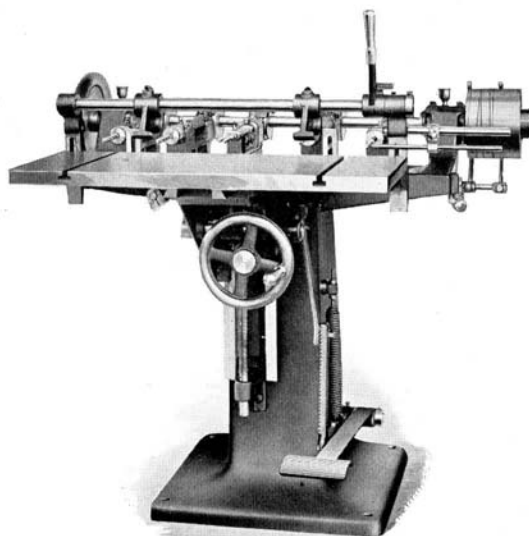


All Heads require $2\frac{1}{2}$ -inch width on the spindle rail. The S-2 Heads bore on the common center line only. The Radial Arm types are adjustable for staggered boring. Double Spindle Universal types have one spindle on the common center line and the other adjusts radially from it for the varying centers stated.

No.	Style of Head	Code
S-2	Plain Capped Single Spindle for straight line boring on $2\frac{1}{2}$ " minimum centers	OVERSAIL
S-5	Radial Arm Adjustable Single Spindle with $1\frac{3}{4}$ " arm radius and $1\frac{3}{4}$ " minimum centers	OVERSPIN
S-6	Radial Arm Adjustable Single Spindle with 2" arm radius and $2\frac{1}{4}$ " minimum centers	OVERSEND
S-7	Radial Arm Adjustable Single Spindle with 3" arm radius and $1\frac{1}{4}$ " minimum centers	OVERSTEP
S-8	Radial Arm Adjustable Single Spindle with 4" arm radius and $2\frac{1}{4}$ " minimum centers	OVERSOLD
S-9	Radial Arm Adjustable Single Spindle with 6" arm radius and $2\frac{1}{4}$ " minimum centers	OVERSTILL
S-11	Double Spindle Universal for one hole on common center line and one at any location from $1\frac{1}{4}$ to 3" from the fixed spindle	OVERSTAND
S-12	Double Spindle Universal for one hole on common center line and one at any location from $1\frac{3}{4}$ to 4" from the fixed spindle	OVERSPOT
S-13	Double Spindle Universal for one hole on common center line and one at any location from $1\frac{3}{4}$ to 5" from the fixed spindle	OVERSTART

Extension Brackets for Nos. 369 and 371 Gang Borers

EXTENSION Brackets are applied to the No. 369 and No. 371 Gang Borers when it is necessary to increase the cross range of spindle heads for extreme requirements. These Brackets are shown with the No. 371 Borer on page 66. They are adjustable on the spindle rail and are fitted with a splined shaft for the drive of the heads. The length of Bracket indicates the maximum distance at which a plain spindle on the Bracket will bore from a plain spindle on the machine rail. They can be either right or left hand. Codes: 14-inch Bracket, ONBACK; 16-inch Bracket, ONBEAT; 18-inch Bracket, ONBITE; 20-inch Bracket, ONBOOT.



No. 368 Pedestal Column Horizontal Gang Borers

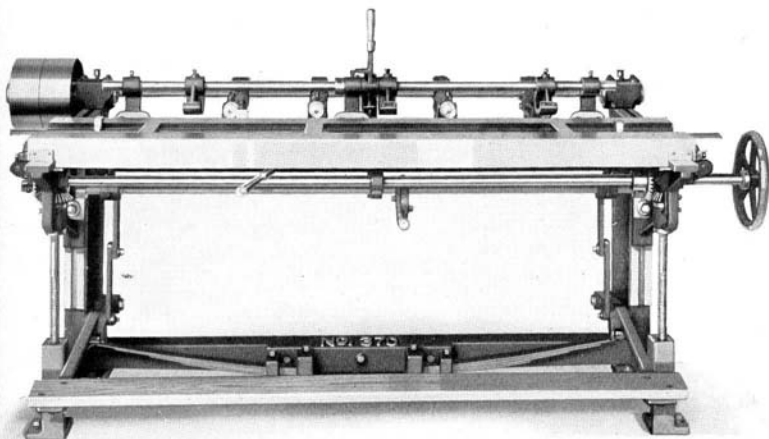
THIS Borer can be fitted with any of the standard spindle heads listed on the two preceding pages. It is built in lengths of 20 and 30 inches and is intended for miscellaneous light work not requiring the heavier and longer machines. It is particularly efficient for edge boring in flat stock.

The Table can be fitted with the top clamp shown or with a front clamp for thick stock. It feeds to the bits by a foot lever and the stroke is regulated by a stop rod. It will adjust to 8 inches below the normal center line of the bits. Boring can be done to a depth of 5 inches and with bits up to 1-inch diameter.

The Spindle Drive Shaft has 8x3½-inch tight and loose pulleys to run about 850 R. P. M. Motor Drive may be by belting to the tight pulley or an attached bracket and sleeve coupling can be furnished for direct connection to a 2 or 3 H. P. motor.

No.	Length	Floor Space	Wt. in Lbs.	Code
368	20"	3' 6" x 3' 6"	925	ODDLAKE
368	30"	4' 4" x 3' 6"	1000	ODDMAN

Attached Motor Bracket and Sleeve Coupling, extra



No. 370 Double Column Horizontal Gang Borers

LIKE the No. 368, this Gang Borer is especially suited for edge boring in wide flat stock. Pin hole boring in table leaves is a good example. It is not limited to such work, however, and the boring of straight or angle holes in irregularly shaped pieces can often be handled to advantage on this type of machine.

The Table will lower to 8 inches below the normal center line of the bits and regularly has combined hand and foot feed with adjustable stroke for boring to a depth of 6 inches. Power feed can be substituted and has three speeds arranged to feed continuously or to make one stroke and stop. Either a top clamp or a front clamp is furnished, but the Endwise Centering Device for table leaves, shown in the cut, is extra.

The Spindle Drive Shaft can be fitted with any combination of our Standard Heads and has 10x4½-inch tight and loose pulleys to run 850 R. P. M. An attached motor bracket and coupling can be furnished for direct drive.

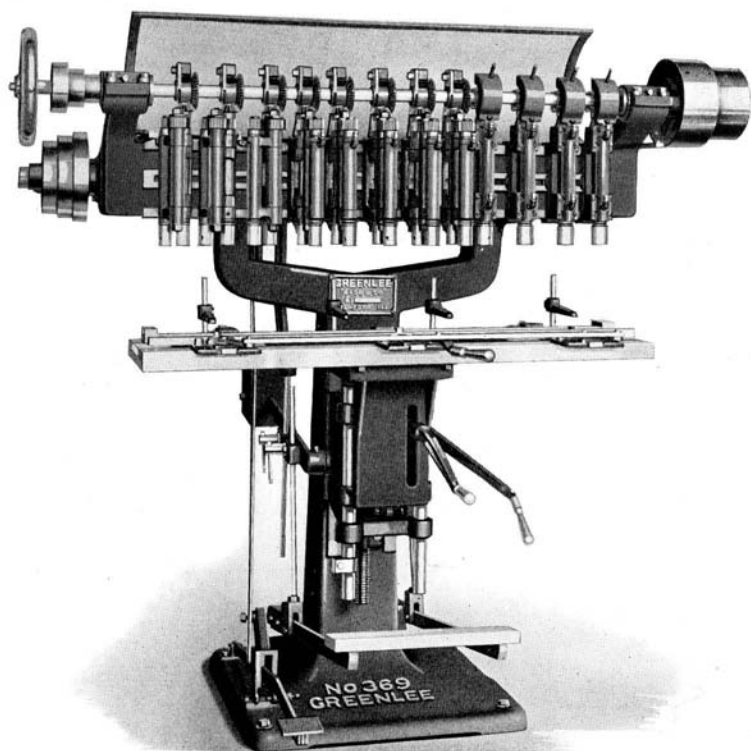
No.	Length	Floor Space	Wt. in Lbs.	Code
370	4'	6' 3" x 3' 10"	1400	OXFAIR
370	5'	7' 3" x 3' 10"	1600	OXFENCE
370	6'	8' 3" x 3' 10"	1800	OXFOOT

Power Feed substituted, extra

Table Leaf Endwise Centering Device, extra

Attached Motor Bracket and Coupling, extra

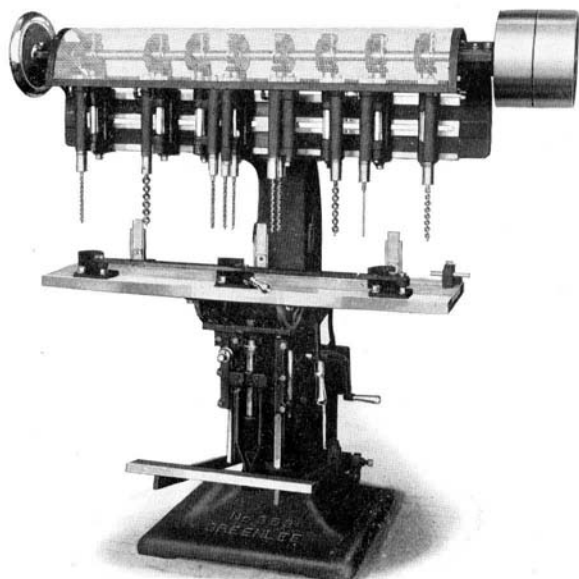
POWER



No. 369 4-ft. Borer with Power Feed

No. 369 Pedestal Column Vertical Gang Borers

VERTICAL Gang Borers are popular because of the convenience in handling the stock on a horizontal table which directly takes the thrust of boring. In addition, the work lies flat for boring wide stock and there is also an advantage in having it in plain sight. Our No. 369 machine is a type widely used in almost every class of shop for light and medium work. It is built with maximum boring lengths of from two to five feet and can be fitted with any combination of our Standard Spindle Heads.

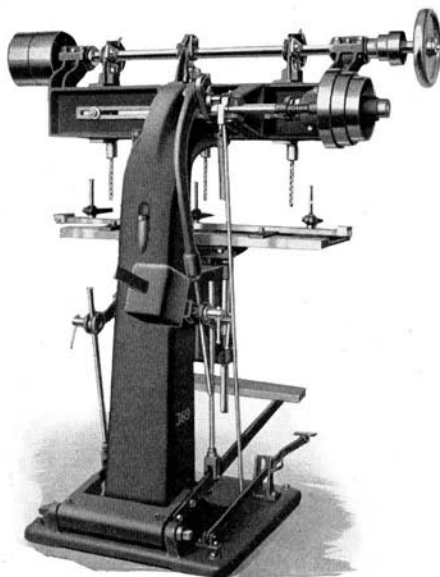


No. 369 3-ft. Borer with Foot Feed

The Frame is a column of cored box section with a wide spreading base to give good stability. The upper end supports the spindle rail and drive shaft and is divided or Y shaped on the longer machine to give greater rigidity. The front of the column is provided with planed ways upon which the table knee piece is adjustably mounted.

The Table is of cast iron with removable wood inserts. It is 14 inches wide and 6 inches longer than the maximum boring length of each machine. Widely spaced turned steel guides rigidly support the table on the knee and secure easy and accurate feed movement. Its stroke is adjustable up to $7\frac{1}{2}$ inches and independent screw adjustment for working height is provided. It will lower to 17 inches below the spindles.

Tilting Table Adjustment can be provided to facilitate the boring of holes on an angle, although this requirement is not usual. It permits tilting the table forward 45 degrees, but reduces the maximum distance from table to spindle by 3 inches.

**No. 369 Gang Borers—Continued****Rear View of No. 369 with Power Feed**

The Feed is by a combined foot treadle and hand lever, but power feed can also be added so that either may be used. The power mechanism is belted from a cone pulley on the drive shaft and controlled by a convenient foot lever so arranged that the table will feed continuously or make one stroke and stop. Three speeds are provided for making 10, 14 and 22 strokes per minute.

Standard Spindle Heads, also Extension Brackets for increased cross range are described on pages 56 and 57. The spindle drive is through hardened steel bevel gears from the double splined main shaft. These gears are housed together so that perfect mesh is maintained when the heads are adjusted along the rail. The drive of any spindle can be disengaged, however, to permit it to stand idle. The great majority of boring work can be handled with these standard heads, but we are prepared to furnish cluster or other special types when required.



The Spindle Drive Shaft runs in long bearings supported by the spindle rail and can be easily removed for adding spindle heads. It is equipped with 9x4½-inch tight and loose pulleys at one end and a balance wheel at the other. Double splines are provided to give perfect balance and the shaft should run 850 R. P. M.

Spring Plunger Hold-downs are furnished extra when specified and are recommended for boring wide flat stock on machines having cross extension brackets. They are mounted on the spindle rail or extension brackets in the same manner as the spindle heads and hold the work to the table while the bits are being withdrawn.



Spring Plunger
Hold-down

The Range is equal to average work, but the maximum size of bits depends upon the number of spindles, their type, kind of wood and the depth of boring. Cluster heads or adjustable close center types should be used only for the smaller bit sizes, while the center line and heavy radial heads will bore 1 or 1½-inch holes in ordinary woods and to a depth of 6 inches.

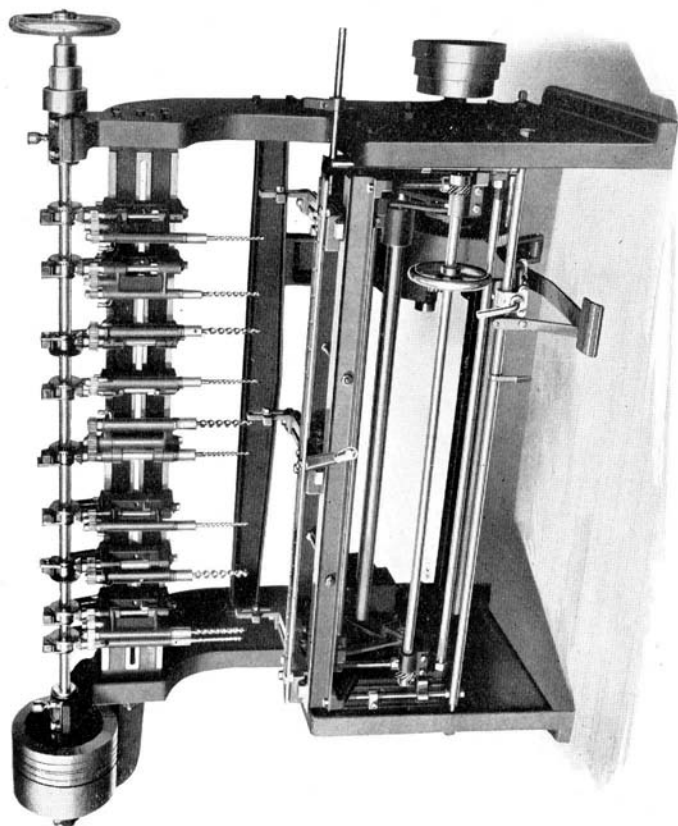
A Separate Countershaft with cone drive pulley for variable bit speeds can be furnished extra when specified. It is regularly fitted with 12x4½-inch tight and loose pulleys to run 520 R. P. M.

When Motor Driven, the main shaft is usually fitted with a tight pulley only, for belt drive from the motor. If preferred, a coupling for direct drive will be supplied, but a separate support for the motor is then necessary. A 5 H. P. motor is suitable for average requirements.

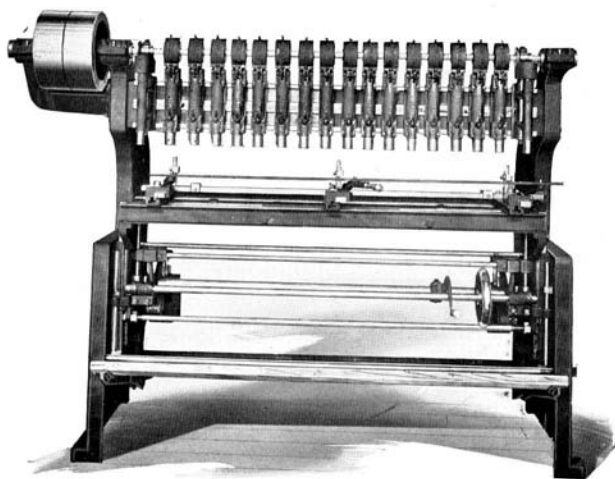
The Equipment includes a suitable clamp or holding stops, necessary wrenches, driving arrangement as specified and spindle heads extra as selected for the requirements.

Machines in 4 and 5-ft. lengths have divided or Y shaped columns as shown on page 54.

No.	Length	Floor Space	Wt. in Lbs.	Code
369	2'	3' 10" x 3' 3"	1350	ODALISK
369	3'	4' 10" x 3' 3"	1500	ODDITY
369	4'	5' 10" x 3' 3"	1700	ODDMENT
369	5'	6' 10" x 3' 3"	1850	ODDNESS
Power Feed added, extra			150	POWER
Spring Plunger Hold-down, extra			13	OVOID
Separate Countershaft for three bit speeds, extra				COUNTER
Tilting Table Adjustment, extra				



No. 371 Gang Borer with Open Table and Pitman Power Feed



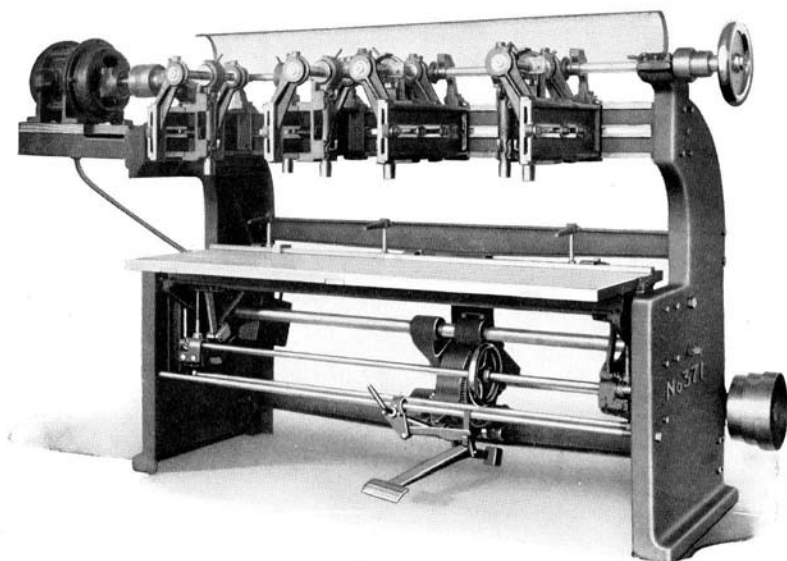
No. 371 with Foot Feed

No. 371 Double and Triple Column Vertical Gang Borers

THE design of this type of Gang Borer adapts it to a wide variety of work including the manufacture of automobile bodies, wagons, implements and furniture. It is built in lengths from 4 to 12 feet and can be fitted with any number of our Standard Spindle Heads or with special types when requirements demand.

The End Frames are heavy castings which provide gibbed ways for the table knees and avoid the usual overhung table mounting. They are strongly joined by accurately fitted girts, and the 10-foot and longer machines have a center frame to add stiffness.

Power Feed is regularly provided for the table, but foot treadle feed with auxiliary hand lever can be furnished for light work on short machines. The Pitman power feed is recommended for average requirements. It has three speeds and the table will either feed continuously or stop after each full stroke. The control is by foot treadle and a handle is provided to stop the feed in an emergency. Screw power feed is furnished for extra heavy work. It is controlled by a foot lever which provides for the table to stop after each stroke.

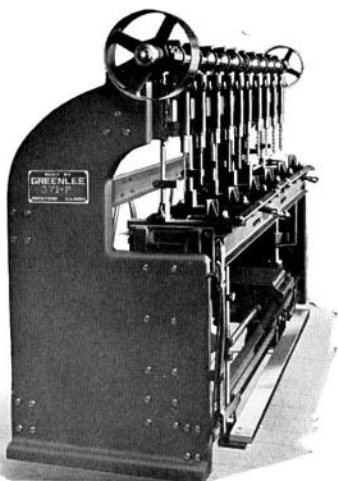
**No. 371 Gang Borers—Continued**

**Motor Driven 6-ft. No. 371 with Cross Extension Brackets
and Hard Wood Table Top**

The Table is 18 inches wide and regularly of open construction for chip clearance. It is equipped with adjustable back stops with hold-downs and end stops, also a lever operated front eccentric bar clamp. A glued up hardwood table top having metal fittings may be substituted when preferred.

Standard Spindle Heads are described on pages 56 and 57. The spindle drive is through hardened steel bevel gears from the double splined main shaft. These gears are housed together so that perfect mesh is maintained when the heads are adjusted along the rail. Provision is made, however, for disengaging the drive of any spindle when it is to stand idle.

The Range is for 1-inch diameter or even larger bits, and 6-inch stock can be handled. The table stroke is adjustable up to 7-inch length and the table also has independent adjustment for convenient working height.



No. 371 with Screw Power Feed

Cross Extension Brackets are illustrated with the machine on the opposite page and are furnished to increase the cross range of the spindle heads. Various lengths are listed on page 57.

Spring Plunger Hold-downs are furnished extra and are recommended for boring wide flat stock on machines having cross extension brackets. They are mounted on the spindle rail or extension brackets in the same manner as the spindle heads and hold the work to the table while the bits are being withdrawn. This type of hold-down is shown on page 63.

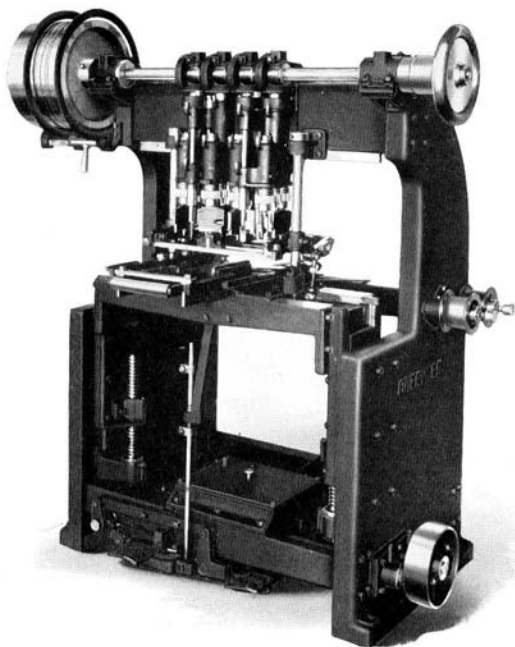
When Belt Driven, the attached main spindle drive shaft is fitted with 14x4 $\frac{3}{4}$ -inch tight and loose pulleys running 850 R. P. M. The drive shaft bearings are carried by the end frames and intermediate bearings are carried by the spindle rail on the longer machines.

When Motor Driven, we usually furnish a flexible coupling for the spindle drive shaft and a motor supporting bracket is then attached to the end of the machine. The direct connected drive ordinarily requires a 7 $\frac{1}{2}$ or 10 H. P. motor running 850 R. P. M. A higher speed motor can belt to a tight pulley on the spindle shaft.

The following refer to machines with Pitman Power Feed. Screw Feed is extra and Foot Feed is substituted at a reduction.

No.	Length	Frame	Wt. in Lbs.	Code
371	4'	Double Column	2700	OXMARCH
371	5'	Double Column	2850	OXMARROW
371	6'	Double Column	3000	OXMART
371	8'	Double Column	3300	OXMEAT
371	10'	Triple Column	3800	OXMOLAR
371	12'	Triple Column	4100	OXMOUTH
Spring Plunger Hold-down, extra			13	OVOID

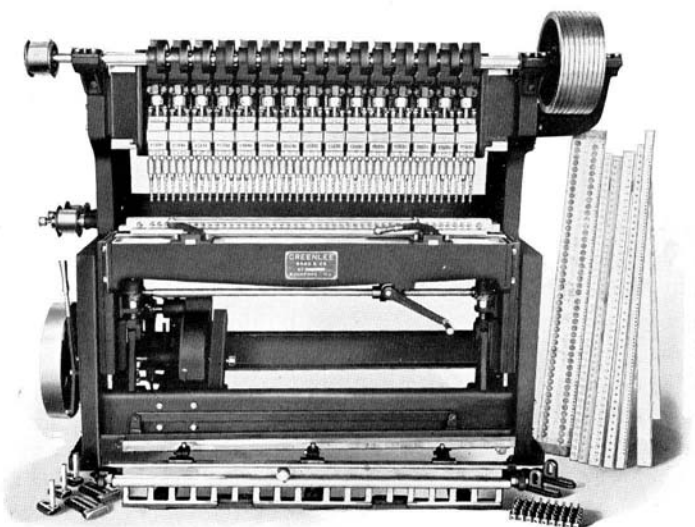
Attached Motor Bracket and Coupling, extra



No. 374 Extra Range Double Column Gang Borer

THIS heavy Gang Machine is designed for such extreme requirements as are encountered in the manufacture of shell shipping cases, bottle boxes and similar difficult boring work. Its rigid frame, extra heavy boring heads and powerful geared screw table feed provide for larger boring than can be accommodated on any standard range machine. The frame is built in various lengths for boring from 32 to 60 inches between outside spindle centers.

In The Arrangement Shown, it is equipped for boring shell box partitions and has special cluster heads, shutter feed and an automatic clamp. Modifications can be made to suit various classes of work and conditions. Boring Heads can be furnished with one or more spindles. They are securely mounted on the rail which is extra strong and rigid. Less elaborate table equipment can be furnished and it can be fitted with a hand operated clamp. The table feed is by two power driven screws which permit extra deep boring. A stop rod with adjustable stops regulates the length of stroke.



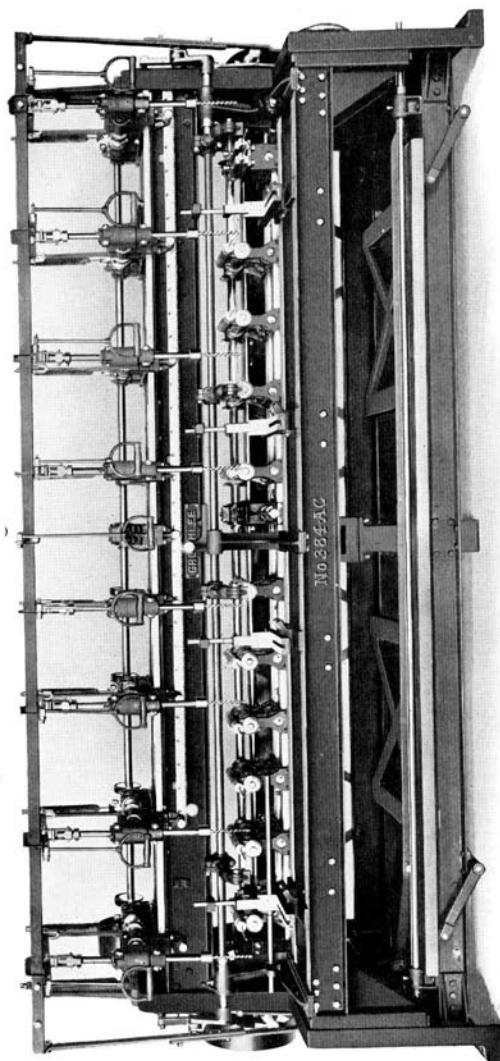
No. 375 Piano Player Part Gang Borer

THE highest degree of accuracy is obtained with the above machine in boring Piano Player parts and other precision work. True running spindles with spacing perfectly maintained, and boring to an exact depth, permits rapid duplication of parts so as to guarantee maximum economy on quantity production.

The Standard Frame is for working 5-foot lengths, and provides planed ways for the vertically adjustable table which feeds by a Pitman mechanism under control of a hand lever for starting or reversing the stroke.

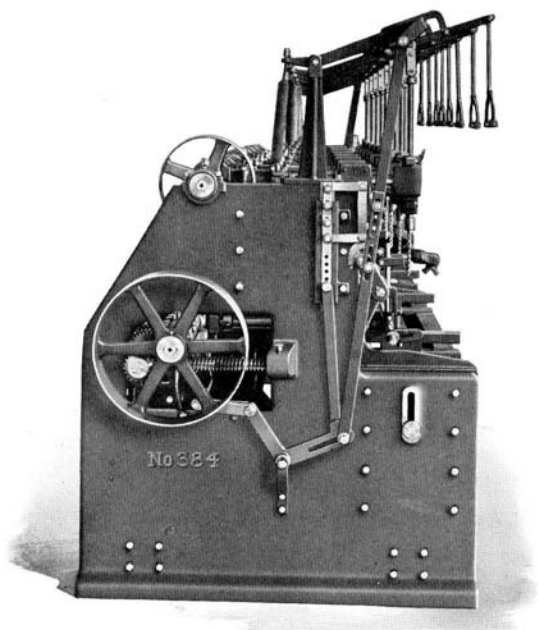
The Table is furnished with straightening and holding clamps and may also have a floating table top with both transverse and endwise movement by a lever to secure different boring positions determined by stops. This permits boring two or more rows of holes in the same piece at one handling.

Spindle Heads are supplied in patterns most suitable for the particular work in hand. From 20 to 45 spindles are usually furnished and these may have bevel gear or spiral drive. Fixed center or adjustable cluster heads are also obtainable as required.



No. 384 Combined Vertical and Horizontal Gang Borer

Built in Lengths from 6 to 16 Feet

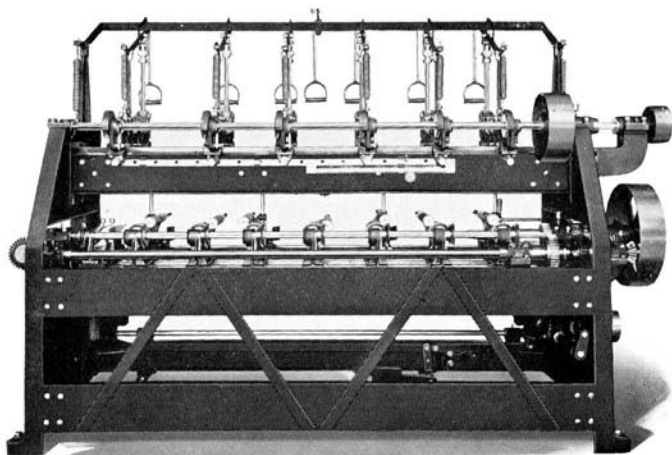


End View of No. 384 with Power Clamp

No. 384 Combined Vertical and Horizontal Gang Borers

THIS Borer is designed for handling parts requiring boring from two faces. It not only combines vertical and horizontal spindles operating in gang, but it may have both angle and end boring spindles. Its broad application is indicated by its use for boring poles, reaches, axles, bolsters, machine frames, railway car posts, etc. Long machines can be used to advantage in boring two pieces at one time.

The Frame consists of broad end castings connected by heavy steel girts with rigid bracing. The rail for the vertical spindles consists of two beams with separators and a wide top plate planed to receive the gibbed spindle carriages.

**No. 384 Gang Borers—Continued****Rear View of No. 384 Gang Borer**

The Horizontal Spindle Rail is built like the vertical rail but is arranged to feed toward the work table. On short machines it travels on ways at each end, but on longer frames a center support with a wide faced slide is added.

The Power Feed moves the rail carrying the horizontal spindles, operating through lead screws at each end. The mechanism consists of hand frictions and cut gearing. Lever connections feed the vertical spindles while the horizontal ones are boring, but the vertical spindles can be fed independently by disengaging the connections.

The Table is made of two deep knee castings fitted to gibbed ways on the end frames and connected by steel beams with cast separators. This open construction disposes of all chips and permits using any form of work clamp. The vertical adjustment is by two connected screws operated by one crank at the right end. A long clamp bolt with hand wheel locks it in the working position.

The Automatic Clamp is illustrated on the preceding pages. Its adjustable arms close on the work before the boring begins and release after the bits are withdrawn. Hand operated clamps can be substituted and special clamps can be furnished.



Pole Boring Machine Clamps have adjustable beds and back fences to take care of tapering pieces. The fences have long and short hold-downs, also end stops for locating the work.

In Operation, a piece is placed on the clamp bed and the treadle pressed at any point. Immediately the clamps close on the piece and all spindles feed to the work; then the bits recede and the clamp releases.

The Vertical Spindles are supported by a horizontal yoke carrying a cross shaft which is gear driven from the upper main shaft. This yoke adjusts on the upper rail and supports the vertical housing for the driving sleeve through which the spindle slides. Vertical spindles are either without or with transverse adjustment. The latter also may have angular movement.

The Horizontal Spindles are mounted in yokes adjustable on the lower spindle rail and are made in a wide variety of patterns. The plain horizontal spindle without vertical adjustment is gear driven direct from the lower main shaft. The various adjustable types are driven by spur gears from the yoke shaft which drives from the main shaft.

Cluster Spindles for boring special groups of holes at close centers may be built in either the vertical or horizontal types, although the horizontal is always to be preferred.

Double Spindles are made in several types, chiefly of the horizontal pattern since for adjustable centers these are the more efficient and capable of the wider ranges. Double vertical spindles are built, but in limited variety.

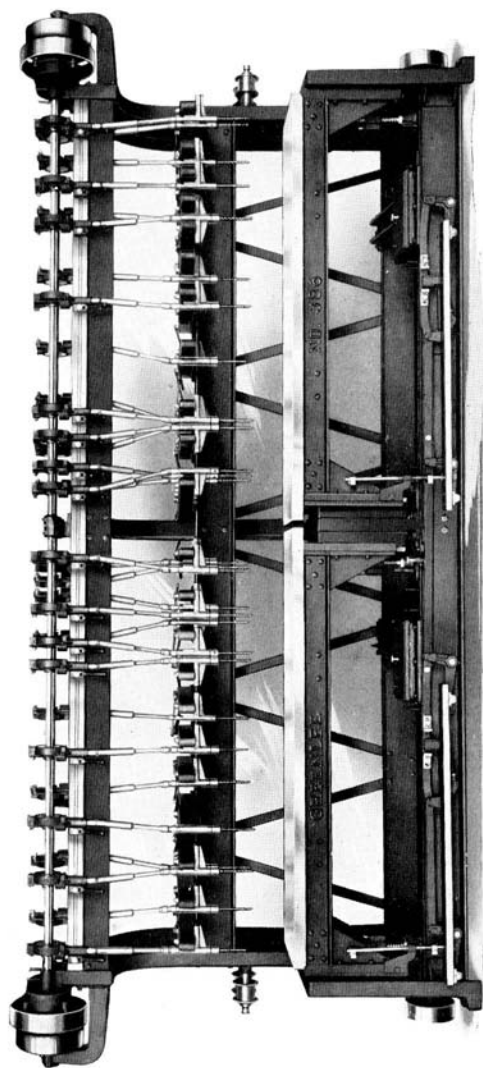
All Spindles have longitudinal adjustment by means of double racks and pinions. Their drive is through hardened steel bevel gears with teeth accurately formed on a gear generator. They are held in perfect mesh at all times, but can be disengaged to permit any spindle to stand idle.

The Countershaft locates directly over or under the center of travel for the horizontal spindle rail and carries drive pulleys for the horizontal and the vertical spindle drive shafts.

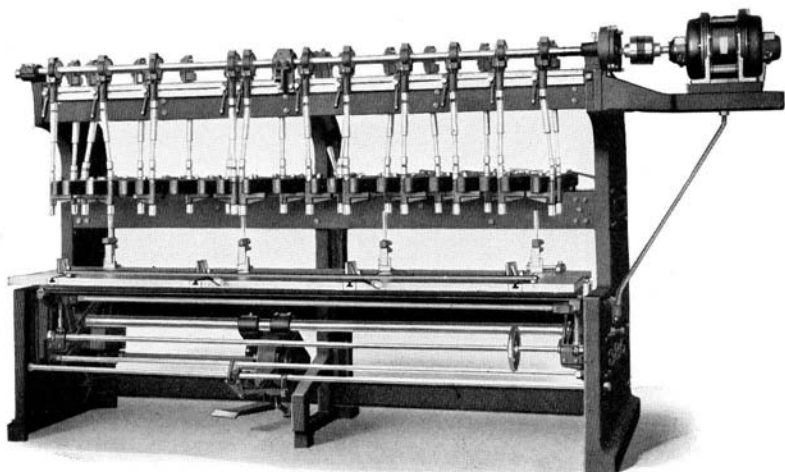
The Range is for boring stock up to 8 inches square and to a distance of from 6 to 16 feet between the outside spindles, as specified. The horizontal spindle rail has a travel of 9 inches and vertical spindles have 10-inch travel.

The Equipment includes the separate countershaft, wrenches, a 2-inch bit extension for each spindle, also the outfit of clamps, hold-downs and stops as specified.

No. 384 Borer in lengths from 6 to 16 feet. Weights, 6000 to 9200 pounds without spindles. Code, add length to OXEYED.



No. 386 14-ft. Universal Spindle Gang Borer
Divided Table Arranged for Either Section to Feed
Separately or Both Together as a Unit

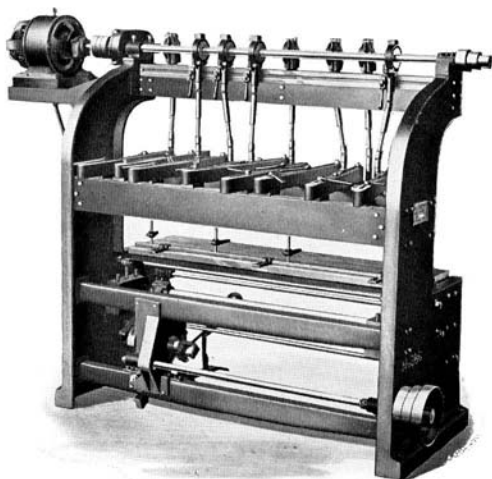


Motor Driven 10-ft. No. 386 with Pitman Power Feed

No. 386 Double and Triple Column Universal Spindle Gang Borers

THE wide range and ease of adjustment of this Universal Spindle Machine adapts it to a greater variety of work than any other pattern of multiple borer. The conditions favoring this design are where the holes are numerous, either located irregularly or in rows across the piece, and in places at close centers, also where a great variety of patterns must be bored. These conditions are met with particularly in the manufacture of automobile bodies, implements, farm wagons, box boards and phonograph cabinets. The machine is built in lengths from 4 to 16 feet and a 4-foot borer will readily accommodate as many as 24 spindles.

Universal Spindles can be quickly located at any point over the length and boring width of the table. The drive is from two splined parallel shafts and the long connections between joints avoid running them at sharp angles. The joints have capacity beyond that required for any ordinary boring work, they run without play or looseness, and the working surfaces are hardened and properly lubricated. All spindles have thrust ball bearings.

**No. 386 Gang Borers—Continued**

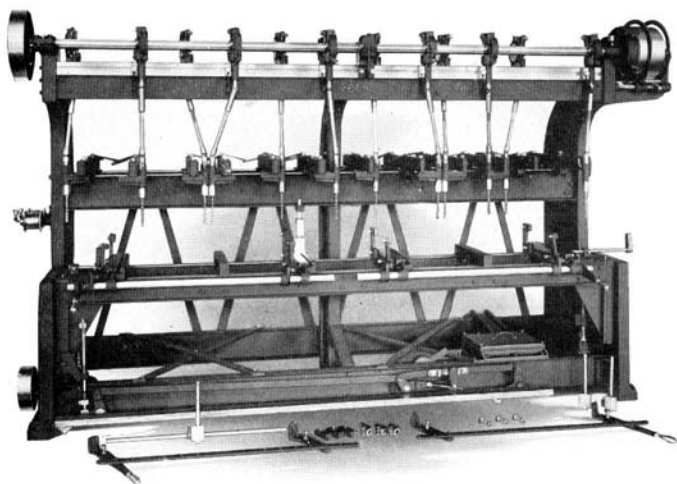
Rear View of 6-ft. No. 386 with Motor

The Machine Frame is deep and has heavily ribbed end sections with structural steel connections and rigid diagonal bracing. The end frames are extended forward and have gibbed ways to receive the two table knee castings which are joined by steel I beams. The drive shaft bearings are at the top and intermediate shaft supports are furnished.

The Table is regularly of open type for chip clearance and has adjustable back stops with hold-downs and end stops, also a lever operated front eccentric bar clamp. A glued up hardwood table top having metal fittings may be substituted when preferred.

Power Feed is regularly provided for the table, but foot feed with auxiliary hand lever can be substituted for light work on short machines. This, however, is not usual.

Pitman Power Feed is considered standard on 10-foot and shorter machines although it is furnished on machines as long as 14 feet for such work as wagon box boards. It has three speeds and the table will either feed continuously or make one full stroke and stop. The control is by foot treadle and a handle is provided to stop the feed in an emergency.



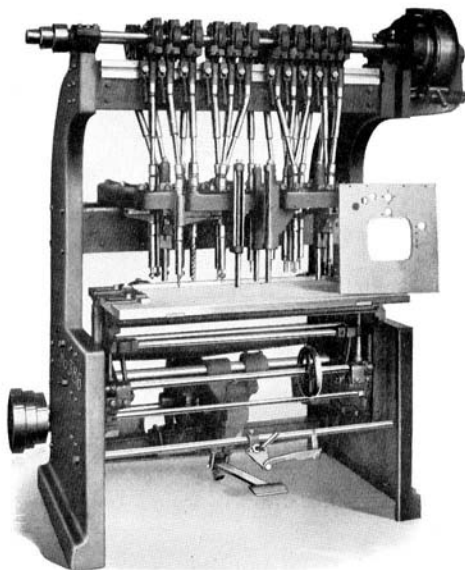
No. 386 10-ft. Borer with Screw Power Feed

Screw Power Feed is standard for 12-foot and longer machines and can be used to advantage for extra heavy work on shorter borers. It is controlled by a foot lever which provides for the table to stop after each full stroke.

Divided Table Machines for handling both long and short stock are also built. Two feed mechanisms of the Geared Screw Type are then furnished so that each table will feed independently, but they can be coupled together to work as a unit. Two independent machines can be similarly used together when so arranged.

Bevel Gear Drive is used for all spindles. The gears are of hardened steel with accurately planed teeth to insure quiet running and maximum durability. Both gears are housed together and they remain in mesh when the spindles are adjusted along the rail. Provision is also made for disengaging the drive to allow any of the spindles to stand idle.

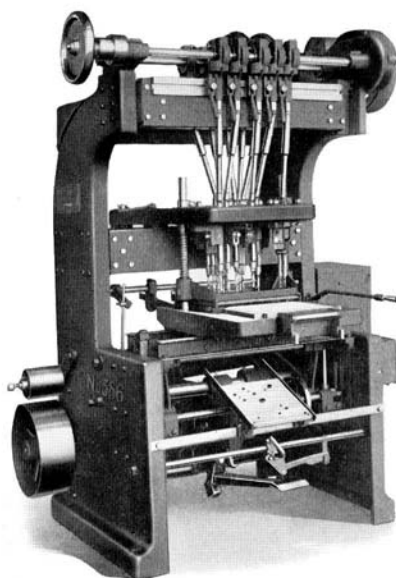
The Range is for stock up to 6 inches thick and operating any ordinary size of bits. The maximum spread of spindles crosswise of the table is 22 inches. Standard spindles work as close as $1\frac{1}{2}$ -inch centers and the extra heavy spindles to 2-inch centers. The light pattern spindles work to $1\frac{1}{4}$ or even $1\frac{1}{8}$ -inch centers. Special clusters are furnished for extreme needs.

**No. 386 Gang Borers—Continued**

**No. 386 with Special Spindle Supports
for Phonograph Motor Boards**

Long Arm Spindle Supports having both transverse and angle adjustments are carried on the cross channels of the frame and are fastened by clamp brackets and bolts having attached wrenches. A long slot at the front end receives the bolt for locking the spindle in place. The spindles are interchangeable and several may be mounted on one arm support.

Special Arrangements are illustrated on this and the following page. The above machine has two special spindle supporting frames for mounting standard spindles and spring hold-downs. These frames permit adjustable or fixed spindle mounting. The machine on the following page has a special centering clamp, shutter feed and discharge for the stock, special spindles and clusters with vertical adjustments, also a bit template to insure precision work and ease in making the set-up.



**Special No. 386
for Phonograph Motor Boards**

so that the drive for each part is entirely independent both for the spindles and the feed. This extra countershaft may be supported overhead or attached to the rear of the machine frame and fitted with tight and loose pulleys or a coupling for a motor of any speed up to 1200 R. P. M.

The Motor Size varies from $7\frac{1}{2}$ to 15 H. P. depending upon the number of spindles and kind of boring work. The speed should be 850 R. P. M. for direct connection, but any high speed motor can be used for belting to the tight pulley on the drive shaft.

No. 386 Universal Spindle Borer, built in 4, 5, 6, 8, 10, 12, 14 and 16-foot lengths. Weight of 10-foot Pitman Power Feed Machine with 10 spindles, 6000 lbs. Code, add length to OXLAND.

Standard Spindles for $1\frac{1}{2}$ -inch centers.

Light Type Spindles for $1\frac{1}{4}$ -inch centers.

Extra Heavy Spindles for 2-inch centers.

Standard Long Arm Support.

Spring Plunger Hold-down.

Spring Plunger Hold-downs can be furnished for mounting on the spindle supports. They are recommended for wide flat stock and serve to hold the work to the table while the bits are being withdrawn.

The Main Drive Shaft should run 850 R. P. M. It has 14 by $4\frac{3}{8}$ -inch tight and loose pulleys for belt drive, but a flexible coupling can be substituted for direct motor drive. At an extra charge the frame can be fitted with an attached cast iron bracket for a direct connected motor.

A Special Countershaft for extra long machines can be furnished when necessary to provide double end drive, or for the divided table machines

Code, OVERLASH
Code, OVERKEEP
Code, OVERMAT
Code, OVERNEST
Code, OVERWEIGH