

Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

**WOODWORKING
MACHINERY**

GREENLEE
WOODWORKING MACHINERY
for General Manufacturing Purposes



built by
Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

This Catalog was issued

I n t r o d u c t i o n



This catalog is simply a bound collection of separate descriptive bulletins of our line of Woodworking Machines for general manufacturing purposes. Since each bulletin bears the type number of the machine it describes, we have arranged them in the order of those numbers for easy reference. And because of our system of numbering, this automatically groups the same general types of machines together, as listed in the contents on the back of this sheet.

In presenting this catalog of machines, we wish to call attention to the fact that Greenlee Bros. & Co. have always held to the policy of building a limited line of highly developed specialties rather than attempting to build a complete line of machines for every purpose. This permits giving close individual attention to these specialties and makes it possible to keep them strictly modern and capable of meeting the changes in manufacturing conditions that take place from year to year.

There are in the Greenlee line a large number of heavy Car Shop Machines, Tie-Working Machines, Timber Framers, and certain other types of a more or less special nature, which are not included in this catalog. For this reason we urge that you write us fully regarding your requirements, if the machine you are seeking is not shown here, as it may be built by us.

In addition to machinery, we manufacture a line of high grade tools for working wood. This includes hollow mortising chisels, hollow chisel bits, machine boring bits of all kinds, router bits, and such hand tools as augers, auger bits, car bits, expansive bits, bit extensions, carpenters' chisels, gouges, draw knives, etc. These are described in separate catalogs, which will be sent on request to those interested.

If the date stamped on the bottom of the title page of this catalog shows it to be an old issue, write us for a new one and mention this old date.

C o n t e n t s

Each descriptive bulletin in this catalog is numbered to correspond to the type number of the machine it describes, and these are bound in the order noted below. They are arranged in groups according to the general class of work that the machines are designed to do, and each group is preceded by a division sheet, which gives some general information concerning that particular group of machines.

PLANERS and SHAPERS—One Hundred Series

Single and Double Cabinet Planers; Single and Double-Spindle Shapers.



MORTISERS—Two Hundred Series

Foot and Power-Feed Hollow Chisel Mortisers, Hinge or Trim Mortisers.

BORING MACHINES—Three Hundred Series

Post Borers; Single-Spindle Pedestal Borers; Horizontal and Vertical Gang Borers.

SAWS—Four Hundred Series

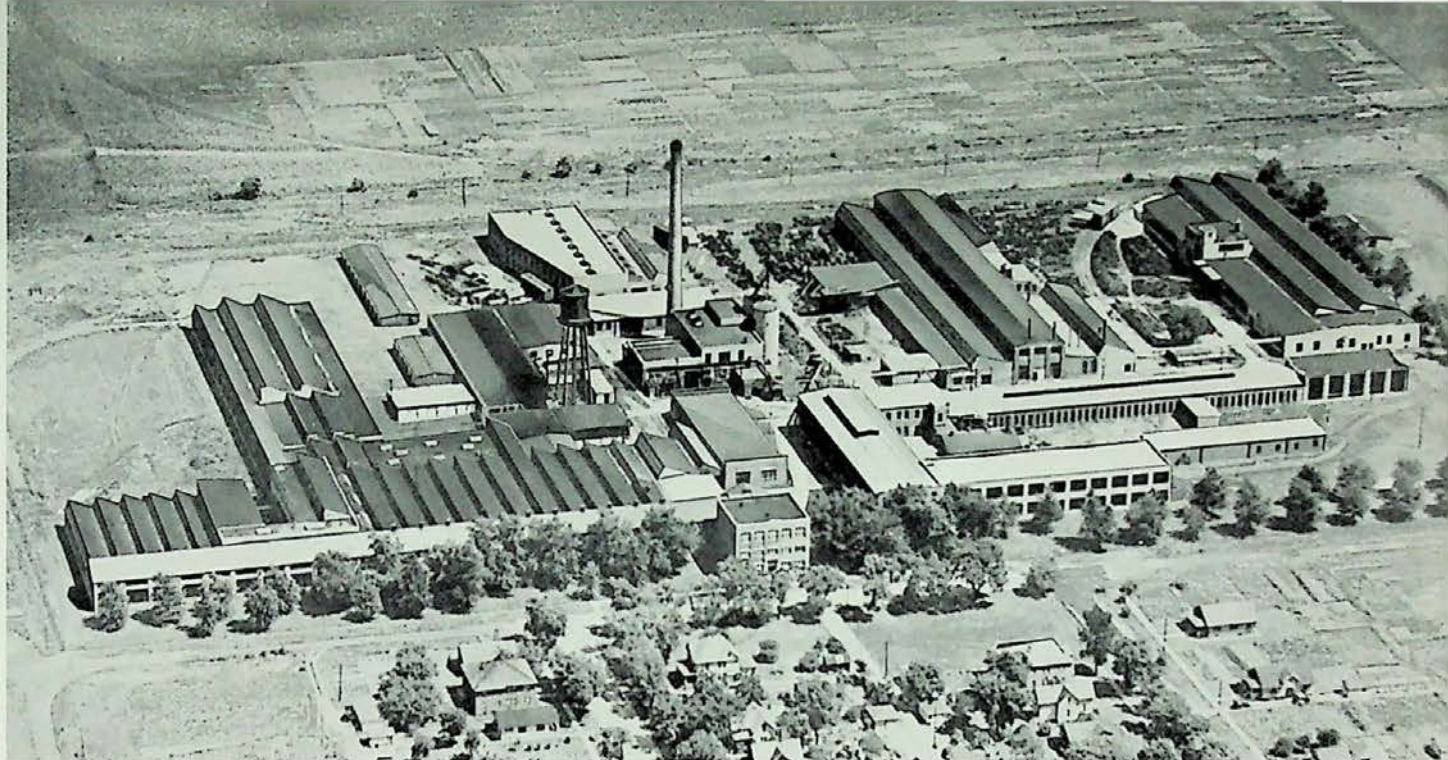
Band Scroll Saws; Hand and Self-Feed Rip Saws; Tilting-Table and Tilting-Arbor Variety Saws.

TENONERS and DOUBLE SAW—Five Hundred Series

Single-End Tenoners; Double Cut-off Saws; Double-End Tenoners.

SASH MACHINES—Six Hundred Series

Sash and Door Clamps; Sash Frankers; Sash Dovetailers; Sash Relishers; Door Relishers; Combination Relishing and Mortising Machines.



The Greenlee Plant at Rockford Illinois



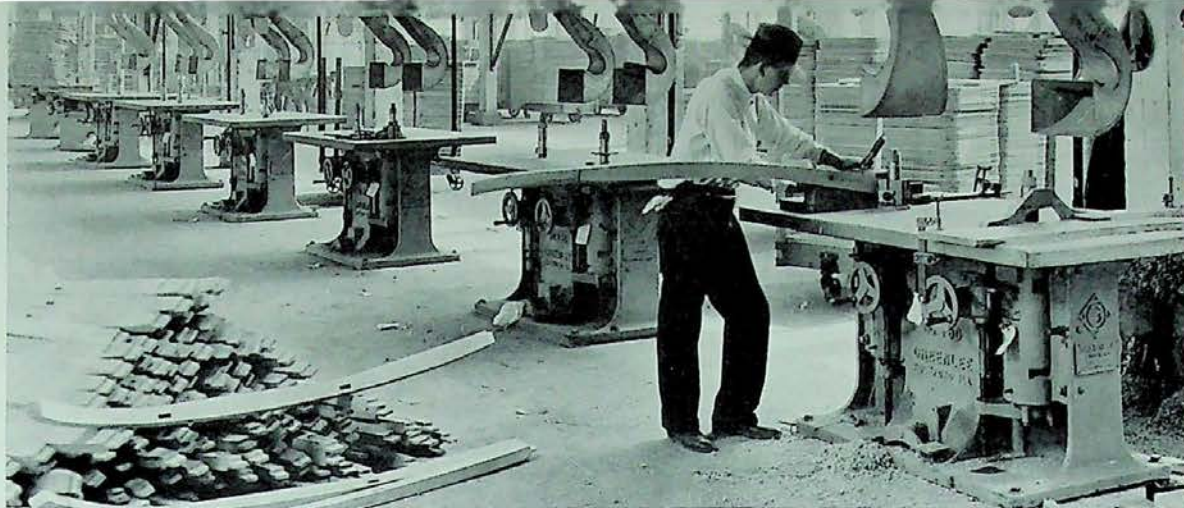
Above is shown an airplane photograph of the Greenlee Plant, which is located on twenty-five acres of land in the industrial section of Rockford. The buildings, which are of modern construction and largely fireproof, occupy a space having a frontage of about 1200 feet and a depth of about 700 feet.

In addition to the line of Woodworking Machinery for general manufacturing purposes and for railroads, this plant produces Woodworkers' Small Tools, Metal-Working Machinery, and certain specialties for inside wiring, pushing pipe, demolition work, etc. Two foundries produce grey-iron and semi-steel castings for the Greenlee products and also for other manufacturers.

The Greenlee Plant is modern in buildings, arrangement, and in the equipment for turning out its products. The precise metal-working machinery produced here for the automotive and other industries demands the best in manufacturing equipment and personnel. And all this is utilized for building the Greenlee line of Woodworking Machinery.

Users of such equipment will find it interesting and instructive to see Greenlee products in the making and are invited to visit the Greenlee Plant at any time. If it is desired to see particular machines in operation, an appointment should be made.

Rockford is located eighty-five miles northwest of Chicago and can be reached conveniently by train or motor. It is on U. S. Highways 20 and 51.



One Group of the 43 Greenlee Electric Shapers in an Automobile Body Plant

The section immediately following this page is made up of descriptive bulletins on Single and Double Planers and Double-Spindle Shapers. High-speed electric machines are usually specified, although provision is made for belt drive of the single planers, and shapers with belted motor drive are available.

It is a well known fact that there are really no types of woodworking machines that require the accurate and careful building that high-speed planers and shapers require, if they are to function satisfactorily over a long period of time. For this reason it is most important that such tools not only be correct from the standpoint of the design itself, but that the machining of all parts and the assembling into a finished product be done under the most favorable manufacturing conditions.

In all these respects Greenlee Planers and Shapers deserve an exceptionally high

rating. They are strictly modern designs from frame to cutter head, as a study of the bulletins will show. Beyond this, they are built by skilled mechanics with years of experience in the woodworking machinery field, who have at their disposal the very best in manufacturing equipment and tools. In fact it is the same equipment used in building the Greenlee Precise Metal-Working Machinery for the automotive and other industries.

Greenlee Planers and Shapers are well known throughout the woodworking field for the service they have given in the manufacture of furniture, automobile bodies, etc. Installations can be seen where from one to seventy-five of these machines are in use, and many letters are in our files telling of production increases, lower costs and better products, as a result of installing them. We invite you to write us for assistance in arranging to see Greenlee Planers and Shapers in operation.

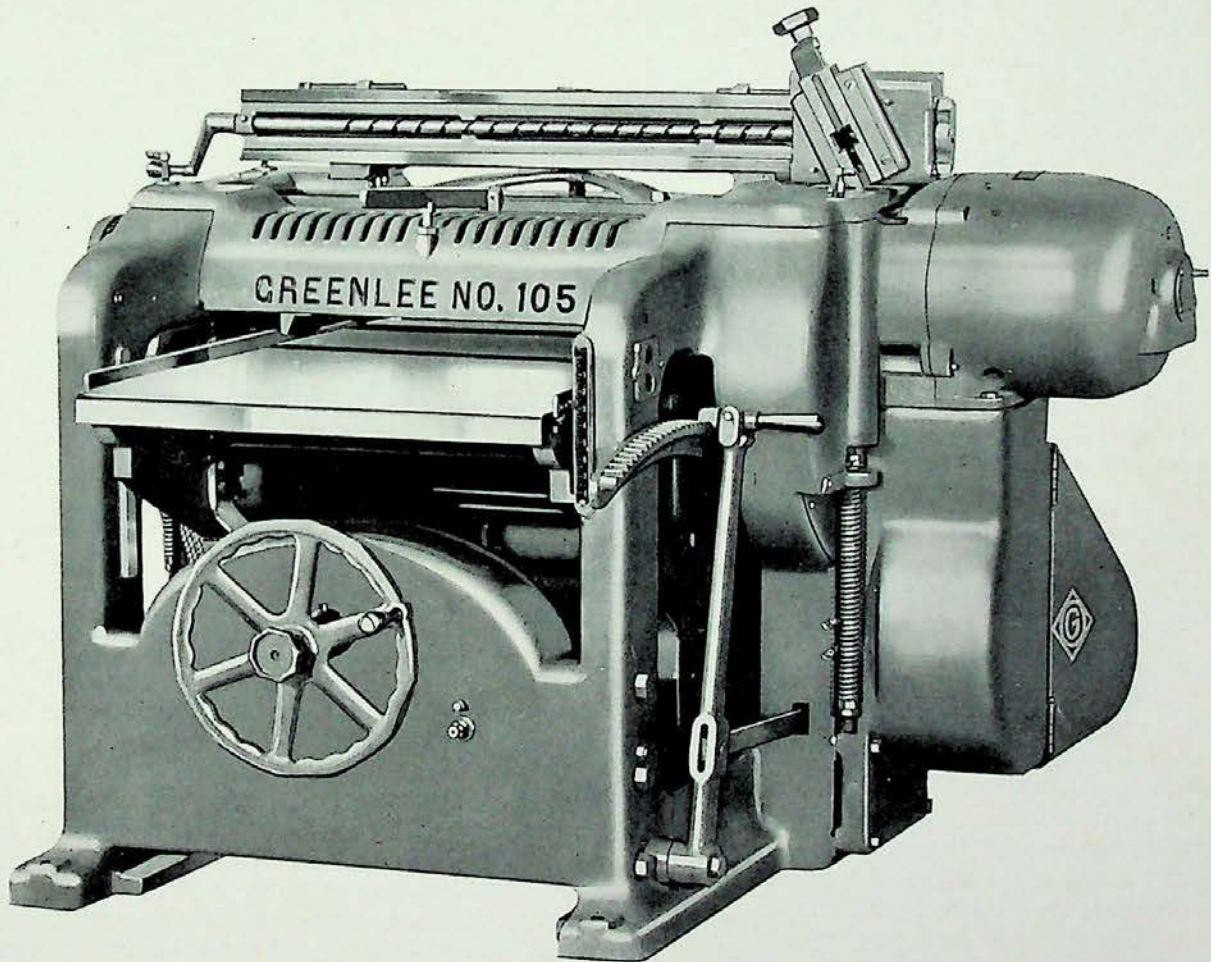
Greenlee No. 110 Planer in a Furniture Plant



PLANERS & SHAPERS

Greenlee

No. 105 FOUR-ROLL SINGLE PLANER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

No. 105 FOUR-ROLL SINGLE PLANER

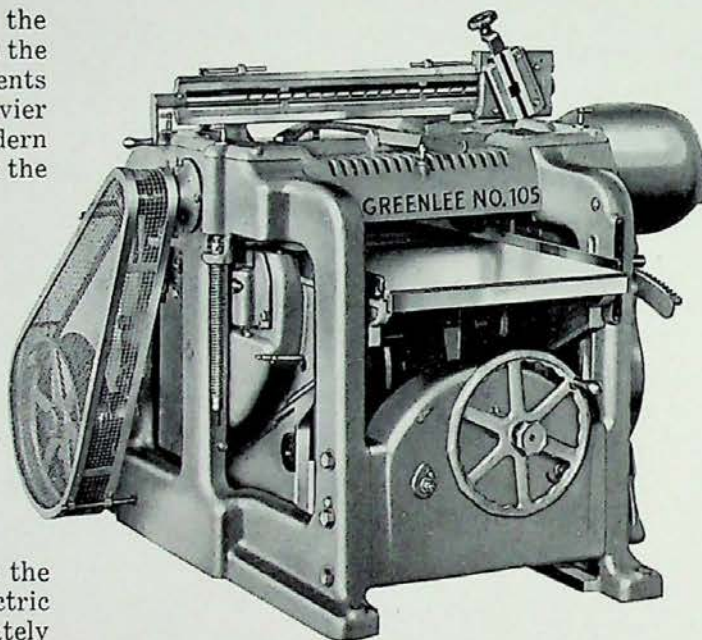
THE Greenlee No. 105 has been judged the most highly developed single planer in the four-roll field, and its many improvements make it a worthy companion of the heavier Greenlee six-roll No. 110. It is a strictly modern machine in every respect and closely follows the principles of design which have made the No. 110 Single Planer so universally popular. It was brought out to handle work not requiring the six-roll machine and is somewhat lighter and has fewer parts. The essentials are very similar to the No. 110, however, and it is capable of the finest grade of cabinet planing.

Outstanding Improvements

Improvements over other four-roll planers include completely enclosed feed gears, all bearings of either the ball or roller type, a built-in motor on the cutter head spindle when arranged for electric operation, and single-end drive from a separately mounted pulley when belt drive is employed.

Special attention has been given throughout the entire design to make for compactness, convenient adjustments and safety in operation. Examples of these features are found in the arrangements for setting and sharpening the cutter head knives, the built in wiring and switches, the rugged frame, and the positively guided bed, which is self-aligning and is gibbed to insure correct contact of bed, wedges and frame. The top-roll gear case is built into the right frame and the one for the bottom-roll drive is built into the left bed.

Frame The frame consists of two heavy, semi-box-type castings which are securely tied together by two main bottom girts, front and rear top girts and roll guards. Perfect alignment is maintained by doweling and keying. That portion of each side frame at the roll-bearing pockets is made in a heavy L-section to securely connect the end and center columns and to provide rigidity and strength where the head, chip breaker and pressure bar are supported and the bed guided.



Left-hand front view of 26-inch motor-driven machine. The 30-inch planer is shown on the preceding page.

Feed Drive

The feed is regularly belt driven from a pulley on the left end of the cutter head spindle to the lower feed shaft pulley, which is furnished in two sizes, and through two-step cone pulleys on the right side of the machine. With this arrangement, four feeding speeds of from 25 to 80 feet per minute are available. When so ordered, the machine can be fitted with a four-speed feed motor having drum control, and all belts are then eliminated.

Feed Rolls

All feed rolls are power driven. The solid rolls run on a Timken bearing located at each end and mounted on a dead shaft, which is supported on cylindrical guides. Similar support of the sectional roll assembly is provided with two roller bearings and a dead shaft at each end. A sectional top infeed roll is regular. The sections are of forged steel, each having independent yield, and the design provides for the replacement of springs without removing any of the sections. A solid top infeed roll can be furnished when desired.

Feed Gears

All feed gears are cut from the solid and are completely enclosed to exclude all dust and chips. Proper mesh is maintained by means of double expansion links, when the top infeed roll is raised or the bed adjusted. This arrangement also provides for tilt of the top infeed roll. All the bearings and gears run in grease, provided by pressure gun, insuring ample lubrication at all times.

Chipbreaker

The chipbreaker can be of either the sectional or flexible type. In either case, it is carried by steel rings passing around the trunnions which are integral with the head bearing housings. This mounting makes its movement concentric with the cutting circle of the head and permits close location to the knives. The whole assembly can be swung up over the head for inspection by lifting off the shavings exhaust hood, and it can be entirely removed by taking out four cap screws.

An automatic chipbreaker lift is operated by the top infeed roll and is arranged so that the heel of the chipbreaker is always above the edge of the incoming stock. This is of decided advantage on a machine having only two infeed rolls, because it helps prevent the stock from turning or pausing while passing through.

The sectional chipbreaker consists of a heavy semi-steel bar having two-inch wide hardened steel sections. These sections have a lip projecting above the lower edge of the chipbreaker bar, which prevents the shavings and dust from pounding in between the sections and the bar. Each section has independent yield against an individual spring. Lubrication is provided by a felt wick, which extends the full length of the bar and which is supplied with oil from four oilers at the top. Improvements in sectional chipbreaker design enable the Greenlee machines, so equipped, to handle work on which the flexible type previously has been considered an essential requirement.

The flexible chipbreaker consists of a reversible spring carried on a bar, which is fastened to the supporting rings. The lip has a yield of $\frac{1}{8}$ inch and projects about $\frac{3}{16}$ of an inch beyond the bar.

Pressure Bar

The pressure bar is of extra heavy section to make it exceptionally strong and rigid, and it has a renewable hardened steel lip, which comes in contact with the stock. Each end of the pressure bar has independent screw adjustment for lining up with the cutter head, and a single hand-

wheel at the center provides convenient vertical adjustment without changing the alignment.

Cutter Head

The round cutter head regularly has four knives, and it is unusually stiff because of all possible metal being retained in forming the knife slots and screw pockets. This also reduces the space where shavings and dust might collect. The gibs are tapped to carry the locking screws, so that the entire knife clamping and adjusting arrangement can be renewed by simply securing the replaceable parts and without doing any work on the head body. Another advantage is that the movement of screws and gibs in clamping the knives does not throw the head out of balance.

Spiral cutter heads can be furnished to meet unusual conditions in planing curly or cross-grained material, such as built-up core stock or cross-banded parts where tearing out must be reduced to the greatest possible extent.

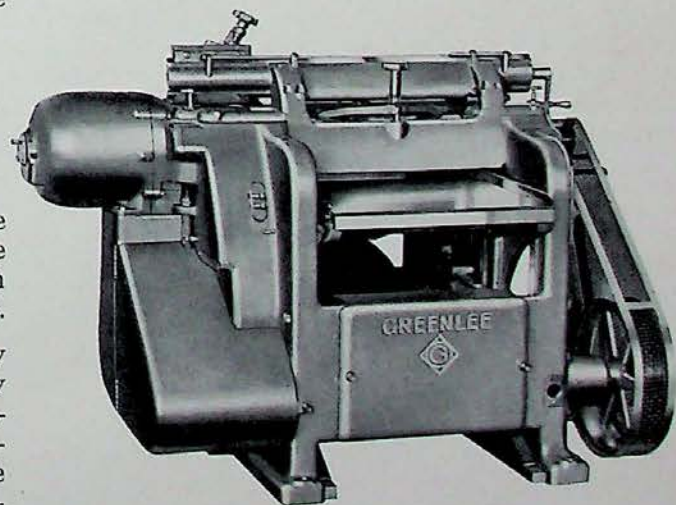
Head Bearings

The cutter head bearings consist of a large-diameter, deep-grooved, precision ball bearing at each end and an additional one at the end of the motor. These are so mounted that they pull out with the entire head assembly, including the rotor of the built-in motor.

Lubrication of the head bearings is by grease gun, the same as all other bearings on the machine. This method is efficient, convenient and very economical.

Platen

The platen for supporting the work under the cutter head consists of a thick piece of steel which has been hardened and



Rear view of 26-inch motor-driven No. 105 Planer

ground. It is carried by a heavy cast-iron sub-platen to which it is firmly bolted.

Knife Grinder

An important feature of the knife grinding arrangement on this planer is that the grinding and jointing bar remains on the machine in its correct relation to the head, so that it is always ready for use. This saves time and makes for convenience and accuracy. The knife grinder has a built-in, ball-bearing motor driven from a plug-in socket in the left-hand side frame, and it regularly takes its current from the power line. It carries a disc wheel, and the position of the grinder permits it to slightly hollow grind the knife. The advantage in hollow grinding is that the knives can be jointed more times for each grinding than when ground straight.

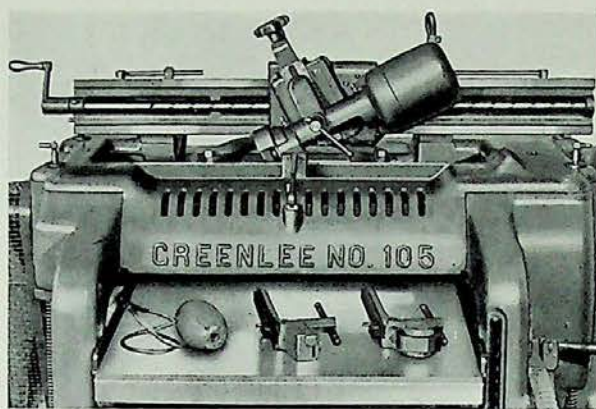
The carriage, on which the grinder can be quickly mounted, is moved back and forth on the bar by a hand-operated screw, giving an even movement at the rate of $1\frac{3}{4}$ inches for each revolution. It also carries the jointing attachment and the knife setting gauge.

Adjustments

All adjustments on the No. 105 are convenient and simple. An easily-operated handwheel raises and lowers the bed, and one-eighth-inch movement is had for each turn. Simple leveling adjustment to .00075" is also provided. An electric power hoist for the bed can be furnished when specified. All roll adjustments can be reached from the outside of the machine. The knife adjusting screws will not bind, and the knife setting gauge is marked for the correct cutting diameter.

Belt Drive

When belt driven, the machine is arranged with a ball-bearing pulley having a connection to the cutter head through a flexible coupling. This arrangement relieves the head bearings of all belt pull. The pulley is mounted within a housing having adjustment for belting in any direction to a motor or separate countershaft.



Knife Setting, Grinding, and Jointing Equipment. Note that the Grinding and Jointing Bar always remains on the machine.

Specifications

Range

The No. 105 Planer is designed to handle stock up to 8 inches thick, and three sizes are built for 26, 30 and 36-inch wide material. The guard over the top infeed roll is set for a maximum cut of $\frac{3}{4}$ -inch. Regular motor size for 26" and 30" machines.....15-H. P. Regular motor size for 36" machine.....20 H. P. Other motor sizes available.....10 and 25 H. P. Standard Motor speed.....3600 R. P. M. Standard feeding speeds.....25, 40, 50 and 80 F. P. M. Spindle pulley for belt drive.....5"x 7"

Countershaft (Timken-bearing) for belt drive:
T and L pulleys.....10"x 6"
Drive pulley.....16"x 6"

Diameter of outlet on dust hood:
For 26" machine.....7"
For 30" and 36" machines.....8"

Net weight in pounds:
26" machine.....5200
30" machine.....5400
36" machine.....5700

Weight in pounds boxed for export:
26" machine.....5850
30" machine.....6100
36" machine.....6500

Measure in cu. ft. boxed for export:
26" machine.....198
30" machine.....214
36" machine.....238

Floor space:
26" machine.....6'- $\frac{1}{2}$ " x 5'-10"
30" machine.....6'- $\frac{1}{2}$ " x 5'-10"
36" machine.....6'-10 $\frac{1}{2}$ " x 5'-10"

Codes:

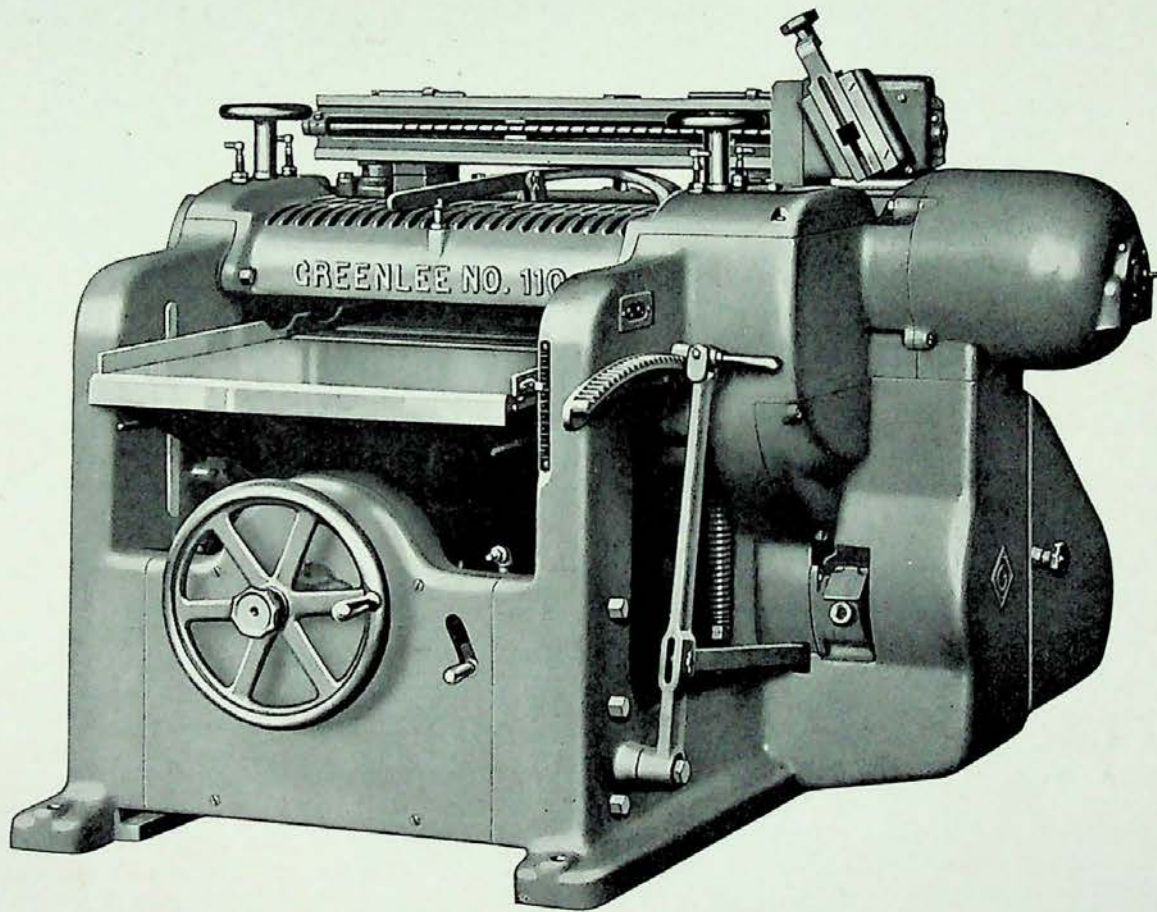
26" machine with 15-H.P. motor.....BAKUZ
26" machine with 10-H.P. motor.....BECAC
26" machine with 20-H.P. motor.....BECUF
30" machine with 15-H.P. motor.....BECUL
30" machine with 10-H. P. motor.....BECYM
30" machine with 20-H.P. motor.....BEDAD
36" machine with 15-H.P. motor.....BEHUS
36" machine with 20-H.P. motor.....BEHYT
36" machine with 25-H.P. motor.....BEJAM
26" belt-driven machine with countershaft.....BEDOL
30" belt-driven machine with countershaft.....BEDUM
36" belt-driven machine with countershaft.....BEJEN
Countershaft omitted from belt-driven machine.....BEDYN

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

NO. 110 SIX-ROLL SINGLE PLANER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

NO. 110 SIX-ROLL SINGLE PLANER

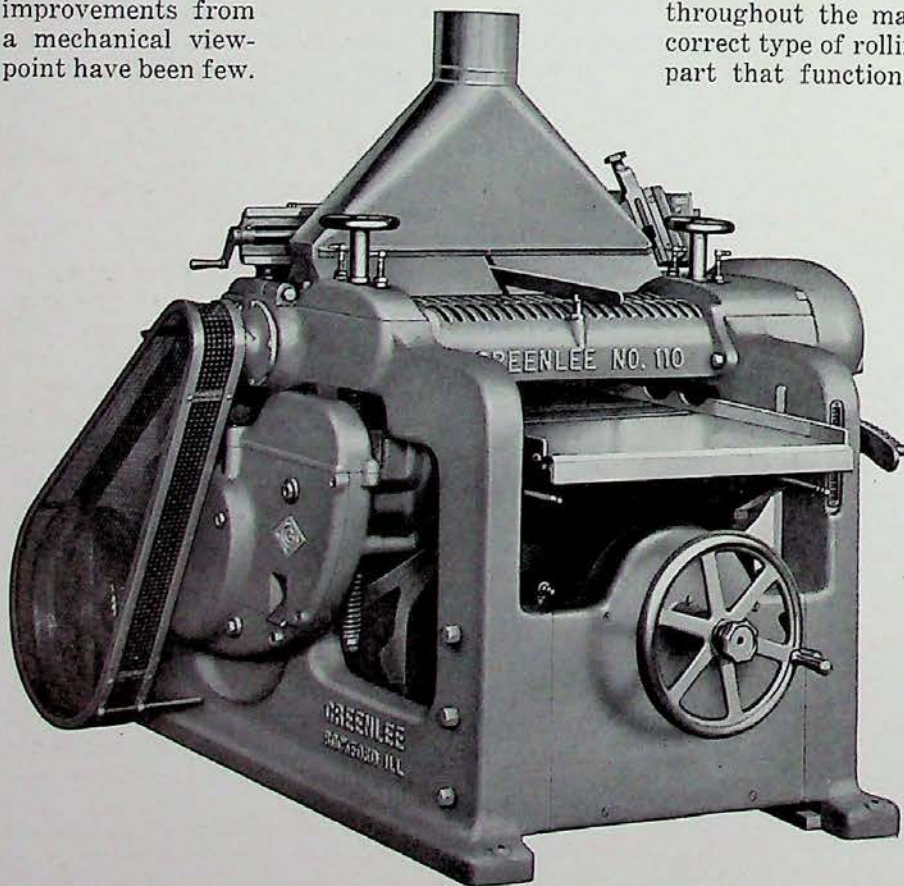
EVEN a brief study of this machine will show, beyond question, that it represents the greatest advancement yet made in the design of single surface planers. The photographs shown in this bulletin alone reveal enough important features to warrant the conclusion that the Greenlee No. 110 stands pre-eminent in the single surfacer field.

In general, the trend of modern machinery design and construction is more and more toward increasing the productive capacity, reducing the maintenance cost, and prolonging the useful life of the machine, as well as improving the quality of the output. Although surfacers capable of good work have been built for years, the improvements from a mechanical viewpoint have been few.

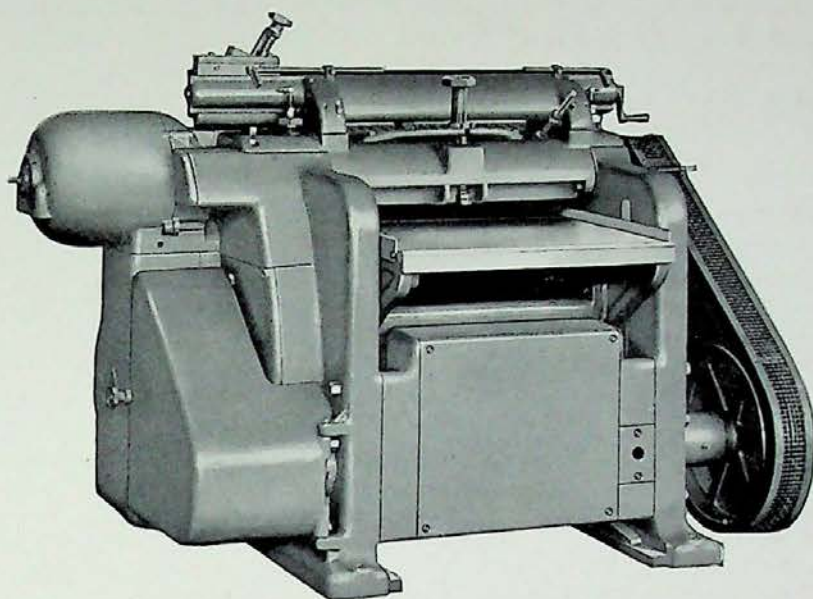
During its development, the Greenlee Planer had the advantage of the combined efforts of capable designing, sales, and field engineers who were experienced in the production and operation of surfacers. It was to be entirely new from the floor up and was to be built by craftsmen using precise equipment in an organization accustomed to high shop standards. Consequently it was not necessary to make any compromise from the ideal surfacer planned by the engineers.

All of the principles essential to good planing have been carefully adhered to, but important improvements have been made at nearly every point. The most recent developments in metallurgy and heat treatment are applied to the materials used, while friction has been reduced throughout the machine by application of the correct type of rolling bearing for each rotating part that functions under production. Every detail was given thoughtful attention, so that the entire machine would have a mechanical excellence worthy of the Greenlee name. No detail has been considered good enough as long as it could be improved upon. The result is a single surfacer of modern design, low in upkeep cost and capable of producing quality planing in large quantities.

Complete investigation will convince the most skeptical of the superiority of this machine. The more important features are described in this bulletin, and their worth is shown by the many Greenlee Planers in successful operation on all kinds of work, from box boards at 150 feet per minute to large, finely finished panels.



Left Front View of No. 110 Planer with Dust Hood in Position.



Rear View of No. 110 Planer from Motor Side.

Outstanding Improvements

Ball and roller bearings are used throughout the machine, reducing destructive friction to a negligible point and requiring a minimum of power, as well as preserving alignment of parts. The enclosed gearing, protected from dirt and well lubricated, adds to this freedom from wear and breakage and further reduces the power requirement. An arrangement securing ease of infeed, combined with an automatic lift, correctly setting the chipbreaker regardless of amount of cut, insures a maximum of output with a minimum of human effort.

Independent leveling and single height adjustment of the pressure bar, spring-locked and convenient bottom roll leveling, and simplified bed leveling are noteworthy examples of adjustment improvements. The knife sharpening equipment is so designed that it can be conveniently used with absolute accuracy. The motor-driven machines have the motors built-in as an integral part of the frame, adding to the rigidity and compactness of this surfacer, which is heavy for the amount of floor space it occupies.

Frame construction itself has been radically improved and all rotating parts are enclosed to provide safety for both the operator and the machine. These outstanding improvements are but the high lights which first attract attention, showing the value of the Greenlee Planer and

its money-saving possibilities. The details are fully as interesting and equally important.

Head

The cutter head is machined from solid forged blanks of the highest grade steel for the purpose. Great care is taken in the heat treatment to secure a maximum of toughness and resistance for the stresses it must withstand. After forging, the heads are rough turned and then allowed to season. The seasoning is repeated after other machining operations, and this insures a head that will "stay put" at all times.

The head rotates in large, over-size ball bearings, especially selected from the highest grade precise bearings made by the leading bearing manufacturer.

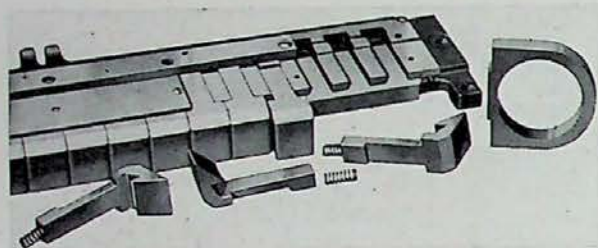
The bearings are located very close to the head body in order to avoid any spring in the spindle ends. Bearing housings are designed for grease lubrication, which is clean, positive, efficient and economical. The housings are clamped in perfectly aligned holes in the frame, preventing any possibility of cramping the bearings.

Heads are regularly furnished in the 4-knife round type with 20 or 30 degree cutting angles. Other styles can be furnished when required. All possible metal is retained in both the head body and the extended ends. The knife gibs move at right angles to a radial line when being tightened, eliminating any tendency to throw the head out of balance due to any slight difference in position. Screws for adjusting the knives to the cutting circle are so designed that they will not bind, and they fit the holes so closely that dust can not work down and clog their movement. There are no tapped holes in the head to cause trouble from stripped threads, which would have to be repaired in such a manner as to destroy the balance. Gib screws are threaded into the knife gibs, and the adjusting screws into sleeves, so that either can be readily replaced when necessary to do so.

Spiral Heads

For cross-banded panels, cross-grained cutting or for use on material of a curly nature, spiral heads are of considerable assistance, since they reduce tearing

out to the absolute minimum. Three or four-knife round spiral heads can be furnished at extra cost. They are machined to the same dimensions as standard heads and are interchangeable with them.



Heavy one-piece Chipbreaker Bar with steel retaining plates for fingers and springs. Note how hardened steel fingers are milled out to project over lower edge to exclude dust.

Chip-breakers

Both sectional and flexible chip-breakers are available for this machine. Each type has a heavy cast bar mounted on rings which completely encircle the trunnions on the head bearing housings. This construction insures great rigidity and a concentric action relative to the cutting cylinder, permitting close operation to the knives with no danger of injuring them. Unlike most chipbreakers of the concentric or the link type, this one will not bind on the stock. A carefully worked out lift, which is simplicity itself, correctly sets the bar at the proper height for the amount of cut being taken, but only high enough for the stock to enter easily without sacrificing the required pressure. Thus, the ideal chip-breaker is realized, safely working close to the cutting circle, requiring a minimum of space, and keeping the material firmly on the platen while allowing it to feed through without interruption or attention and without any effort on the part of the operator.

Dust proof, lubricated construction, combined with the lift described above, form a sectional chipbreaker which works equally well on strip or panel stock. The easy-acting, hardened steel fingers have one-quarter inch independent yield and adjust themselves to suit the material. They project over the lower edge of the bar on the side toward the head so that dust and chips cannot enter. A felt wick distributes oil as it is needed, but not enough to get on the stock. Fingers and springs are readily accessible without re-

moving the bar from the machine. Edges of the fingers are rounded to prevent damage to stock.

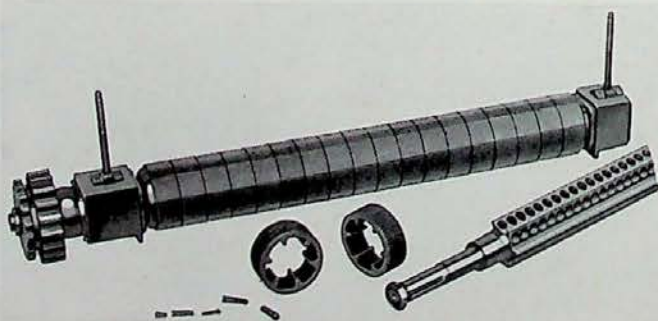
For those who prefer the flexible type, this chipbreaker has many advantages. The spring is slotted to equalize the pressure at all points and is reversible so that it may be used until both edges are worn out. The method of holding it is so designed that the bending does not take place along a line through the middle only. The entire spring is flexible across the width from edge to edge, and this greatly increases the useful life of the spring.

Pressure Bar

An independent adjustment at each end of this exceptionally heavy pressure bar provides for leveling it parallel to the cut. A separate single hand-wheel, graduated to one thousandth of an inch, makes the adjustment for height. Therefore, when the bar is raised or lowered the parallel adjustment is not affected. The lower edge is provided with a hardened steel, replaceable wearing strip. Ample spring pressure, a simplicity of adjustment, and rigid heavy construction with the edge of the lip working very close to the cut keeps the stock on the platen and helps to eliminate chatter and "sniping." Pieces as short as four inches can be run successfully, if they are kept butted.

Platen

The platen consists of a thick, hardened steel plate, accurately ground to a mirror finish and securely bolted in a deep-ribbed heavy cast-iron sub-platen. The latter is bolted to substantial brackets cast on the bed. The steel platen can be shimmed up for regrinding when this is eventually necessary, or it can be easily replaced with a new one if desirable.



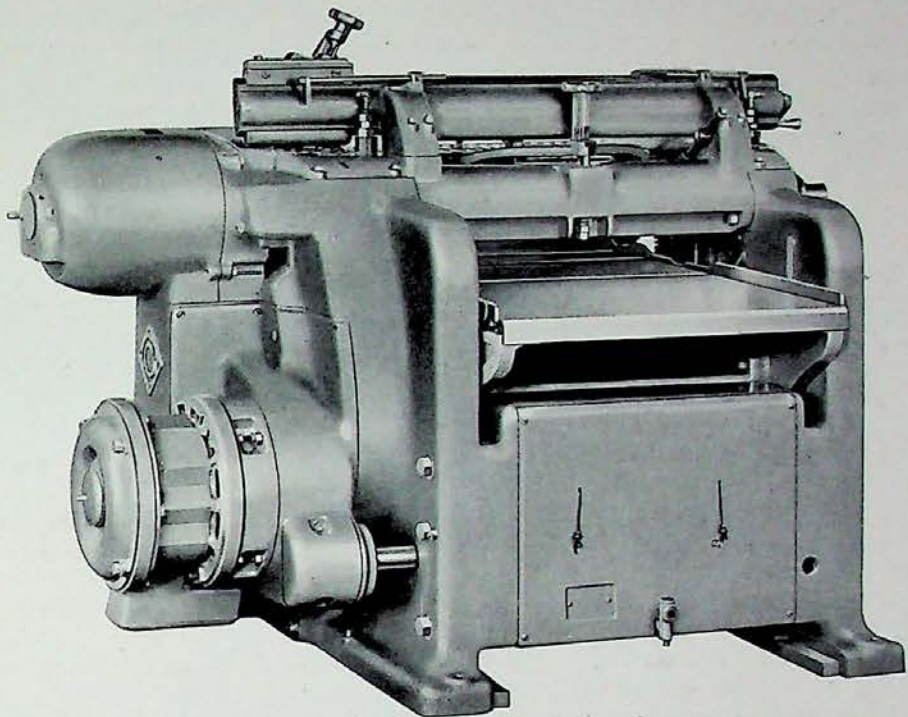
Top Infeed Roll showing ball end on the bearing cap for expansion linkage. Note the double Timken bearings at each end. Steel sections are 2" wide and have chamfered corners. Shaft is milled from solid steel bar. Section springs are mounted on pins and sleeves to prevent distortion. When end plates are loosened, sections can be spread to permit removing or inserting spring units.

Feed Rolls

Four Timken roller bearings are provided on each feed roll, two at each end mounted in semi-self-aligning boxes. The bottom rolls and the top out-feed roll are of iron cast to heavy steel shafts in such a manner that they can never come loose. The internal shape is such as to resist bending stresses, and the rolls and shaft ends are accurately ground. The bottom roll bearing cases are seated on wedges, with the adjustment brought within easy reach from outside the machine. Only one wrench is necessary as the adjustments have spring locks.

The top out-feed roll is carried by the top out girt, and the spring pressure sleeves and supporting studs project upward through the girt so they can be adjusted from outside the machine. The top in-feed rolls can also be furnished in the solid type, either smooth or corrugated. They are supported by studs projecting from the top in-feed girt with the adjusting nuts above the girt. Small stiff springs absorb the shock when the rolls drop behind the stock. Even pressure is applied by long springs through an equalizing bar and convenient handwheels above the girt. All the top roll bearing cases are guided in pockets machined in the side frames, so that correct alignment is always maintained.

The top in-feed rolls are regularly of the corrugated sectional type. The sections are of steel, two inches wide and seven-sixteenths of an inch thick. They are mounted on spline shafts milled from solid steel bars. The shape of the splines and the section teeth give a rolling gear-tooth action which reduces wear to a negligible point. The section springs have internal guides which prevent breakage and are so located that the pressure is most effective. The light-weight springs can be used, increasing their life and allowing the sections to adjust themselves to the stock, because the design utilizes the tooth



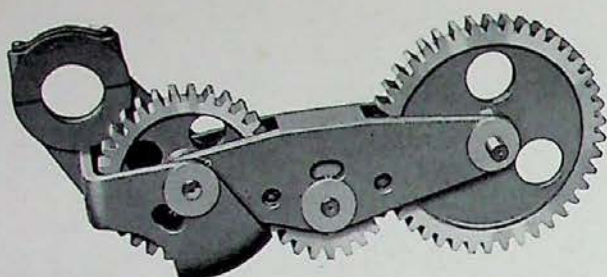
Rear View of No. 110 Planer with Four-Speed Feed Motor.

thrust to assist the springs. An ingenious arrangement permits replacing spring units without removing any of the sections from the shaft. A smooth sectional roll can be supplied for the top out-feed roll when it is desired to run three or more strips at one time.

Feed

All rolls are gear driven, except the second top in-feed, assuring the even feeding action so essential to good work and avoiding troublesome long chains. The gears have cut teeth and all are provided with roller bearings mounted on hardened steel studs supported at each end. Double expansion links keep the gears in proper mesh at all times, providing for movement of the top rolls and adjustment of the bed. The gearing is completely enclosed, the top roll drive being housed in the right frame and that for the bottom rolls in a gear case attached to the bed. The cases are dust proof and oil tight with oil automatically supplied to all working parts. Long life with smooth, quiet, easy running results from this construction.

The feed is usually driven with endless belts from the left end of the head to a built-in shaft at the rear. Cone pulleys provide two quickly changed feed rates which can be further altered



Top Feed Roll Expansion Linkage showing fulcrum, hinge and spherical socket, which permits tilting of the roll without binding.

by an extra pulley, thus giving a choice of four feed rates. Adequate guards permitting quick access to the belts are provided. The roller bearing tightener pulley which starts and stops the feed is controlled by a hand lever with a safety pawl for quick release.

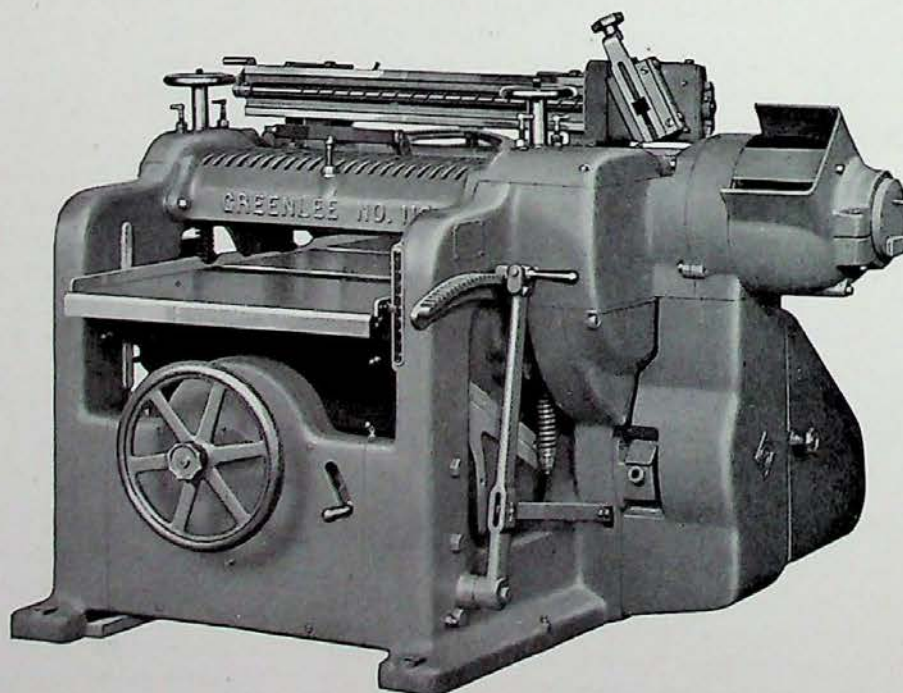
When desired, the machine can be furnished with a four-speed feed motor, which eliminates all belts. It is built-in and is directly geared to the feed through a safety clutch. This clutch releases if the feed rolls are stopped and automatically goes back to work when the overload is relieved. A drum controller at the front of the machine gives instant change of feed rate, allowing the operator to lower the feed for heavy cuts while running at a higher rate on most of the work, thus obtaining the maximum production.

Frame Smooth operation and fine work are a result of the sturdy construction throughout this planer and the proper distribution of metal in the frame and all moving parts. The frame consists of heavy box members securely bolted, keyed and doweled together in such a manner as to form a rigid unit. The ways for the wedges and vertical guides for the bed are a part of the side frames and are accurately ma-

chined and scraped to perfect alignment. Top roll bearing pockets, head bearing seats and the motor bell are also integral parts of the side frames, insuring permanently correct relation of all units. The L-shaped construction around the roll bearing pockets makes the frame much stiffer than customary construction at these points, so that the ends of the frame help support the center portion where the head is located.

Bed The wedges are key gibbed to both the frame and the bed so that all three are kept in contact at all times. They also have a self-aligning girt for the hoist nuts, so that the bed has a full-length bearing. The bed is guided vertically in the frame to prevent endwise movement, and adjustable gibs are provided. All parts are exceptionally heavy and will not yield under the severest cuts.

The bar between the bottom in-feed rolls is adjustable to prevent "sniping" on short stock. In addition, the in-feed table is mounted on springs so that stock is allowed to equalize between the top and bottom rolls, permitting it to enter with no extra effort on the part of the operator, even on heavy cuts. A similar arrangement on the out-feed table supports the stock and helps to prevent "sniping."



No. 110 Planer arranged for Belt Drive. Note that the Pulley Housing is adjustable for belting from any direction.

Hoist

Both hand-wheel and power hoist are provided. The latter is of the metal cone and cup type which will outlast many paper frictions or clashing gears. The simple leveling adjustment to .00075 inches for the bed can be made without removing any parts. Hoist screws have bronze, self-aligning nuts and run in Timken roller bearings, eliminating binding and end play.

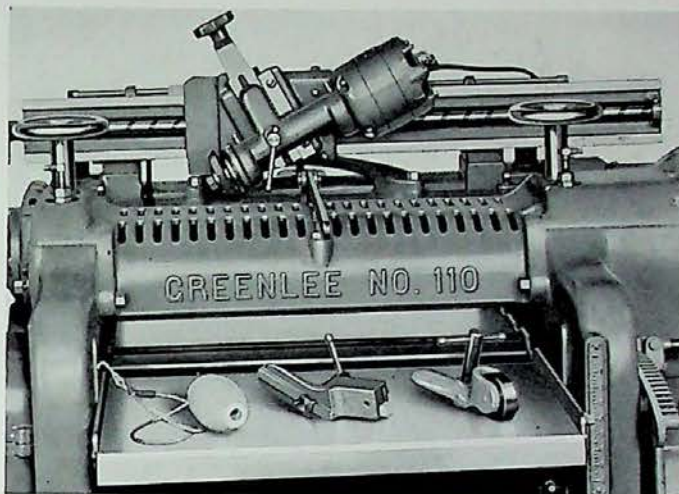
Head Drive

On the electric planer, the motor is compactly built into the machine, directly driving the head and making for better operation and great rigidity, as well as conserving floor space. All controls and wiring are enclosed in the frame.

When belt drive is wanted, the head is driven from one end only by a pulley mounted on a separate spindle. Such arrangement relieves the head of belt pull and slap, leaves the left side of the machine clear, and approaches the ideal pulling conditions of a built-in motor. The pulley housing can be turned to permit belted drive in any direction from a motor or from the separate roller-bearing countershaft.

Knife Grinder

An important feature of the knife grinding arrangement on this planer is that the grinding and jointing bar remains on the machine in its correct relation to the head, so that it is always ready for use. This saves time and makes for convenience and accuracy. A precision knife index is also attached to the bar, and a convenient weight suspended by a cable is used to hold the head in position. The knife grinder has a built-in ball-bearing motor driven from a plug-in socket in the left-hand side frame, and it regularly takes its current from the power line. It carries a disc wheel, and the position of the grinder permits it to slightly hollow grind the knife. The advantage in hollow grinding is that the knives can be jointed more times for each grinding than when ground straight.



Knife Setting, Grinding and Jointing Equipment. Note that the Grinding and Jointing Bar always remains on the machine.

The carriage on which the grinder can be quickly mounted, is moved back and forth on the bar by a hand-operated screw, giving an even movement at the rate of $1\frac{3}{4}$ -inches for each revolution. It also carries the jointing attachment and the knife setting gauge.

Shavings Removal

Shavings are removed through a hood having an outlet 8 inches in diameter.

It is 16 inches long and is arranged so that it can be telescoped when necessary to remove the hood for any purpose.

Lubrication

All bearings outside the gear cases are lubricated by high-pressure grease gun. This method is simple, efficient and convenient. Most bearings require attention but once a week. Feed gears are lubricated by running in oil, and in this way they lubricate their own shaft bearings.

Special Arrangements

The sturdy design of Greenlee Planers fits them for special arrangements to meet unusual requirements. High-frequency operation has been used in many cases, but since the benefits derived from it depend to such an extent upon the work and other factors involved, each case should be carefully analyzed before it is employed. Head speeds from 5400 to 6000 R.P.M. have been used.

Hopper feeds of the belt slat type can be applied for handling small pieces. Less effort is required on the part of the operator for feeding, and the machine is easily kept operating at full capacity by the use of this attachment.

A special in-feed arrangement has also been developed for use in taking stock directly from a cut-off saw. With this device, the material is brought from the saw to the planer by a live-roll conveyor, and a man is not required at the in-feed end to feed the machine.

Specifications

Range The No. 110 Planer is designed to handle stock up to 8 inches thick, and two sizes are built for 30 and 36-inch wide material. The guide over the top in-feed roll is set for a maximum cut of $\frac{3}{4}$ -inch.

Regular head motor sizes:

30-inch machine.....	15-H.P.
36-inch machine.....	20-H.P.

Other motor sizes available..... 10 and 25-H.P.

Standard head motor speed..... 3600 R.P.M.

Standard feeding speeds..... 25, 40, 50 and 80 F.P.M.

Standard pulley for belt drive..... 5" x 7"

Countershaft (Timken-bearing) for belt drive:

T and L pulleys..... 10" x 6"

Drive pulley..... 16" x 6"

Diameter of outlet on dust hood..... 8"

Net weight in pounds:

30-inch machine..... 7600

36-inch machine..... 8100

Weight in pounds boxed for export:

30-inch machine..... 8400

36-inch machine..... 8950

Measure in cu. ft. boxed for export:

30-inch machine..... 230

36-inch machine..... 246

Floor space:

30-inch machine..... 6'-4 $\frac{1}{2}$ " x 6'-3"

36-inch machine..... 6'-10 $\frac{1}{2}$ " x 6'-3"

Codes:

30-inch machine with 15-H.P. motor..... BIDYM

30-inch machine with 10-H.P. motor..... BIFAD

30-inch machine with 20-H.P. motor..... BIFEG

36-inch machine with 20-H.P. motor..... BIFUM

36-inch machine with 15-H.P. motor..... BIFYN

36-inch machine with 25-H.P. motor..... BIGAG

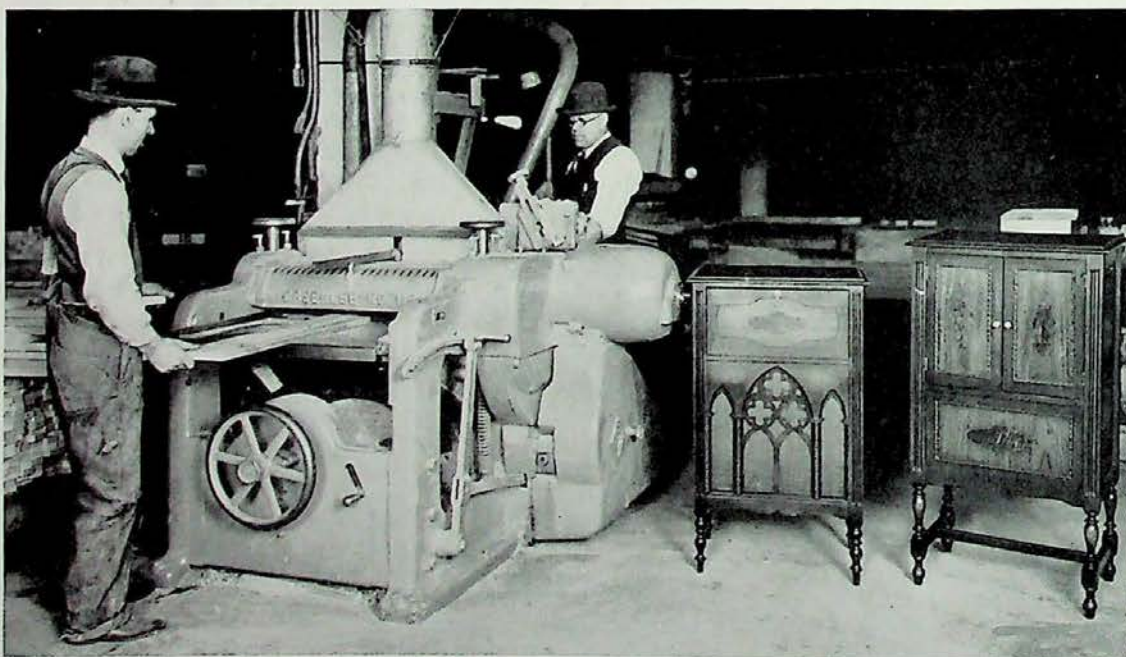
Add for 4-speed feed motor..... BIGYP

30-inch belt drive machine with countershaft..... BIHIM

36-inch belt drive machine with countershaft..... BIHON

Add for countershaft omitted from belt-

drive machine..... BIJAL



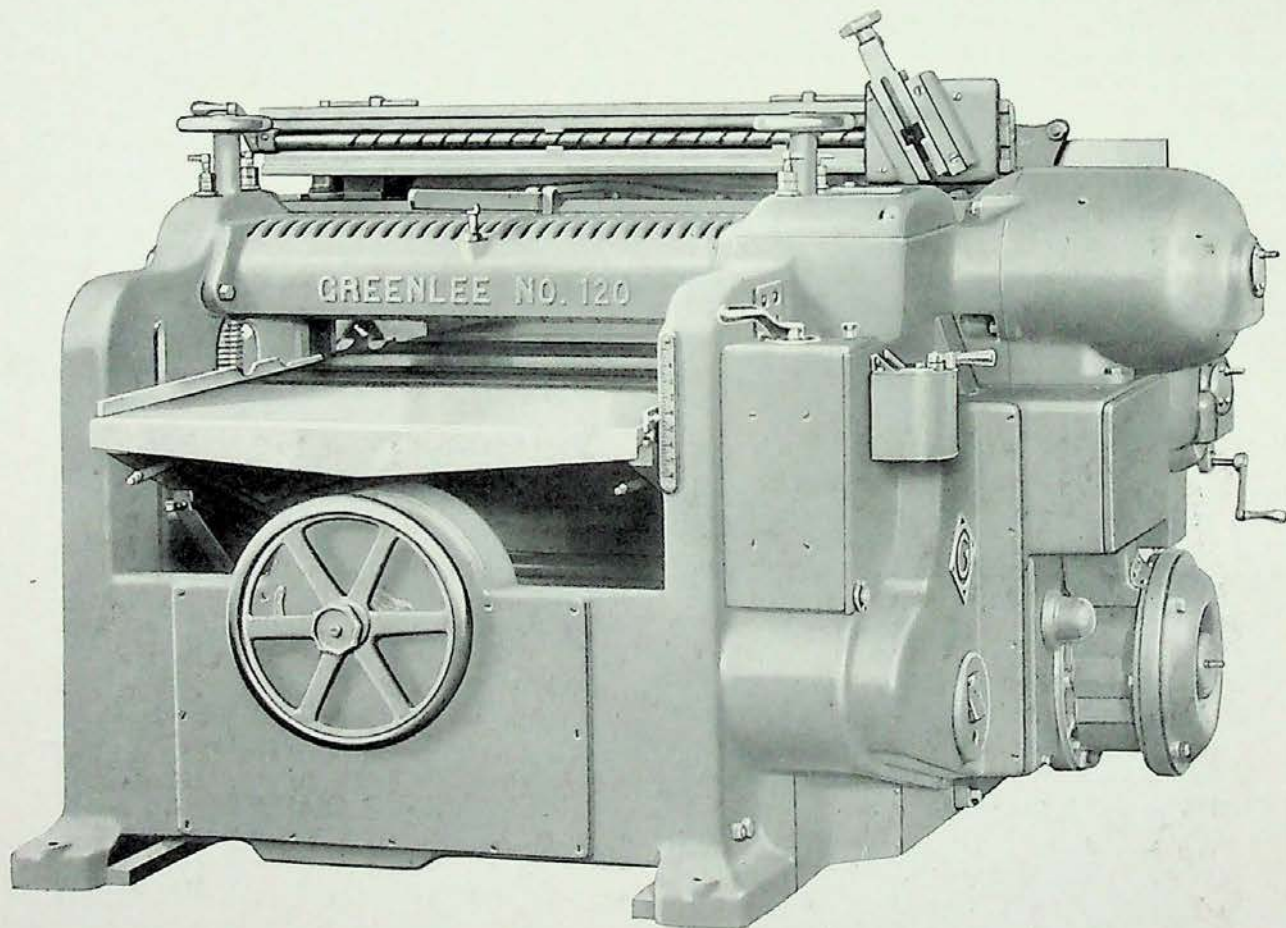
A Typical Installation of the Greenlee No. 110 Planer where fine work is demanded.

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

No. 120 EIGHT-ROLL ELECTRIC DOUBLE PLANER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

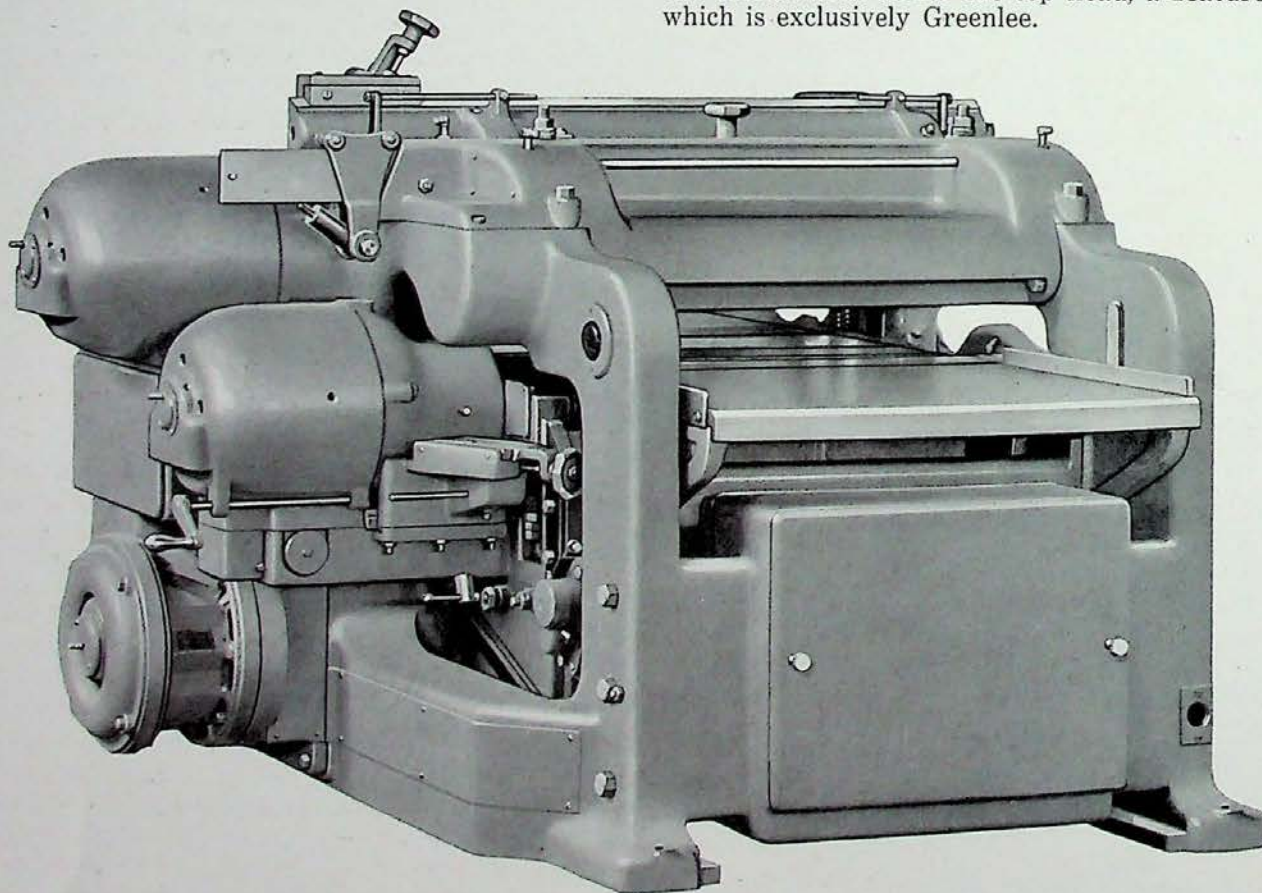
Greenlee

No. 120 EIGHT-ROLL ELECTRIC DOUBLE PLANER

THE performance of this double planer is so far ahead of anything ever before obtainable that it stands out in the woodworking industry as the leading double planer of the day, from the standpoint of high-speed production as well as from the quality of the work that it produces. A glance at the accompanying illustrations will reveal its modern, up-to-the-minute design; heavy, compact construction; and the complete and convenient operating features.

Improvements over other double planers involve many original features which have not before been introduced in planer design. Users go on record as approving these modern developments

by written statements of praise and by ordering additional machines. An improvement that reduces repair costs and prolongs the life of the planer is that all feed gears are fully enclosed and run in an oil bath. Dust, chips, and dirt are thus excluded, and perfect lubrication is assured. Great rigidity around the cutter heads results from the rugged frame construction and the proper distribution of metal, providing a sturdiness not obtainable with mere pounds of meaningless cast-iron. Perfect planing is assured even when short stock goes through other than butt to butt, because of the location of the rolls. The same close roll centers are maintained at the bottom head as for the top head, a feature which is exclusively Greenlee.



Rear view of No. 120 Electric Double Planer from motor side. Note the compactness of the entire design. The front view of this same machine is on the preceding page.

An improvement, which greatly increases the efficiency of knife grinding and jointing, and which makes the Greenlee Double Planer a machine entirely independent of accessories, is the built-in trolley which carries the bottom head when it is withdrawn. The head yoke is easily pulled out and rides on the trolley bar, eliminating all need of a saw horse or other device to support it from the floor.

The grinder carriage and grinder bar remain permanently on the machine, so that lining up is unnecessary. After attaching the motor-driven grinder, which is interchangeable between the top and bottom heads, it is only necessary to locate the knife against the knife stop, fasten the weight that holds the head against the stop, and start grinding. The jointer then replaces the grinder on the carriage, and the knives are jointed at full speed.

The general design of this machine is such that the lines are pleasing to the eye and decidedly practical from the standpoint of operation. No unsightly mass of gears, shafting or pulleys mar its attractiveness or impair its safety. In addition, it makes a well balanced machine which is heavy for its size, compact and rigid, and which occupies relatively small space.

Frame Vibration has been reduced to a minimum by the sturdy construction throughout this double planer, and by a proper distribution of metal in the frame and all moving parts. The frame consists of two heavy, box-type side castings tied together by two main box-type girts, the top-infeed roll guards, and the top out girt. The main girts are keyed and doweled to the side frames for permanent alignment, and the entire structure is so designed that perfectly rigid support is given to all the working parts. The L-shaped construction in that part of the frame around the roll bearing pockets and head bearings is so rigid that a small coin can be balanced on edge on the frame, showing the point to which vibration has been reduced. Usual planer construction at this point is weak, because the roll pockets have no vertical sides, and consist merely of a bar from $\frac{3}{4}$ to 1-inch thick and 2 to 3 inches in width, which is under the roll bearing housings.

Drive The drive of this planer is by a built-in motor on each cutter head and a four-speed motor for the feed, providing maximum efficiency. If preferred, the feed motor can be eliminated by belting to the feed shaft from the top head. Push-button control is provided for

the head motors and drum control for the feed motor. Motors regularly furnished are 15 to 25-H.P. for the top head, 10 to 20-H.P. for the bottom head, and 5 to 10-H.P. for the feed. Head motors run 3600 R.P.M., and all motors are regularly for 220 or 440 volt, 2 or 3 phase, 60 cycle alternating current. They can be furnished in sizes to suit any working condition. All wiring and all starting switches are built into the frame, covering and protecting them and adding to the appearance of the machine.

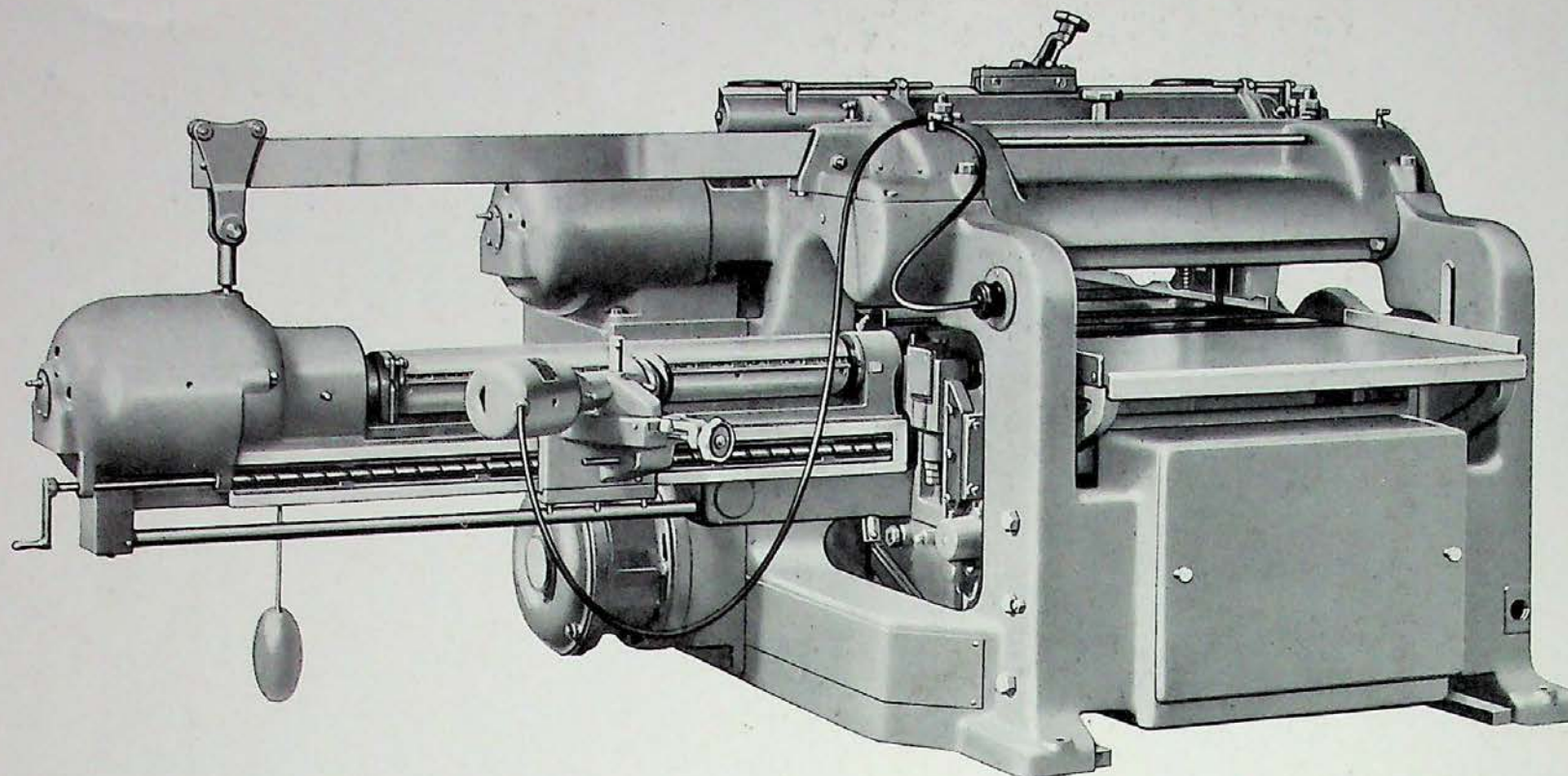
To enable the operator to get at the fingers and terminals in the drum controller, the case swings on a pivot on the right front side of the planer. The case can be swung down so that three sides are open for making adjustments, and it is locked by a thumbscrew on top.

Bearings The No. 120 is equipped throughout with anti-friction bearings of either the ball or roller type, which are of ample size for the heaviest required cuts. Rolls are carried in Timken bearings mounted in grease-tight, semi-self-aligning housings, while both the top and bottom heads run in large diameter, deep-grooved precision ball bearings.

The Feed The feed is regularly driven by a four-speed motor. The motor pinion engages a gear which is connected to a shaft by means of a safety slip clutch. From this shaft, the drive is taken by means of idler gears and expansion links to the top rolls. Another expansion link and cross connection shaft transfers the drive to a gear box on the left side, which contains an idler train to drive the bottom rolls. Expansion links always keep the gears in proper mesh.

When preferred, this machine can be arranged with a belt-driven feed. With this arrangement, a pair of enclosed two-step cone pulleys and a lever-operated belt tightener are located on the right side. A change of pulleys on the left side provides four feeding speeds of from 25 to 80 feet per minute, which are also standard for the four-speed-motor feed, but any increase up to 150 feet is obtainable in either arrangement.

Feed Rolls All feed rolls run in Timken double bearings mounted in vertically-adjustable, grease-tight housings. All bottom rolls and top out-feed roll are of cast-iron and are cast to their supporting shafts. Their design is such as to prevent distortion under any pressure to which they might be subjected in the operation of this machine.

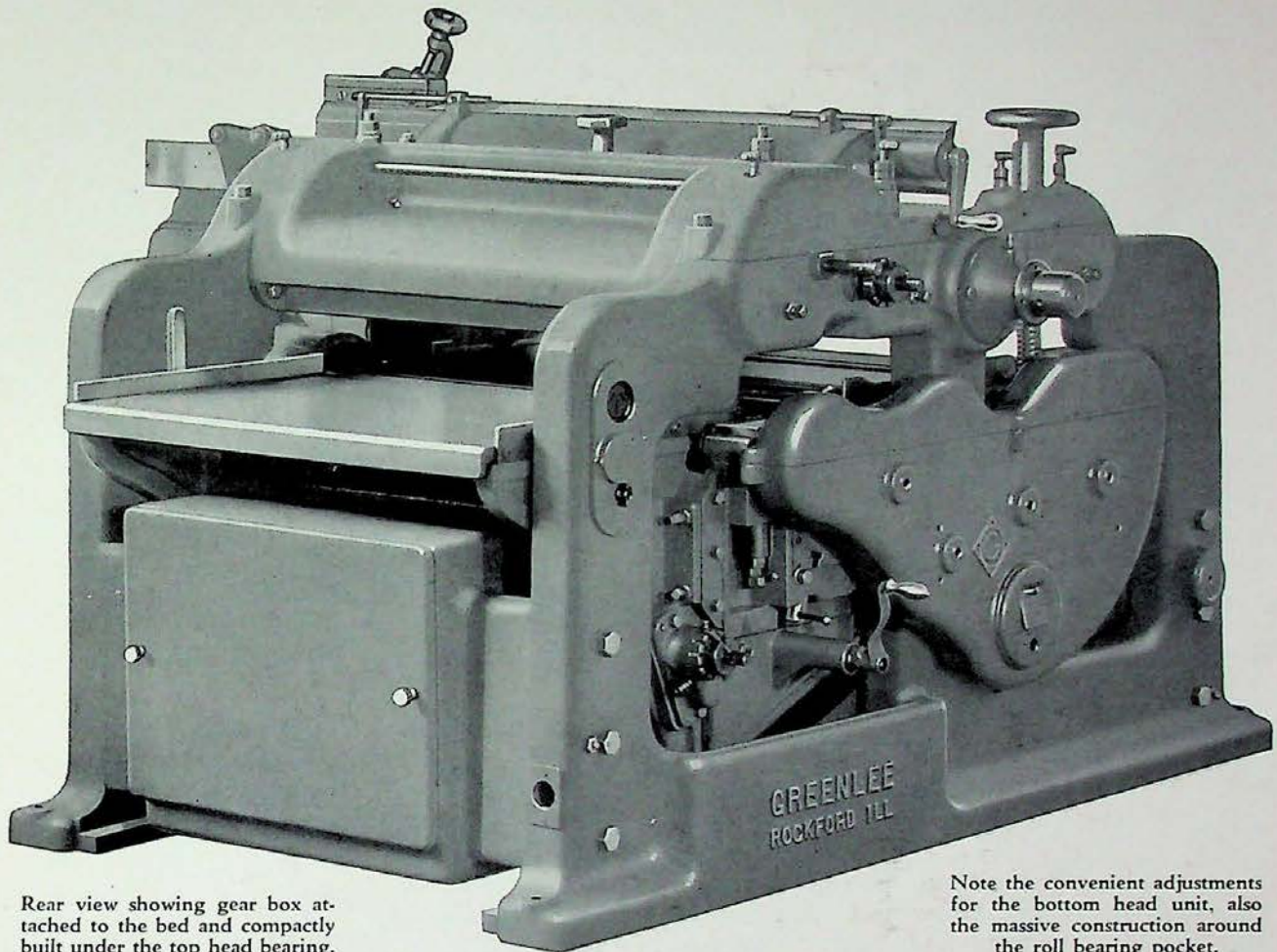


Above is shown a rear view of the Greenlee No. 120 Eight-Roll Electric Double Planer with the bottom head pulled out for setting, grinding and jointing the knives. Note the absence of any means of support from the floor, since the head yoke is carried on a built-in trolley, which is pushed back out of the way when not in use. This is one of the many original features of the Greenlee, which makes it the leader in the Double-Planer field.

It is also important to note that the same grinder, jointer and knife setting gauge are used on both the top and bottom heads. The grinder bar for the

top head always remains mounted on the machine. The bottom head yoke has ways for the grinder carriage machined directly upon it, and these are scraped perfectly parallel with the head. This means that there is never any lining up to be done before grinding the knives of either head.

The above photograph also shows the long lead screw, which gives an even movement to the grinder; the accurate knife-stop index, which remains in place on the bearing case; and the rigid conduit, which slides through a hole in the bottom head housing when the head yoke is moved.



Rear view showing gear box attached to the bed and compactly built under the top head bearing.

Note the convenient adjustments for the bottom head unit, also the massive construction around the roll bearing pocket.

Top in-feed rolls are regularly of the sectional type, but solid rolls can be substituted. Roll sections are of steel, each having independent yield, and the design is such that springs can be replaced without removing any of the sections. The roll assembly is kept under proper tension by a spring at each end having a handwheel at the top of each spring bolt for adjustment.

Feed Gears

All feed gears are cut from the solid and run in an oil bath in a housing to exclude all dust and chips. A sight indicator shows the amount of oil in the housing, and a covered spout for filling is provided. Feed gears are mounted in such a way that proper mesh is maintained at all times, and all idler gears are mounted on roller bearings carried by hardened studs supported at both ends. Such features add years to the life of the machine by practically eliminating all wear.

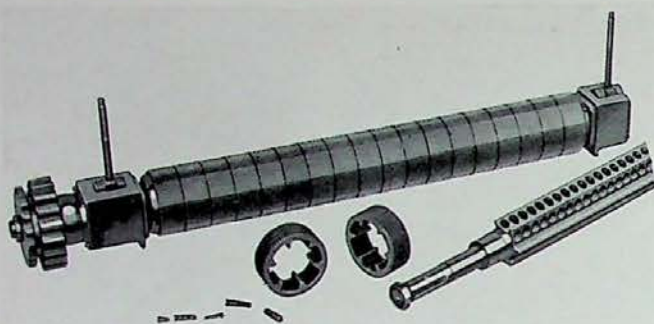
Hopper Feed

Special arrangements can be made for hopper feed to handle short stock as shown by the photograph of the machine so equipped. This is being used on box boards at 150 feet per minute, but is just as suitable for slower feeds on fine work.

The feeding arrangement consists of a steel-slat conveyor carried by roller chains driven from the bottom roll gear case. The mounting at the front is on the end of the bed, so that no separate support is required. Conveyor slats are covered with strips of composition belting, so arranged that stock can not catch on them. The bumper plate can be set for feeding from either side, and on an angle in either direction.

Chip-breakers

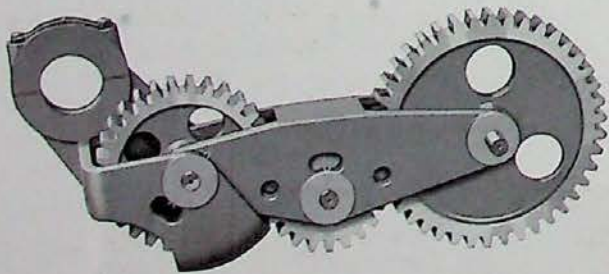
The chipbreaker for the top head can be of either sectional or flexible type. Sectional is standard. It is carried by steel rings passing around the trun-



Top Infeed Roll showing ball end on the bearing cap for expansion linkage. Note the double Timken bearings at each end. Steel sections are 2" wide and have chamfered corners. Shaft is milled from solid steel bar. Section springs are mounted on pins and sleeves to prevent distortion. When end plates are loosened, sections can be spread to permit removing or inserting spring units.

nions which are an integral part of the head bearing housings. This mounting makes its movement concentric with the cutting circle of the head and permits close operation to this circle. The mechanical lift automatically sets the chipbreaker at the correct height for incoming stock, regardless of thickness. This provides for continuous feed at all times.

The sectional chipbreaker has 2-inch wide sections made of hardened steel. A special lip projecting up on the side of the chipbreaker bar, toward the cutter head, prevents shavings and dust from pounding in between the sections and the bar. Each section has independent yield against an individual spring. Lubrication is amply taken care of by four oilers at the top of the bar, which lead to a felt wick extending from one end of the bar to the other, and which keep each of the fingers lubricated. The bottom ends of the fingers are beveled on the sides, so they will climb the edge of stock passing through on an angle without marring it.



Top Feed Roll Expansion Linkage showing fulcrum, hinge and spherical socket, which permits tilting of the roll without binding.

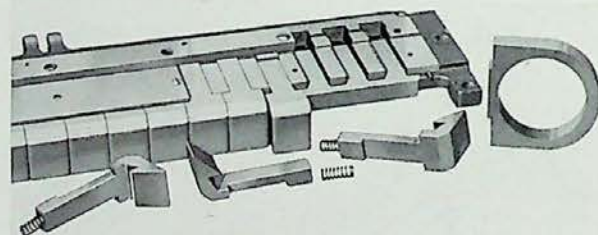
The flexible chipbreaker consists of a reversible flexible spring carried on a bar which fastens to the same rings that are used for the sectional chipbreaker. The lip has $\frac{1}{8}$ inch yield and projects about $\frac{3}{16}$ of an inch beyond the bar.

The bottom head chipbreaker bar is bolted directly to the bed and is adjustable for height. This chipbreaker can be of the sectional, flexible, or rigid type, but the rigid is standard and is fitted with a hardened steel renewable lip which comes in contact with the stock.

Pressure Bars

The pressure bars used in this double planer are exceptionally rigid, being about eight times as stiff as the usual pressure bar, and the lip which comes in contact with the stock is of hardened steel and is readily replaceable.

The top head pressure bar is of heavy cast-iron with hardened steel lip, located $1\frac{1}{8}$ " back of the center line of the head and mounted in vertical ways. A single hand wheel is provided for ver-



Heavy one-piece Chipbreaker Bar with steel retaining plates for fingers and springs. Note how hardened steel fingers are milled out to project over lower edge to exclude dust.

tical adjustment, giving .001" for each notch in the hand wheel hub. A set screw and lock nut is provided at each end of the pressure bar for levelling up, allowing an adjustment of $\frac{1}{8}$ " up or down from normal position. The method of spring support distributes the load so that there is no deflection.

The bottom head pressure bar is of heavy cast-iron with hardened steel lip and is carried in vertical gibbed ways in the bottom head housing. It has a self-locking screw adjustment at each end and is spring supported.

Cutter-heads The round cutterheads regularly have four knives, and the cutting circle is 5 inches. They are unusually stiff because of all possible metal being retained in forming the knife slots and screw pockets.

This also reduces the space where shavings and dust might collect. The gibs are tapped to carry the locking screws, so that the entire knife clamping and adjusting arrangement can be renewed by simply securing the replaceable parts and without doing any work on the head body. Another advantage is that the movement of screws and gibs in clamping the knives does not throw the head out of balance.

Spiral cutter heads can be furnished when required for planing curly or cross-grained material, such as built-up core stock or cross-banded parts where tearing out must be reduced to the greatest possible extent.

Head Bearings

The cutterhead bearings consist of a large-diameter, deep grooved, precision ball bearing at each end and an additional one at the end of the motor housing. These are carried in housings which pull out with the entire head assembly, including the rotor of the built-in-motor.

Bottom Head Housing

In addition to carrying the head, the bottom head housing also carries the pressure bar and the out-feed roll, so that all three adjust as one unit in changing the cut. Micrometer adjustment adds to its convenience and automatic locking makes for accuracy. Independent adjustment for each unit is also provided for.

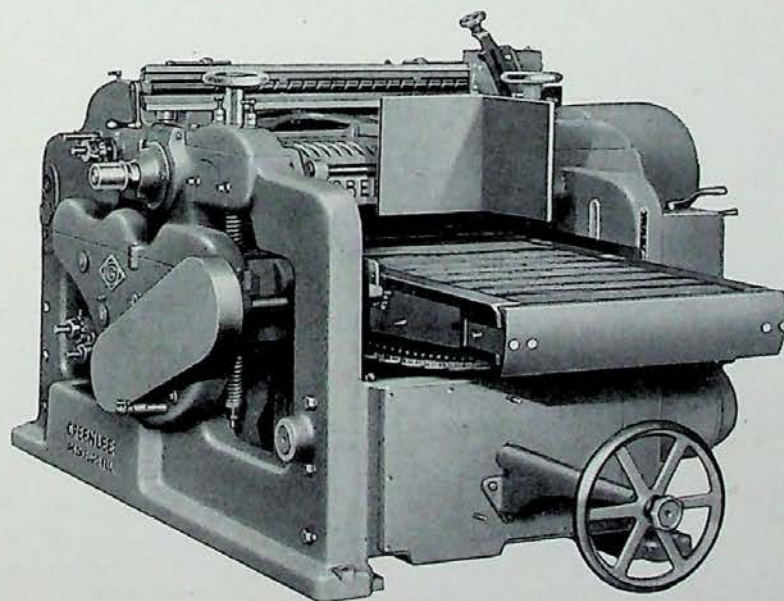
Both the bottom head unit and its platen are quickly and easily clamped in position.

Platens

The platens for supporting the work are of hardened and ground steel, $\frac{7}{8}$ -inch thick, and are mounted on heavy cast-iron sub-platens. The bottom head platen is guided in vertical ways to keep it level, and the top out-feed roll is connected to it so that one adjustment takes care of both. An additional convenience is the micrometer adjustment which accurately indicates the amount of movement to .001" and automatically locks the platen.

Table Hoist

A motor-driven hoist is provided for raising and lowering the planer bed. This is controlled by a drum-type switch mounted at the right front corner of the machine. The control handle automatically returns to the neutral position when it is released by the operator. The hoist motor is mounted in the front bottom girt and is directly geared to the hoist screw. Provision is made for the motor to stall without injury to the motor or machine parts if the bed is moved too far in either direction, or if the operator attempts to raise the bed while material is in the machine. These safety features are of considerable value to the owner and a source of satisfaction to the operator, since they eliminate breakage and make for faster production.



No. 120 Double Planer equipped with Hopper Feed for handling short stock on fast feeds. Note that handwheel is extended for convenience.

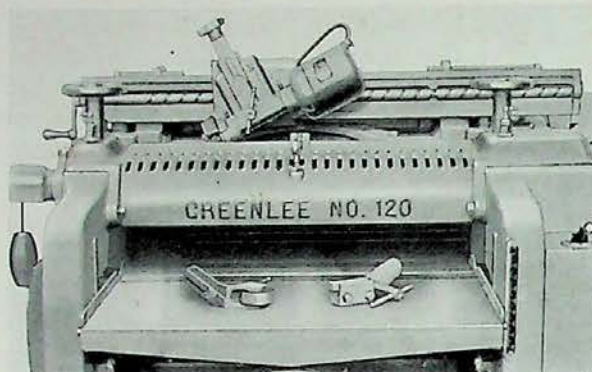
The handwheel at the front can be used for the final, precise setting of the bed. It gives a movement of $\frac{1}{16}$ " for each turn. By moving the handwheel shaft lengthwise, the right-hand gear is disengaged, permitting the left-hand screw to be turned independently for leveling the bed to .00075 of an inch. An exclusive feature of the design is the self-aligning hoist nut girt which provides the only connection between the wedges, so that the adjustment for leveling the table can be made without disconnecting any girts or causing any misalignment within the machine.

Knife Grinding

The arrangement for grinding the knives on the bottom head is an exclusive Greenlee feature. Instead of pulling out the head and support-

ing the end on a saw horse or dolly, this planer is equipped with a built-in trolley which supports the bottom head yoke when it is pulled out. The grinder carriage is mounted on ways machined on the yoke, and is scraped parallel to the head so that there is nothing to line up. The same grinder, jointer, and knife setting gauge are used for both the top and bottom heads. The grinder is ball-bearing equipped and is driven by a $\frac{1}{2}$ -H.P., 3600 R.P.M. motor. Power is supplied from plug-in sockets in the side frames. The grinder wheel is $4\frac{1}{2}$ " in diameter with a $\frac{5}{8}$ " face and a $1\frac{1}{4}$ " bore.

A guard is placed over the grinder wheel to keep all emery dust from the grinder bar. The grinder carriages remain on the ways, and the knife stops push back, but remain attached to the machine when not in use. A weight sus-



Knife Setting, Grinding and Jointing Equipment for both heads. Note that grinder bar always remains in position.

pended by a cable is used to keep both the top and bottom heads in place while grinding. This complete arrangement is more convenient than old-time methods, it saves much time in getting ready to grind and joint the knives, and it provides for much greater accuracy of work.

Shavings Removal

Shavings are removed

from the top head through a hood having an outlet 8-inches in diameter. It is 16 inches long and is arranged so that it can be telescoped for removing the hood. The bottom head has a 7-inch outlet underneath the machine for connecting to a pipe through the floor.

Lubrication

All bearings outside the gear cases are lubricated by high-pressure grease gun. This method is simple, efficient and convenient. Feed gears run in oil, and in this way they lubricate their own shaft bearings.

Specifications

Range

The No. 120 Double Planer is designed to handle stock up to 8 inches thick, and two sizes are built for 30 and 36-inch wide material. The guard over the infeed roll is set for a maximum cut of $\frac{3}{4}$ ".

Regular Motor Sizes:

30-inch machine	
Top Head	15 H. P.
Bottom Head	10 H. P.
36-inch machine	
Top Head	20 H. P.
Bottom Head	15 H. P.

Other Motor Sizes Available:

Top Head	25 H. P.
Bottom Head	20 H. P.
Standard Motor Speed	3600 R. P. M.
Standard Feeding Speeds	25, 40, 50 and 80 F. P. M.

Diameter of Outlets on Dust Hoods:

Top Head	8"
Bottom Head	7"

Net Weight in Pounds:

30-inch machine	10400
36-inch machine	11100

Weight in Pounds Boxed for Export:

30-inch machine	11400
36-inch machine	12175

Measure in cu. ft. Boxed for Export:

30-inch machine	270
36-inch machine	290

Floor Space:

30-inch machine	6' 3" x 7' 4"
36-inch machine	6' 9" x 7' 4"
Additional space on right for pulling out head	3' 0"

Codes:

Standard 30-inch machine	
15-H. P. top head; 10-H. P. bottom head	BOKIN
20-H. P. top head; 10-H. P. bottom head	BOKOP
20-H. P. top head; 15-H. P. bottom head	BOKUS
25-H. P. top head; 15-H. P. bottom head	BOKYT
25-H. P. top head; 20-H. P. bottom head	BOLAM

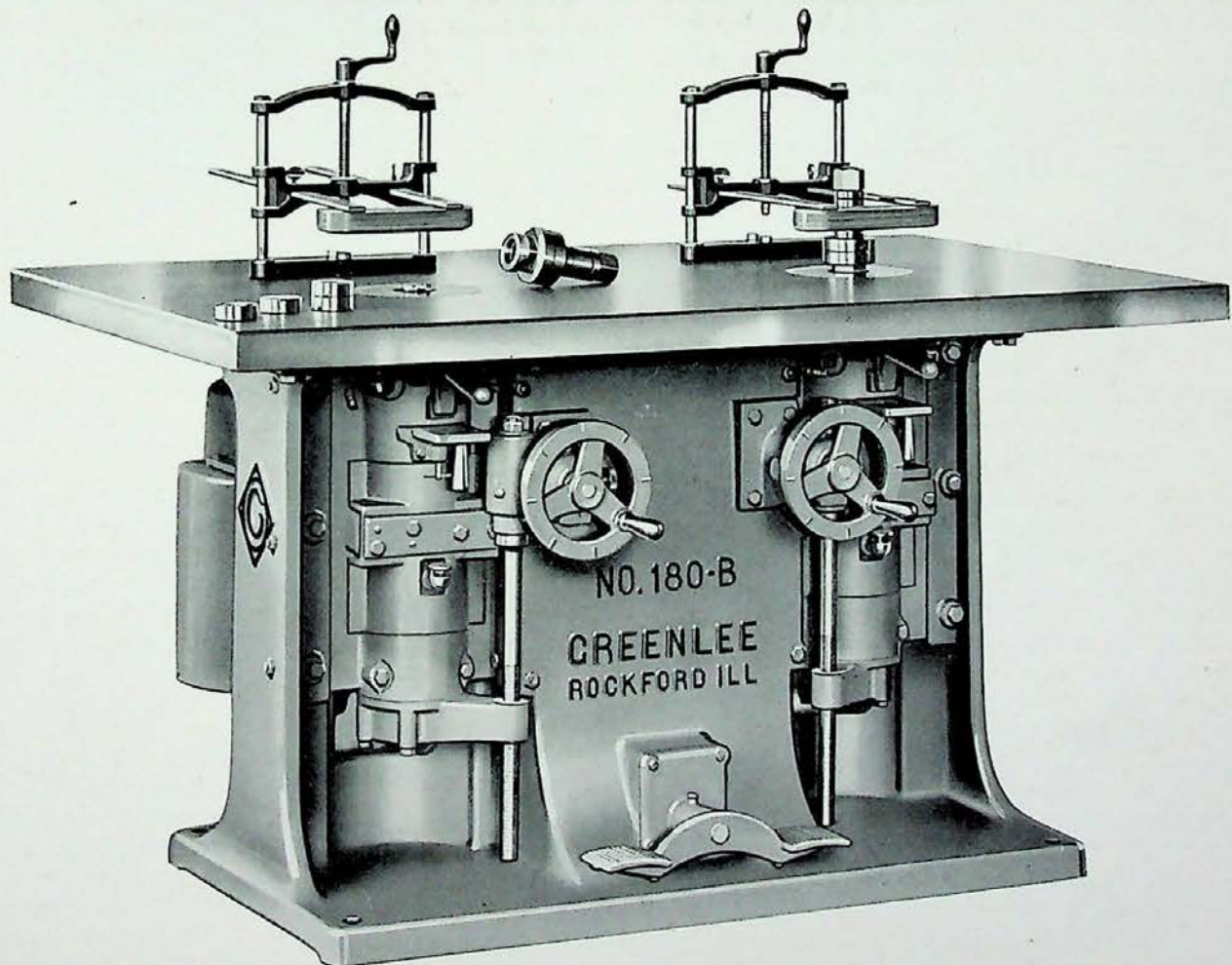
Standard 36-inch machine	
20-H. P. top head; 15-H. P. bottom head	BOLIP
25-H. P. top head; 15-H. P. bottom head	BOLOS
25-H. P. top head; 20-H. P. bottom head	BOLUT

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

HIGH-SPEED BELTED-MOTOR-DRIVEN SHAPERS



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

HIGH-SPEED BELTED-MOTOR-DRIVEN SHAPERS

THE unusual refinements of design and construction found in Greenlee Belted-Motor-Driven Shapers are an outgrowth of many years of experience gained in building fine woodworking machinery for many purposes. Supplementing this is the added experience gained in building Electric Shapers having motors built directly on the spindles.

The development of these machines was undertaken to meet the need of concerns who wish to avoid installing a separate frequency changer, as required for the full electric shaper. Each one is offered with a claim for merit based on correct design, accuracy of construction and improved details, which make for efficiency on the part of the operator.

The Greenlee Line — There are three different machines in the Greenlee line of Belted Shapers — one single-spindle machine and two having double spindles. This provides a suitable size and style for all usual classes of work encountered in the manufacture of furniture, musical instruments, novelties, etc. Since all of these machines are of the same basic design, it is desirable to include all under one mechanical description. Differences in size and details are noted throughout this circular.

The No. 165 Single-Spindle Shaper is a machine suitable for either light or medium-heavy work where a single spindle is sufficient. Where the amount of shaper work handled does not justify the buying of a double-spindle machine, but does require

both directions of spindle rotation, the No. 165 can be furnished with a reversible motor. The spindle top is then locked to the spindle, and a lock is also provided for the regular spindle nut.

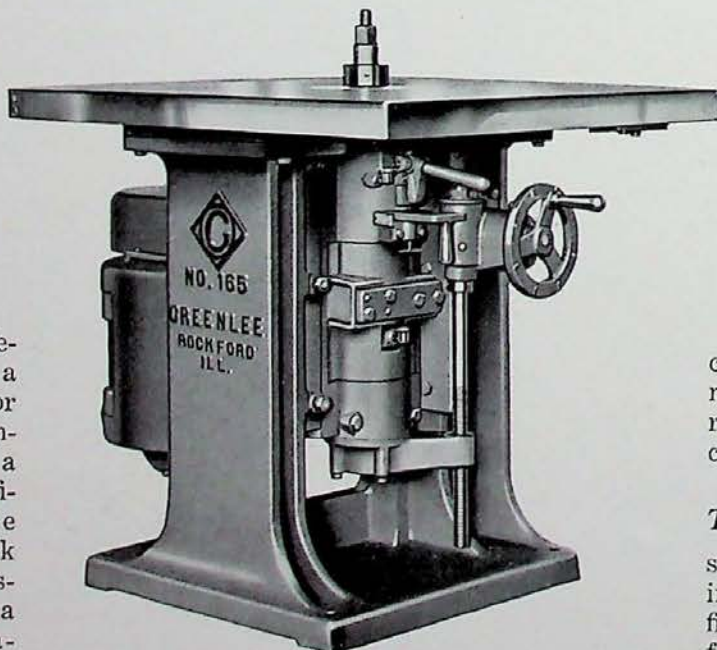
The No. 178-B is recommended when a double-spindle shaper is required for regular work on small parts. Its frame and table are smaller than the corresponding parts of the other double-spindle machine, and the spindle spacing makes it especially convenient for shaping small parts in any class of shop.

The No. 180-B Shaper is the most popular of the double-spindle machines. That is because its size and spindle spacing makes it an all-around shaper for light and medium-heavy work in most any shop.

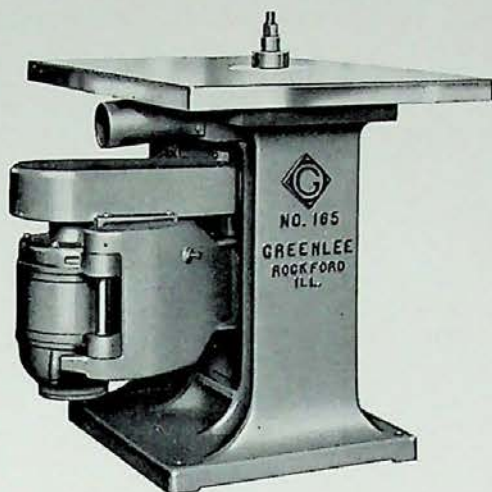
Frame The frame is a single-piece casting of heavily ribbed box construction, which rigidly supports the table, spindle carriages and attached motor mounting. It has a wide spread at the top and base, although sufficient foot room is allowed for convenient operation. On

the double-spindle machines, the center section is formed into a practically dust-proof compartment, which encloses the magnetic starters. Similar provisions are made for the single-spindle machine by a compartment at the rear of the right-hand frame column.

Table All tables are made from a special mixture of cast-iron to give a dense, fine-grained metal. All four edges are machined, and the upper



No. 165 Single-Spindle Shaper



Rear View of No. 165 Shaper

corners are rounded to prevent marring the stock. Care is taken to plane the four edges perfectly square to assist in making set-ups. Tables are unusually heavy and have a strong flange for bolting to the frame. At the outer edge is a wide, flat-bottom rib, which strengthens the table and provides for the convenient clamping of forms on the top surface. Deep ribs radiate from the flange to outer rib to stiffen the table and to eliminate any tendency toward warping. A cast-iron lower shaving exhaust hood is built in below the table for each spindle and has a 4-inch outlet.

Spindles All spindles are made of alloy steel and are scientifically heat treated to combine toughness with hardness. This fits them to withstand the shocks and stresses to which they are subjected and to maintain their original fine balance. The entire spindle assembly receives an exact running balance after the parts have been machined and fitted to very close limits. In the assembly, the bearings and detail parts are held against true shoulders, which eliminate any strain or springing of the spindle unit.

Bearings Specially selected, precision ball bearings are used in all Greenlee Shapers. They are mounted in a heavy body of cast-iron and fit perfectly in the spindle housings, which are ground to a master

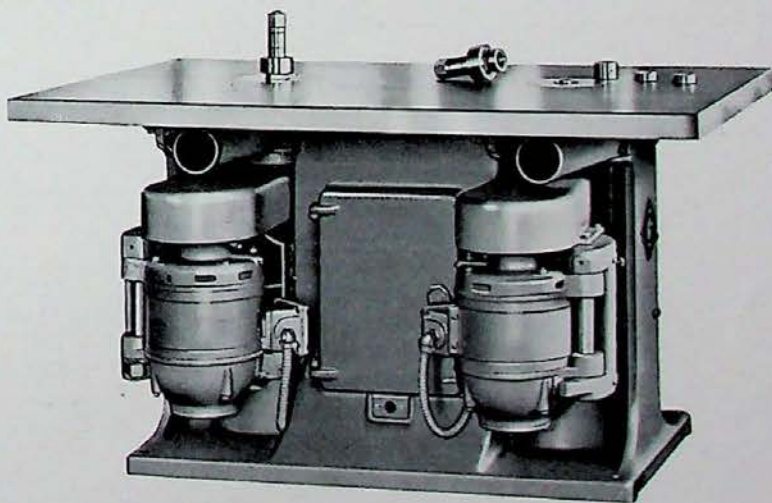
gauge. Replacement of bearings is, therefore, easily accomplished when necessary.

Lubrication These machines have been designed for extremely high spindle speeds and have oil-mist lubrication for the spindle bearings. Wick feed in conjunction with a self-contained oil well, insures a constant and uniform supply of oil reaching the bearings under all conditions. The motor bearings are provided with fittings for convenient lubrication by high-pressure grease gun.

Spindle Tops Spindle tops are detachable, self-centering, and interchangeable, being screwed to the upper end of the spindle. Tops $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ ", 1", $1\frac{1}{8}$ ", $1\frac{1}{4}$ ", $1\frac{3}{8}$ " or $1\frac{1}{2}$ " diameter with nuts and knife and filling collars are furnished as specified. Standard lengths are 6" and 9".

Spindle Mounting The dovetail adjustable gibs for the spindle carriage extend the full length of the carriage ways. Adjustment for height of spindle is through a screw, spiral gears and a convenient hand-wheel. The screw is fitted with a ball thrust bearing for easy operation, and the wheel is graduated for accurate setting. One revolution of the graduated handwheel raises or lowers the spindle $\frac{1}{16}$ ". The Greenlee design also permits change of endless belts without removing or disturbing the spindle.

Spindle Lock The Greenlee Spindle Lock spans the spindle close to the top and at its largest diameter. This prevents straining or springing the spindle when heads



Rear View of No. 180-B. The No. 178-B is similar, except for distance between spindles and a smaller table.

or knives are being clamped in position. When once applied, the spindle remains locked until released by the operator. A spring plunger holds the lock in the released position when not in use. Since the motor is fully protected by the overload relay, no harm can be done even if the starting button should be pressed while the lock is engaged.

Spindle Brake

In order to speed up knife changing and other spindle set-up, as well as to reduce the danger of accidents, Greenlee has developed a hand brake to quickly bring the fast moving spindles to a stop. The brake is built right on the spindle carriage with in easy reach of the operator. An oblong block of hard wood, shaped to fit the spindle, is forced against it by convenient hand lever. A spring releases the pressure when the hand is removed.

Hold-Downs, Guards, Etc.

Greenlee Shapers are furnished with various types of hold-down guards to meet the requirements of a great variety of shaping. These safety accessories make shaping more accurate and prevent accidents by covering up any portion of the knives that might be exposed more than necessary.

Motor Mounting

Each spindle is driven by a totally-enclosed, fan-cooled, ball-bearing motor, mounted at the rear on a hinged bracket attached directly to the spindle

carriage. In this arrangement the motor travels with the carriage in its vertical adjustment, eliminating the need for a long pulley on the spindle. This permits a minimum spacing between the top and lower spindle bearings and insures a smoother running spindle, because of the increased stiffness.

Controls

The magnetic starters are housed within the frame and are equipped with thermal protective relays. Motor control is by convenient push-button stations located under the table in front of each spindle. All wiring is in flexible conduit, and this is housed in a cored passage under the table for the push-button. On the double-spindle machine, a double foot pedal at the front of the base serves for cutting off the power to each spindle motor.

Drive

The automatic belt-tensioning device has ample range to compensate for two sizes of motor pulley without change in belt, when two spindle speeds are wanted. In their standard arrangement, the Nos. 165, 178-B and 180-B Shapers are equipped with a light, endless, flat canvass belt for each spindle. A 9000 R.P.M. spindle speed has been found generally applicable, but higher speeds are readily available. For speeds up to 7200 R.P.M., a three-strand V-belt drive can be furnished. A removable cast-iron guard, mounted on the motor bracket, protects the belt and pulleys from refuse.

Specifications

	No. 165	No. 178-B	No. 180-B
Number of spindles.....	1	2	2
Size of table.....	42"x 33"	54"x 35"	66"x 42"
Height of table.....	36"	36"	36"
Distance between spindle centers.....	36"	24 1/2"	30"
Spindle center to front edge of table.....	15"	15"	18"
Spindle center to ends of table.....	21"	14 3/4"	18"
Spindle carriage vertical adjustment.....	7"	7"	7"
Standard motor H. P.	5	5	5
Code with standard motors.....	CAFAK	CAGAL	CAHAM
Other motor sizes available.....	3 & 7 1/2	3 & 7 1/2	3 & 7 1/2
Net weight in pounds with standard motors.....	2200	3200	3700
Floor space with standard motors.....	42"x 42"	54"x 42"	66"x 45"
Base size on floor.....	28"x 26"	44"x 29"	50"x 30"

*The No. 165 Shaper can be furnished with 42"x 36" table, having spindle 18" from front edge.

STANDARD 60-DEGREE, 2-KNIFE COLLARS for each spindle are 3/4" thick and are furnished in 2 7/16" and 3 7/16" diameters.

FILL-UP COLLARS regularly 1/2", 1" and 1 1/2" thick

by 1 1/4" diameter for each spindle.

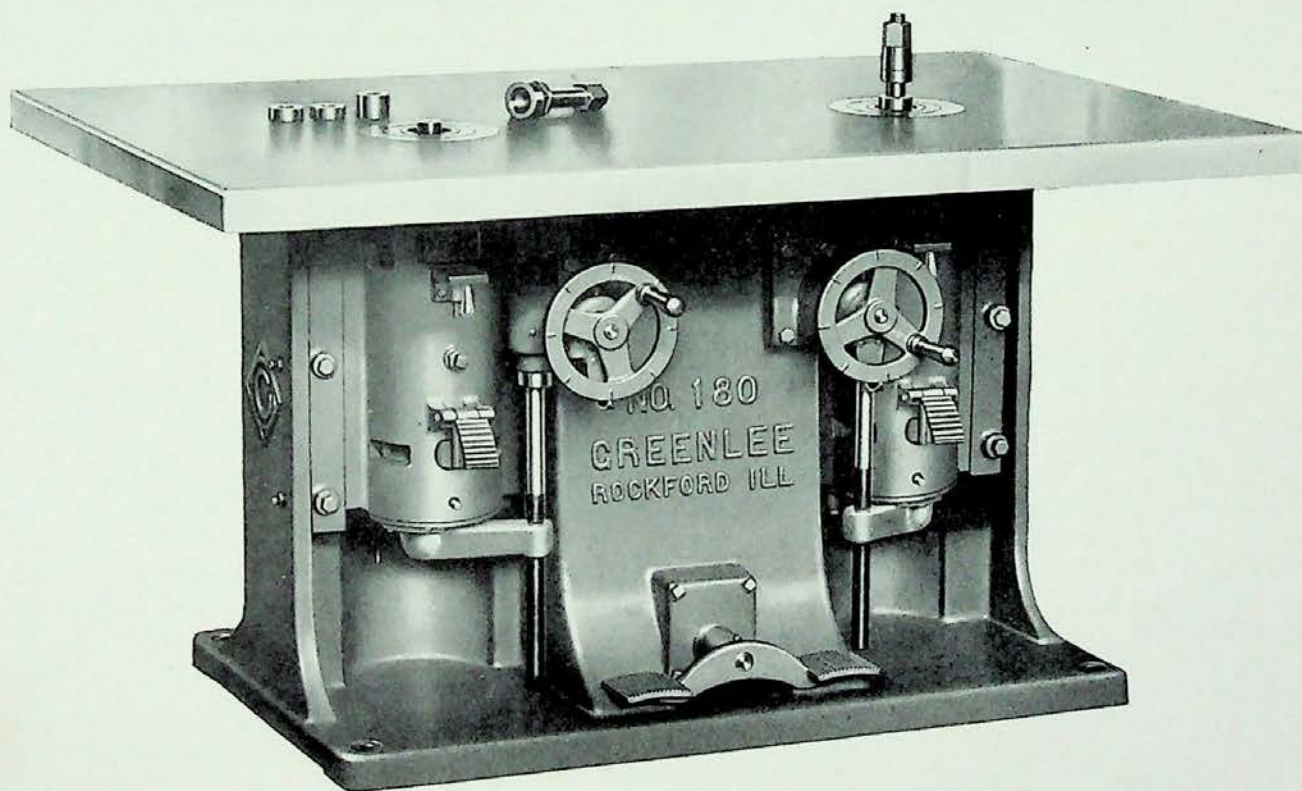
CONCENTRIC TABLE RINGS for each spindle consist of rings having 5 1/4", 3 1/4" and 2 1/4" openings.

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing

Greenlee

HIGH-SPEED ELECTRIC SHAPERS



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

HIGH-SPEED ELECTRIC SHAPERS

THE unusual refinements of design and construction found in Greenlee Electric Shapers are an outgrowth of many years of experience gained in building fine woodworking machinery for many purposes. Supplementing this is the added experience of building special precision metal-working machines for the automotive industry. The production of such a line demands capable designers, the latest and best in equipment, and a shop personnel that knows how to build to fine limits. It was under such conditions that the first Greenlee Electric Shaper was designed and built.

The development of Greenlee Shapers was undertaken with a full realization that superiority could be obtained through strict adherence to the most exacting standards of construction rather than by any attempt to depart far from standard practice in the general design. As a result each machine is offered with a claim for merit based on correct design, accuracy of construction, and improved details, which make for efficiency on the part of the operator. Greenlee Shapers, being full electric machines, have the motors on the spindles, which is a decided advantage in many respects. It provides a more efficient drive than by any other method, higher spindle speeds can be had, less floor space is required, and the machine can be placed in any position, since it need not conform to the established location of line shafting or motors. Not the least of the advantages, however, is the absolutely smooth running, which provides for a quantity of work not obtainable with any other method of drive.

These Shapers are known as heavy machines. Not heavy because of meaningless cast-iron, but because of having sufficiently heavy frames and details to make them perfectly rigid even when the high-speed spindles are called upon to handle maximum cuts. This feature in connection with the fine workmanship built into them and the use of the best materials for the purpose has established a reputation for Greenlee Shapers which is in keeping with the splendid results being had with them in all classes of plants.

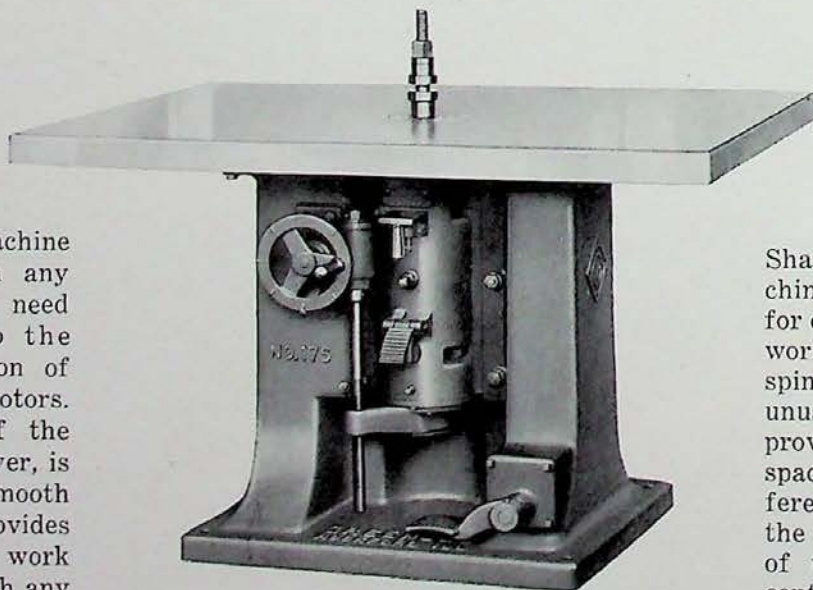
The Greenlee Line

There are four different machines in the Greenlee line of Electric Shapers—one single-spindle machine and three having double spindles. This provides a suitable size and style for all usual classes of work encountered in the manufacture of furniture, cabinets, musical instruments, novelties, automobile bodies, farm implements, interior trim, etc. Since all of these machines are of the same basic design and are constructed under the same high standards of workmanship, it is desirable from the standpoint of both customer and builder to include all under one mechanical description. Differences in size and details are

noted throughout this description and in the specifications on the last page of this bulletin.

The No. 175 Single-Spindle

Shaper is a heavy machine, but it is suitable for either light or heavy work where a single spindle is sufficient. Its unusually large table provides ample working space but does not interfere in any way with the convenient handling of the piece while in contact with the spindle knives.



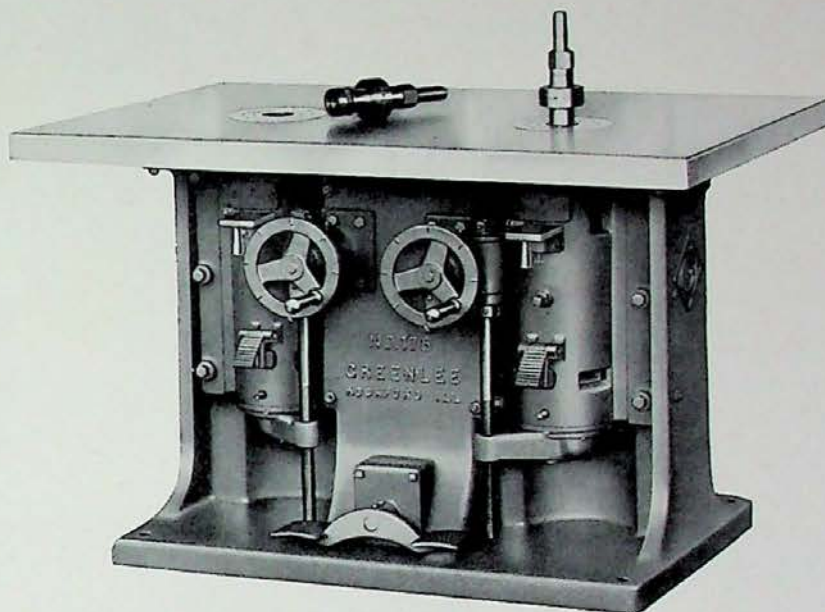
No. 175 Single-Spindle Shaper

In some woodworking plants where the amount of shaper work handled does not justify the buying of a double-spindle machine, but does require both directions of spindle rotation, the No. 175 can be furnished with a reversible motor. The spindle top is then locked to the spindle, and lock nuts securely hold the knife collars on this kind of work.

When a double-spindle shaper is required for regular work on small parts, the No. 178 is recommended. Its frame and table are smaller than those of the other two double-spindle machines, and the spindle spacing makes it especially convenient for shaping small parts in any class of shop.

The No. 180 Shaper is the most popular of the double-spindle machines. That is because its size and spindle spacing makes it an all-around shaper for light, medium and heavy work in any class of shop, with the exception of the extremely heavy shaping on parts in automobile body or similar plants where long heads are required. It is, however, used extensively in body plants for general-purpose shaping and is the type designated as a detail shaper by that industry.

The No. 182 Extra Heavy Shaper is best known in the automobile body industry because of its arrangement for handling large parts and because of its ability to take heavy cuts. It has the same spindle spacing as the No. 180, but the table is much longer, and larger motors are used. It is regularly equipped with overhead steady



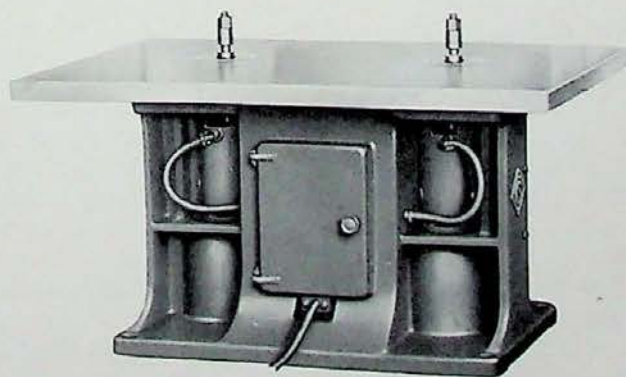
No. 178 Double-Spindle Shaper

bearings and spindle tops for slip-on cutter heads. Its extensive use in body plants places it next in importance to the No. 180 and makes it one of the outstanding machines of the industry. Some of the large plants have fifty or more of these shapers in operation.

Frame The frame is a single-piece casting of heavily ribbed box construction, which prevents vibration and rigidly supports the table and spindle housings. It has a wide spread at the top and base, although sufficient foot room is allowed for convenient operation. The center section is formed into a compartment which encloses the magnetic starters. Convenient access to them is provided by a door at the rear which closes against finished surfaces, making the compartment practically dust proof.

Table All tables are made from a special mixture of cast-iron to give a dense, fine-grained metal. Accuracy is insured by permitting them to season after a roughing cut is taken, and by finishing the machining process just before the shaper is assembled. All four edges are machined as carefully as the top of the table, and the upper corners are rounded to prevent marring the stock. Care is taken to plane the four edges perfectly square to assist in making set-ups.

Tables are unusually heavy and have a strong flange for bolting to the frame. At the outer



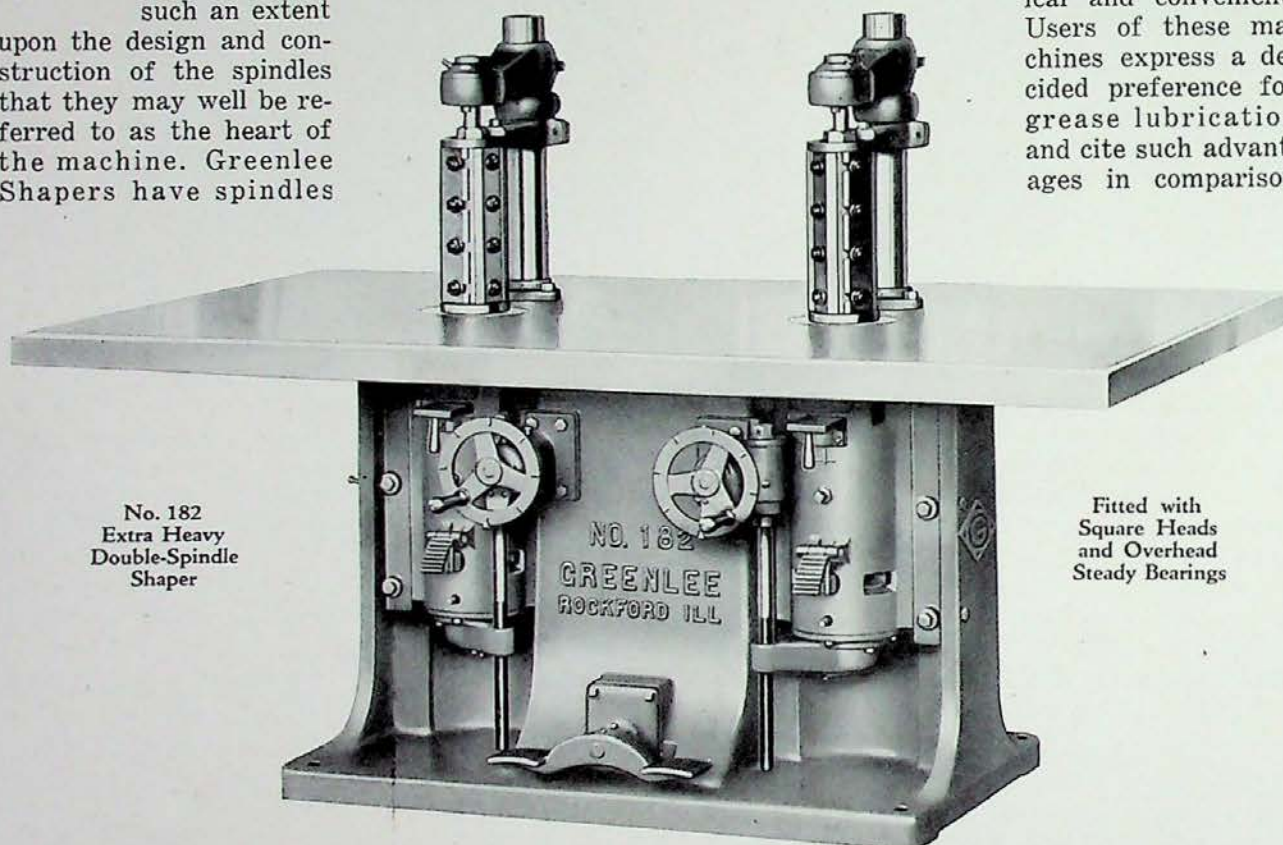
Rear View of No. 180 Showing Door to Starter Compartment and the Frame Construction common to all Greenlee Double-Spindle Machines.

edge is a wide, flat-bottom rib which strengthens the table and provides for the convenient clamping of forms on the top surface. Deep ribs radiate from the flange to outer rib to stiffen the table and to eliminate any tendency toward warping.

Spindles The success of a shaper depends to such an extent upon the design and construction of the spindles that they may well be referred to as the heart of the machine. Greenlee Shapers have spindles

in a heavy body of cast-iron and fit perfectly in the spindle housings, which are ground to a master gauge. Replacement of bearings is, therefore, easily accomplished when necessary.

Lubrication is by high-pressure grease gun, a method which has proven most efficient, economical and convenient. Users of these machines express a decided preference for grease lubrication and cite such advantages in comparison



which are designed to give the maximum in strength and rigidity, and they receive unusual attention from the selection of materials to the final run on the machine test floor.

All spindles are made of alloy steel and are scientifically heat treated to combine toughness with hardness. This fits them to withstand the shocks and stresses to which they are subjected and to maintain their original fine balance. The entire spindle assembly receives an exact running balance after the parts have been machined and fitted to very close limits. In the assembly, the bearing, rotor, and detail parts are held against true shoulders, which eliminate any strain or springing of the spindle unit.

Specially selected, precision ball bearings are used in all Greenlee Shapers. They are mounted

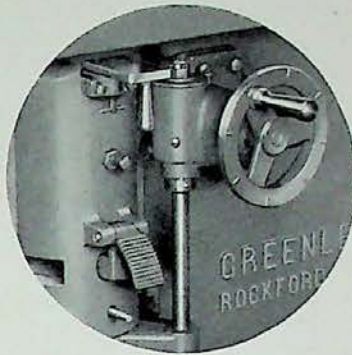
with other methods as fewer bearing renewals, less time to lubricate, lower cost, and cleaner machines due to no oil leakage. Fresh lubricant is continually being fed into the bearings, and the action is always certain.

Spindle Tops Spindle tops are detachable, self-centering, and interchangeable, being screwed to the upper end of the spindle. Various diameters up to 1½" can be furnished. Tops 1⅜" or 1¼" diameter in either 6 or 9 inch lengths with nuts and knife and filling collars are standard equipment on the Nos. 175, 178 and 180 machines. Spindle tops 1⅜" or 1½" diameter and in lengths for 6, 8, 10, 12 or 14" slip-on knife heads are standard for use with overhead steady bearings on the No. 182 Shapers. Knife and filling collars can also be furnished for this machine when required.

Ball-bearing overhead steady bearings and overhead steady bearing spindle locks are used on square heads from 6 to 14 inches long, and they can be furnished on any Greenlee Shaper. The overhead steady bearing is provided with a concentrically expanding device which expands the spindle within the bearing sleeve. This sleeve is fitted to the inner race of the ball-bearing and revolves with it. The device locks the revolving bearing sleeve with the spindle and holds both in absolute concentric relation with the ball-bearing. It is easily unlocked to slide off smoothly when the bearing is removed. This is an exclusive patented feature which makes possible a perfect alignment of the spindle and the ball bearing in the overhead steady bearing, at the same time permitting quick removal. In addition, it makes the removable overhead steady bearing as rigid as the lower fixed bearing.

Spindle Housing The spindle housings are tubular in shape, providing a very rigid support for the bearings. They are designed to fully protect the motor and to provide proper ventilation. Adjustment for height of spindle is through a screw, spiral gears and a convenient hand wheel. The screw is fitted with a ball thrust bearing for easy operation, and the wheel is graduated for accurate setting. One revolution of the hand wheel raises or lowers the spindle $\frac{1}{8}$ of an inch, and the wheel is graduated in sixty-fourths.

Knife Setting Gauge Another exclusive Greenlee feature is the knife setting gauge. As shown in the photograph, this gauge is used to accurately line up the knives of square slip-on heads so that they will be perfectly balanced and as near to cutting perfection as possible. The gauge is located from the lower rubbing ring and the knife edge is



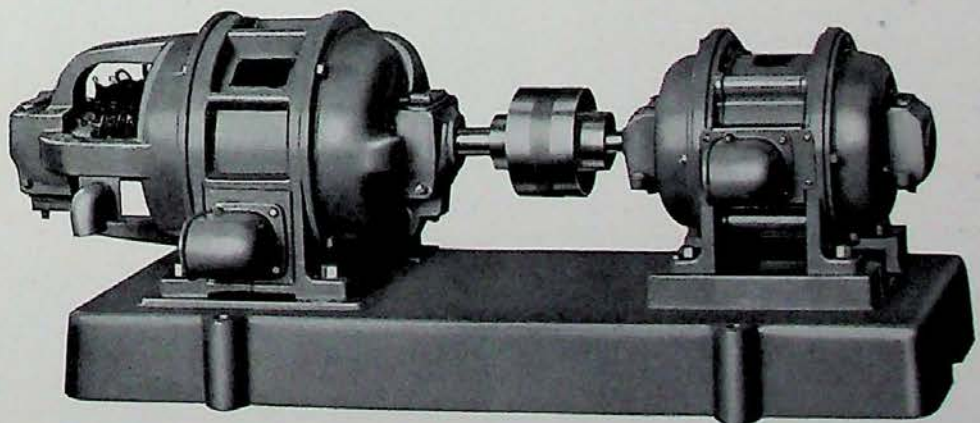
Showing Spindle Brake, Spindle Lock and Mechanism for Vertical Adjustment.

brought up and located to the gauge face, so that the same cutting circle results. When one knife is accurately set and locked the spindle is swung around by hand and the other knife is located against the gauge.

Spindle Lock The Greenlee Spindle Lock spans the spindle close to the top and at its largest diameter. This prevents straining or springing the spindle when heads or knives are being clamped in position. When

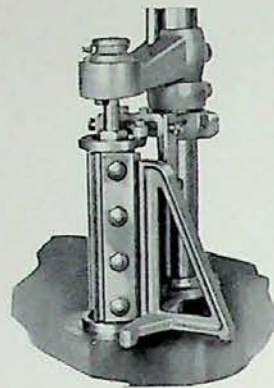
once applied, the spindle remains locked until released by the operator. This prevents the possibility of an accident by starting the spindle before the knife set-up is completed. A spring plunger holds the lock in the released position when not in use. Should the starting button be pressed while the lock is engaged, nothing would happen except the throwing out of switch relay.

Spindle Brake In order to speed up knife changing and other spindle set-up, as well as to reduce the danger of accidents, Greenlee has developed a brake to bring the fast moving spindles to a stop within a relatively short space of time. The brake is built right on the spindle housing within easy reach of the operator's foot. Since spindles turning at 7200 R.P.M. require several minutes to run down when the current is shut off, operators usually stop them by pushing a piece of stock against the spindle, running the risk of injuring the fingers and hands. This cause of many accidents is now eliminated. Tests



Direct Connected Frequency Changer Set

have shown that a spindle equipped with even a 14-inch square head can be stopped in a few seconds with but moderate pressure exerted on the brake. Spindles equipped with small cutters can be stopped almost instantly. The construction of the brake is simple. An oblong block of hard wood, shaped to fit the spindle, is forced against it by stepping on a foot treadle. A spring releases the pressure when the foot is removed. This brake saves a great deal of time on machines where frequent set-up changes are made.



Knife Setting Gauge for Square Heads

spindle for starting, and by foot treadle at the base for stopping. The starters are equipped with overload relays and are housed within the frame. Convenient access to them is had through a door in the rear of the frame. All wiring is in flexible conduit and this is housed in a cored passage under the table for the push button.

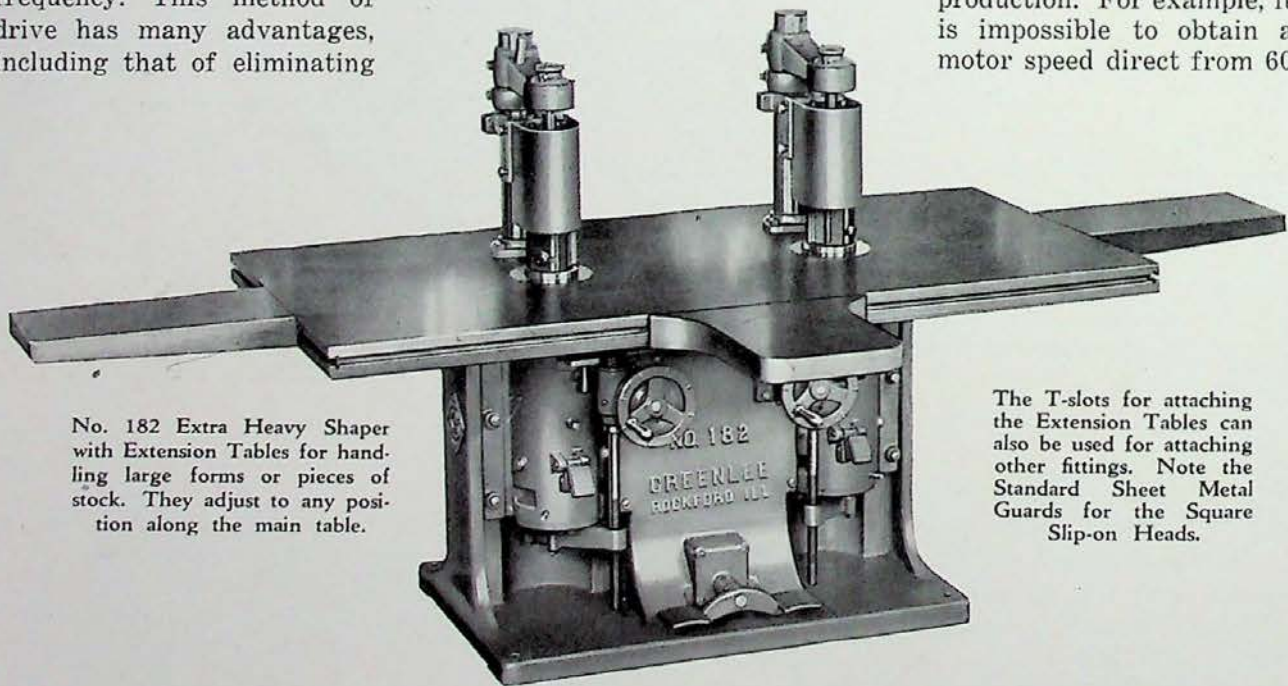
Frequency Changer Sets

Frequency changers, to step up the frequency of the electric current, are supplied with Greenlee Shapers on special order.

Electrical Equipment The motors are mounted directly on the spindles and are fully protected by their housings. They can be furnished in different sizes for operating at 7200 R.P.M. with 120 cycle current from a frequency changer or generator, but other speeds can be had by varying the frequency. This method of drive has many advantages, including that of eliminating

The unit is compact, the motor and frequency changer being bolted to a cast base, and the entire assembly is arranged to take up but a very small amount of floor space.

Frequency changers are required for these machines to provide the high speed necessary for smooth cutting, and large production. For example, it is impossible to obtain a motor speed direct from 60



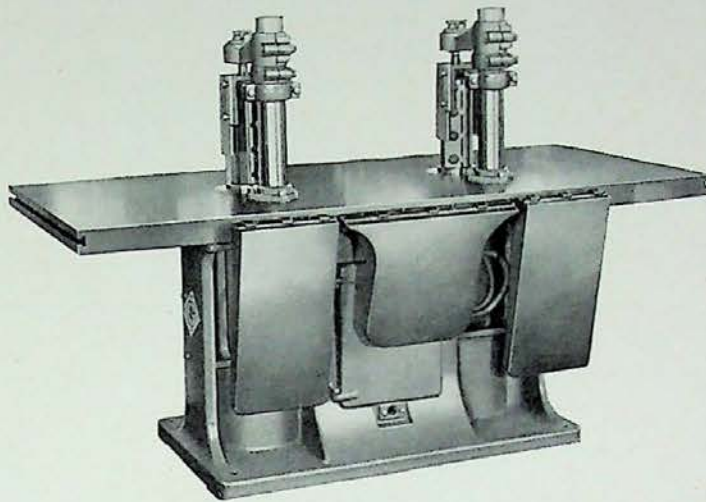
No. 182 Extra Heavy Shaper with Extension Tables for handling large forms or pieces of stock. They adjust to any position along the main table.

The T-slots for attaching the Extension Tables can also be used for attaching other fittings. Note the Standard Sheet Metal Guards for the Square Slip-on Heads.

all belts along with their usual troubles and cost of upkeep. In addition, there is the advantage of the floor space saved and the greatly improved quality of work obtained.

The motor control is by convenient push-button stations located under the table in front of each

cycle power line of more than 3600 R.P.M. Since shapers produce their best work at high speed, such as 7200 R.P.M., frequency changers are used to step up the speed. The majority of frequency changers furnished are direct motor driven, but belted drive can be furnished.



Rear View of No. 182 showing Extension Tables hung up when not in use.

Extension Tables To facilitate the accurate and safe handling of large holding forms and pieces of stock, Greenlee has developed auxiliary tables for the Nos. 180 and 182 Shapers to increase the main table size at the desired points. For this purpose the main table is machined with Tee slots on the front and two end edges. A machined tongue on the extension table accurately fits this slot, and heavy Tee bolts rigidly clamp it in position. This arrangement permits moving the extension table to any position along the main table for supporting various shapes and sizes of stock. As shown in the photograph, the extensions, when not in use, are detached and hung up on hooks on the rear of the shaper, saving considerable floor space around the sides and ends of the machine.

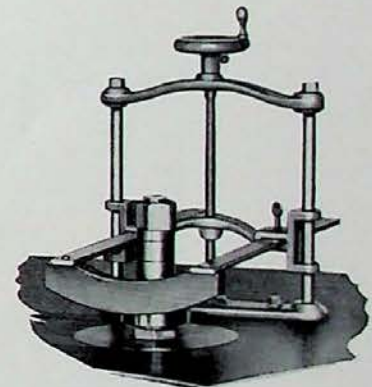
These extensions are made from the same high grade material and are machined to give the

same close finish as the main tables. In addition, they are fitted closely and accurately so that their surfaces are always in exactly the same plane as that of the main table.

In using large holding forms for stock, as in automobile body plants, etc., it is found that the Greenlee table extensions speed up production and reduce accidents. The danger of catching a large form on the table end and throwing it against the knives at the wrong angle, causing serious injury to the operator, is done away with by the use of these tables. The work slides smoothly over the table and extensions with little effort and no loss of time.

Adjustable Extension Stock Rest Another improvement recently developed by Greenlee is the adjustable extension stock rest. This is used when

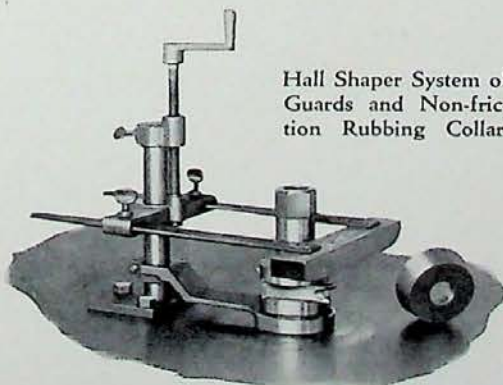
large pieces of angular or bowed stock are being shaped, such as roof rails for automobile bodies, grand piano side frames, etc. The extension stock rest is adjustable so that differences in the curve of various pieces of stock can be taken care of. It is fastened beneath the permanent table and is rigidly held in position when locked. When not in use it fits under the table, like the drawer of a desk, where it is out of the way.



Connell & Dengler Variety Shaper Hold-Down Guard

This improvement has greatly increased the efficiency of shaping angular, curved or bowed stock. Greater accuracy when the stock is placed against the cutter heads results because the same position is maintained at all times. Less strain is thrown on the operator than formerly, the rest supporting the stock and relieving him of unnecessary physical effort.

Hold-Downs, Guards, Etc. Greenlee Shapers are furnished with various types of hold-downs, guards, and rubbing rings to meet the requirements of a great variety of shaping, samples of which are shown in the



Hall Shaper System of Guards and Non-friction Rubbing Collar.

photographs. These safety accessories make shaping more accurate and prevent accidents by covering up any portion of the knives that might be exposed more than necessary.

The guards used on square-head cutters are

quickly adjusted to take care of changes in the work to be shaped. They are of heavy sheet metal and are attached to a bar on the steady bearing support. Vertical adjustment is provided for various thicknesses of stock.

Specifications

	No. 175	No. 178	No. 180	No. 182
Number of Spindles.....	1	2	2	2
Size of table.....	56"x 40"	54"x 35"	66"x 42"	84"x 39"
Height of table.....	36"	36"	36"	36"
Distance between spindle centers.....		24½"	30"	30"
Spindle center to front edge of table.....	18"	15"	18"	18"
Spindle center to ends of table.....	28"	14¾"	18"	27"
Standard motor H.P.	4	4	4	7½
Other motor sizes available.....	2, 7½	2, 7½	2, 7½	4, 12½, 18
Net weight in pounds with standard motors.....	2100	2500	3000	3300
Weight in pounds boxed for export.....	2600	2950	3675	4025
Measure in cu. ft. boxed for export.....	72	60	92	108
Code with standard motors.....	VUPIV	BYHUL	BYJIK	BYLOM
Code to be added for 2 H.P. motors.....	BYLAG	BYLAG	BYLAG	
Code to be added for 7½ H.P. motors.....	BYJYN	BYJYN	BYJYN	
Code with 12½ H.P. motors (182 only).....				BYLUN
Code with 18 H.P. motors (182 only).....				BYLYP

Knife and filling collars regularly furnished for each spindle of the Nos. 175, 178, and 180 Shapers consist of two pairs of ¾" thick knife collars, slotted for two knives, and one each ½, 1, and 1½" thick filling collars. These vary in diameter according to the diameter of the detachable tops, and they can be furnished in other

standard and special sizes when required. Collars can also be furnished for the No. 182 Shaper when specified.

End Extension Tables for the Nos. 180 and 182 Shapers are 24" long and 12" wide. Front Extension Tables are 18" long, 22" wide where they are attached, and 14" wide at the outer end.

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

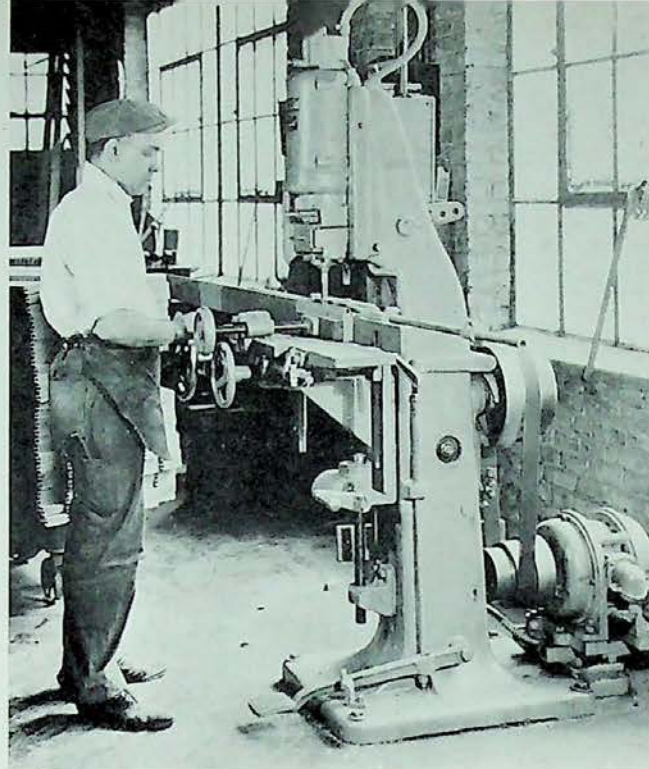
MORTISERS

In 1876 the first successful hollow chisel mortiser was exhibited at the Philadelphia Centennial by the two Greenlee Brothers, founders of the Company that bears their name. Because of its unique character and easily recognized capacity for improving mortising operations in all classes of woodworking, it proved to be one of the most interesting mechanical exhibits in the way of attracting public attention.

The instant success of the hollow chisel type of mortiser marked the real starting point in the machinery manufacturing career of its developers. Since then Greenlee Bros. & Co. have built many types of these machines for many purposes, and the many hundreds in daily use stand as proof that they are built to a high standard of design and construction.

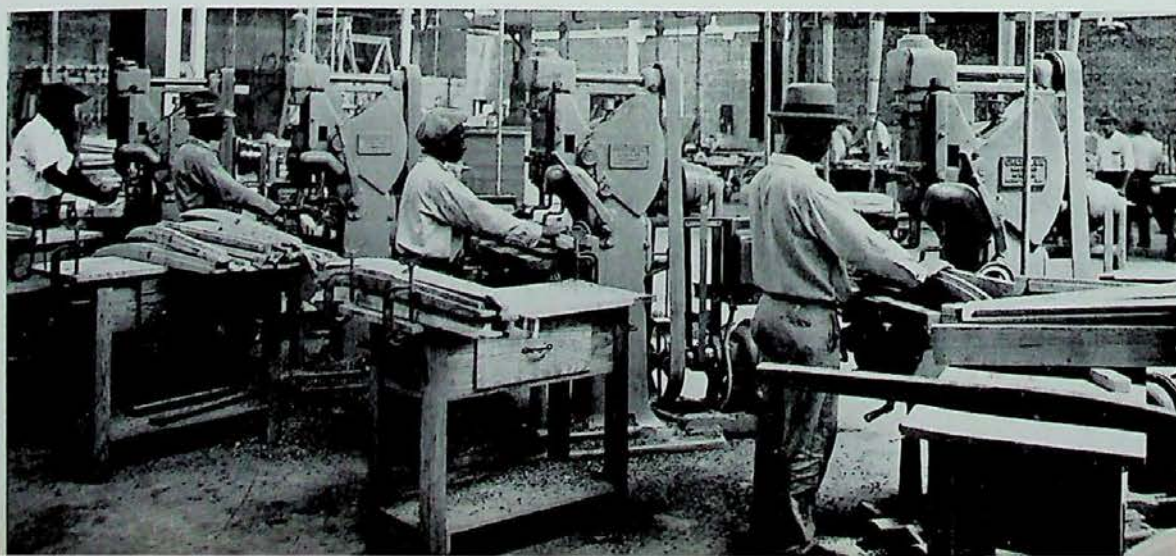
Today, there are in the Greenlee line sixteen different mortisers, ranging from light foot-feed types to the heavy timber machines for car shops and providing a size and style for every practical mortising requirement, including gang machines with from three to six heads. No attempt has been made to show all of them here, since the purpose of the catalog section following this page is to show the most popular types for use in the manufacture of furniture, automobile bodies, sash, doors and similar products. Included in this list is the No. 251 Hinge or Trim Mortiser.

If you do not find the mortiser in this catalog that you are looking for, write to us, specifying your requirements. And if you have a mortising problem of any kind, we invite you to lay it before us. Our many years of experience in the manufacture of both the machines and their tools places us in a position to be of real help.



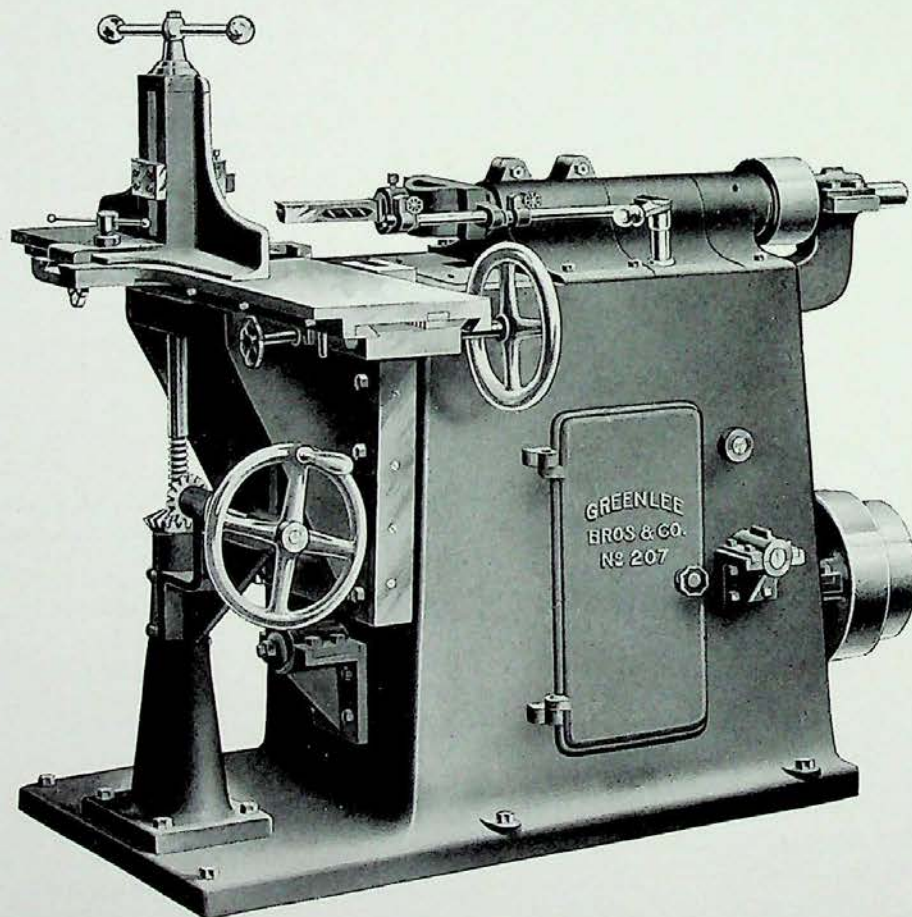
A Greenlee No. 227-BM Mortiser in a Furniture Plant

Four of Twelve Greenlee No. 228 Mortisers in a large Manufacturing Plant in the South



Greenlee

No. 207 HORIZONTAL HOLLOW CHISEL MORTISER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

No. 207 HORIZONTAL HOLLOW CHISEL MORTISER

FOR many years after we perfected the hollow-chisel type of mortiser, all such machines were built in the horizontal pattern. Of late years, however, most small and medium range mortisers have been of the vertical type, since they are considered more convenient for general purpose work. For certain classes of medium heavy mortising, some manufacturers have standardized on horizontal machines, and, therefore, we offer our No. 207, which is an improved pattern of our former No. 5.

The application of this mortiser is very general. Many have been installed for use in the manufacture of wagons, agricultural implements, furniture, automobile bodies, etc. Convenient adjustments and control provide high efficiency and fit it for any class of work within its range. The general design embodies a box form of main frame, which fully encloses the feeding mechanism and provides a rigid support for the table and the reciprocating chisel carriage.

Table The table is rigidly supported by a knee piece mounted on gibbed ways at the front of the frame. A convenient hand wheel, operating through bevel gears, provides vertical adjustment from 29½ to 36½ inches above the floor. It lowers to 6½ inches below the center line of the chisel socket and has rack and pinion lengthwise movement of 12 inches to adjustable stops. The quick-acting screw clamp will handle material up to 9½ inches in thickness.

There are two styles of tables that can be furnished. The No. 207-C Mortiser has an extra wide table fitted with a swivel fence adjusting to 16 inches from the front edge, while the table of the No. 207 Mortiser has a straight fence adjusting to 10 inches from the front.

Feed The feed mechanism consists of slow-running, external band frictions operating through chain-connected drums to a rack

and pinion to produce the reciprocating motion. It is driven by a cone pulley to provide a change of feeding speed.

Control The feed control is simple and convenient. The chisel carriage reciprocates automatically with a rapid return, but can be reversed, stopped or started from any point in its stroke by means of the operating lever. The length and position of the stroke is regulated by adjustable stops.

Drive When belt driven, this mortiser is furnished with a separate countershaft for overhead location or for mounting on or beneath the floor. It has 10 x 5½-inch tight and loose pulleys, which should run about 850 R.P.M.

Motor drive is arranged by furnishing a short floor shaft with a driving pulley and cone suited to a motor of any speed up to 1500 R.P.M. This shaft is fitted with a support and a coupling, and it replaces the regular countershaft.

Range The range of this mortiser is for operating chisels from 5/16 to 1¼-inch, although larger sizes can be used under favorable conditions. The stroke is adjustable up to 6 inches, which permits mortising to maximum depths of from 5 to 5½ inches with 6½-inch blade chisels.

Equipment The equipment includes one each 3/8 x 4-inch and 1/2, 5/8, 3/4 and 1 x 6½-inch blade hollow chisels and bits, a set of chisel and bit bushings, wrenches, and the proper shaft for either method of drive.

Weights and Codes

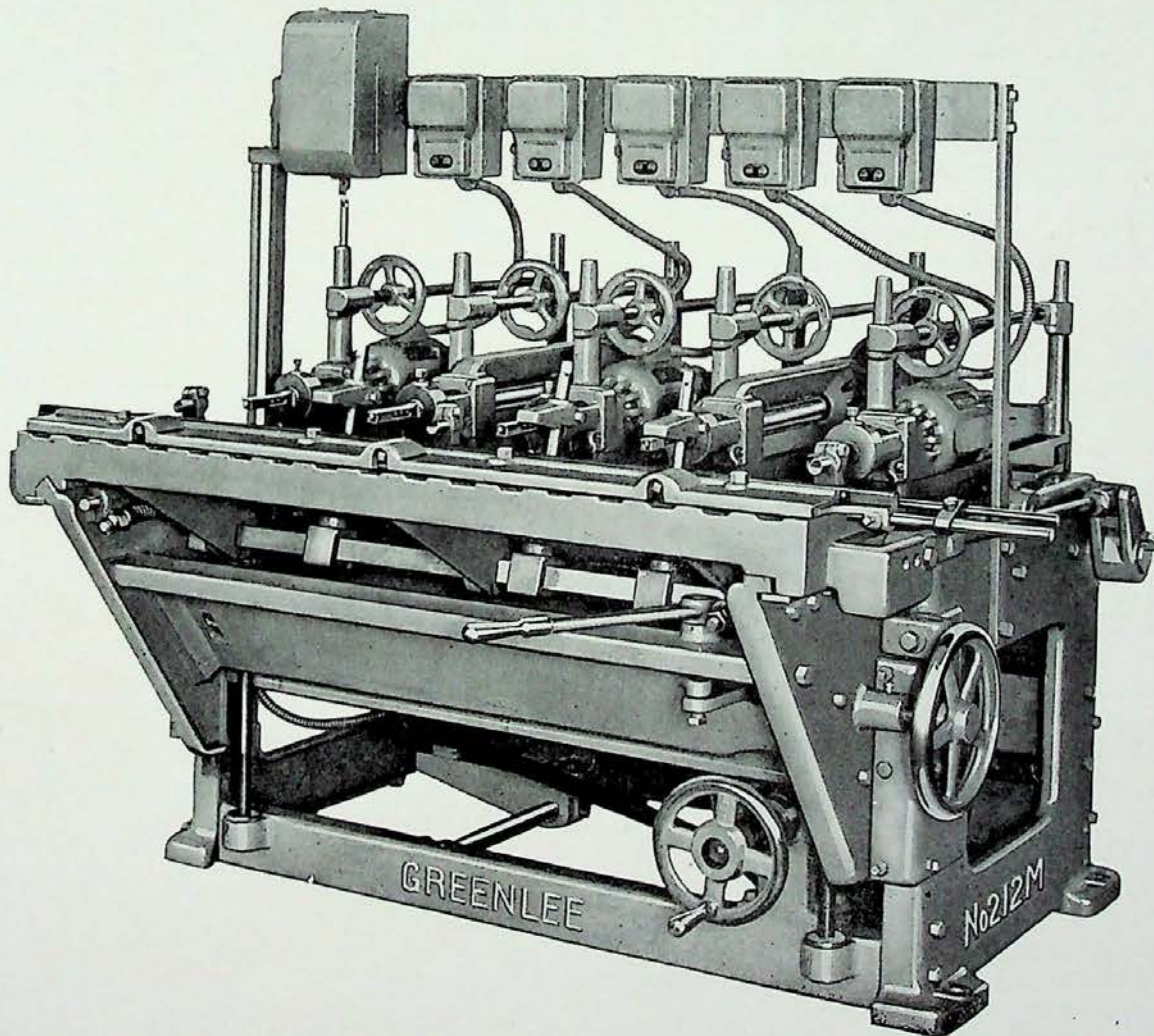
Net weights in pounds:	
No. 207 Mortiser.....	2300
No. 207-C Mortiser.....	2375
Weights boxed for export:	
No. 207 Mortiser.....	2700
No. 207-C Mortiser.....	2775
Box measure in cu. ft.:	
No. 207 Mortiser.....	90
No. 207-C Mortiser.....	90
No. 207 Mortiser with standard table and straight fence.....	CALAR
No. 207-C Mortiser with special wide table and swivel fence.....	CALES

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

No. 212 TYPES OF MULTIPLE-SPINDLE MORTISERS



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

No. 212 TYPES OF MULTIPLE-SPINDLE MORTISERS

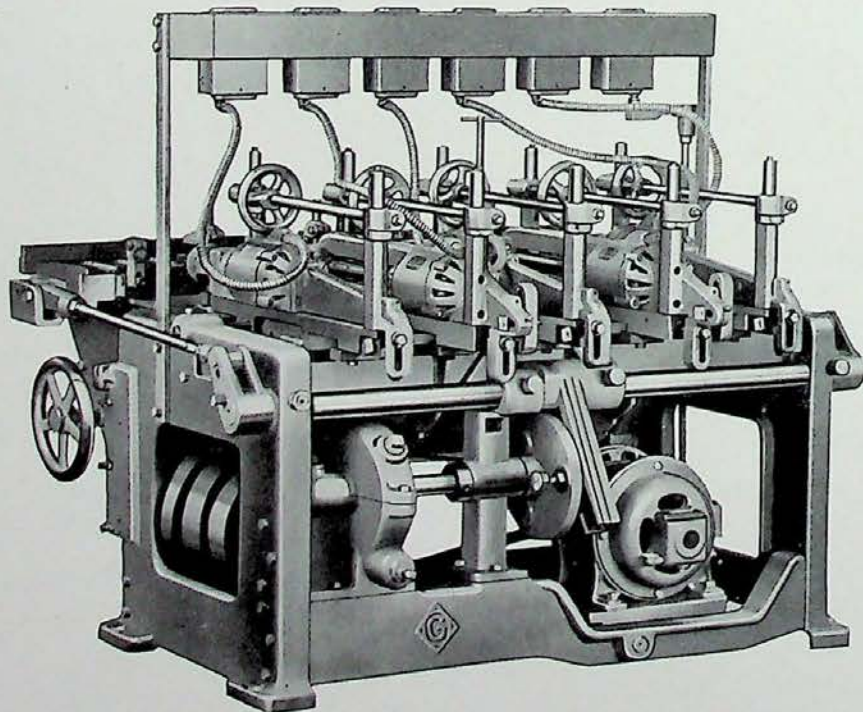
EVERY progressive manufacturer of wood products is deeply interested in the lowering of production costs. One of the most effective ways of doing this in many plants is by employing multiple-spindle machines for mortising work. It is the logical way of making parts in quantity where several mortises are to be made within a reasonable distance of each other. Not only does it increase production, but it provides for greater accuracy in machining.

The advantages of gang mortising are readily apparent when it is considered that, as a rule, all mortises in a part can be made at one handling and usually at one mortising stroke. The increase in production is enormous. In figuring the time that can be saved by the installation of one of these machines, it is not enough to take into consideration only the saving in the mortising operation itself, even if that does amount to several hundred per cent. An important saving that must not be overlooked is the one resulting from the accurate duplication of parts, which reduces the time required for making the assembly.

The first Greenlee Multiple-Spindle Mortiser was built more than thirty-five years ago, but at that time there was no demand for such a machine, except in special cases. Today, hundreds of woodworkers are using these Greenlee machines in the manufacture of furniture, sash, French doors, implement frames or any other products where two or more mortises are made in the same face of a part and within a reasonable distance of each other.

The use of hollow chisels makes multiple work practical. They alone can produce square or oblong mortises, form recesses and cut open slots or gains. No lay-out is necessary, and yet the machine works absolutely accurate in size and spacing. This means time saving in mortising and in assembling, owing to the perfect duplication of parts.

The two mortisers described in this bulletin are of the same general design and have about the same range and capacity. They differ, however, in the method of drive. The No. 212-M is an electric machine with a motor on the spindle of each mortising head, while the No. 212 has belt-driven spindles. The electric machine is always recommended where proper alternating current is available, because of its lower power consumption and greater all-around efficiency.



Rear view of No. 212-M Electric Multiple-Spindle Mortiser showing feed mechanism and its motor. A front view is shown on the preceding page.

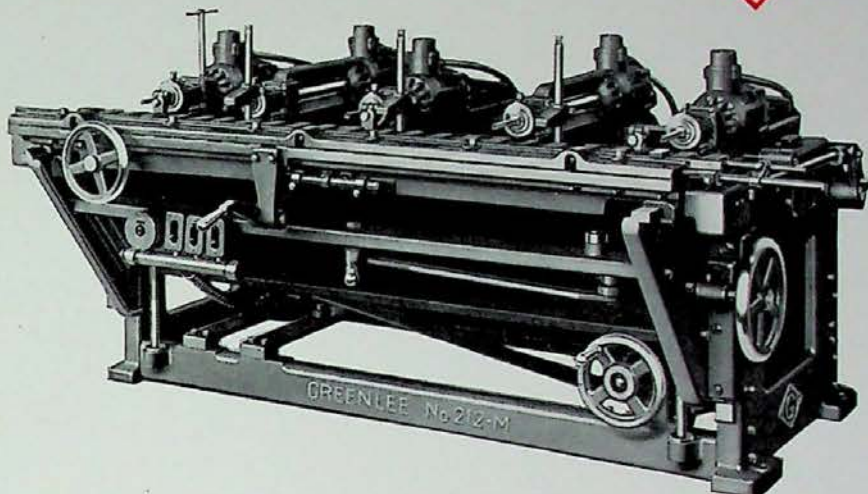
An automatic end-boring attachment for boring caster holes in table legs, while they are being mortised, can be added to either machine. It is regularly motor driven by a 3600-R.P.M. motor.

Frame The frames of these machines are powerfully built to withstand the strains of mortising and to operate at high speed without vibration. They consist of two heavy end castings tied together by channel-type girts which support the mortising heads and power feed mechanism.

The joints between the girts and end frames are scraped and doweled to insure perfect alignment. The spindle-head rail is an unusually heavy casting with large rectangular ways and heavy cross ribbing to prevent distortion under heavy loads. The channel shaped ways which guide the table knees are adequately proportioned to properly support the table and are a part of the end frames. Adjustable gibs are provided for take-up in two directions. The ways have a heavy toe-clamp at the upper end for locking the knees rigidly against the frame. These knees are supported on cross-connected screws having self-aligning bronze nuts. Knees are connected by heavy L-shaped girts.

Tables The table regularly furnished is the plain type without endwise movement. When long mortises are to be made, however, a compound table can be substituted, which has 6-inch endwise movement by a convenient hand-wheel. Both types are of cast-iron and are heavily ribbed and well proportioned. They are securely gibbed to the table knees and have a V-way at one end for perfect guidance during the mortising stroke. Front and end stops are provided, also an adjustable back fence.

An automatic clamp is regularly furnished with the plain table, but can be omitted when not required. It grips the stock during the mortising stroke and until the chisels are withdrawn, but releases the stock in time for it to be replaced or to be moved endwise when making long mortises. A hand clamp is regular equipment on the compound table, since the stock remains clamped in making long mortises.



A 72-inch No. 212-M with Compound Table. Now regularly built with starters mounted above, as shown in the preceding illustrations.

Feed The power-feed mechanism is driven from a motor mounted inside the frame on the No. 212-M, and from the attached countershaft on the No. 212. In each case three-step cone pulleys provide three speeds. The feed operates through a disc clutch, a worm gear drive, a crank disc, a pitman mounted on a heavy rocker shaft, and a connecting link to each end of the table. This construction insures an even table movement and mortises of accurate depth. Three lengths of table strokes are provided and there are three stroke positions to permit working various widths of stock at the front edge of the table. The control is by a convenient hand lever just beneath the table, which operates the multiple disc clutch and provides for instant starting and stopping of the feed.

Mortising Heads Mortising heads of both types have rack and pinion adjustment along the rail to which they are gibbed, and they also have vertical adjustment for staggered mortises and endwise adjustment for equalizing chisel lengths, or to make mortises of different depths. The vertical adjustment of each head on the electric machine is by handwheel, operating through connected screws.

The bit spindles on the electric machine run in ball bearings and carry the rotors of the built-in motors. This eliminates the long spindle belt of the belted machine and lowers the required power as well as the cost of maintenance. On each type, adjustable thrust bit bushings are furnished, and the chisel socket is a part of the spindle housing to maintain perfect alignment of the mortising tools at all times.

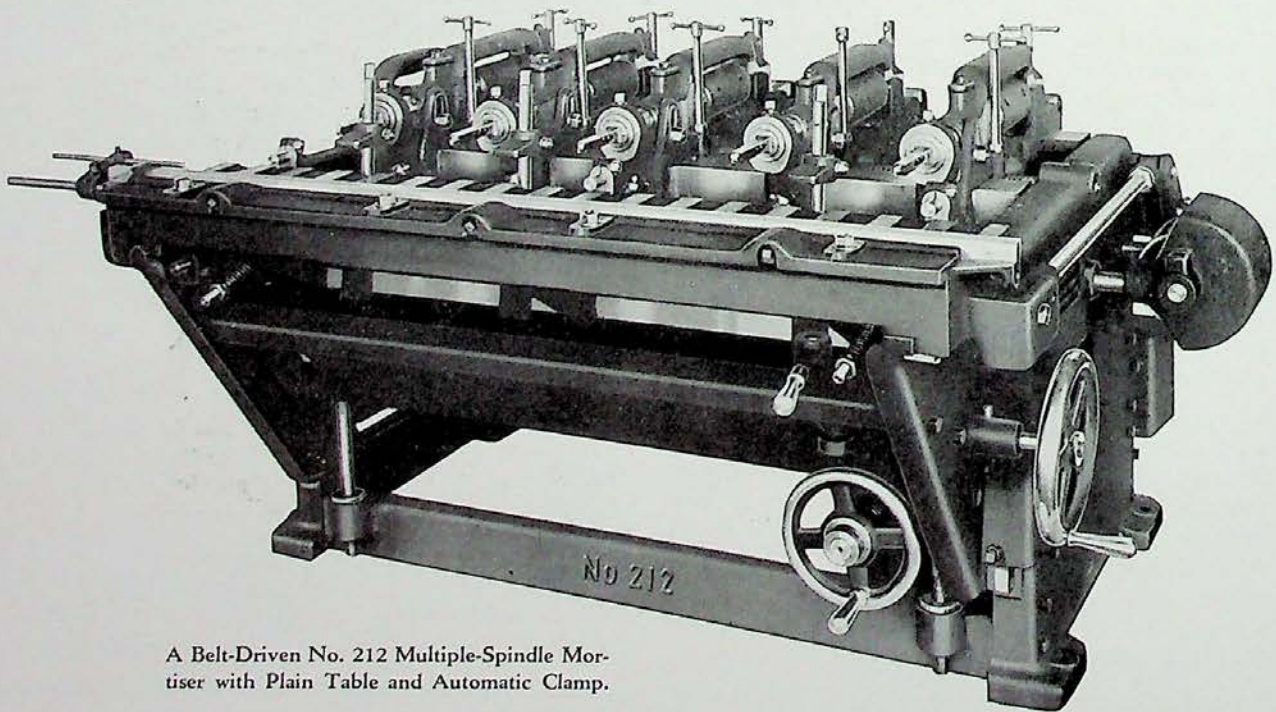
Motors and Control

Built-in motors on the Electric Mortiser are regularly furnished for 220 or 440 volt, 2 or 3 phase, 60 cycle current, and the size can be varied to suit special conditions. Push button start and stop stations provide convenient control for each motor, so that any head can stand idle when not required. A master push button station is provided for stopping all motors at once. The starters have relays for overload and under-voltage protection, eliminating all fuses, and all wiring is in conduit.

Specifications

Chisel Capacity.....	1"
(A $\frac{3}{4}$ " or $\frac{7}{8}$ " is the maximum in extremely hard woods.)	
Maximum chisel centers.....	50" and 72"
Minimum chisel centers.....	4"
Maximum width of stock.....	8"
Table strokes per minute.....	7, 14 and 21
Lengths of table stroke.....	4", 5" and 6"
Lengthwise travel of compound table.....	6"
Endwise adjustment of spindle heads:	
No. 212-M Electric Machine.....	1½"
No. 212 Belted Machine.....	2"

Vertical adjustment of spindle heads:	
No. 212-M Electric Machine.....	2½"
No. 212 Belted Machine.....	1½"
Standard Spindle Motors on	
No. 212-M.....	1½-H.P., 3600 R.P.M.
Spindle motors on Special-Range	
No. 212-M.....	4-H.P., 3600 R.P.M.
Tight and loose pulleys on No. 212.....	12"x 6½"
Countershaft speed on No. 212.....	750 R.P.M.
Net weights in pounds of 50-inch, 5-head machines:	
No. 212-M Electric Mortiser.....	4550
No. 212 Belted Mortiser.....	4600
Weights boxed for export of 50-inch, 5-head machines:	
No. 212-M Electric Mortiser.....	5050
No. 212 Belted Mortiser.....	5100
Measure in cu. ft. boxed for export.....	155
Additional weight for 72-inch machines.....	700
Floor space of 50-inch machines:	
No. 212-M Electric Mortiser.....	5'-8"x 5'-3"
No. 212 Belted Mortiser.....	6'-0"x 6'-9"
Codes for No. 212-M Electric Mortiser:	
3-head, 50 inch machine.....	CEHEM
4-head, 50-inch machine.....	CEHIN
5-head, 50-inch machine.....	CEHAL
6-head, 50-inch machine.....	CEHOP
Add for special-range, 4-H.P. heads.....	CEHYS
Add for 72-inch range.....	CEJAM
Compound Table for 50-inch machine.....	CEJIP
Compound Table for 72-inch machine.....	CEJOR
Codes for No. 212 Belted Mortiser:	
3-head, 50-inch machine.....	CALYZ
4-head, 50-inch machine.....	CEDEG
5-head, 50-inch machine.....	CALUX
6-head, 50-inch machine.....	CEDIK
Add for 72-inch range.....	CEDYN
Compound Table for 50-inch machine.....	CEFAG
Compound Table for 72-inch machine.....	CEFEK



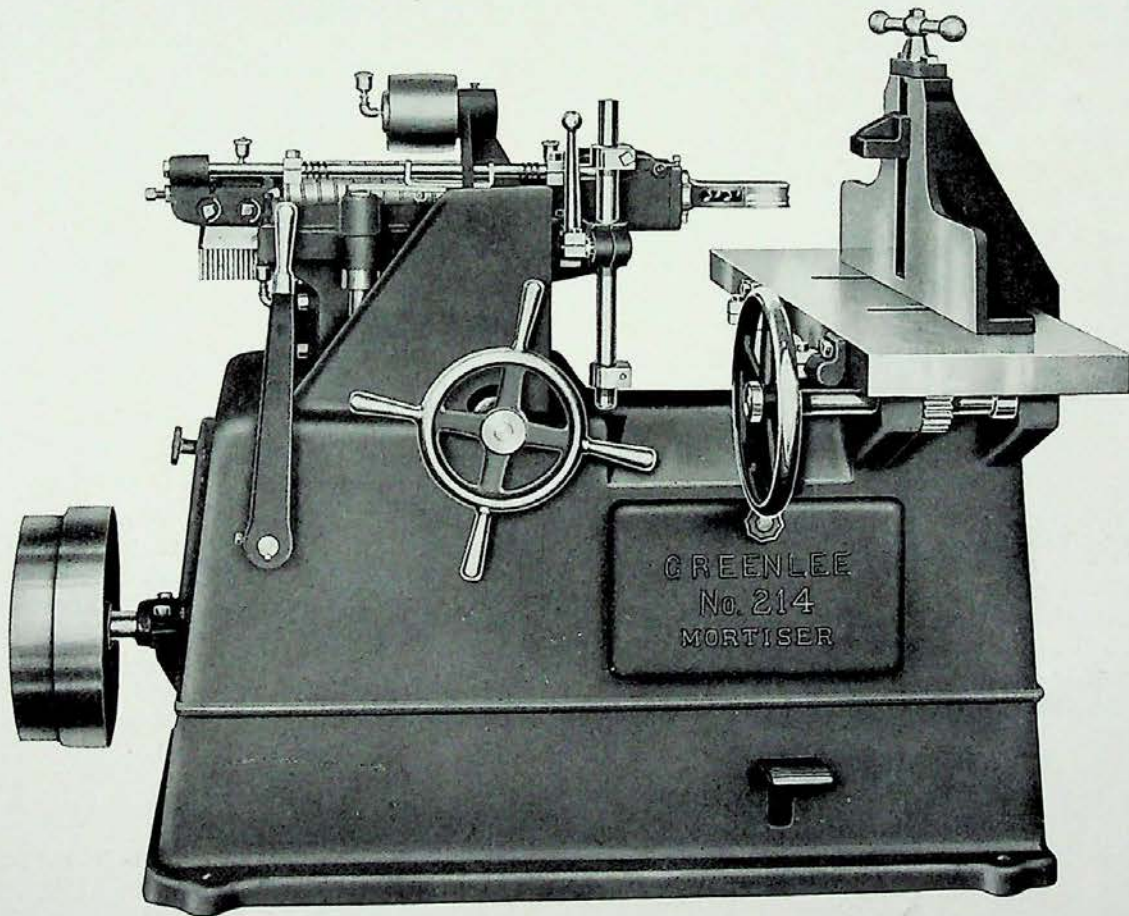
A Belt-Driven No. 212 Multiple-Spindle Mortiser with Plain Table and Automatic Clamp.

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

NO. 214 HORIZONTAL HOLLOW CHISEL MORTISER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

NO. 214 HORIZONTAL HOLLOW CHISEL MORTISER

THIS Mortiser meets a definite demand for a medium heavy size of horizontal machine for use in wagon, implement, automobile body and furniture factories as well as in the smaller car shops. It is particularly convenient on account of easy vertical adjustment of the chisel ram. Beyond this, the chips fall from the face of the stock and layout marks are always clearly visible. Vertical mortisers in both larger and smaller sizes are, however, included in our complete line of hollow chisel machines.

The design is along our well developed lines with the addition of certain new and improved features. It has a box form of main frame entirely enclosing the driving mechanism. At the top of this frame are gibbed ways on which the timber table is mounted and traversed. At the opposite end, and housed within the frame, are ways to carry the vertically adjustable knee piece supporting the reciprocating chisel ram. This is counter-balanced and fitted with a quick vertical adjusting and locking device.

Its operation is very rapid and convenient. Particular attention has been given in locating the handwheels and levers for clamping the timber, moving the table, raising and lowering the chisel ram and controlling the feed, so that each is readily accessible. All adjustments are thus made quickly with the least possible exertion.

Timber Table

The table is 46 inches long, 17 inches wide and has 14-inch cross movement by a convenient handwheel. The heavy timber fence has angle adjustment and is arranged to adjust across the table for varying widths of stock. A powerful screw clamp securely holds the work, and a multiple stop rod on the edge of the table is controlled by a foot treadle for gauging the length of the mortises. These features make for efficiency.

Feed The feed mechanism is driven by a cone pulley which provides for a change of feeding speed. Internal band frictions on a shaft properly geared to the chisel ram produce the reciprocating motion. All gearing is machine cut, while the shafting is accurately ground of high carbon steel. The frictions are engaged and released by an automatic stop rod on the ram, and the operator's lever keeps the feed under perfect control. The chisel ram works automatically for any number of strokes, or may be stopped or reversed whenever desired. The return stroke is particularly rapid.

Drive When belt driven, this mortiser is furnished with a separate countershaft for overhead location or for mounting on or beneath the floor. It has 10 x 5½-inch tight and loose pulleys, which should run about 725 R.P.M.

Motor drive is arranged by furnishing a short floor shaft with suitable pulleys and a coupling for direct connection to a motor of any speed from 700 to 1500 R.P.M. This is substituted for the regular countershaft.

Range The range of this mortiser is for operating chisels from ⅝ to 1½-inch regularly, or up to 1¾-inch in special cases. The chisel ram has an 8-inch stroke and 8-inch vertical adjustment. Stock up to 8 inches wide and 10 inches high can be clamped on the table.

Equipment The equipment includes one each ½, ⅝, ¾, 1 and 1¼ x 6½-inch blade hollow chisels and bits, chisel and bit bushings, wrenches and the proper shaft for either method of drive.

Weights and Code

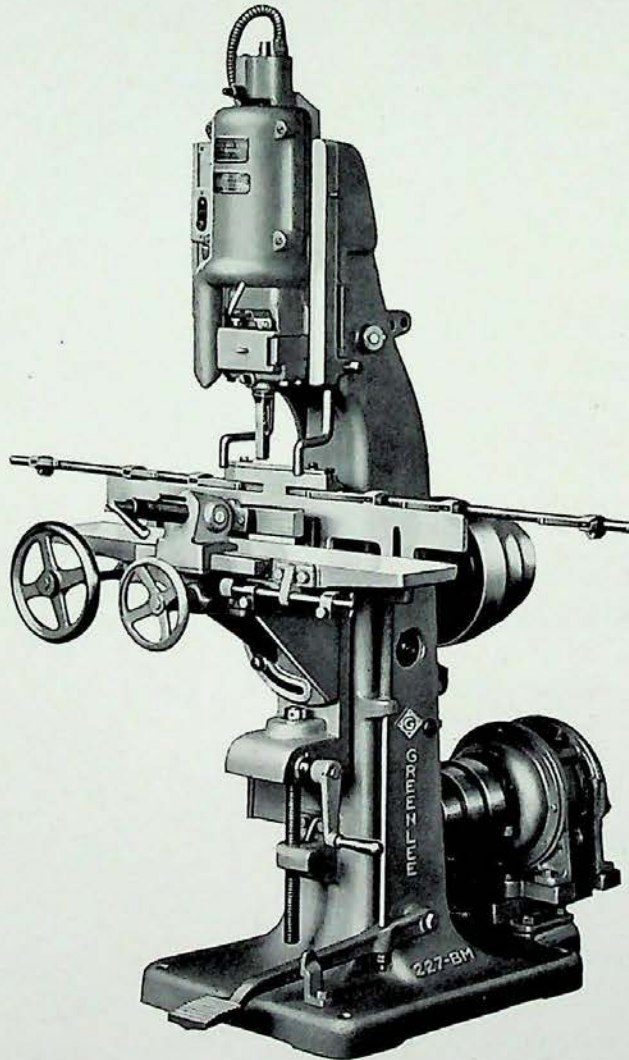
Net weight in pounds.....	3600
Weight boxed for export.....	4200
Box measure in cu. ft.	105
No. 214 Horizontal Mortiser.....	CELAP

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

NO. 227 TYPES OF HOLLOW CHISEL MORTISERS



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

NO. 227 TYPES OF HOLLOW CHISEL MORTISERS

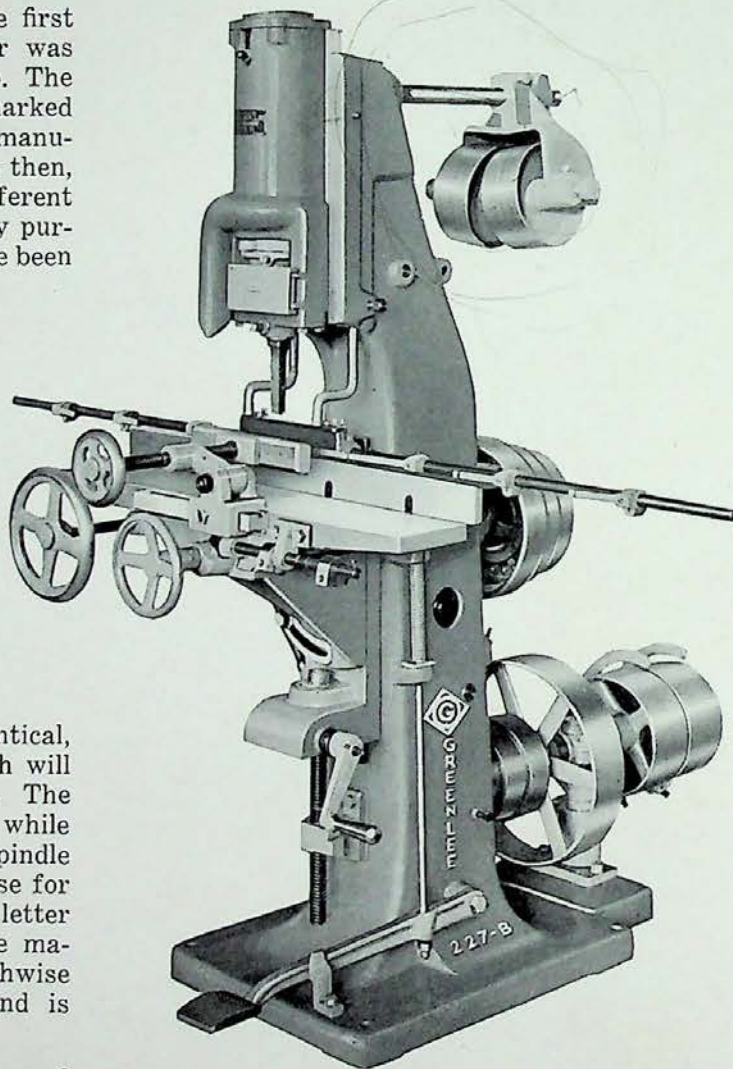
MORE than half a century ago the first successful hollow chisel mortiser was developed by Greenlee Bros. & Co. The instant success of this type of machine marked the real starting point in the machinery manufacturing career of its developers. Since then, Greenlee Bros. & Co. have built many different kinds of hollow chisel mortisers for many purposes and far-reaching improvements have been made. Today, these machines still maintain their leadership wherever accuracy and speed are of importance and where comparisons have been made on the basis of actual mortising costs.

The Greenlee line of hollow chisel mortisers is most complete, including many sizes ranging from the light, foot-feed types to the heavy timber machines for car shops. But for general work in furniture, sash, door and similar manufacturing, the No. 227 types of power-feed machines described in this bulletin are outstanding.

These two machines are practically identical, except for the method of drive, and both will operate chisels up to one inch square. The No. 227 type is a belt driven machine, while the No. 227-M has a motor on the bit spindle and a separate motor mounted on the base for the drive of the feed. Addition of the letter "B" to either number indicates that the machine has a compound table with lengthwise movement for making long mortises and is equipped with a clamp.

Both mortisers are ball-bearing machines, and the design embodies features which are important from the standpoint of production. Tools are fed to the work by a flexible power stroke, which can be instantly stopped or started, three feeding speeds are available, proper tool holders are provided, and an air blast blows away the chips and cools the tools.

Frame The frame is a strong, one-piece casting which encloses the power-feed mechanism, with the exception of the drive pulley. The ways for the chisel carriage and



The Belt-Drive No. 227-B Mortiser with Compound Table and regular clamp. On the preceding page is shown the No. 227-BM Electric Mortiser with the quick-acting clamp.

table knee are machined at one setting to insure correct alignment and permanent accuracy.

Chisel Carriage The chisel carriage is extra long and is reciprocated in gibbed ways by the power-feed mechanism. It fully encloses the ball-bearing bit spindle, which has ball-bearing thrust and on which is mounted a long pulley for the belt drive machine or the



built-in motor of the electric mortiser. The bit fastening at the lower end is covered by a cast-iron shield, which is hinged for ready access in changing tools. Adjustable thrust bit bushings are provided to maintain correct relation between the bit and chisel. The spindle of the electric mortiser has a hand brake for quickly stopping. Either machine can be furnished with a bit extension for occasional boring jobs, or even with clusters for boring more than one hole at a time. A blower within the carriage provides forced ventilation for the motor as well as an air blast on both machines for chip removal and cooling the tools.

Feed The power-feed mechanism consists of an enclosed worm drive mounted in ball bearings and running in oil. Instant starting and stopping is made possible by the use of a dry disc clutch mounted in a roller-bearing pulley driven from the countershaft or feed motor. When the clutch is disengaged, it acts as a brake to instantly stop the chisel carriage at any point in its stroke.

Wear is reduced to the absolute minimum in the feed mechanism. The clutch discs are of hardened steel and are without any kind of fabric facing. In addition, the design is such that when the clutch is running, the shifter lever is not in contact with the spider. This eliminates wear at that point.

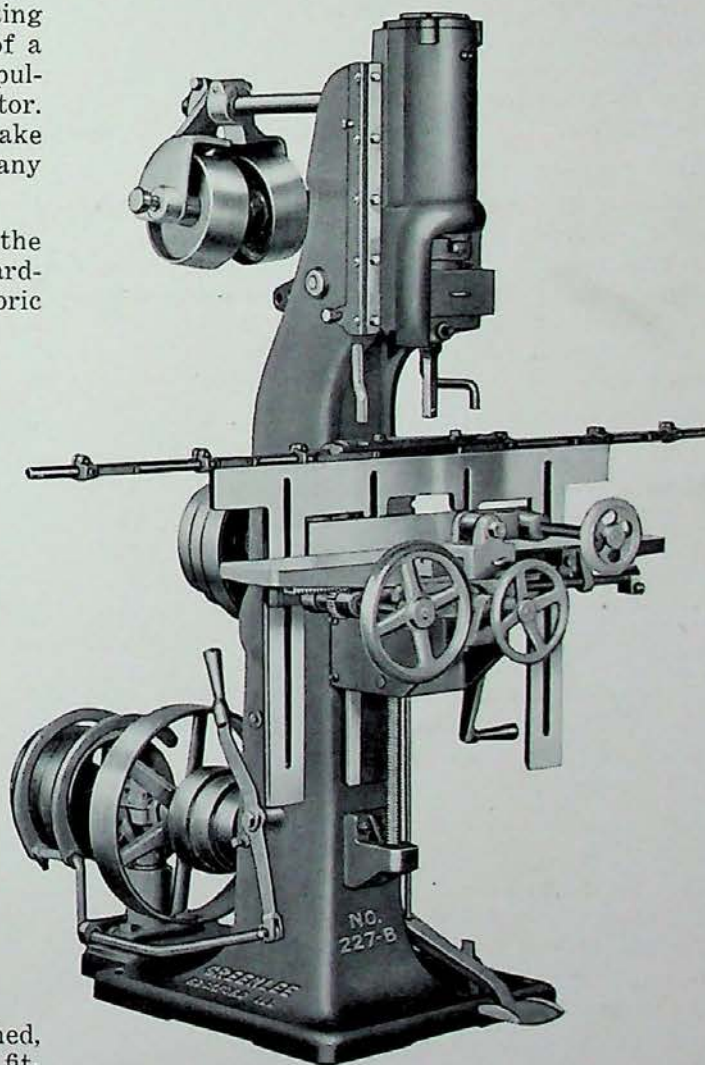
The control is by a convenient foot lever, located close to the floor, so that the operator can rest his heel on the floor while working the lever with the ball of his foot. Jogging of the feed is thus possible for extremely difficult work. The foot lever has a hold-down lock for use when continuous mortising strokes are wanted.

Three feeding speeds are provided by means of the cone pulleys. Slower or faster feeds than the standard can be furnished, and feeds as high as 70 strokes per minute have been used for mortising soft woods. The chisel stroke is also adjustable for three different lengths. Chisels with 4-inch blade are standard in the $\frac{3}{8}$ -inch and larger sizes, but $2\frac{3}{4}$ -inch blade is advised for $\frac{1}{4}$ and $\frac{3}{16}$ -inch sizes.

Tables Two styles of tables can be furnished, differing only in adjustment and fittings. Both styles have vertical, tilting, and cross adjustments, but only the compound table, designated by the letter "B," has lengthwise

movement for making long mortises by successive chisel strokes. Its movement is gauged by adjustable stops. The compound table also differs from the plain table in having a work-holding clamp. This type of table is regularly recommended for usual requirements.

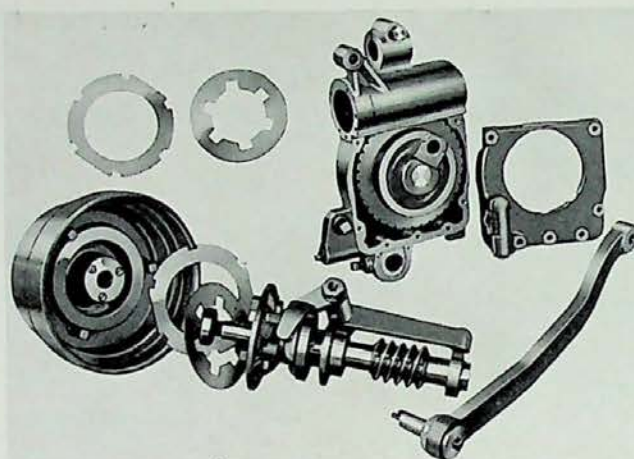
The table clamp furnished can be one of two styles. The screw clamp shown on the belted machines is regular equipment with the compound table, but the quick-acting lever clamp shown on the No. 227-BM mortiser can be substituted. The latter is not as suitable for high stock as the standard screw clamp.



Left Front View of a No. 227-B Mortiser with Special High Back Fence. When wanted, a detachable screw clamp can be mounted on the back fence.

The standard back fence has vertical adjustment and is fitted with a lip hold-down. Two adjustable prong hold-downs are also carried from the machine frame. A special high back fence with adjustment for handling stock from 2½ to 14 inches high under the lip hold-down can also be furnished. If wanted, this can be fitted with a detachable screw clamp mounted on the top of the fence for holding high stock.

Drive All belts are eliminated on the electric mortiser with the exception of the short feed belt which is required on both machines. The bit spindle has a built-in motor mounted on it for its drive, and the feed is driven by a separate, direct-connected motor mounted on an attached bracket on the machine base.



Disassembled Feed Works showing the parts of the worm gear drive and the dry disc clutch.

The two motors have inter-locked wiring and are controlled from the same push-button station on the machine. The magnetic starter is always furnished with protective relays instead of ordinary fuses.

The belted mortiser regularly has an attached base drive shaft with tight and loose pulleys. From a drive pulley on this shaft the bit spindle is belted

over idle pulleys at the top of the frame. When motor drive is wanted, the motor is mounted on an attached bracket and is direct connected to the base drive shaft in a similar manner to that of the feed motor on the No. 227-M electric machine. When wanted, a wire mesh belt guard extending from the machine base to the idle pulleys can be furnished.

Specifications

Equipment Each mortiser is regularly equipped with a ½ x 4-inch hollow chisel with bit, a set of chisel bushings, adjustable thrust bit bushings, a 6-foot layout stop rod with 6 spring stops, and necessary wrenches.

Maximum chisel capacity	1"
Chisel stroke	2½" to 4"
Maximum distance from chisel socket to table	19"
Maximum distance from back fence to chisel center	3"
Standard number of strokes per minute	30, 40 and 50
Slower or faster feeds can be provided.	
Table size	6"x 36"
Vertical adjustment of table	13"
Cross adjustment of table	3½"
Lengthwise adjustment of compound table	8"
Angular adjustment of table	45°
Clamping width with regular clamp	5½"
Maximum height of stock that can be worked under a 4" chisel	14"
This height can be increased on special order.	
T and L pulleys on belt-drive machine	10"x 4"
Countershaft speed	1150-R.P.M.

Motor for belt-drive machine	3 or 5-H.P., 1200-R.P.M.
Spindle motor on electric machine, 4-H.P., 3600-R.P.M.	
Feed motor on electric machine	2-H.P., 1200-R.P.M.
Net weight in pounds of No. 227-B	1350
Net weight in pounds of No. 227-BM	1450
Weight boxed for export of No. 227-B	1850
Weight boxed for export of No. 227-BM	1900
Box measure in cubic feet of No. 227-B	58
Box measure in cubic feet of No. 227-BM	59

Codes:

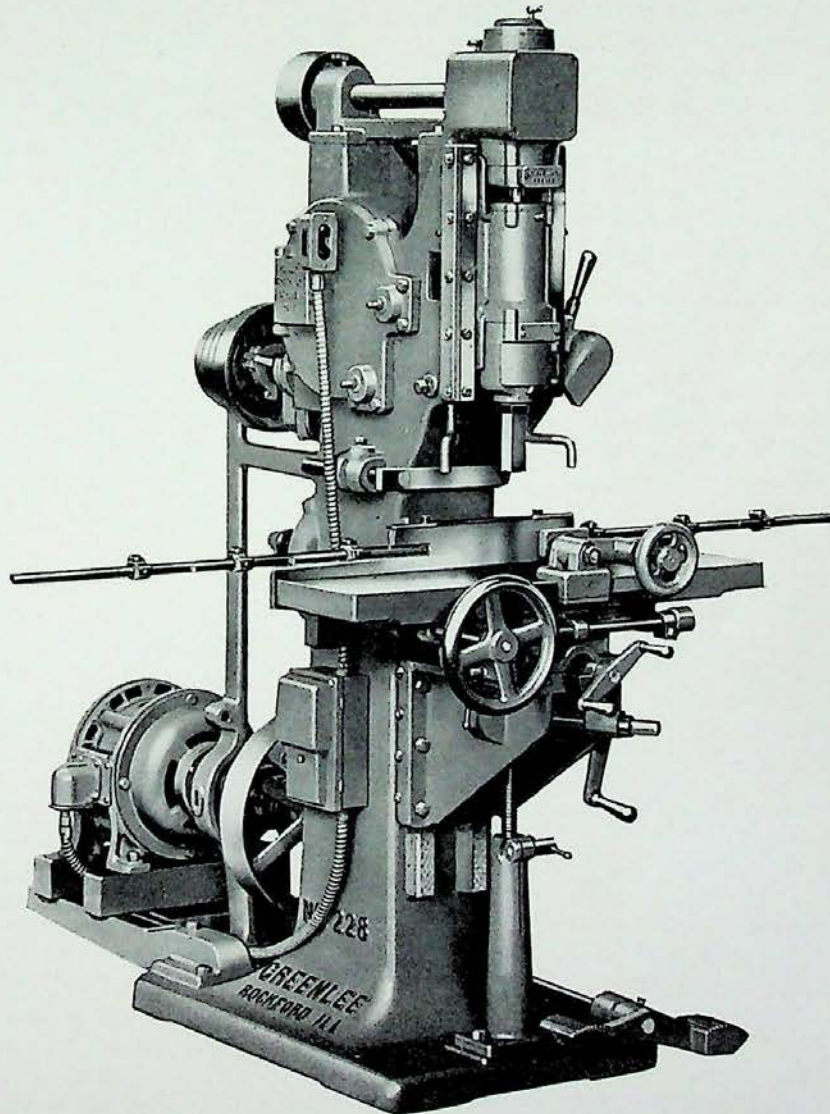
No. 227-B belt-drive with compound table	CILAN
No. 227 belt-drive with plain table	CILEP
Special high back fence substituted	CILYV
Screw Clamp for high back fence	CIMAP
Belt guard	CIMER
No. 227-BM electric machine with compound table	CIMUV
No. 227-M electric machine with compound table	CIMYX
Special high back fence substituted	CINOV
Screw clamp for high back fence	CINUX

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

NO. 228 POWER-FEED HOLLOW CHISEL MORTISER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

NO. 228 POWER-FEED HOLLOW CHISEL MORTISER

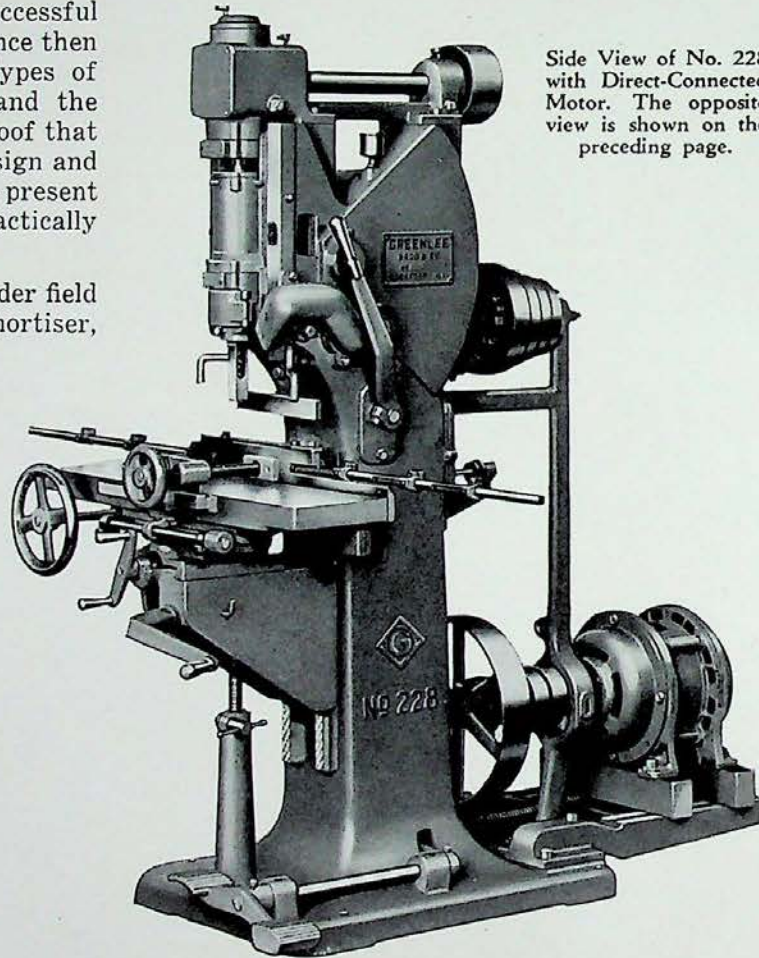
GREENLEE produced the first successful hollow chisel mortiser in 1876. Since then this company has built many types of these machines for many purposes, and the many hundreds in daily use stand as proof that they are built to a high standard of design and construction. Including the No. 228, the present line provides a type and size for practically every purpose in all classes of shops.

The hollow chisel machine covers a broader field of usefulness than any other type of mortiser, and it never has been approached in convenience or economy. It alone produces any shape, size, depth or length of mortise, is absolutely accurate and uses a simple tool outfit of moderate cost.

The No. 228 mortiser has a very broad application. It holds an unrivaled place in the automobile body industry, because of its adequate range, large output, perfect feed control and dependable service. In the manufacture of furniture, implements, sash, doors, etc., this mortiser is also widely used and is of proven value.

Some advantages of the design of this mortiser are that the tools feed to the stock at variable speeds to suit the work and size of chisel, the stroke is adjustable and has a quick return, adjustable thrust bit bushings aid in proper tool setting, chips are blown away by an air blast, and every adjustment is provided for quick and accurate work. In addition, the ball-bearings of the bit spindle and horizontal top shaft lower the power consumption and make for accuracy and long life.

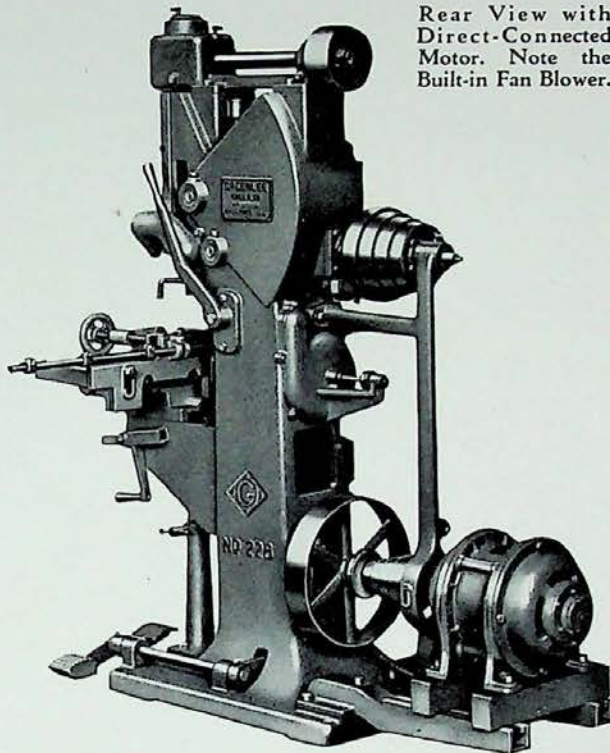
Frame The frame is a sturdy, one-piece casting, which encloses the power feed mechanism with the exception of the drive pulley. It has a wide spreading base for stability, and the ways for the chisel carriage and table knee are machined at one setting to insure perfect alignment of the moving parts.



Side View of No. 228 with Direct-Connected Motor. The opposite view is shown on the preceding page.

Chisel Carriage

The extra long chisel carriage reciprocates on gibbed ways machined on the front of the frame. It fully encloses the bit spindle, which runs in ball bearings and is driven through heat-treated bevel gears from the horizontal shaft at the top, which also runs in ball bearings. The chisel holder is securely screwed to the bottom of the carriage to insure permanent alignment of the tools. Adjustable thrust bit bushings aid in proper tool setting and minimize tool breakage. A hinged door guards the revolving spindle parts and permits easy access to the spindle for setting or removing the hollow-chisel bit.



Rear View with Direct-Connected Motor. Note the Built-in Fan Blower.

in depth of mortise is possible with it, and that the control is so simple and positive. This is of especial value in the production of furniture and automobile bodies.

The drive of the feed is by belt from the base shaft over four-step cone pulleys, providing four feed rates varying from 16 to 40 strokes per minute. When other feed rates are required, the pulley sizes can be changed to suit.

Tables The compound table of the No. 228 has vertical adjustment by means of the elevating screw and hand crank, lengthwise movement by rack and pinion, and cross adjustment by a quick-acting screw. When clamped in position, the work is not moved until the mortise is completed, as the table adjustments permit bringing it to the correct position under the chisel for the size of mortise required.

The universal table of the No. 228-C machine has tilting adjustment to 30 degrees in addition to the adjustments of the compound type. It is

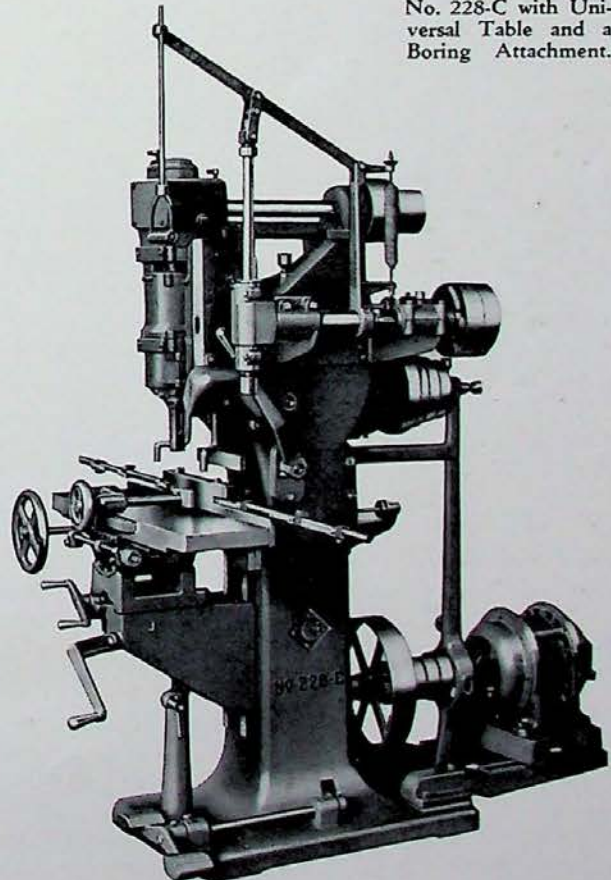
Feed Mechanism

The feeding arrangement of this No. 228 Mortiser is one of its outstanding features, because of its influence on production and accuracy of work. A geared pitman of great power, driven from the cone pulley at the rear through a clutch and a simple system of gearing, is connected to the chisel ram by a link to provide the mortising stroke and quick return. The clutch is an improved dry-disc type, which permits instantly stopping or starting of the feed with either the hand lever or double foot treadle. The hardened steel shipper ball and fingers are adjustable for wear. When the clutch is released, a leather-faced brake is automatically applied, which instantly stops the feeding movement, speeding up production and simplifying the control.

The length of the mortising stroke can be varied to suit conditions. It is changed by means of the adjustable pitman bolt on the pitman gear, which is easy to get at through a small door in the frame. All gears of the feeding mechanism are fully housed within the frame and are lubricated by grease gun.

The importance of this method of feed is apparent when it is considered that absolute accuracy

No. 228-C with Universal Table and a Boring Attachment.



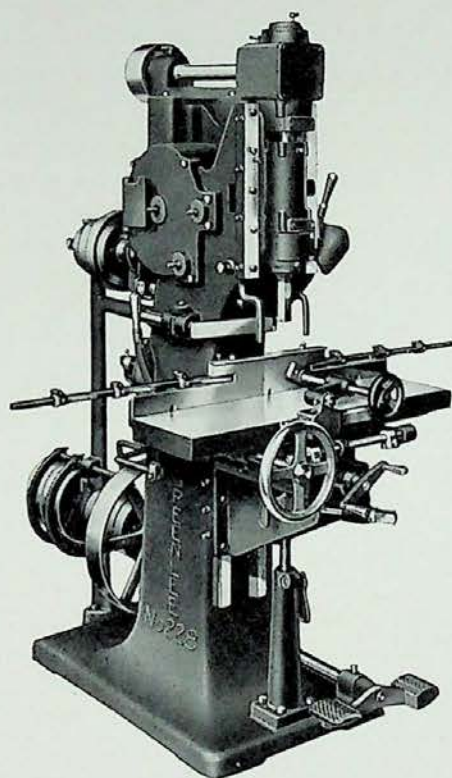
intended for use in shops where the product regularly requires the making of mortises on an angle.

Both styles of tables are 9½ x 36 inches. The back fence is adjustable for height, is fitted with a lip hold-down and carries the six-foot stop rod with its adjustable layout stops. An auxiliary back fence is carried from the frame for use on extremely high work, and two prong hold-downs are also carried from the frame of the machine.

The table extension at the front is fitted with a screw clamp, which is adjustable for height. When desired, a quick-acting lever clamp can be substituted. It is not, however, as suitable for high stock as the standard adjustable screw clamp.

Fan Blower

In order to keep the surface of the work free from chips, this machine is equipped with a built-in fan blower at the rear and cast-iron connections for directing the air blast to the work. It not only blows away the chips, but helps cool the mortising tools. The



No. 228 with Tight and Loose Pulleys for Belt Drive

fan drive is by a round belt from the countershaft.

Boring Attachment

A boring attachment with angular adjustment to 35 degrees in either direction and cross adjustment to 5½ inches can be applied to the right side of the machine when desired. It will operate bits as large as 1½ inches in diameter and bore through 8-inch material. This attachment is often applied for handling the ordinary boring work which is many times required on stock being mortised. It has tight and loose pulley drive by belt from a pulley on the top horizontal shaft.

Drive

Belt or motor drive can be furnished as required. When belt driven, the base countershaft is furnished with tight and loose pulleys. Motor drive is provided for by fitting the base with a motor bracket and the drive shaft with a sleeve coupling. This provides a compact, self-contained unit with three short, open belts for driving the horizontal shaft at the top, the variable feed, and the fan blower.

Specifications

Equipment

Each mortiser is regularly equipped with one each 5/16" x 2 3/4", 3/8" and 1/2" x 4", 5/8" and 3/4" x 5" hollow chisels with bits, a set of chisel bushings, adjustable thrust bit bushings, a 6-foot layout stop rod with 6 spring stops, and necessary wrenches. When specified, a wire mesh belt guard can be furnished at extra cost.

Maximum chisel capacity.....	1 1/4"
Chisel stroke.....	2 1/2" to 5"
Maximum distance from back fence to chisel center.....	4 5/8"
Standard strokes per minute.....	16, 24, 32 and 40
Table size.....	9 1/2" x 36"
Vertical adjustment of table.....	14 1/2"
Cross adjustment of table.....	5"
Lengthwise adjustment of table.....	12"
Angular adjustment of universal table.....	30°
Clamping width.....	8 1/4"
Maximum height of stock that can be worked under a 5" chisel:	
With compound table.....	15"
With universal table.....	12"

T and L pulleys on belt-drive machine.....	10" x 4 1/2"
Countershaft speed.....	850 R.P.M.
Standard motor size.....	5-H.P.
Motor speed.....	Regularly 1200; can be 750 to 1500 R.P.M.
Net weight in pounds.....	2200
Weight boxed for export.....	2750
Box measure in cu. ft.....	70
Additional weight for boring attachment.....	175

Floor space:

With T and L pulleys.....	4'-0" x 5'-8"
With direct-connected motor.....	4'-0" x 6'-4"

Codes:

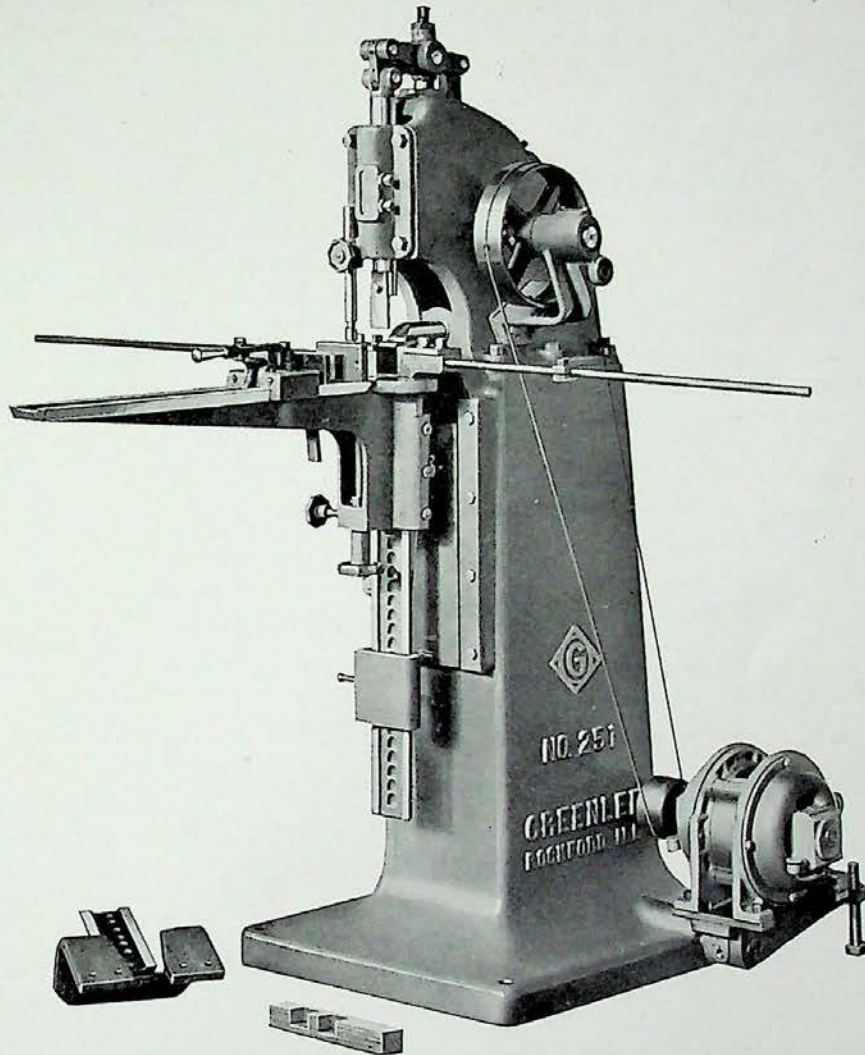
No. 228 with Compound Table and T and L Pulleys.....	COGIK
No. 228-C with Universal Table and T and L Pulleys.....	COGOL
Add for attached motor bracket and coupling.....	COGYN
Boring Attachment.....	COHAG
Belt Guard of wire mesh.....	COHEK

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

No. 251 HINGE OR TRIM MORTISER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

No. 251 HINGE OR TRIM MORTISER

ANY plant manufacturing a product which requires the making of hinge seats, short rabbets, open mortises or other edge trimming cuts for any purpose, will find this machine a time saver. Simplicity was the keynote in its design, which combines speed with economy and convenience of operation.

The general design is that of a sturdy, vertical machine with the main working parts enclosed within the upper part of the frame. The two chisels are reciprocated at right angles to each other by an eccentric, and the stock is fed to them by means of a table, which is rigidly supported directly beneath the vertical chisel. The standard drive arrangements are designed to meet conditions existing in every class of shop.

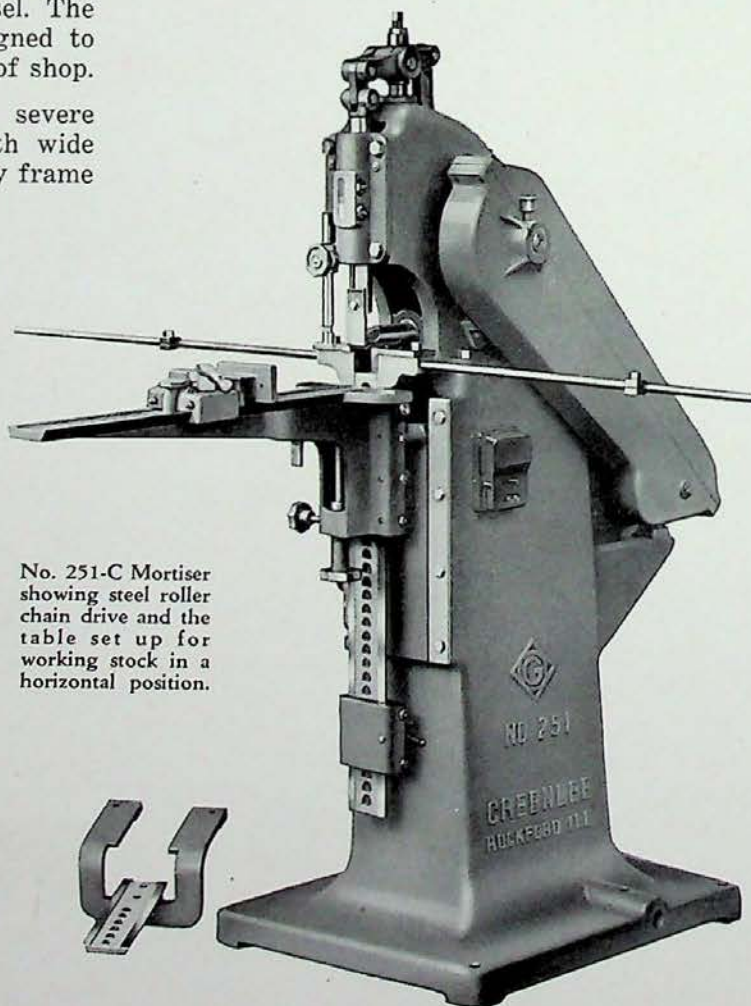
Frame In order to withstand the severe strain of fast mortising with wide chisels, this machine is built on a heavy frame consisting of a strong, one-piece casting with a wide spreading base. The table is carried on gibbed ways at the front of the column, and the housing for the chisel operating mechanism is securely bolted to the top.

Chisel Mechanism The rams which carry the chisels reciprocate in bronze bushings and are guided by bronze taper keys. They are actuated by an eccentric on the main drive shaft, which drives through an arrangement of connecting rods, rocker arms and links. These are so arranged that a perfectly balanced drive is had, resulting in the elimination of destructive vibration. The rams regularly make 600 strokes per minute.

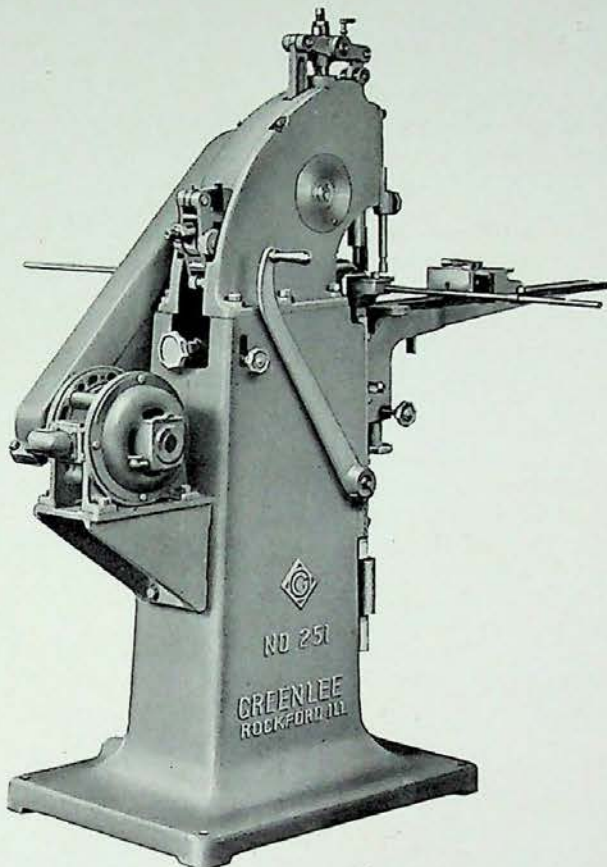
The eccentric shaft is carried in bronze bushings in the top housing and is also provided with a bearing outside of the tight and loose pulleys. When chain drive is furnished, this bearing is a part of the drive housing. Simple and effective lubrication is

provided for all bearing surfaces, the ones in the top housing being lubricated by felt wicks from two reservoirs.

Chisels The chisels are securely bolted and keyed to the cylindrical rams. The vertical chisel is designed to cut the grain of the wood both lengthwise and crosswise, so that the horizontal chisel, which completes the cut, will not tear the wood at the edges of the mortise. In addition, the horizontal chisel has spur teeth on each edge of the bottom surface to further aid in making a clean-cut mortise.



No. 251-C Mortiser showing steel roller chain drive and the table set up for working stock in a horizontal position.



Rear view of No. 251-C showing motor mounting for roller chain drive.

Adjustment for wear of the chisels and for their location relative to each other is provided for by means of convenient screw adjustment for the rocker arms. Take-up is also provided for the taper keys which guide the chisel rams.

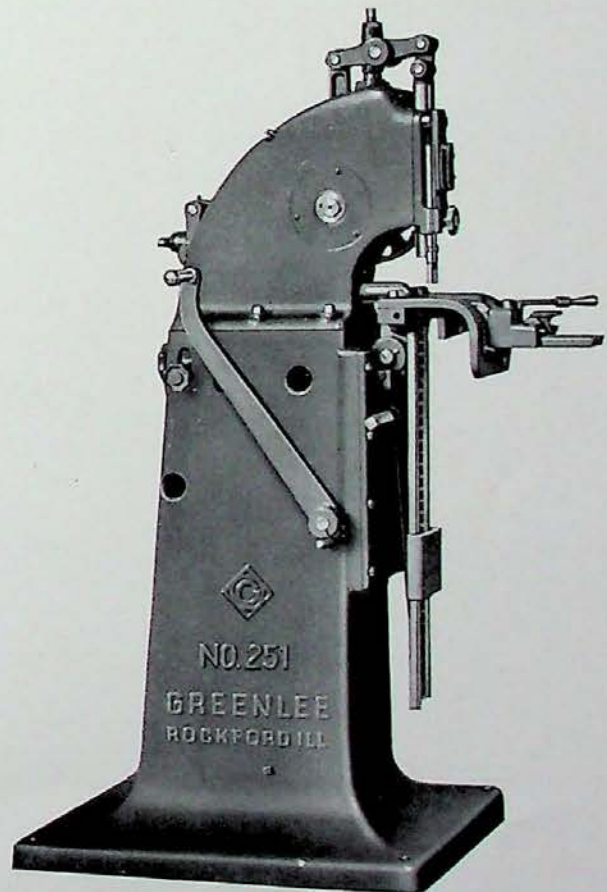
Table The table, or stock holding device, is so arranged that stock can be mortised in either a horizontal or a vertical position. When the machine is to be set up for stock held vertically, the long, horizontal stock support is removed and the short clamp support mounted in place, as shown in the illustration at the bottom of this page. The quick-acting lever clamp is interchangeable between the two supports. It has ratchet adjustment of 1-inch steps and intermediate screw adjustment.

Complete adjustments for size and thickness of stock are provided by hand knobs which operate screws, and by the ratchet and screw adjustment of the work clamp. Tilting adjustment to 15 degrees upward provides for any necessary

pitch to the bottom of the mortise to suit the particular hinge being fitted.

The table is raised to the work by a hand lever which has adjustment to suit the operator, and the vertical depth of cut is regulated by a combination stop and spring hold-down, which contacts with the work before the chisels start to cut. This prevents chips from getting under the stop, which would cause inaccuracy in the depth of cut being made.

Drive The drive can be arranged to suit the conditions. It can be by tight and loose pulleys, by belt from a motor on a hinged bracket on the base of the machine, or by a short steel roller chain from a motor mounted near the top of the machine. The different arrangements are shown in the illustrations. A 1-H.P., 1800-R.P.M. or slower speed motor is usual, but a 2-H.P. motor can be used. Any available current can be employed.



No. 251 Mortiser with table set up to handle stock in a vertical position.



An Incubator Leg showing a blind rabbet made on a Greenlee Hinge Mortiser.

Specifications

Range The standard machines will handle chisels varying in width from $\frac{1}{2}$ to $2\frac{1}{4}$ inches, and the stroke is $1\frac{3}{8}$ inches, which provides a maximum cutting depth of $1\frac{5}{16}$ inches for both chisels. The table tilts upward 15 degrees, has $1\frac{3}{8}$ -inch vertical feed and is arranged to handle 24-inch wide stock in a horizontal position or 30-inch in the vertical position. Stock up to 4 inches thick can be clamped in the vertical position. The special-range mortiser will handle chisels up to 4 inches in width.

Equipment The standard equipment includes a pair of chisels of any specified size up to $2\frac{1}{4}$ inches, a stop rod for each side of the table, the table equipment and the ar-

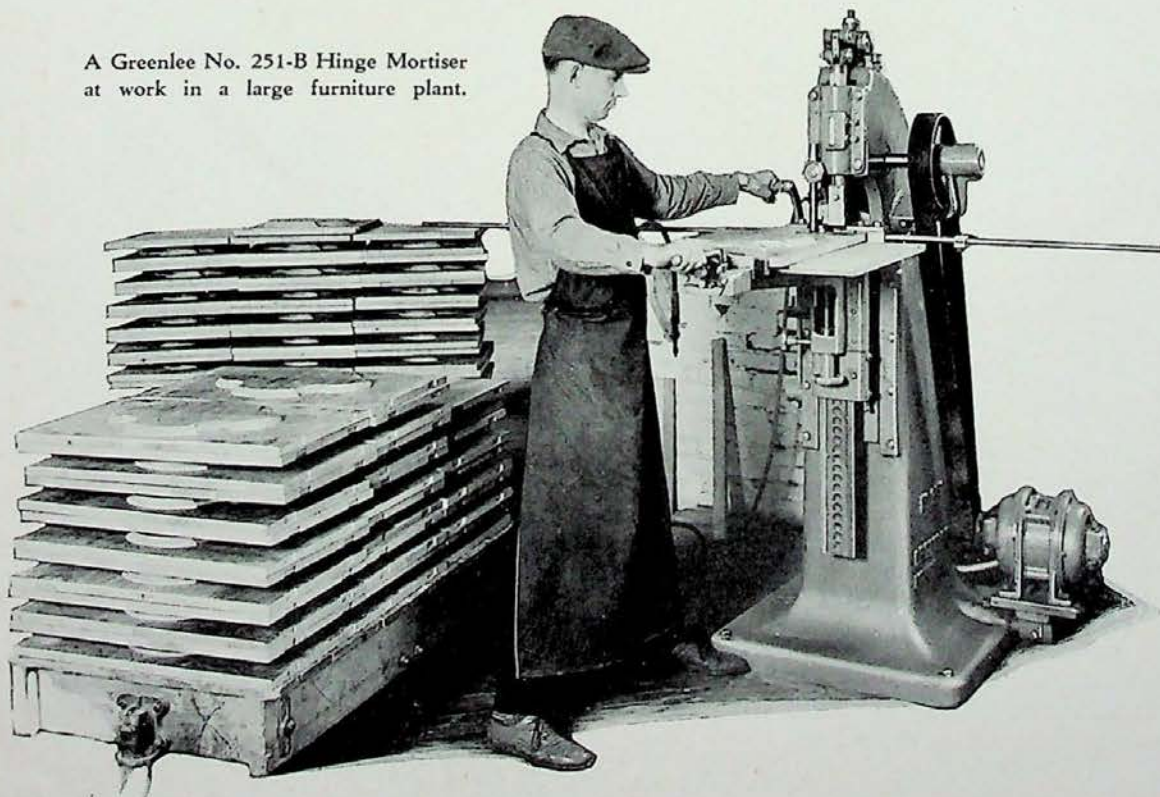
range of drive specified. A proper motor is regular equipment on the No. 251-C types.

Strokes of chisel rams per minute.....	600
Tight and loose pulleys on No. 251.....	10"x 2 1/2"
Speed of tight and loose pulleys.....	600 R.P.M.
Motor for No. 251-B.....	1 H.P. and of any speed up to 1800 R.P.M.
Net weight in pounds of Nos. 251 and 251-B.....	1200
Net weight in pounds of No. 251-C.....	1400
Weight boxed for export of Nos. 251 and 251-B.....	1650
Weight boxed for export of No. 251-C.....	1900
Box measure in cu. ft. of Nos. 251 and 251-B.....	58
Box measure in cu. ft. of No. 251-C.....	62

Codes:

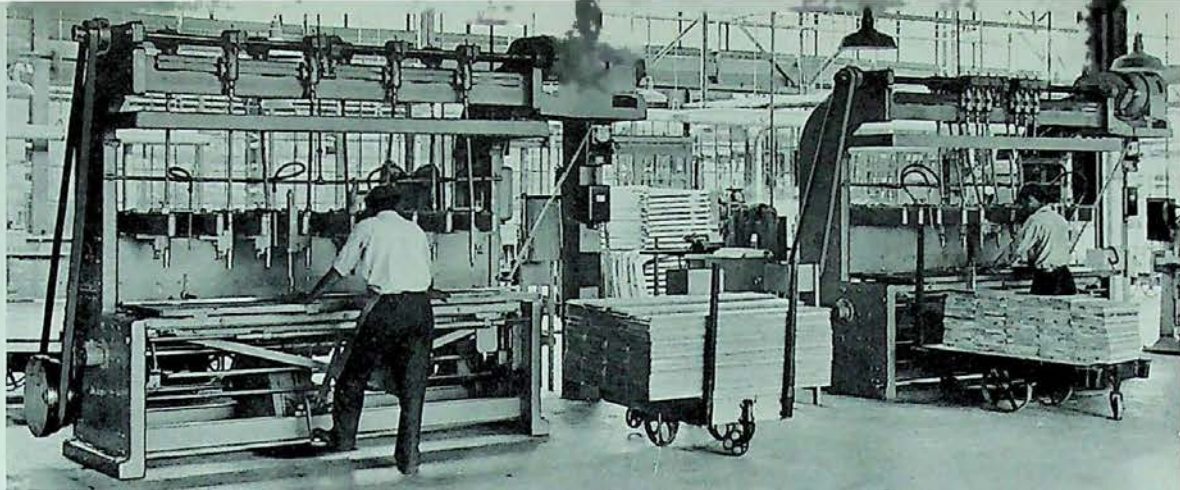
No. 251 with tight and loose pulleys.....	CUNAN
No. 251-B arranged for belted motor drive.....	CUNEP
No. 251-C with self-contained roller chain drive from a 1-H.P., alternating-current motor.....	CUNIR
No. 251-C as above, but with a direct-current motor.....	CUNOS
Special Range Mortiser for Chisels up to 4" wide:	
For Nos. 251 and 251-B, add code.....	CUNYV
For No. 251-C with 2-H.P. motor, add code.....	CUPAP

A Greenlee No. 251-B Hinge Mortiser at work in a large furniture plant.



GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*



These two Greenlee No. 386-C Gang Borers are turning out accurately bored parts at high speed

That Greenlee Bros. & Co. have given much thought to the design and building of boring machines and their tools is shown by the fact that there are not less than 35 distinct types in the complete Greenlee line of single-spindle borers, gang borers and the heavy machines for car shop work. However, we show here only the single-spindle and gang machines suitable for general manufacturing purposes, such as for furniture, automobile bodies, radio cabinets, novelties, etc. If the machine you need is not illustrated here, tell us of your requirements, as it is very likely that it is included in our line.

The importance of gang boring in the economical manufacture of wood products accounts for the emphasis we have placed on this type of machine for many years. We have made an intensive study of gang boring problems, of the machines necessary to solve them, and of the proper

boring bits for use in them. As a result we offer a complete line of gang machines which provides a proper borer for practically every requirement.

Supplementing this line of gang machines are the single-spindle post and pedestal type borers which are designed to handle the miscellaneous boring in every class of shop. Special attention is called to the beltless, electric machines, hundreds of which are installed in woodworking plants throughout the country. These are unusually fast, accurate and convenient to operate and service.

Because of this complete line of machines, and since we manufacture every type of boring tool for use in them, we invite you to "Put Your Boring Problems Up To Greenlee." You will get the benefit of our many years of experience at no additional cost and without obligation.

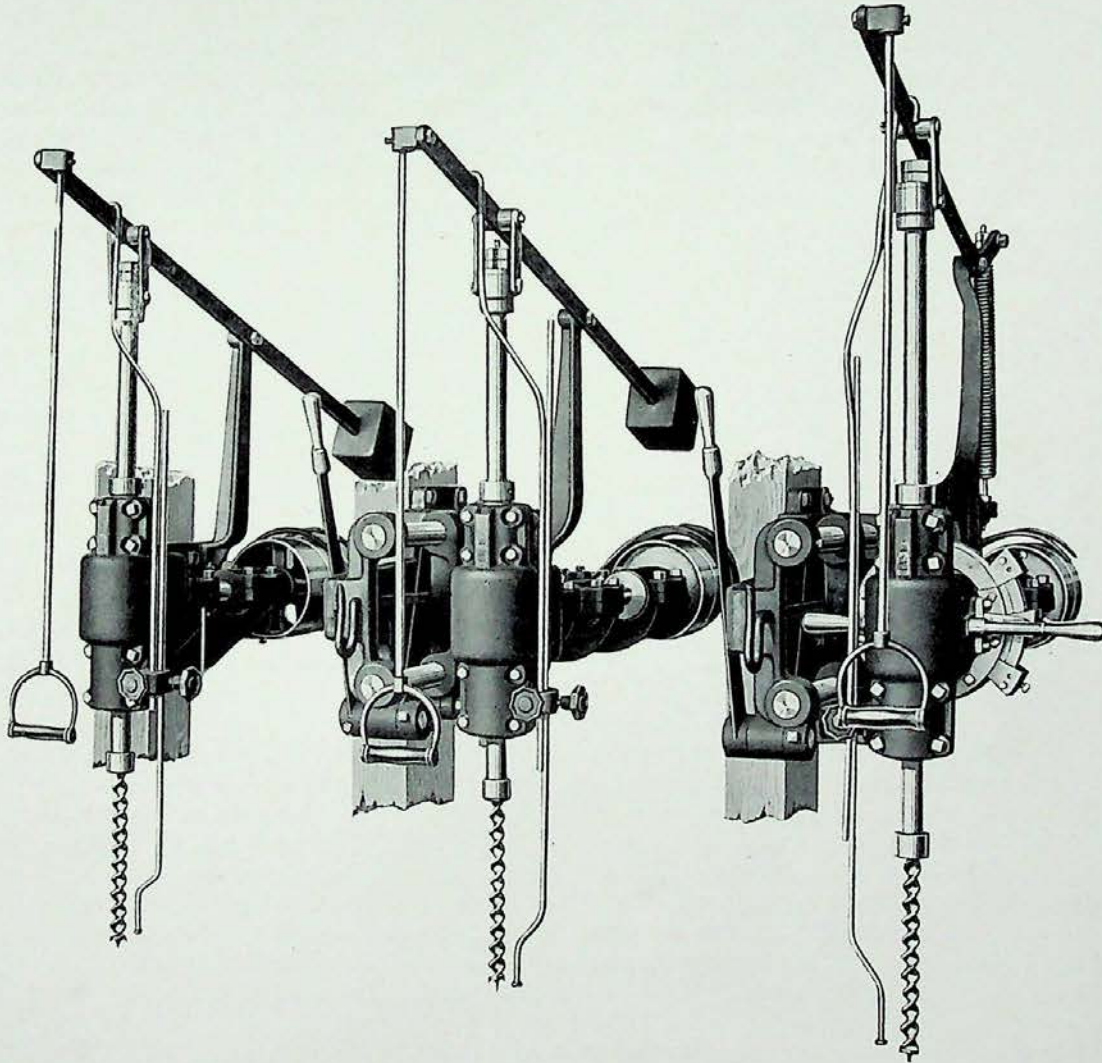
Five Greenlee No. 356 Single-Spindle Borers in a Modern Industrial Plant



**B
O
R
E
R
S**

Greenlee

NO. 350 TYPES OF HEAVY POST BORERS



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

NO. 350 TYPES OF HEAVY POST BORERS

THE advantages of these heavy borers may be overlooked by the buyer who simply compares the prices of light or old-style machines with the prices of these high-grade tools. Better speed and greater accuracy and convenience will repay the excess in price, since the workman producing a larger output on one of these post borers costs no more than when working on an inferior machine.

Styles Three styles of Heavy Post Borers are here shown. The No. 350-A is a plain vertical, the No. 350-B is a compound vertical, and the No. 350-C is a radial-vertical. The first has no adjustment for the spindle housing, the second has in and out adjustment of 12 inches, while the last type has both the cross movement and a radial adjustment for angle boring. The compound borer is now considered as a special and is built only to order.

The radial adjustment of the No. 350-C is to 35 degrees from the vertical. Angular stops can be set on a graduated arc, and the lever handles are used to instantly swing to any angular position. A spring latch holds the setting.

Spindle Housing The spindle housing is cast with the post bracket on the plain vertical machine, but for the compound and universal machines it is mounted on two round guides held by the main bracket casting, to provide 12-inch transverse adjustment. This insures easy cross movement for the spindle carriage and provides perfect support for heavy boring in all its working positions.

Bit Spindle

The bit spindle is driven by a pair of hardened steel bevel gears having accurately planed teeth. The spindle passes through a long sleeve on which the driving gear is mounted, it is counterpoised by a weight or spiral spring and is fitted at the top with thrust ball bearings. Stops are provided to regulate the depth of boring and the length of the spindle stroke, also to hold down the work.

Auxiliary Table

An auxiliary table can be furnished as an extra when specified. It has a 24 x 30-inch glued-up hard wood top and a bracket for mounting on the post. Vertical adjustment can be provided.

Drive

Tight and loose pulleys are regular equipment for drive from a line shaft. Motor drive is usually arranged by belting direct from the motor to a tight pulley on the spindle drive shaft. If preferred, the No. 350-A Plain Post Borer can be fitted with an attached bracket for direct coupled drive, but for the others the belted arrangement is preferred.

Range

All these borers are equal to any ordinary requirement, and 3-inch or even larger diameter bits can be used. The spindle stroke is regularly 20-inch, but this can be reduced or increased as required.

Equipment

The regular equipment of each borer includes three machine bits in diameters less than 1-inch and of length up to 12 inches, a 1/2-inch bit socket bushing, belt shifter, and 8 x 3 1/2-inch tight and loose pulleys to run about 1200 R.P.M. A bit guard can be furnished at extra cost.

Weights and Codes

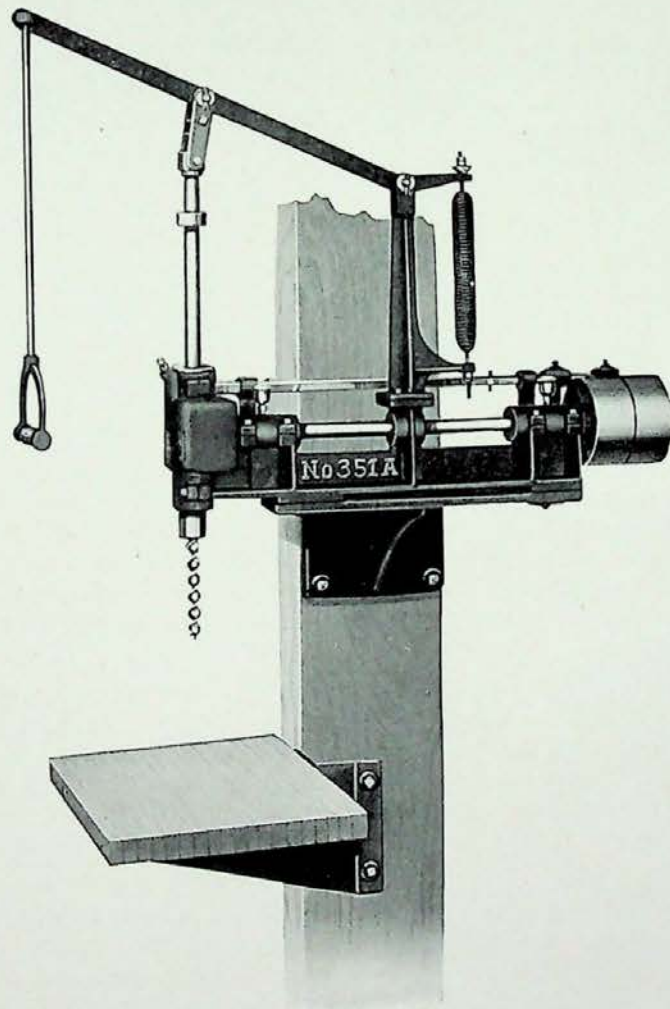
MACHINE	350-A	350-B (Special)	350-C
Net weight in pounds.....	350	550	600
Weight boxed for export.....	525	800	850
Box measure in cu. ft.	28	28	28
Code for standard borer.....	DAJIS	DAJOT	DAJUV
Code for auxiliary table with vertical adjustment.....	DAKAP	DAKAP	DAKAP
Code for auxiliary table without vertical adjustment.....	DAKES	DAKES	DAKES
Code for foot feed for No. 350-A.....	DAKIT		
Code for attached motor bracket on No. 350-A.....	DAKUX		

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

No. 351 LIGHT VERTICAL POST BORER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

NO. 351 LIGHT VERTICAL POST BORER

THE original vertical type of boring machine was, no doubt, a belted spindle running in two bearings supported on a post. Even today some machines have not been improved much beyond that point. Many years ago, however, Greenlee Bros. & Co. introduced their heavy gear-driven post borers, and later on this light gear-driven machine was designed. All of these post borers have proven most successful, which accounts for their popularity.

Comparison of this borer with others will quickly show its superior features. It is neat and compact, the gearing is in an oil case, gear teeth are formed on a gear shaper, parts are well proportioned, operation handy, and every detail well finished. Above all, it will stand up under hard and steady wear.

Bit Spindle

The spindle as regularly made has an eleven-inch thrust, sliding through the long sleeve on which the bevel driving gear is mounted. This thrust can be increased somewhat, if so ordered. A stop regulates the depth of stroke, and a spring draws

the spindle up after each stroke. The spindle is provided with a ball thrust bearing.

Spindle Housing

The spindle housing is cast with the main yoke carrying the horizontal shaft bearings. It encases the steel drive gears with an oil chamber and provides long bearings for the spindle sleeves. The spindle is regularly fed by an overhead pull, but a foot lever and connecting rod can be added at a small extra charge.

Auxiliary Table

The table illustrated on the front of this bulletin is furnished as extra equipment, when specified. It consists of a supporting bracket arranged to fasten to the post, and it regularly has a wood top 14 x 20 inches.

Other Mounting

Other mounting is possible by omitting the post bracket and bolting the main yoke to the top of a horizontal frame. Two or more machines thus mounted will provide different bit sizes or permit boring more than one hole at a time.

Range

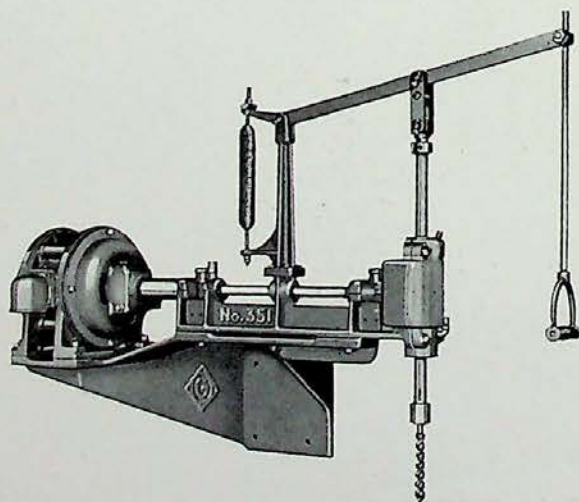
The range of these borers is for ordinary boring with 4, 5, 6 or 8-inch twist bits in diameters up to about 1½-inch. The spindle offsets 10 inches from the side of the post and it is 10 inches forward from the face. The bit socket is ½-inch.

Equipment

Each borer is regularly equipped with three bits, ½-inch or less, a belt shifter, and tight and loose pulleys or a sleeve motor coupling. An attached motor bracket for self-contained, direct-connected drive can be furnished as an extra.

Weights and Codes

Net weight in pounds.....	200
Weight boxed for export.....	300
Box measure in cu. ft.	6
No. 351 Borer.....	DECOG
Foot Lever Feed in addition to hand pull.....	DEDAC
Table Bracket and Wood Top.....	DEDIG
Attached Motor Bracket.....	DEDOK



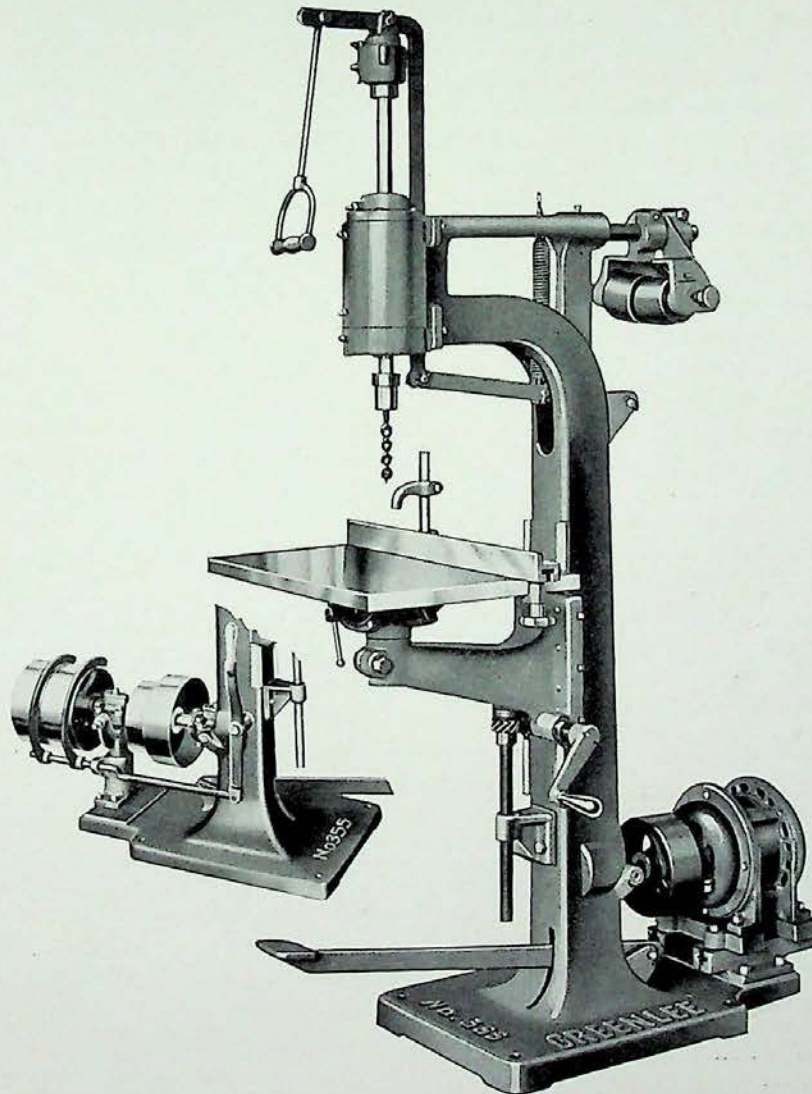
No. 351 with Direct Connected Motor

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

NO. 355 LIGHT SINGLE-SPINDLE VERTICAL BORER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

NO. 355 LIGHT SINGLE-SPINDLE VERTICAL BORER

THE demands of furniture, automobile body and cabinet shops, also industrial schools were considered when this borer was developed. Of medium range, sturdy design and mechanical completeness, it meets a definite need in shops of this class where equipment with belt-driven spindles is used. Greenlee Electric Borers, of similar range and on which all belts have been eliminated, can be had for use where proper alternating current is available.

The general design consists of a one-piece frame with a wide base to give steadiness, a self-contained countershaft, a universally adjustable table, and a well supported, ball-bearing bit spindle with hand pull and foot lever feed.

Frame The frame consists of a single column with a floor base measuring 20 x 32 inches. It is double braced at the top to give strength and rigidity at the boring head. The table knee is mounted on gibbed ways on the front of the column and is provided with spiral geared screw adjustment. A ball thrust bearing carries the weight of the table and its knee, insuring easy vertical movement.

Table The carefully machined work table is 24 inches long by 18 inches deep. It is mounted on a double segment cradle on the knee, which provides angular adjustment up to 45 degrees. The cradle is pivoted on the knee, so that the table can be rotated, and this, with the angular adjustment, permits tilting in any direction for angle boring.

The table fence is 26 inches long, 2 inches high, and is fitted with a center hold-down stop for the work. The fence is clamped to the table edges by a hand knob at either end, and this mounting provides for its use in any desired position on the table.

Boring Spindle

The spindle is $1\frac{1}{4}$ inches in diameter and runs in ball bearings. It regularly has an 8-inch stroke, but this can be increased to 10 inches on special order. An adjustable stop collar is provided to regulate the length of stroke. The feed is by foot lever or hand pull, and a coil spring provides a quick return stroke. The bit socket is regularly for bits with $\frac{1}{2}$ -inch shanks.

Countershaft

The countershaft is adjustably mounted on the rear of the base and is fitted with an $8\frac{1}{2}$ -inch and $10\frac{1}{2}$ -inch diameter two-step cone pulley for two bit speeds. The fast speed figures 2.65 and the slow 2.12 times the countershaft speed. It has 9-inch diameter by $3\frac{1}{4}$ -inch tight and loose pulleys, and a belt shifter with control lever is conveniently located at the side of the column.

Motor Drive

When motor driven, the countershaft is omitted and the motor is mounted on an attached bracket at the base, for belting direct from its pulley to the 4-inch diameter by $3\frac{1}{2}$ -inch face spindle pulley. A 2-H.P. motor of any speed up to 1800 R.P.M. is recommended.

Range

The range is for bits up to about $1\frac{1}{2}$ inches in diameter and for any length of twist up to 6 inches. The distance from the bit center to the machine column is $14\frac{1}{2}$ inches, and the maximum distance from the bit center to the fence is $9\frac{1}{2}$ inches. The maximum distance from the table to the bit chuck is 18 inches.

Weights and Codes

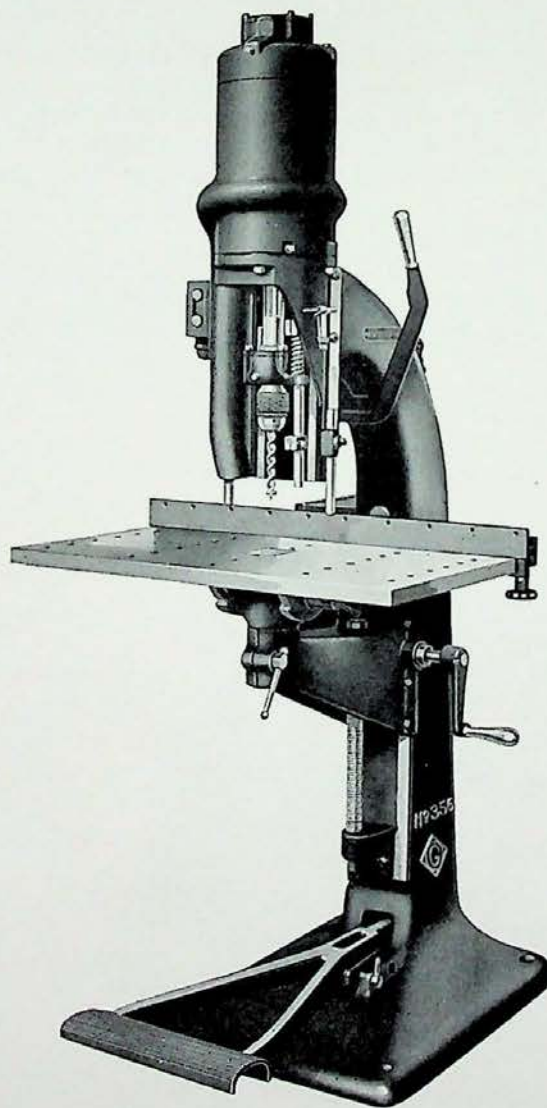
Net weight of No. 355 in pounds.....	900
Net weight of No. 355-M in pounds.....	800
Weight of No. 355 boxed for export.....	1300
Weight of No. 355-M boxed for export.....	1200
Box measure of No. 355 in cu. ft.	55
Box measure of No. 355-M in cu. ft.	55
No. 355 with base countershaft.....	DEGIL
No. 355-M with attached motor bracket.....	DEGOM

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

NOS. 356 AND 357 ELECTRIC BORERS



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

NOS. 356 AND 357 ELECTRIC BORERS

OUTSTANDING in the Greenlee line of Single-Spindle Borers are the two electric machines illustrated in this bulletin. The principle of design is the same for each, since they are built around the idea of a stationary motor, a splined spindle, which slides in a broached sleeve within the motor, and a ball bearing mounted on a slide, which moves with the spindle and supports it in all positions. This design eliminates all belts and gears and provides an ease of operation and accuracy not found in any other style of single-spindle borer.

The No. 356 is the heavier of the two borers, since it has greater capacity and is fitted with a larger motor. It is an ideal general-purpose machine for use in the manufacture of furniture, radio cabinets, automobile bodies, etc., and is now being used for these and many other products in plants throughout the country.

When the No. 356 is to be operated on continuous, high-production work, it is sometimes specified with power feed for the bit spindle, as illustrated on this page. This adds to its efficiency, since it relieves the operator of feeding the spindle and permits faster handling of the stock.

The No. 357 Borer differs somewhat in frame and details from the No. 356, and it is a lighter machine with a smaller motor. It was designed especially for chair work, although it is in no way limited to any one class of boring. An important

feature is that the boring head has very narrow ways to permit working close to the projections of irregularly shaped pieces. In addition, this head can be furnished as a post borer, as illustrated on the last page of this bulletin.

Frames

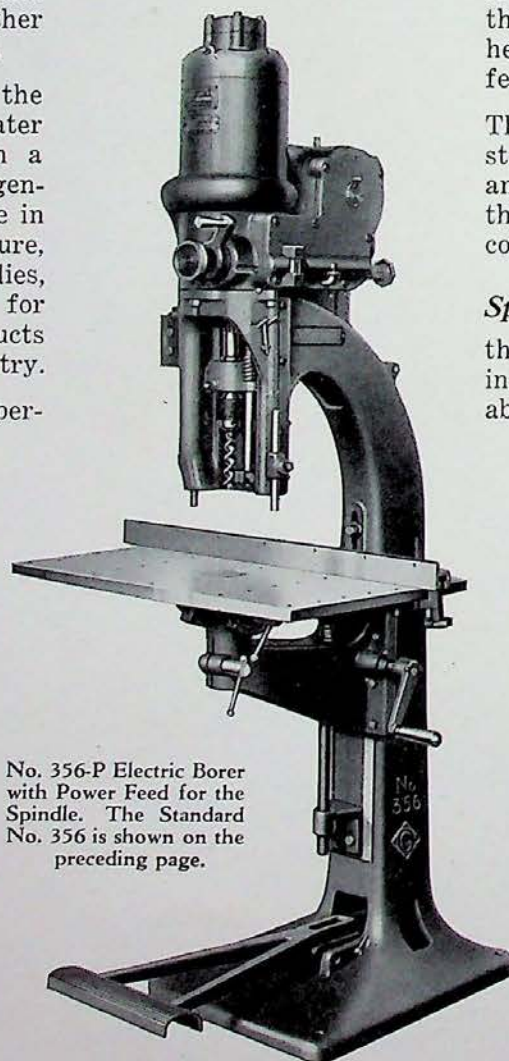
The frame of the No. 356 Borer is a one-piece casting with the column cored out to receive the connections for the foot lever feed. It is well proportioned for rigidity and convenience in boring, and the base is wide spreading and heavy to make the machine perfectly stable.

The frame of the No. 357 is a straight column with three feet, and the boring head is bolted to the upper part. The foot lever connections are on the outside.

Spindles

The spindle of each machine runs in a thrust and supporting ball bearing, which is mounted directly above the bit chuck and which is carried on a slide moving in planed ways. Since the bearing and slide move with the spindle, perfect support is provided in all positions. This is one of the most important features in the design of these borers, because it insures accuracy in boring as a result of the perfect guiding of the bit by the spindle, regardless of the length of the stroke.

The upper end of the spindle has ten milled splines and slides in a broached sleeve within the motor. This construction permits mounting the motor in a stationary



No. 356-P Electric Borer with Power Feed for the Spindle. The Standard No. 356 is shown on the preceding page.

position and makes the feeding movement exceedingly free and easy, because of the absence of all extra weight in the moving parts. The standard bit chuck is of the self-centering type with capacity for shanks up to $\frac{5}{8}$ -inch diameter. Special clusters for boring more than one hole at a time can be furnished.

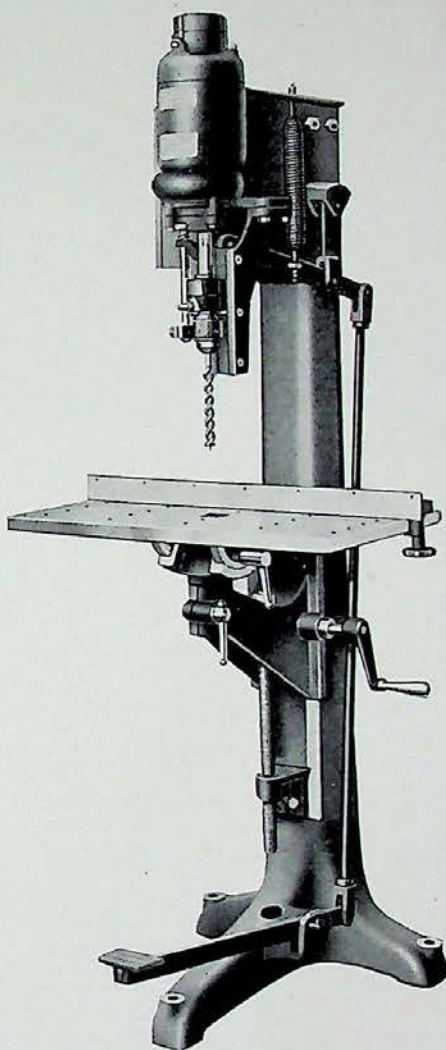
Feed Both machines regularly have foot feed lever for the boring spindle, and the No. 356 has an auxiliary hand lever for use when desired. This, however, can readily be removed. Three positions for the fulcrum of the foot lever provide adjustment for changing the leverage and also the amount of spindle travel in proportion to the movement of the foot lever. Absolute accuracy in the length of the spindle stroke and depth of boring is provided for by means of a lug on the spindle slide, which engages two adjustable stops on the vertical stop rod.

Ease of operation and accuracy in boring are the results of the feeding arrangements described above. Due to the perfect balance of moving parts, only slight pressure is required on the foot lever to operate the spindle. When this is released, the spindle immediately returns to the top position.

Power Feed for No. 356

On the preceding page is an illustration of the No. 356 type of borer with a power-feed spindle. This is known as the No. 356-P. It is especially efficient in shops where duplicate parts are bored in quantity, since it relieves the operator of feeding the spindle and sets the pace for high production.

This power feed mechanism is regularly furnished in addition to the foot lever feed, but the auxiliary hand lever is then omitted. It provides three feed rates of 18, 27 and 42 strokes



No. 357 Electric Borer. Note the narrow ways for the spindle bearing slide for boring close to projections on a piece.

per minute, and the stroke is adjustable from 3 to 6 inches. The drive is from the bit spindle through a worm and worm gear, transmitting motion to a cam through a set of change gears and another worm and worm gear. A convenient handle at the front operates a disc clutch for starting and stopping the feed.

Tables The tables are of the same design but differ in size. The one for the No. 356 is 30 inches by 22 inches, while that of the No. 357 is 30 inches by 16 inches. Each has a back fence with adjustment in any direction over the entire surface, being securely clamped in place by a quick-acting screw clamp at both ends. Screw vertical adjustment is had by a hand crank, and the pivot and cradle mounting permits tilting in any direction for angle boring. A number of holes are provided in the table and fence of each machine for fastening forms or work stops.

Motors The motor of each machine is a 3600-R.P.M., shaftless, alternating type, regularly stocked for 220 or 440 volt current. It is fully enclosed by the housing at the top of the frame and has a built-in blower for forced ventilation. A pipe connection directs the air blast to the work for chip removal. Push-button control is furnished and the starter has overload relays instead of fuses. All wiring is enclosed in conduit.

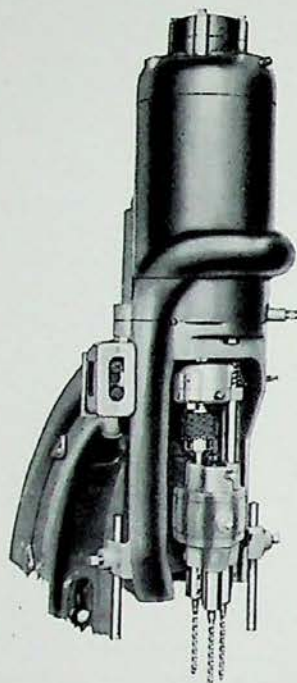
A 3-H.P. motor is standard for the No. 356 Borer and a $1\frac{1}{2}$ -H.P. for the No. 357. The No. 356 can, however, be furnished with a 5-H.P., 3600-R.P.M. motor, or a 3-H.P. at slower speed, and it can be fitted with a two-speed motor. The No. 357 can also have a slower-speed motor in the $1\frac{1}{2}$ -H.P. size, when that is desirable.

Ball bearings for the motor sleeve makes the machine light running and provides long life.

No. 357-A Post Borer

Illustrated to the right is the No. 357-A Post Borer, which consists of the boring head of the No. 357 machine arranged for bolting to a post. It can have foot lever feed for the spindle or it

can be fitted with a hand lever as shown. When desired, both can be supplied.



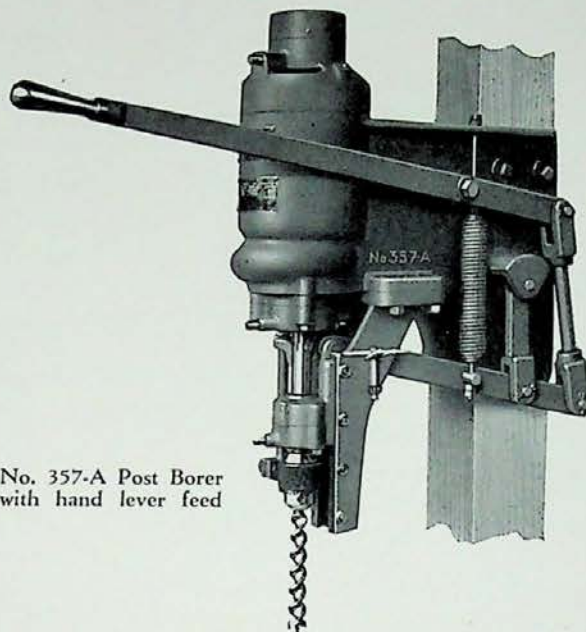
A Special Three-Spindle Cluster on a No. 356 Borer

This electric post borer has become very popular, because of its simplicity and convenience, resulting from the absence of all belts and gears. It can be placed in any position for convenient use, since it is not dependent on any existing belting arrangement for its drive.

Specifications:

Range The No. 356 Borer has sufficient range for the requirements of a single-spindle borer in automobile body, furniture or similar work. It will readily operate bits up to 1½-inch diameter in hard wood, and its stroke is adjustable up to 10 inches. The bit chuck is 42 inches above the floor at the bottom of its maximum stroke. The spindle center is 16 inches from the face of the frame, and the maximum distance from the table to the bit chuck is 25 inches. The table adjusts from 26 to 41 inches above the floor. The spindle stroke of the No. 356-P Power Feed Borer is adjustable from 3 to 6 inches.

The No. 357 Borer will operate 1-inch or larger bits in hard wood, which is sufficient for chair or other furniture work. Its stroke is adjustable up to 6 inches, and the bit chuck is 46 inches above the floor at the bottom of its maximum stroke. Longer spindle stroke can be supplied,



No. 357-A Post Borer with hand lever feed

when required. The spindle center is 18 inches from the face of the column as a standard. The maximum distance from the table to the bit chuck is 22 inches, and the table adjusts from 30 to 46 inches above the floor.

Weight in pounds:

No. 356 Foot-Feed Borer.....	1000
No. 356-P Power-Feed Borer.....	1100
No. 357 Borer with spindle 18" from column.....	900
No. 357-A Post Borer with spindle 18" from post....	300

Codes for No. 356 Borers:

No. 356 Foot-Feed Borer.....	DEHEL
No. 356-P Power-Feed Borer.....	DEHIM
For 5-H.P. motor on above borers, add.....	DEHON
For 3-H.P., 1800-R.P.M. motor, add.....	DEHYS
For a two-speed, 3-H.P., 3600-R.P.M. and 1½-H.P., 1800-R.P.M. motor, add.....	DEJAL

Codes for No. 357 Borers:

No. 357 Borer with spindle center 18" from column..	DEJOP
No. 357-A Post Borer with spindle center 18" from face of post.....	DEKAN

For a 1½-H.P., 1800-R.P.M. motor on above borers, add.....DEKUV

Universal table with knee piece and ways for use with No. 357-A Post Borer.....DEKYX

Plain Table with knee piece and ways, providing vertical adjustment, but without angle adjustment.....DELAP

Separate cast-iron feet for a wood column.....DELES

Hand-lever spindle feed in addition to foot lever on No. 357-A.....DELIT

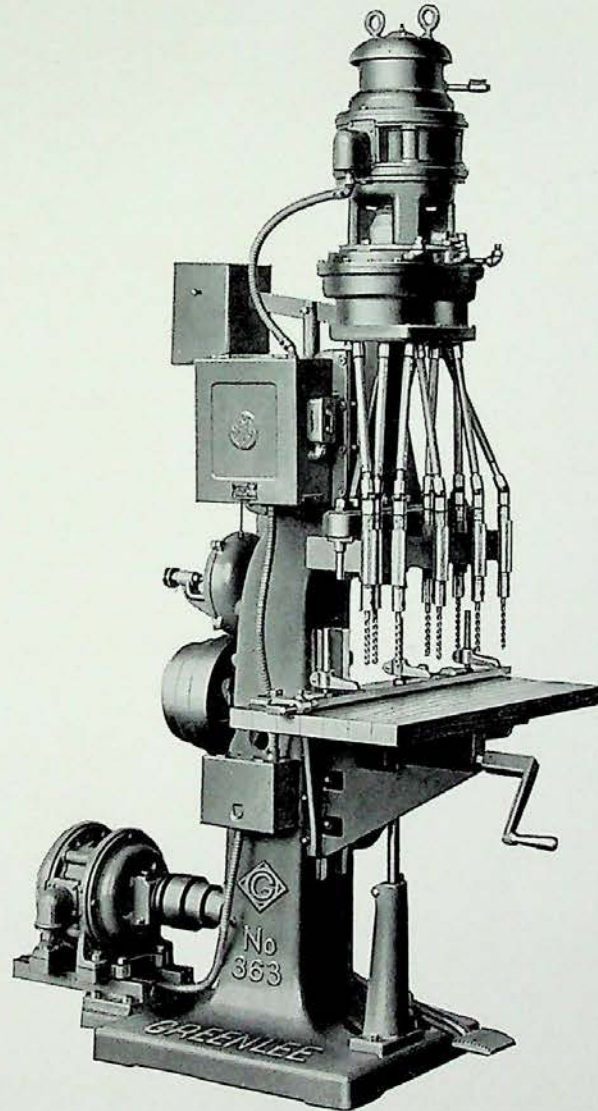
Hand-lever feed substituted for foot lever.....DELOV

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

No. 363 UNIVERSAL-SPINDLE GANG BORER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

No. 363 UNIVERSAL-SPINDLE GANG BORER

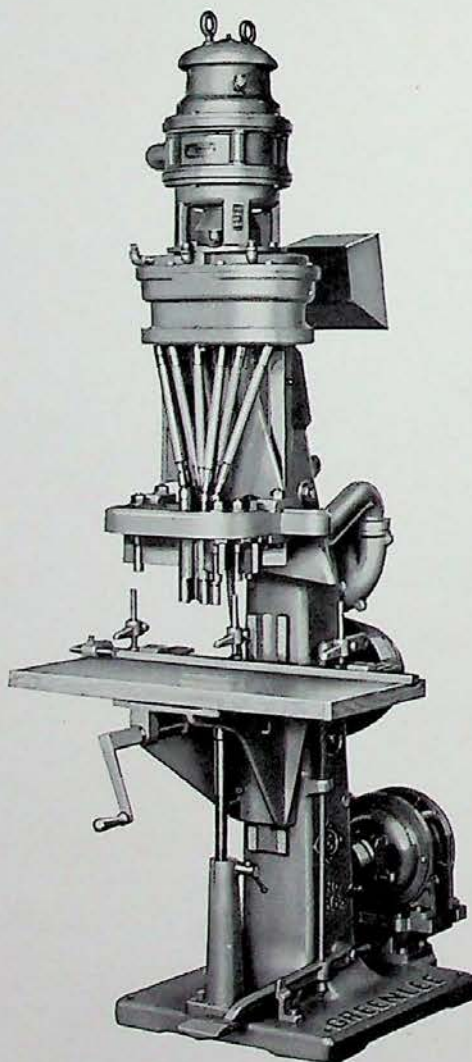
IN practically every plant where automobile bodies, furniture, pianos, radio cabinets, case goods, novelties, etc., are manufactured, there are many small parts to be bored, which can not be handled economically, except on a machine designed for that purpose. And in many plants it is in the boring of these parts that the greatest inefficiency occurs, because such operations are often lost sight of in perfecting methods for handling more important pieces.

To meet this situation, the Greenlee No. 363 Cluster Type of Universal-Spindle Gang Borer is offered. It is especially adapted to the boring and countersinking of small holes in these miscellaneous small parts, and its design permits the boring of irregularly spaced holes on close centers. Two sizes are built, providing for maximum lengthwise spindle spreads of 12 and 22 inches. Each machine regularly has 4-inch cross adjustment.

The general design is along the lines of our power-feed mortisers. The work is handled on a stationary table, and the spindle carriage reciprocates on the frame. This provides for the rapid handling of pieces between continuous strokes of the spindle carriage.

Frame The frame is a strong, one-piece casting with the interior cored out to receive the mechanism of the power feed. In order to

assure perfect alignment, the ways for the spindle carriage and table are planed at one setting. At the rear is a built-in blower with pipe connection to the front to provide an air blast for blowing away the chips, which would otherwise interfere with the rapid handling of pieces, when boring with continuous strokes.



No. 363-M 22-Inch Motor-Driven Borer equipped with a Special Spindle Supporting Bracket for Boring Saw Handles.

Spindle Carriage The spindle carriage is extra long and reciprocates in gibbed ways on the frame. The top is formed into a housing for the spindle drive gears, while at the lower end a slotted bar is cast integrally with it to serve as a support for the adjustable spindle brackets. The 12-inch machine will accommodate a maximum of 6 spindles, and the 22-inch machine can be fitted with 8.

Feed The power-feed mechanism consists of an enclosed worm drive mounted in ball bearings and running in oil. Instant starting and stopping is made possible by the use of a dry disc clutch mounted in a roller-bearing pulley driven from the countershaft or feed motor. When the clutch is disengaged, it acts as a brake to instantly stop the spindle carriage at any point in its stroke.

Wear is reduced to the absolute minimum in the feed mechanism. The clutch discs are of hardened steel and are without any kind of fabric facing. In addition, the design is such that when

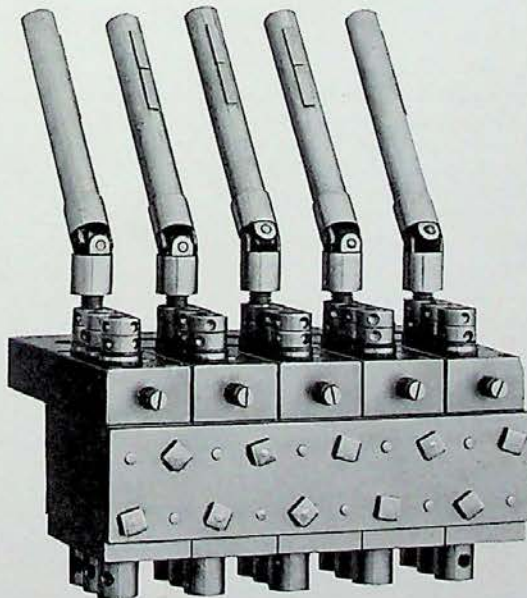
the clutch is running, the shifter lever is not in contact with the spider. This eliminates wear at that point, increasing the life of the parts.

The control is by convenient foot lever, located close to the floor, so that the operator can rest his heel on the floor while working the lever with the ball of his foot. This foot lever has a hold-down lock for use when continuous boring strokes are wanted.

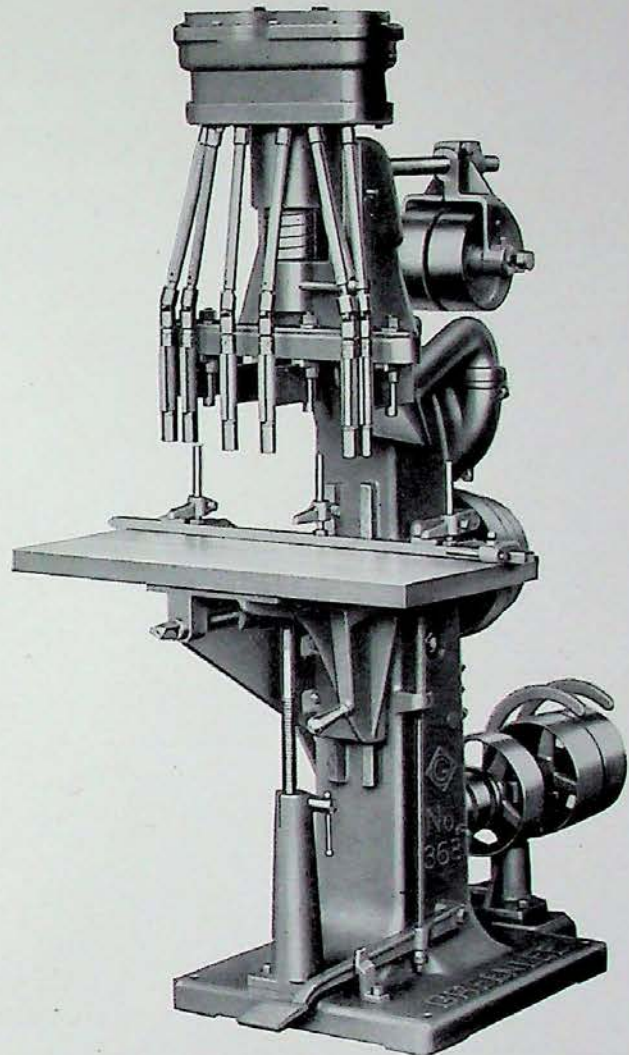
Three feeding speeds are provided by means of the cone pulleys. Slower or faster feeds than the standard can be furnished, and the carriage stroke is also adjustable for three different lengths, to suit the depth of boring.

Spindles The universal spindles are driven by gears housed within the top of the carriage. Standard spindles adjust to $1\frac{1}{4}$ -inch minimum centers, but sizes can be furnished for 1-inch and $\frac{3}{4}$ -inch minimum centers. They are supported by adjustable brackets, which are carried on the slotted bar at the lower end of the carriage.

Special Clusters and Brackets In order to handle the boring of unusual combinations of holes, we are prepared to furnish special fixed center clusters for two or more bits and such special spindle supporting brackets as may be required. The latter



Special Cluster made by Fastening Five 3-Spindle Clusters together for Boring 15 Holes at each Stroke.



No. 363 22-Inch Belt-Driven Borer with Standard Spindle Equipment.

are often specified in order to obtain the close grouping of several standard spindles. Examples of some such special arrangements are illustrated in this bulletin.

Table The table is of hard maple, 18 x 36 inches, supported on a cast-iron knee piece carried on planed ways on the frame. Vertical adjustment is provided by a screw and spiral gears from a detachable crank at the front. Thrust ball bearings make for easy adjustment. The table is equipped with a back fence, an end stop, and hold-down fingers.

Drive When belt drive is required, the machine is furnished with the attached base countershaft having tight and loose pulleys

and a belt shifter. Motor drive is usually provided for by mounting a vertical alternating-current motor on the top of the spindle carriage, for the drive of the spindles, and a horizontal motor on an attached base bracket for the drive of the power feed. They have interlocking wiring and are controlled by push button through a magnetic starter having thermal overload relays and under-voltage protection. In this arrangement the machine is designated as No. 363-M.

Motor drive can also be provided for by using one motor to drive both the feed and the spindles. It is mounted on an attached base bracket and is direct connected to the countershaft.

Specifications

Range With $1\frac{1}{4}$ " spindles, these borers are normally rated for $\frac{5}{8}$ " or smaller diameter bits, although larger sizes are successfully used to a moderate extent in soft wood or for shallow boring under slow feed. The 1" and $\frac{3}{4}$ " spindles should be specified only when they are necessary to obtain the required boring centers. The $\frac{3}{4}$ " spindles are not intended for boring larger than $\frac{5}{16}$ " holes under average conditions.

Two sizes are built, providing for maximum spindle spreads lengthwise of the table of 12" and 22". Both styles permit 4" cross adjustment. The 22" machine will accommodate 8 spindles, while the 12" borer is limited to 6 spindles.

In the rear position on the 22" machine, spindle centers are $9\frac{3}{8}$ " from the face of the machine column, $8\frac{5}{8}$ " from the rear edge of the table, and 6" from the rear position of the regular back fence. These distances are $\frac{5}{8}$ " greater on the 12" machine.

Bit socket diameters:

$1\frac{1}{4}$ " spindles	$\frac{1}{2}$ "
1" spindles	$\frac{3}{8}$ "
$\frac{3}{4}$ " spindles	$\frac{1}{4}$ "

Spindle speeds:

Belted drive	usually 2050 R.P.M.
Double motor drive	1800 R.P.M.

Countershaft for belt drive:

T and L pulleys	10" x $4\frac{1}{4}$ "
Speed	regularly 1150 R.P.M.

Spindle carriage strokes per minute:

With countershaft running 1150 R.P.M.	14, 24 and 34
With countershaft running 850 R.P.M.	10, 18 and 25

Length of spindle carriage stroke..... $2\frac{1}{2}$ " to 4"

Motors on No. 363-M Double-Motor Machine:

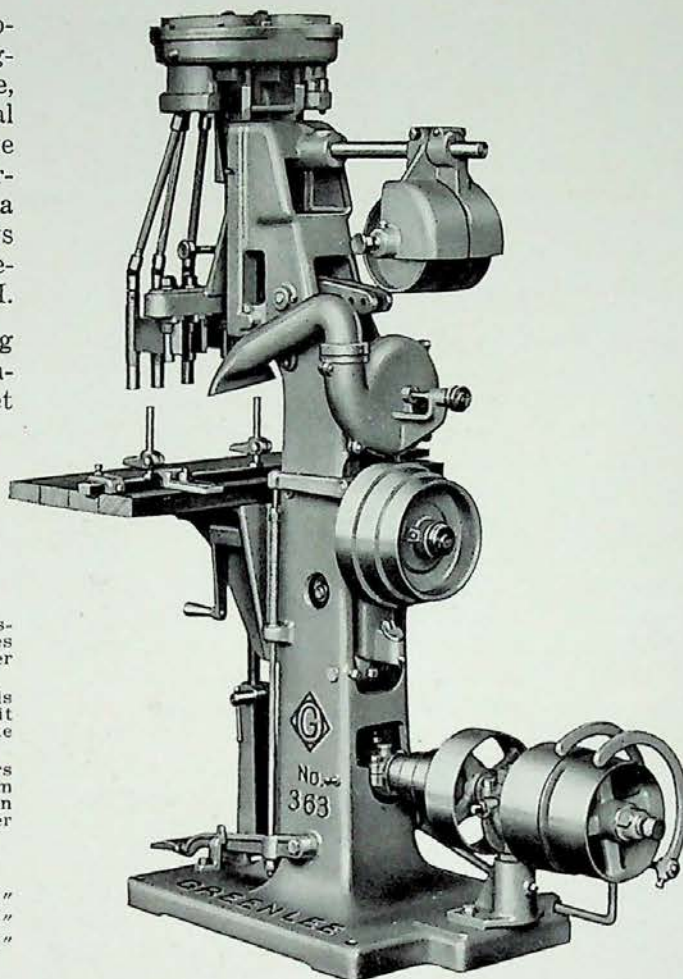
Spindle motor	3-H.P., 1800 R.P.M.
Feed motor	2-H.P., 1200 R.P.M.

Motor for No. 363 Belt-Drive

Machine	3 to 5-H.P., 1200 R.P.M.
---------------	--------------------------

Net weights in pounds:

No. 363 Belt-Drive Borer for 22" centers.....	1500
No. 363 Belt-Drive Borer for 12" centers.....	1450
No. 363-M Motor-Drive Borer for 22" centers.....	1900



Rear View of No. 363 22-Inch Belt-Driven Borer.

Weights boxed for export:

No. 363 Belt-Drive Borer for 22" centers	2050
No. 363 Belt-Drive Borer for 12" centers	2000
No. 363-M Motor-Drive Borer for 22" centers	2550

Box measure in cubic feet:

No. 363 Belt-Drive Borers	60
No. 363-M Motor-Drive Borer	65

Floor Spaceabout 3 ft. x 5 ft.

Codes:

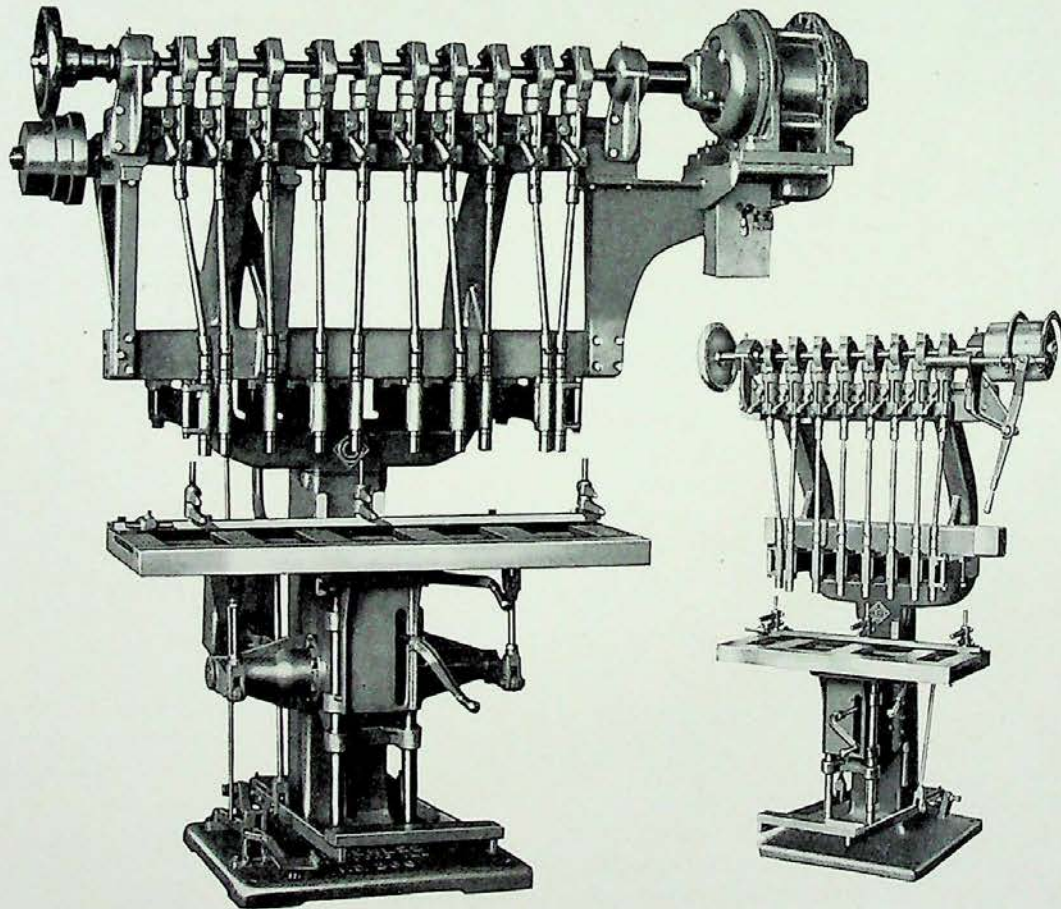
No. 363 Belt-Drive Borer for 22" centers.....	DIJAK
No. 363 Belt-Drive Borer for 12" centers.....	DIJIM
No. 363-M Motor-Drive Borer for 22" centers.....	DIJUP
Standard $1\frac{1}{4}$ " universal bit spindle.....	DIKAL
Light pattern 1" universal bit spindle.....	DIKEM
Extra light $\frac{3}{4}$ " universal bit spindle.....	DIKIN

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U.S.A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

NO. 366 UNIVERSAL-SPINDLE GANG BORER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

No. 366 UNIVERSAL-SPINDLE GANG BORER

THE use of universal spindles on this pedestal-column gang borer means much in the way of increased range and flexibility. It provides for wide cross adjustment, close grouping of spindles, and quick changes in set-up. All of these features broaden its field of application, and the use of ball bearings make for accuracy and low power requirements.

Frame The frame consists of a box-section column with a heavy spreading base, which provides good stability. To the upper end is securely bolted the one-piece, rigidly braced casting, which forms the spindle rail and spindle bracket supporting rail.

Table The table is regularly made of cast-iron with removable wood inserts, but a built-up hardwood table can be substituted. Widely spaced turned steel guides support the table on its knee and secure an easy and accurate feed movement. The long machines have double lever connections to the outer end of the table to distribute the pressure and to prevent springing. A back gauge, an end stop and hold-down stops are regular, but special clamping arrangements can be provided.

Table Feed This borer is regularly furnished with a power feed mechanism in addition to a combined foot treadle and hand lever feed arrangement, which can be used when the power feed is disconnected or omitted. Three speeds are provided and the adjustable stroke is controlled by a convenient foot lever, which permits the table to feed continuously, or to make one complete stroke and stop after engaging the lever.

Spindles Standard ball-bearing spindles work to 1½-inch minimum centers, have 12-inch cross adjustment, and radial adjustment for close grouping, or for boring several holes

in a line across the table. Vertical screw adjustment of two inches can be provided to secure accurate setting of the boring bits for depth. This type of radial spindle can also be furnished for 1 and 1¼-inch centers. In addition, plain spindles, without radial adjustment, can be furnished in all the above sizes, and these are provided with 2-inch vertical adjustment.

All spindles are driven through heat-treated, steel bevel gears having teeth generated on a gear shaper. These are housed together for proper mesh of teeth, but can be quickly disengaged when a spindle is to stand idle.

Drive The spindle drive shaft runs in ball bearings. When belt driven, it is fitted with 9 x 4½-inch tight and loose pulleys, to run 850 R.P.M. Motor drive is arranged by direct connecting to the spindle drive shaft and supporting the motor on a bracket attached to the rails. A 900 R.P.M. motor is standard, and the size varies according to the number of spindles and size of holes.

Range This borer is normally rated for 1-inch or smaller bits and for boring through stock up to 4 inches in thickness. The machine rated lengths are between outside spindles in a vertical position, but the spread can be somewhat greater when required.

Codes and Weights

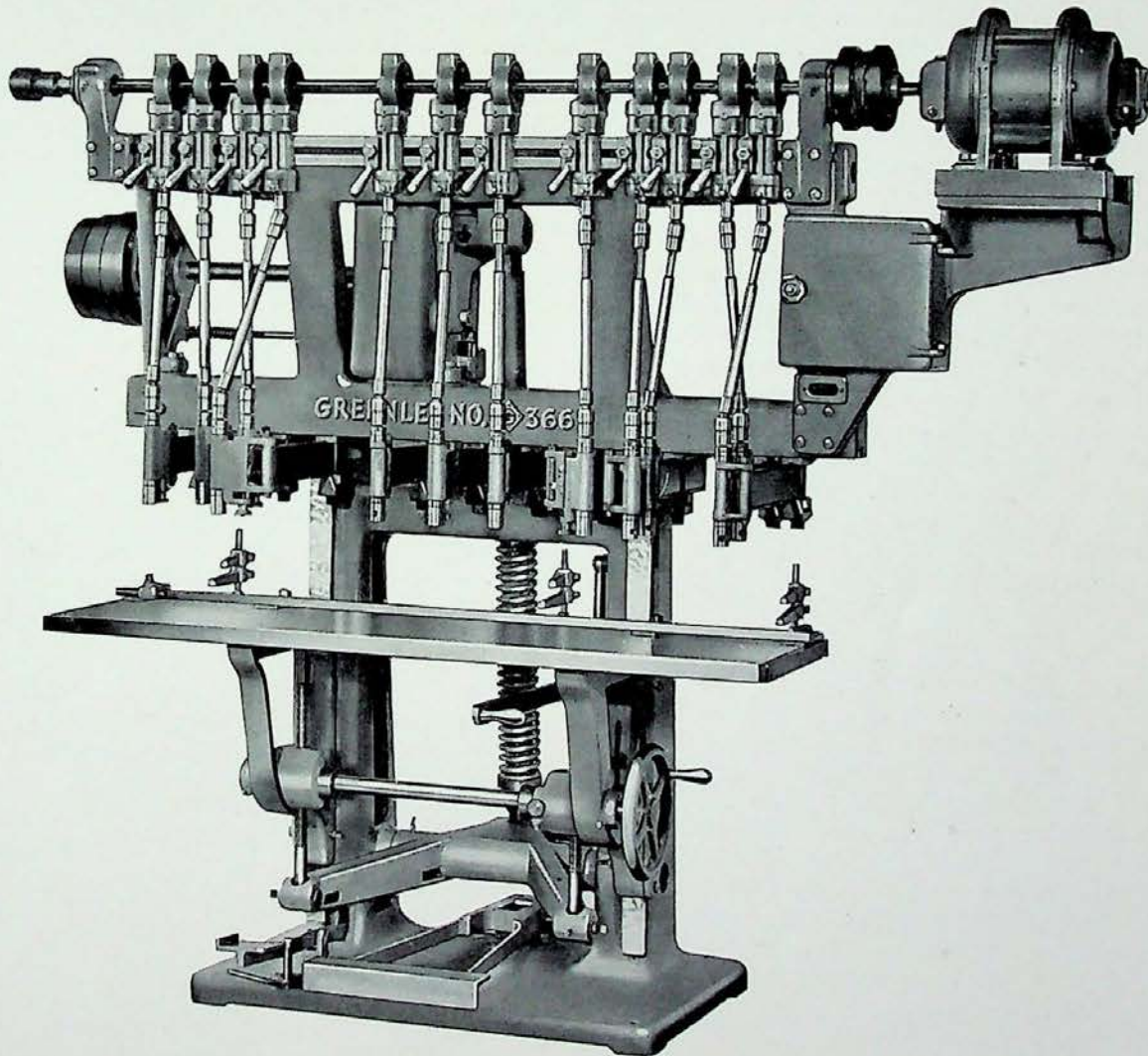
3-foot borer for belt drive.....	DIMOV
4-foot borer for belt drive.....	DIMUX
5-foot borer for belt drive.....	DIMYZ
6-foot borer for belt drive.....	DOFAB
Motor bracket and coupling.....	DOFIF
Standard 1½-inch radial spindle.....	DOFUK
Light 1¼-inch radial spindle.....	DOFYL
Light 1-inch radial spindle.....	DOGAC
Vertical adjustment for radial spindle, add code.....	DOGED
Plain spindle with vertical adjustment, add code.....	DOGIG
Net weight without spindles.....	from 2500 lbs. to 2950 lbs.
Weight boxed for export.....	from 3050 lbs. to 3700 lbs.
Box measure.....	from 70 cu. ft. to 140 cu. ft.
Weight of standard 1½-inch spindles.....	42 lbs.

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U.S.A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

NO. 366-D UNIVERSAL-SPINDLE GANG BORER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

NO. 366-D UNIVERSAL-SPINDLE GANG BORER

EXCEPT for the type of boring spindles used and for the necessary difference in the arrangement for supporting and adjusting them, this machine follows the same design as the No. 369-D Gang Borer. This means that the frame has double columns for supporting the spindle rail and table, and that the cam-feed mechanism provides a uniform travel for the table during the boring stroke.

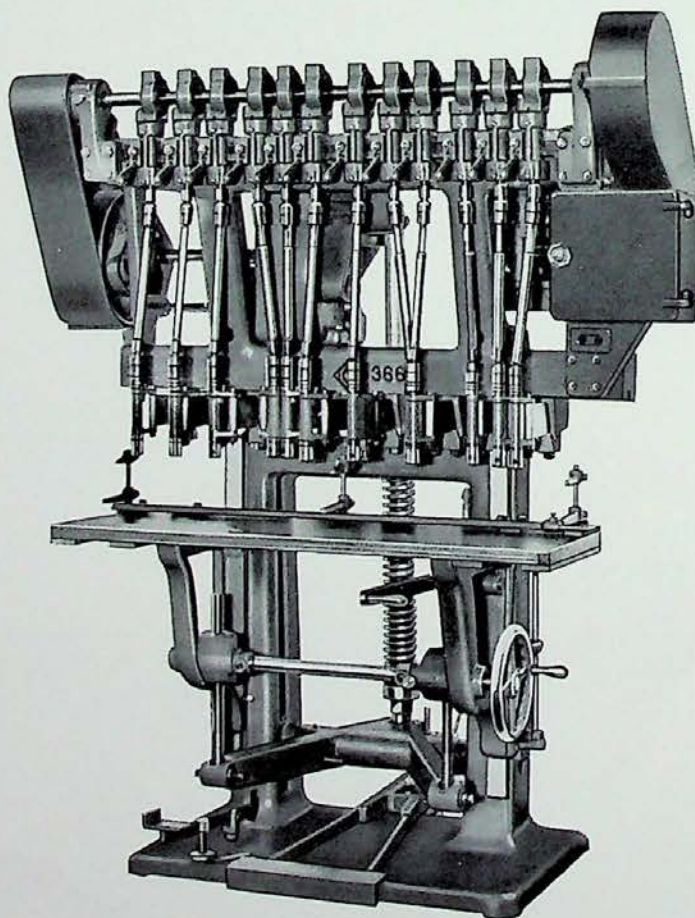
The universal-spindle type of gang borer is adapted to a greater variety of gang boring work than any other, due to its greater flexibility and its wider range of spindle adjustment. The conditions favoring it are where the holes are numerous, either located irregularly or in rows across the piece, on close centers, and where frequent changes in set-up are required. Spindles on this No. 366-D Borer have 12" cross adjustment, and this, in connection with the possibility of close grouping, gives a decided advantage over the straight-rail machine for complicated set-ups.

Frame A wide-flaring base having two vertical box-section columns, joined to form an H, provides a substantial frame having unusual strength and stability. The upper and lower spindle rails are cast in one piece, which insures permanent alignment. The spindle rail frame is securely bolted to the columns, and the complete assembly is of ample proportions to resist the spindle thrust of high-speed production.

Table A hard-maple table top, having a set of adjustable stops and hold-downs, is regularly furnished. It has the advantages that it will not damage the bits, that special forms or clamps can be readily attached and that it is easily renewable. The table is securely fastened to the table knees, which are guided on the frame columns and supported by the table raising screws. The latter have ball thrust bearings and

are cross-connected through spiral gears to a handwheel, giving $\frac{1}{8}$ " table movement for each turn. A knurled thumbscrew locks the setting.

Power Feed The efficient cam feed provides a quick advance of the table toward the bits for one inch, and then four inches of uniform feed, so that each revolution of the bit removes an equal amount of material, thus permitting high bit speeds and faster feed rates. A slight pause at the top of the stroke allows the bits to cut free, making a clean hole. The

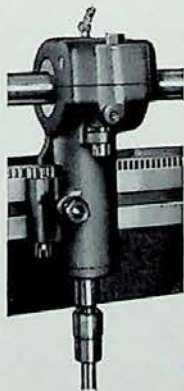


A 4-foot No. 366-D Universal-Spindle Gang Borer with power-feed mechanism, also combined hand and foot feed, V-belt drive, and belt guards. The 5-foot borer on the preceding page is shown with direct connected motor.

down travel is very rapid, and a longer stop at the lower position allows time to replace the bored stock. These features enable the operator to use the continuous feed on many parts, which would otherwise require that the feed should stop after each complete stroke. In addition, the table travels to exactly the same top position on each stroke, so that blind or countersunk holes are bored to uniform depth.

The compact gear box is mounted on the rear, midway between the top and bottom spindle rails, and is securely bolted to the frame. It is oil-tight and dust-proof, protecting the gearing and roller bearings. Oil is automatically distributed to all wearing surfaces. Cut gears, of carefully selected materials, are all mounted on roller bearings and are of ample proportions. The cam rocker arm has convenient screw adjustment to the connecting link for changing the length of the table stroke.

Since the power feed is driven from the spindle drive shaft, it is impossible to operate it when the bits are not running. Cone pulleys furnish a choice of three feed rates. The feed is controlled by a foot pedal, and an ingenious device on the gear box operates the hardened-steel, dry-disc clutch and the automatic brake. A selector, changeable with the foot, provides for continuous or intermittent feeding strokes, and the feed may be jogged or stopped at any point. The power feed can be turned over by a hand crank for testing the set-up.



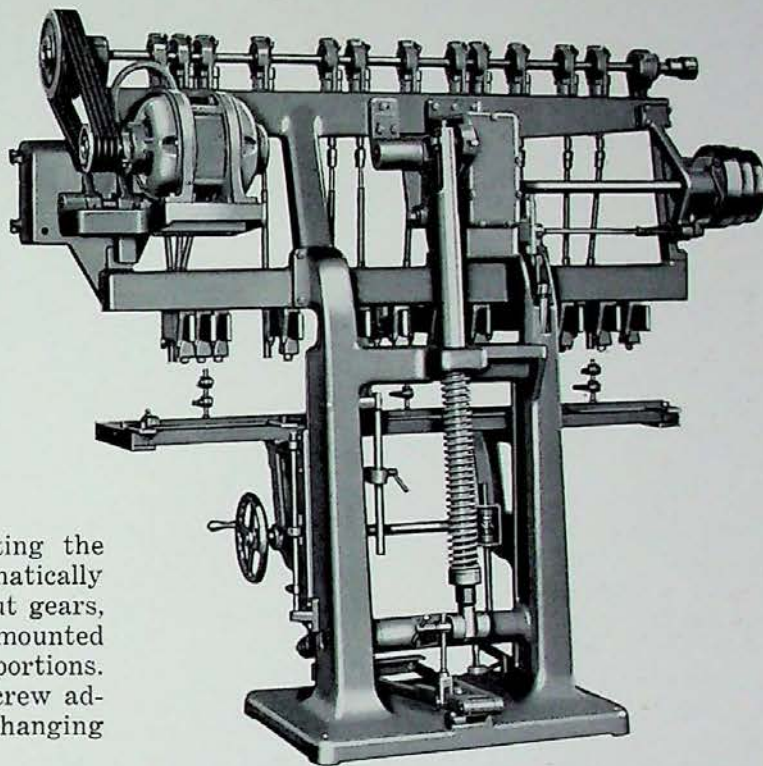
Enclosed roller-bearing top section for drive of any standard spindle. Note rack-and-pinion adjustment and the stud for disengaging the drive.

Foot and Hand Feed

A combined foot and hand-lever feed is regularly supplied in addition to the power feed, but it can be omitted when not wanted. The machine can also be furnished with hand and foot feed only.

Drive

The spindle drive shaft is mounted in sleeves, which run in ball bearings, and it can be withdrawn

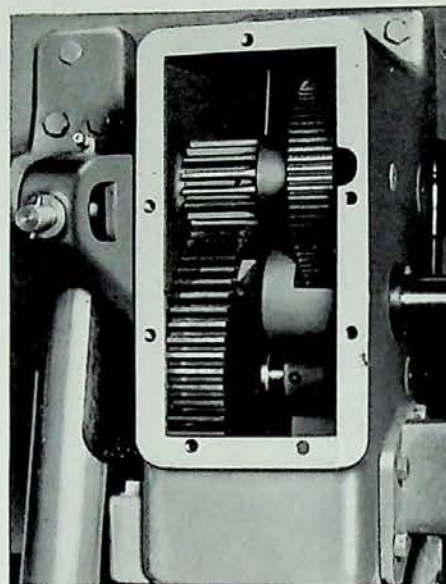


Rear view of No. 366-D with belt guards removed, showing V-belt drive from a motor mounted on a hinged bracket. This view also shows the power-feed mechanism and connections for hand and foot feed.

when changing spindles. It has two spline keys for the accurately-shaped, hardened-steel drive gears, which are attached to the spindle drive units to maintain correct mesh with the spindle gears when the driving units are moved. Totally-enclosed, roller-bearing spindle top drive units with convenient quick disengaging device and rack-and-pinion adjustment are supplied when ordered. The right-hand bearing sleeve is extended for mounting the pulleys when belt driven or to form part of the coupling when directly motor driven. The left-hand sleeve is also extended to form the cone pulley for driving the power feed.

Standard tight and loose pulleys are 9"x 4 1/2", and no separate countershaft is required. Any standard motor of suitable speed can be mounted on an attached motor bracket and coupled to the drive shaft. The standard speed is 900 R.P.M. for average work. When preferred, a hinged motor bracket can be attached to the rear of the spindle rail for V-belt drive, and this provides a more compact arrangement. An 1800 R.P.M. or slower speed motor can then be used.

Spindles Standard ball-bearing spindles work to 1½" minimum centers, have 12" cross adjustment, and radial adjustment for close grouping, or for boring several holes in a line across the table. Vertical screw adjustment of two inches can be provided to secure accurate setting of the boring bits for depth. This type of radial spindle can also be furnished for 1" and 1¼" centers. Spindles with 2" vertical adjustment, but without radial arm, can be furnished. We are also prepared to furnish fixed-center clusters and other special heads to suit unusual boring requirements. In all cases it is suggested that drawings or sample



Power-feed gear box with cover removed, showing compact arrangement of gears and the external cam arm with its screw adjustment for length of table stroke.

parts be submitted for use in working out the best possible combination of boring spindles.

Range This machine is rated for boring holes up to 1" diameter under average conditions. The depth can be to 4" with power feed and 5" with foot feed. When required, the power feed stroke can be increased for boring through 5" stock. The borer is regularly built in lengths of 36, 48, 60 and 72 inches. These rated lengths are between outside spindles in a vertical position, but the end spindles can be spread out to increase these distances by about 9 inches.

Specifications

Table stroke with power feed.....	2½" to 5"
Table stroke with hand and foot feed.....	0" to 5½"
Table strokes per minute:	
With drive shaft running 900 R.P.M.....	9, 16 and 22
Other feed rates of 7, 10 and 14, or 12, 19 and 26 strokes per minute can be furnished when desired.	
Vertical adjustment of table.....	11"
Maximum distance from table to spindle nose.....	15"
Table size.....	{ 20" wide x 6" longer than the rated { maximum spindle centers.
Tight and loose pulleys for belt drive.....	9"x 4½"
Motor size for usual conditions.....	5 or 7½ H.P.
Weight in pounds with T and L pulleys, but without spindles.....	3050 to 3500 lbs.
Floor space.....	rated length plus 29"x 4' 9"

Codes for No. 366-D with T and L pulleys and complete with power-feed mechanism and hand and foot feed arrangement:

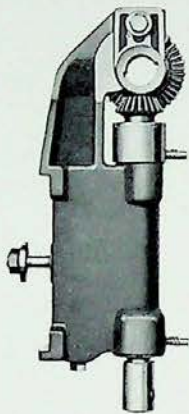
36" machine.....	DIMOV
48" machine.....	DIMUX
60" machine.....	DIMYZ
72" machine.....	DOFAB
Power feed omitted.....	DOFOG
Attached motor bracket and sleeve coupling for direct connected motor drive.....	DOFIF
Motor bracket and pulleys for V-belt drive.....	DOFEC
Standard 1½" radial spindle.....	DOFUK
Light 1¼" radial spindle.....	DOFYL
Light 1" radial spindle.....	DOGAC
Add for radial spindles fitted with 2" vertical adjustment.....	DOGED
Add for plain spindles as above, without radial adjustment, but with 2" vertical adjustment.....	DOGIG

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

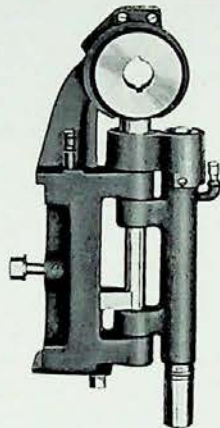
*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

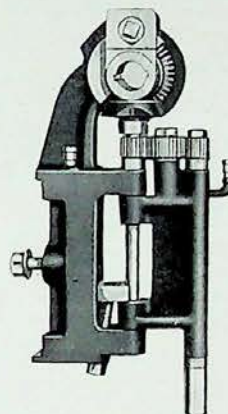
SPINDLE HEADS FOR Nos. 368-371 GANG BORERS



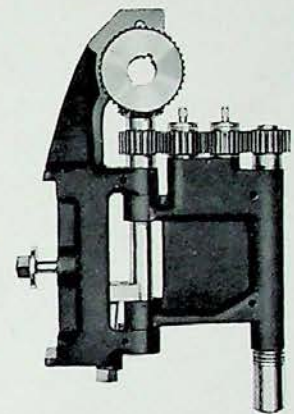
R-2



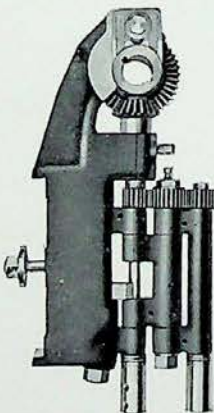
S-5 and S-6



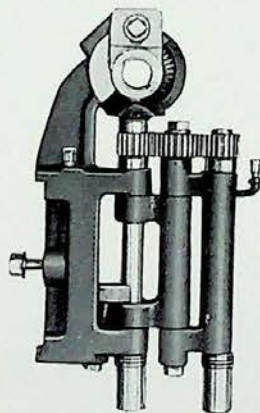
S-7



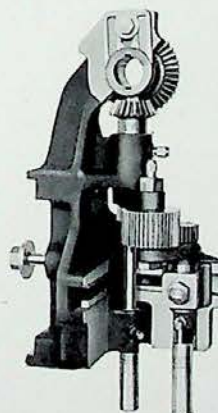
S-8 and S-9



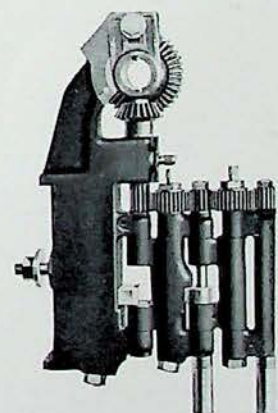
S-11 and S-18



S-12 and S-13



S-15



S-17, S-19 and S-20

Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

SPINDLE HEADS FOR Nos. 368-371 GANG BORERS

THESE Spindle Heads are standard patterns for use on our Nos. 368, 369, 370 and 371 types of Gang Boring Machines. They cover the great majority of requirements, but cluster heads or other special types can be furnished for extremely complicated jobs.

All regular heads require 2½-inch width on the spindle rail for the base and driving gears. The R-2 Plain Heads bore on the common center line only, which is 4 inches in front of the spindle rail. The radial Arm types are adjustable for staggered boring. Double-Spindle Expansion Heads have one spindle on the common center line and the other adjusts radially from it. Universal Extension Heads have cross adjustment for both spindles.

Correct gear mesh is maintained 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 head to allow it to remain idle. All gears are of hardened steel and have accurately planed teeth, and all spindles are ground to size. Bit sockets are regularly for ½-inch round shanks, but screw sockets can be provided. In every installation all gears are fully guarded.

R-2 Plain Head with roller bearings, for straight line boring and working to 2½-inch minimum centers.

S-5 Radial Arm Head with 1¼-inch arm and 2¼-inch maximum cross adjustment. Two of these together will bore to 1¼-inch minimum centers.

S-6 Radial Arm Head with 2-inch arm and 2¼-inch maximum cross adjustment. Two of these together will bore to 2¼-inch minimum centers.

S-7 Radial Arm Head with 3-inch arm and 4¼-inch maximum cross adjustment. Two of these together will bore to 1¼-inch minimum centers.

S-8 Radial Arm Head with 4-inch arm and 5¼-inch maximum cross adjustment. Two of these together will bore to 2¼-inch minimum centers.

S-9 Radial Arm Head with 6-inch arm and 8¼-inch maximum cross adjustment. Two of these together will bore to 2¼-inch minimum centers.

S-11 Double-Spindle Radial Expansion Head for boring two holes on from 1¼ to 3-inch centers and having 4¾-inch maximum cross adjustment.

S-12 Double-Spindle Radial Expansion Head for boring two holes on from 1¼ to 4-inch centers and having 6¼-inch maximum cross adjustment.

S-13 Double-Spindle Radial Expansion Head for boring two holes on from 1¼ to 5-inch centers and having 8-inch maximum cross adjustment.

S-15 Double-Spindle Right-Angle Expansion Head for boring two holes on from 1 to 3-inch centers, either parallel to the rail or at right-angles to it. Can be furnished either right or left-hand and made special for holes on from 1 to 6-inch centers.

S-17 Double-Spindle Universal Extension Head with spindles adjustable from 1 to 3-inch centers and having a 2¾-inch extended radial arm, which permits boring to a maximum distance of 5¾ inches in front of the common center line and provides a maximum cross adjustment of 9 inches. Can be specially arranged for ¾-inch minimum centers.

S-18 Double-Spindle Radial Expansion Head for boring two holes on from 1 to 3-inch centers and having 4¾-inch maximum cross adjustment.

S-19 Double-Spindle Universal Extension Head of same design and maximum range as No. S-17, but for 1¼ to 3-inch centers and 9¼-inch maximum cross adjustment.

S-20 Double-Spindle Universal Extension Head, same as No. S-17, but for 1¼ to 4-inch centers and having a 3½-inch extended radial arm, which permits boring to a maximum distance of 7½ inches in front of the common center line and provides a maximum cross adjustment of 10½ inches.

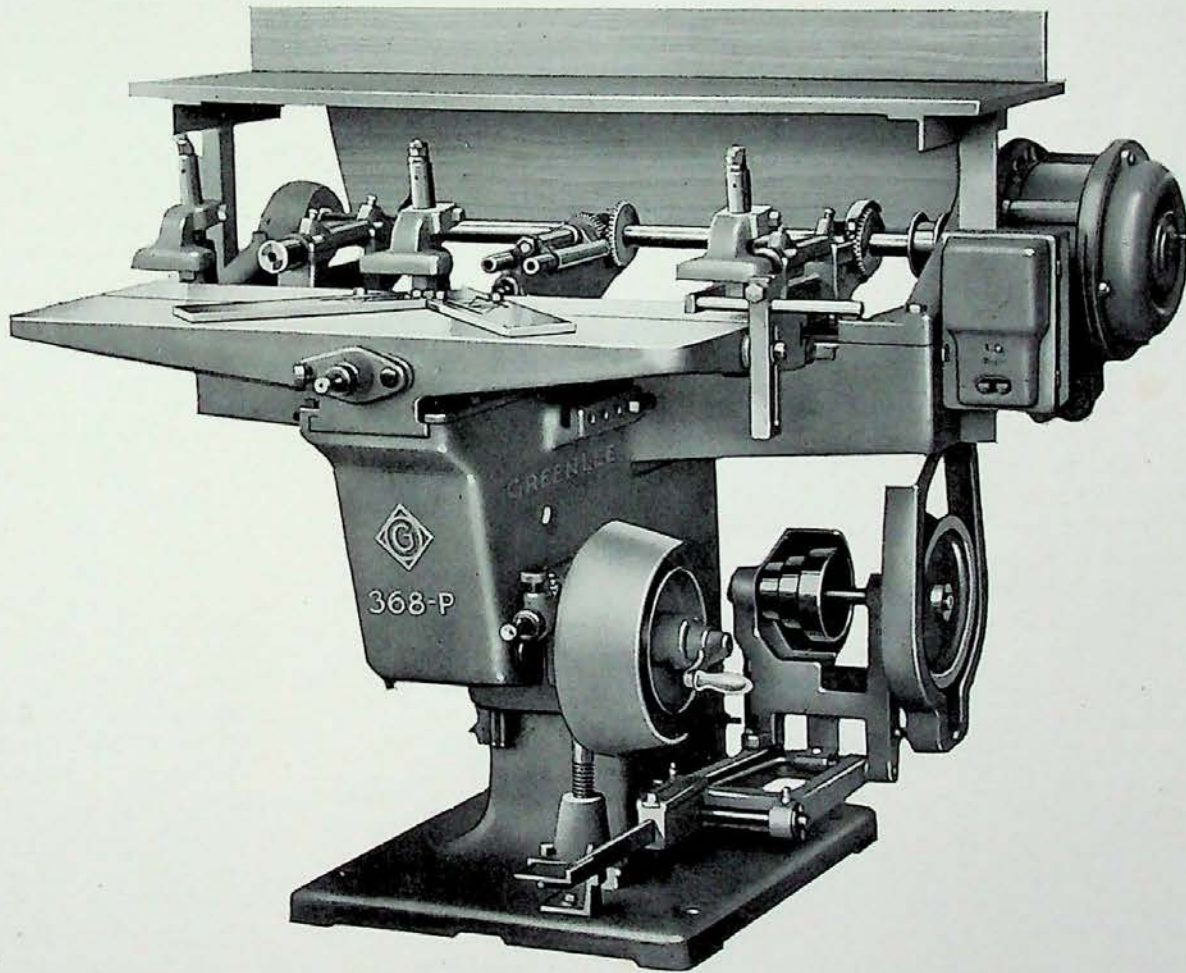
Cross Extension Brackets, increasing the transverse range up to 20 inches beyond the common center line, can be furnished for the No. 369 and No. 371 Vertical Machines.

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

No. 368 TYPES OF HORIZONTAL GANG BORERS



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

No. 368 TYPES OF HORIZONTAL GANG BORERS

THE Greenlee No. 368 Foot-Feed Gang Borer has long been favorably known in the furniture and cabinet industries, because of its simplicity, convenience of operation and accuracy of boring. But there was a need for a power-feed borer of similar range, and for this the No. 368-P was developed. It is a high-production machine for boring short rails and small parts, and its design retains as much as possible of the simplicity which characterizes the foot-feed machines. Both borers have efficient clamping devices to hold a wide variety of shapes, while their accuracy fits them especially for dowel boring and similar precision work.

Each machine is regularly built in two lengths, providing maximum distances between outside spindles of 20 and 30 inches for the No. 368 Foot-Feed Borer, and 24 and 34 inches for the improved No. 368-P Power-Feed machine.

No. 368-P Power-Feed Gang Borer

Frame A sturdy pedestal base, a heavy spindle rail securely bolted and dowelled in place, and a table knee mounted in large dovetailed ways with adjustable gibs, form the frame of this machine. The spindle rail is amply strong to resist boring thrust under high production and to permanently maintain alignment, while the extra depth of the ribs permits mounting a motor directly on the end of the rail, eliminating the necessity of using a motor bracket. Its rear

side is slotted so that the spindle head clamp nuts can be easily reached with an ordinary open-end wrench. The box-type table knee also forms a dirt-proof, oil-tight gear case for the feed mechanism, giving adequate protection and lubrication, making for accuracy and long life.

Table The table is of cast-iron with deep, heavy ribs to remove all possibility

of warping or springing. Long gibbed ways on the center portion form the top of the gear box and insure accurate movement and long wear. A T-slot lengthwise of the table top holds fences or forms, while another in the forward edge

receives the clamp units and bushing plates. The table is adjustable for depth of boring by a crank screw, which has a lock to avoid end play.

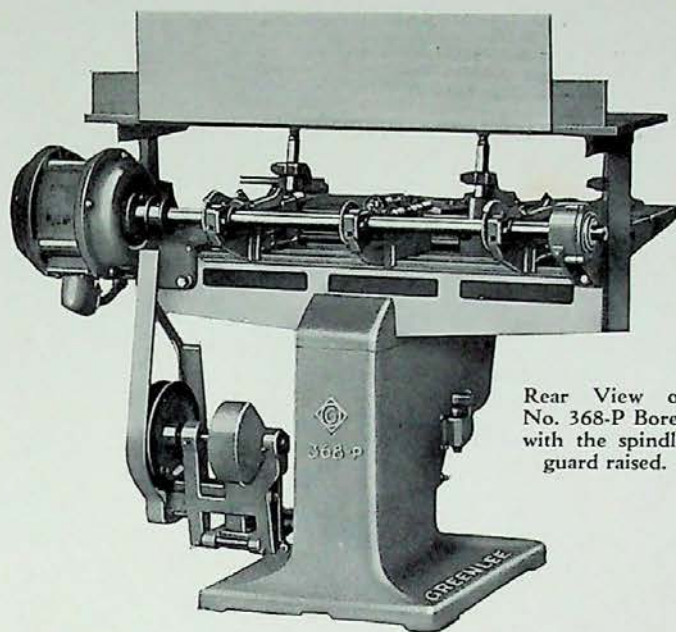
A new type of flat gauge has been developed to assist the rapid handling of material under fast production.

It consists of two pieces attached to the table by T-bolts and arranged to be quickly located for square, 22½ and 45 degrees, but can be set at any other angle. They can be adjusted to and from the forward edge as well as lengthwise of the table. These gauges are used for end boring or as a back fence on stock not over 5 inches wide. The universal end stop can be used at either end of the table.

Feed A heavy cam gear in the table knee operates the table feed. The first 2 inches of infeed are fast, to bring the work to



No. 368-P Motor-driven Power-Feed Gang Borer. A view of this machine from the motor side is shown on the preceding page.



Rear View of
No. 368-P Borer
with the spindle
guard raised.

the bits, then the feed is uniform for the other 2 inches, so that each revolution of the bit cuts an equal amount. This arrangement permits high feed rates without overcrowding the bits and with the least possible strain on the feed mechanism and frame. A pause at the end of the stroke enables the bits to clear themselves for uniform depth of boring. A quick return stroke follows with a pause of sufficient duration to permit changing the stock.

The power feed is driven from the spindle drive shaft, so that there is no possibility of operating the feed when the bits are not running. Three rates of feed are provided by the cone pulleys. A foot pedal, placed conveniently close to the floor, releases the feed and applies the automatic brake. The feed can be started, stopped or jogged as desired, and means are provided for testing the set-up by hand. The machine is equipped with ball and roller bearings, each being carefully chosen with reference to its application.

Clamps Three cam-actuated, rubber-faced power clamps with adjustable spring pressure are regular equipment. They feed down on an angle to securely hold the stock against the front stops on the clamp posts, are easily set for thickness of material, and are positive in action. The hardened plate cam attached to the table knee is quickly regulated for timing the

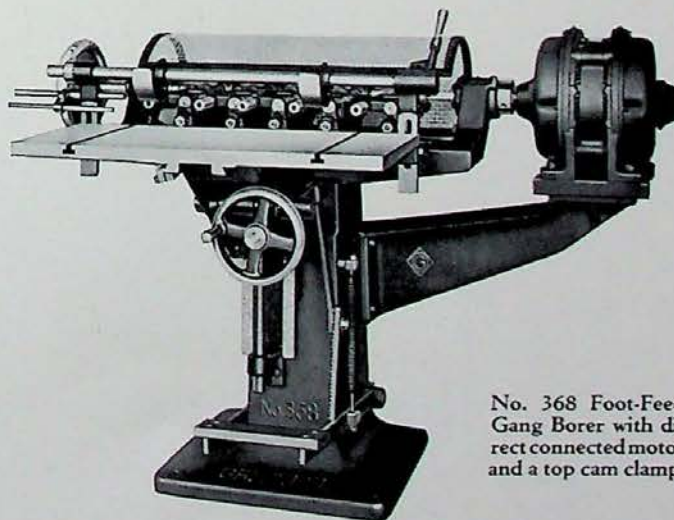
cam stroke. Hand clamps or special back fences can be furnished when required.

Drive The spindle drive shaft is carried in ball-bearing sleeves and can be withdrawn for changing the spindle heads. It has two splines for the hardened steel driving gears, which are housed with the pinions on the heads, and which maintain correct gear centers when spindle centers are changed. A simple means is provided for disengaging the drive of any spindle. When belt driven, the tight and loose pulleys are mounted on the right bearing sleeve. For motor drive, the motor is built onto the end of the spindle rail, as shown in the illustrations.

No. 368 Foot-Feed Gang Borer

The frame is constructed in proportion to the lighter demands of a foot-feed machine.

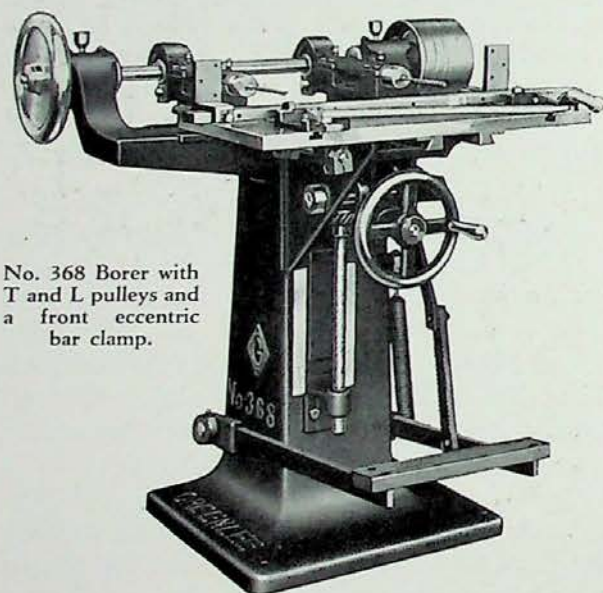
The feed is by means of a double foot treadle with adjustable linkage, so that it can be kept close to the floor. Stop collars limit the table movement and insure accurate boring depth. The table is provided with a T-slot on the forward edge for clamps, stops or bushing plates. Two T-slots crosswise of the table hold a clamp or a back fence. The top cam clamp for thin, flat stock is regular, but the eccentric bar clamp for thick material or the adjustable back fence may be furnished as required. The clamps are hand operated, and suitable end stops are provided for average boring needs.



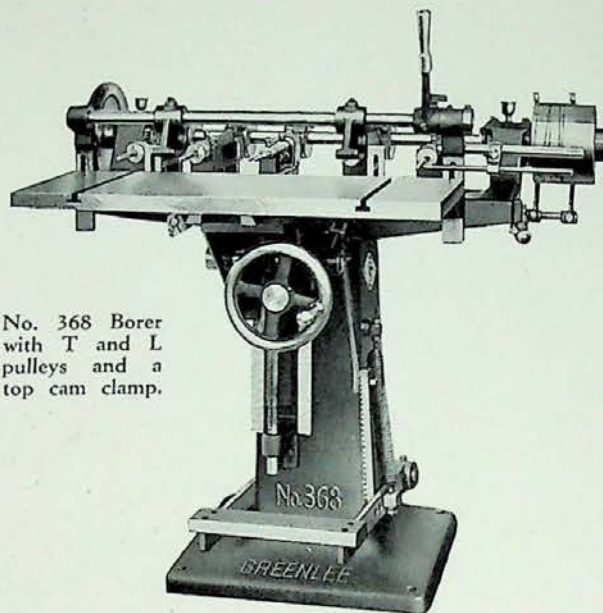
No. 368 Foot-Feed
Gang Borer with di-
rect connected motor
and a top cam clamp.

The drive is similar to the 368-P, except that when a motor is used, it is the standard ball-bearing type mounted on an attached motor bracket and is coupled to the spindle drive shaft.

Spindle Heads Both machines use our standard straight-rail spindle heads, which are interchangeable on the Nos. 369, 370 and 371 Borers. They are furnished in plain, radial arm and adjustable-spindle types, and will handle a wide variety of work. We are also prepared to furnish fixed-center clusters and other special heads to suit requirements.



No. 368 Borer with T and L pulleys and a front eccentric bar clamp.



No. 368 Borer with T and L pulleys and a top cam clamp.

Specifications

Maximum Spindle Centers:	
No. 368	20" and 30"
No. 368-P	24" and 34"
Feed stroke:	
No. 368	up to 6"
No. 368-P	4"
Maximum boring depth:	
No. 368	5½"
No. 368-P	3"
Strokes per minute on No. 368-P	
13, 19 and 26	
Other feed rates can be furnished as required.	
Bit capacity (varies with conditions)	
1"	
Table size:	
No. 368	14"x 28" and 14"x 38"
No. 368-P	16"x 28" and 16"x 38"

Maximum distance from table to spindle centers:	
No. 368	8"
No. 368-P	3"
Maximum thickness under standard clamps:	
No. 368	3"
No. 368-P	3½"
Minimum distance from table to spindle nose:	
No. 368	0"
No. 368-P	¾"
Horizontal table adjustment on No. 368-P	
3"	
R.P.M. of drive shaft	
1200	
Tight and loose pulleys	
8"x 3½"	

Standard motor size:	
No. 368	2-H.P.
No. 368-P	3-H.P.

Floor space:	
No. 368	42"x 42" and 42"x 52"
No. 368-P	50"x 47" and 50"x 57"

Net weights:	
No. 368	1025 lbs. and 1100 lbs.
No. 368-P	1575 lbs. and 1650 lbs.

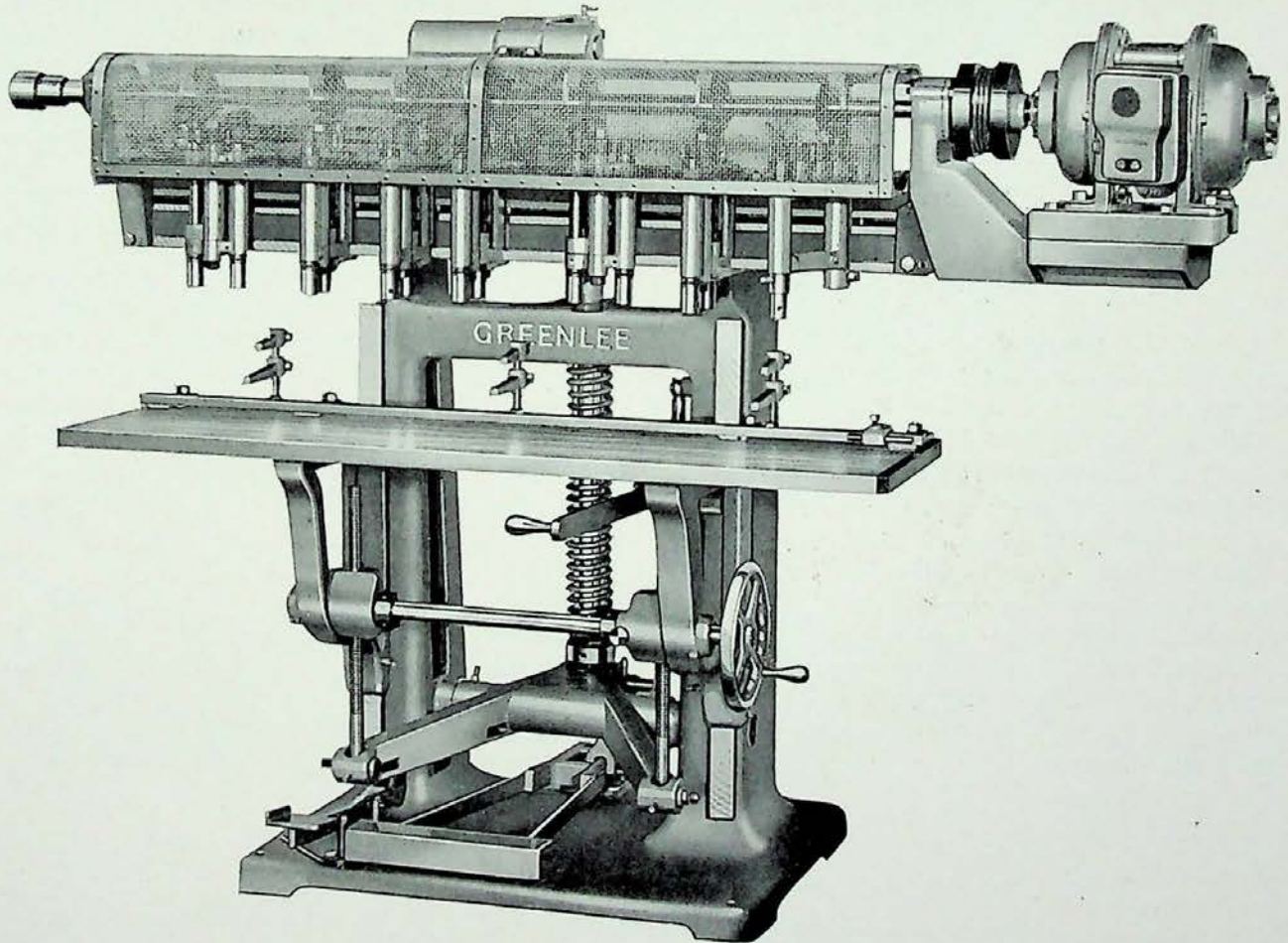
Codes:	
No. 368—20" with T and L pulleys	DUJOL
No. 368—30" with T and L pulleys	DUJUM
Add for motor bracket on No. 368	DUKIL
No. 368-P—24" with T and L pulleys	DUGAB
No. 368-P—34" with T and L pulleys	DUGEC
No. 368-P—24" with motor	DUGIF
No. 368-P—34" with motor	DUGOG

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

No. 369-D DOUBLE-COLUMN VERTICAL GANG BORER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

NO. 369-D DOUBLE-COLUMN VERTICAL GANG BORER

HERE is a Gang Borer that has been designed to meet all the requirements of modern production. It includes all the advantages of the single pedestal type of borer, in addition to providing for the higher spindle speeds suitable for modern cutting tools, and the faster feeds made possible by its rigid construction and its uniform cam feed for the table. These features provide for dependable accuracy and a corresponding increase in efficiency. Built in lengths of from 3 to 6 feet and using Greenlee standard boring heads, this machine is suitable for boring a wide variety of parts.

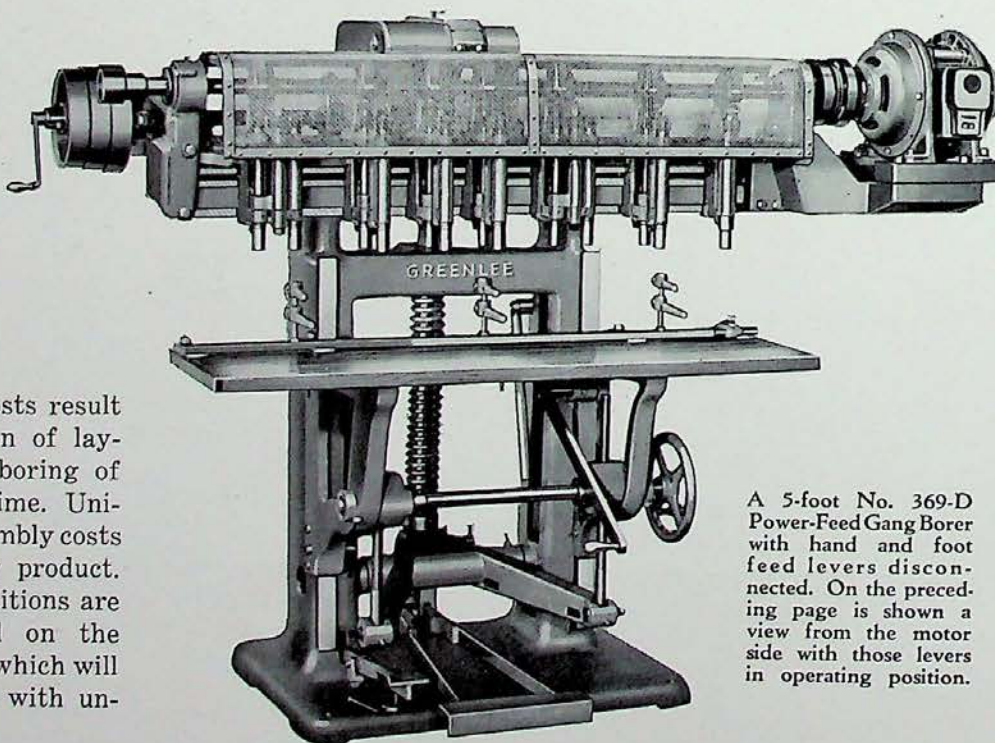
Vertical Gang Borers are popular for various reasons. The work is always in plain sight, it is easy to handle the stock on and off the table, stock lies flat for face boring, and the boring thrust is taken directly by the table mounting. While no one type of gang borer can possibly meet all conditions, vertical machines have a much wider application, and this particular straight-rail machine meets the requirements of many shops.

The merits of gang boring are generally recognized.

Lower machining costs result from the elimination of lay-out work and the boring of many holes at one time. Uniformity reduces assembly costs and makes a better product. These desirable conditions are more than fulfilled on the Greenlee No. 369-D, which will produce rapidly and with unvarying accuracy.

Frame A wide-flaring base having two vertical box-section columns joined to form an H provides a substantial frame having unusual strength and stability. The box-type straight spindle rail, of ample proportions to resist the spindle thrust of high production, is securely bolted to the upper ends of the frame and provides permanent alignment. Long narrow ways on each column for the two table knees give that essential freedom from tilting of the table which is so necessary for accuracy.

Table A hard maple table top, having a set of adjustable stops and hold-downs, is regularly furnished. It has the advantages that it will not damage the bits, that special forms or clamps can be readily attached and that it is easily renewable. The table is securely fastened to the table knees, which are guided



A 5-foot No. 369-D Power-Feed Gang Borer with hand and foot feed levers disconnected. On the preceding page is shown a view from the motor side with those levers in operating position.

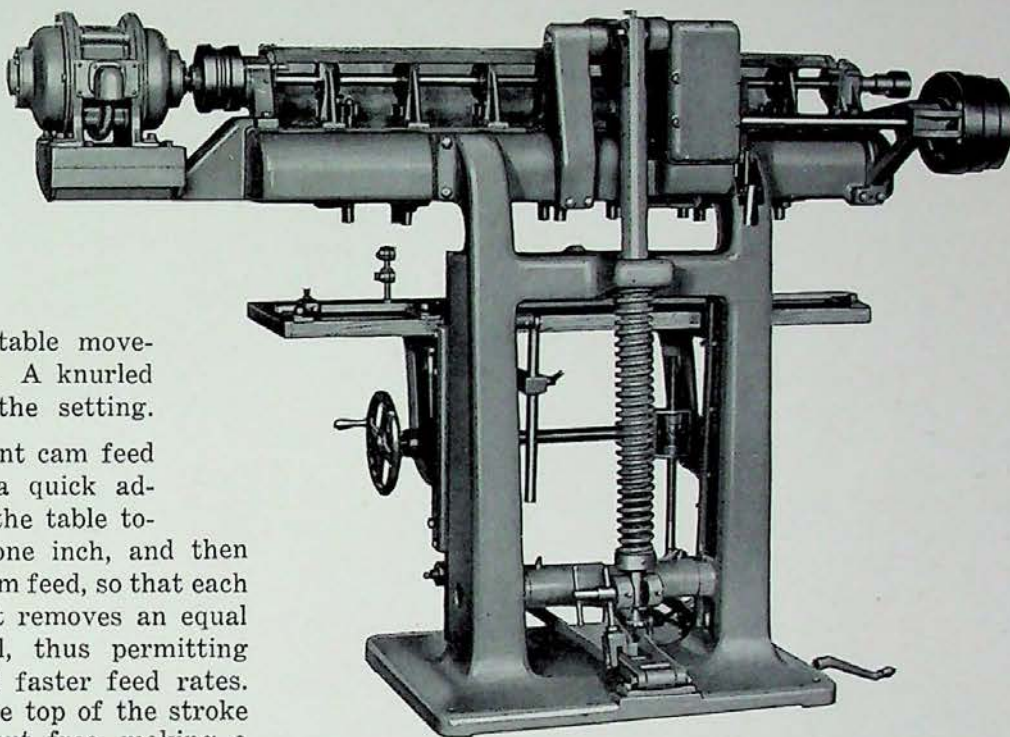
on the frame columns and supported by the table raising screws. The latter have ball thrust bearings and are cross-connected through spiral gears to a hand-wheel, giving $\frac{1}{8}$ " table movement for each turn. A knurled thumbscrew locks the setting.

Power Feed

The efficient cam feed provides a quick advance of the table toward the bits for one inch, and then four inches of uniform feed, so that each revolution of the bit removes an equal amount of material, thus permitting high bit speeds and faster feed rates. A slight pause at the top of the stroke allows the bits to cut free, making a clean hole. The down travel is very rapid, and a longer stop at the lower position allows time to replace the bored stock. These features enable the operator to use the continuous feed on many parts which would otherwise require that the feed should stop after each complete stroke.

The compact gear box is mounted on the rear side of the spindle rail, and the connections are so arranged that the feed thrust counterbalances the bit spindle thrust. It is oil-tight and dust-proof, protecting the gearing and roller bearings. Oil is automatically distributed to all wearing surfaces, including the bronze bearings of the cam arm rocker shaft. Cut gears, of carefully selected materials, are all mounted on roller bearings and are of ample proportions. This unique design has arranged them with the heavy cam arm on the outside, so that the case is surprisingly small.

The heavy feed link forms a part of the table counterbalance, the adjustable portion being supplied by the spring surrounding it and eliminating the usual counterweights. The rocker arm is designed to prevent twisting and uneven table movement. Hoist screws connect directly into the rocker arm and avoid extra connecting links between those parts.



Rear view of No. 369-D showing the table power feed mechanism and the hand and foot-feed arrangement. Note the sturdy construction of the entire machine.

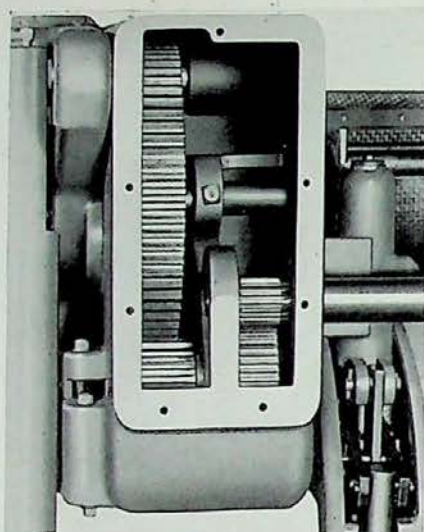
Since the power feed is driven from the spindle drive shaft, it is impossible to operate it when the bits are not running. Cone pulleys furnish a choice of three feed rates. The roller-bearing feed drive shaft is far enough above the floor to provide space for truck storage, and no floor stands are required. The feed is controlled by a foot pedal, and a clever device on the gear box operates the hardened-steel dry-disc clutch and the automatic brake. A selector, changeable with the foot, provides for continuous or intermittent feeding strokes, and the feed may be jogged or stopped at any point. The power stroke can be turned over by a hand crank for testing the set-up.

Foot and Hand Feed

A combined foot and hand lever feed is regularly supplied in addition to the power feed, but it can be omitted when not desired. The machine can also be furnished with hand and foot feed only. Long leverages on the nicely counterbalanced table give extremely easy movement, which enables the operator to produce very efficiently where the work is not too heavy.

Drive

The spindle drive shaft is mounted in sleeves which run in ball bearings, and it can be withdrawn when changing spindles. It has two spline keys for the accurately planed, hardened steel drive gears, which are attached to the spindle heads to maintain correct mesh with the spindle gears when the heads are moved. The right-hand bearing sleeve is extended for mounting the pulleys when belt driven or to form part of the coupling when motor driven. The left-hand sleeve is also extended to form the cone pulley for driving the power feed. Standard tight and loose pulleys are 9x4½",

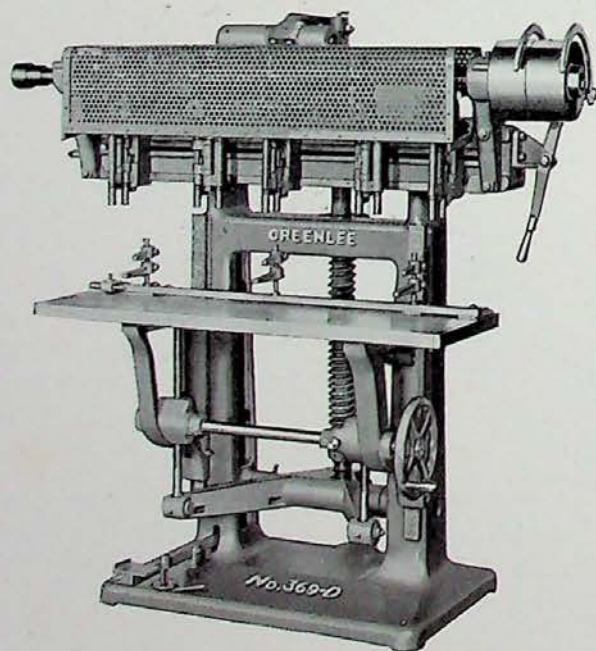


Power-Feed Gear Box with cover removed, showing compact arrangement of gears, external cam arm and control device.

and no separate countershaft is required. Any standard motor can be mounted on the attached motor bracket and coupled to the drive shaft. The standard speed is 1200 R.P.M. for average work.

Spindle Heads

This machine uses our standard straight-rail spindle heads, which are interchangeable on the Nos. 368, 370 and 371 Borers. They are furnished in plain, radial-arm and adjustable-spindle types, and will handle a wide variety of work. We are also prepared to furnish fixed-center clusters and other special heads to suit unusual boring requirements.



A 4-foot No. 369-D Borer with tight and loose pulleys and with power feed, but with hand and foot-feed levers omitted.

Specifications

Range

This machine is rated for boring average holes up to 1-inch diameter, although larger holes can be bored. The depth can be to 4 inches with power feed and 5 inches with foot feed. It is regularly built in lengths of 36, 48, 60 and 72 inches. Maximum spindle centers are slightly more than rated length with plain single-spindle heads.

Table stroke with power feed..... 2½" to 5"
Table stroke with hand and foot feed..... 0" to 5½"
Table strokes per minute:

With drive shaft running 900 R.P.M..... 9, 16 and 22

With drive shaft running 1200 R.P.M..... 13, 22 and 30

With drive shaft running 1800 R.P.M..... 14, 22 and 29

Other feed rates can be furnished.

Vertical adjustment of table..... 11"

Maximum distance from table to spindle nose..... 15"

Tight and loose pulleys for belt drive..... 9"x 4½"

Motor size for usual conditions..... 5-H.P.

Net weight in pounds with T and L pulleys, but without boring heads..... 2450 to 2900

Floor space..... rated length plus 28½"x 41"

Codes for No. 369-D with T and L pulleys and complete with power-feed mechanism and hand and foot feed arrangement:

36-inch machine DULAK

48-inch machine DULEL

60-inch machine DULIM

72-inch machine DULON

Add for machine with power feed only..... DUNAN

Add for machine with foot and hand feed only..... DUNEP

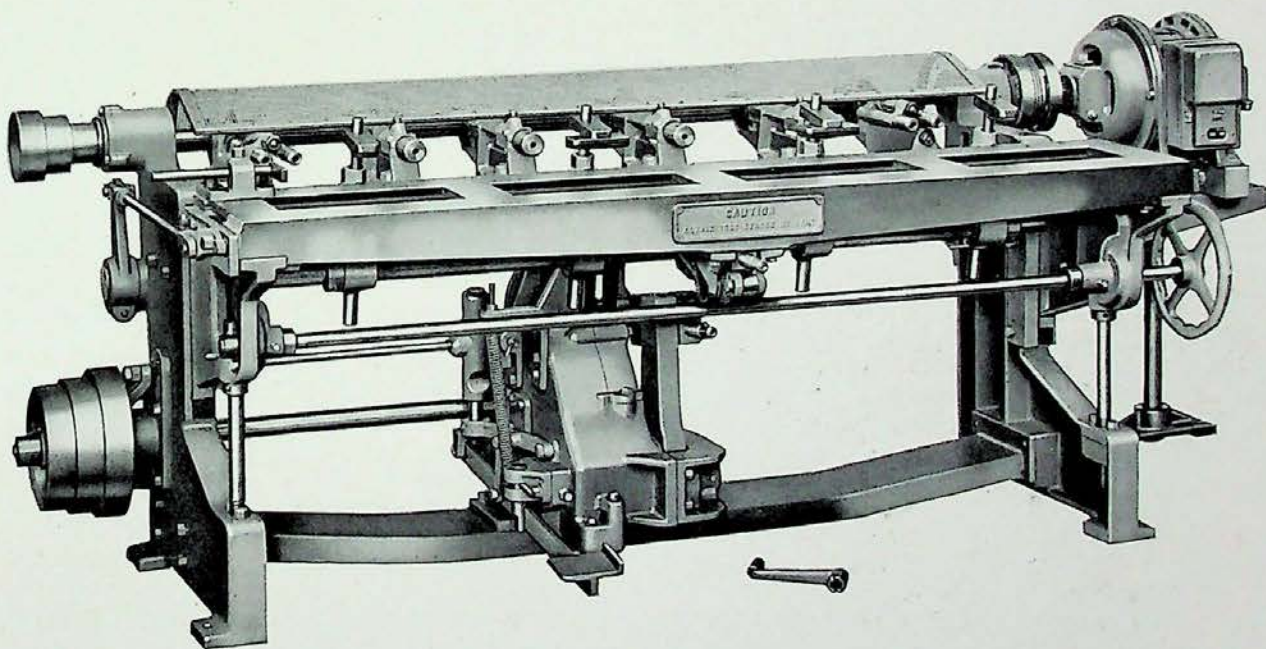
Attached motor bracket DUPAP

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

No. 370 TYPES OF HORIZONTAL GANG BORERS



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

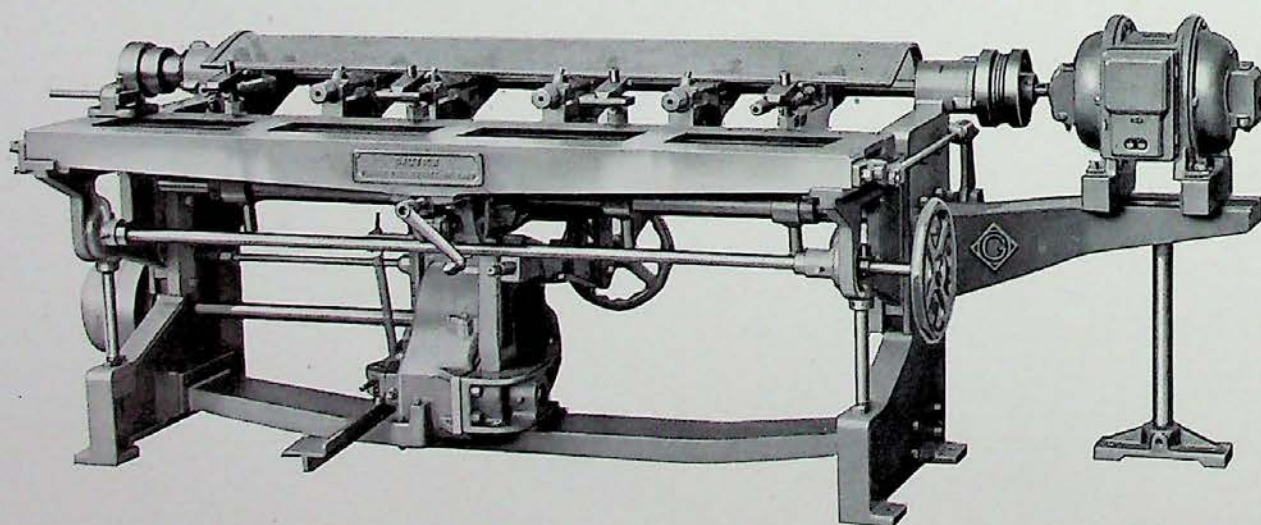
No. 370 TYPES OF HORIZONTAL GANG BORERS

THESE machines find their application particularly in the edge boring of flat stock in the manufacture of such parts as table leaves and long rails. They are also capable of handling a wide variety of general boring to advantage, and their accuracy makes them a logical choice for boring dowel holes. The No. 370 Foot-Feed Borer is for use on pieces difficult to handle or where the quantities are small or production demands are relatively light, while the No. 370-C Cam-Feed Borer will efficiently meet the situation when rapid production is required on quickly-handled material. Both are ruggedly and carefully constructed to fill the demand for a precision borer of wide range.

Both machines take our standard straight-rail spindle heads which are also interchangeable on the Nos. 368, 369 and 371 Gang Boring Machines. They are furnished in plain, radial arm, and adjustable double-spindle types and are illustrated on a separate circular. These heads will handle a variety of boring work, and we are also prepared to furnish special fixed-center clusters when required.

Frame The frame consists of two heavy end castings rigidly connected by the spindle rail and a structural steel lower girt of welded construction. These four members are carefully scraped and dowelled at the joints so that accurate permanent alignment is assured. The spindle rail is of three-quarter box section, heavily constructed to resist the spindle thrust without springing. Slots in the rear side give free access to the nuts holding the spindle heads. The table knees are of the bracket type, substantially constructed and held on scraped surfaces of the end frames by heavy gibs. They are carefully lined up to give perfect travel of the table parallel to the bit spindles. Height adjustment is by means of two screws, so placed as to relieve the gibs of over-hanging strains. They are cross-connected through spiral gears to a natural-grip handwheel, and a thumb-screw lock for the handwheel shaft is provided.

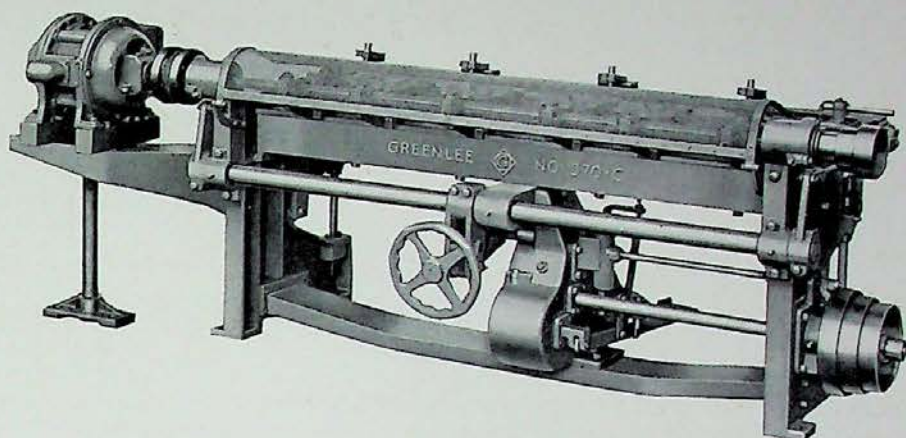
Table These borers have tables of well ribbed cast-iron construction, which prevents springing and warping. The No. 370-C is exceptionally heavy in order to adequately



No. 370-C Power-Feed Borer with Power Clamp and Direct-Connected Motor. A view from the feed-pulley end is shown on the preceding page.



resist the extreme loads of power feed and automatic clamping. A dovetail slot with inserted wooden fillers provides a means of locating forms, clamps, or special feeding devices and leaves space for chips to drop through. A T-slot in the forward edge is used for attaching clamps, front stops or bushing plates. The table for the No. 370 Foot-Feed Machine is mounted on rollers so that very little effort is required to operate it.



Rear view of No. 370-C Power-Feed Borer with Direct-Connected Motor.

Stops and Fences Adjustable end stops are regularly supplied, having a bracket which can be attached to the table in a number of positions. Stops are also attached to the forward edge of the table. When clamps are omitted an adjustable back fence is furnished to take the bit thrust.

Hand Clamps Hand-operated clamps are of two optional types: the top cam clamp for wide or thin stock, which must be held flat on the table, and the horizontal eccentric bar-connected clamp for thick material, which requires clamping on the side opposite the boring face. An endwise centering device can be furnished when it is necessary to equalize slightly varying lengths of stock, as on table leaves and similar parts.

Power Clamps Automatic, rubber-faced clamps are regular equipment on the power-feed machine. They are cam operated, have adjustable spring pressure, and pull forward at a slight angle to straighten the material and hold it firmly against the machined pads on the clamp posts. The cam mechanism is located at the center of the table so that all clamps pull down evenly. A crank screw, projecting from the front of the table, permits timing the clamp movement as required. Two wide-faced and two narrow-faced clamp units are usually furnished. They are easily adjusted for the thickness of material being bored.

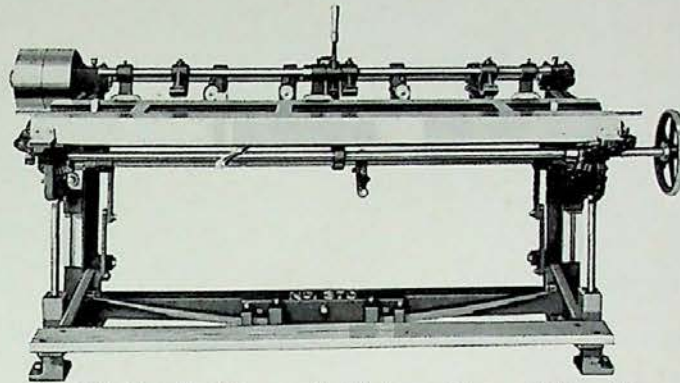
Foot Feed Ease of operation is obtained by the long leverage of the combined hand lever and foot treadle feeds. Both lever and treadle are adjustable to the most conven-

ient position. A heavy torque-resisting rocker shaft with connecting arms and adjustable links to both ends of the table, insure equal movement at each end for accurate depth of boring. Adjustable collar stops dependably limit the length of the boring stroke.

Power Feed The powerful cam feed provides a uniform table travel for the boring stroke and a quick return. This type of feed has the advantage that each revolution of the bits removes an equal amount of stock, and it also permits a pause at the outer position, giving plenty of time for removing and inserting stock under the clamps. This makes for rapid production and provides the maximum in efficiency. Either intermittent feed, making one complete stroke and stopping, or continuous feed can be obtained by a simple indexing device on the foot pedal control. Either feed can be stopped instantly at any point in the stroke by tripping the foot pedal.

The feed is driven from the spindle drive shaft by cone pulleys, providing three feed rates, and the mechanism consists of a hardened-steel, dry disc clutch with automatic brake, a cam and gearing in an oil-tight case, and adjustable linkage giving the required length of stroke and quick adjustment for depth of boring. The latter adjustment can be operated by using the crank in front of the machine, but the handwheel at the rear is provided as an added convenience, since the operator has an unobstructed view from this position. There is also provision for turning the feed over by hand crank to try out a set-up. All rotating parts in the feed mechanism are equipped with anti-friction bearings.

Hopper Feed Various types of hoppers have been developed which can be used to advantage on the power-feed borers for the quantity production of small and medium sized parts. With such an arrangement, the bored pieces are discharged at the front of the machine.



No. 370 Foot-Feed Borer with Tight and Loose Pulleys, Top Cam Clamp and Endwise Centering Device.

Drive The spindle drive shaft is mounted in sleeves which revolve in ball bearings. This mounting permits the shaft to be withdrawn to add or remove spindle heads. The bearing sleeve on the right end is extended to carry the tight and loose pulleys for belt drive or a coupling for direct-connected motor drive, and the left sleeve is extended to form a cone pulley on the 370-C Power-Feed Machine. The drive shaft has two spline keys for the hardened

spindle gears. These accurately planed and hardened steel gears are housed with the spindle pinions, so that correct mesh is maintained at all times. A simple device provides for disengaging the drive on spindles not in use. Direct-connected motor drive has a standard ball-bearing motor coupled to the drive shaft and mounted on an attached bracket.

Range Bits up to 1-inch diameter can be used regularly, and larger sizes can be operated in many woods. Holes up to 6 inches deep can be bored, except that on the 370-C, when power clamps are used, the maximum depth is 5 inches. These machines are built in lengths of 4, 5, 6, 7 and 8 feet. The maximum spindle centers with plain heads are actually 4 inches greater than the rated lengths.

Specifications

No. 370-C Power Feed Borer

Table Stroke.....	2" to 7"
Table length.....	Machine rated length plus 16"
Table width.....	14 1/4"
Table height.....	31" to 34"
Distance from table to spindle at infeed position.....	1 1/2" to 3 1/2"
Maximum thickness under standard clamp.....	3 3/4"
Strokes per minute with 1150 R.P.M. of spindle drive shaft.....	10, 17 and 24
Other feed rates can be furnished as required.	
Floor space.....	Rated length plus 36"x 40"
Net weight in pounds.....	3200 to 4000

No. 370 Foot-Feed Borer

Since this machine has the same frame and table as the No. 370-C, its general specifications are very similar.

The following exceptions should be noted, however:

Table stroke.....	0" to 7"
Maximum thickness under standard vertical clamp.....	4 1/4"
Floor space.....	Rated length plus 17"x 46"
Net weight in pounds.....	1550 to 2350

Codes

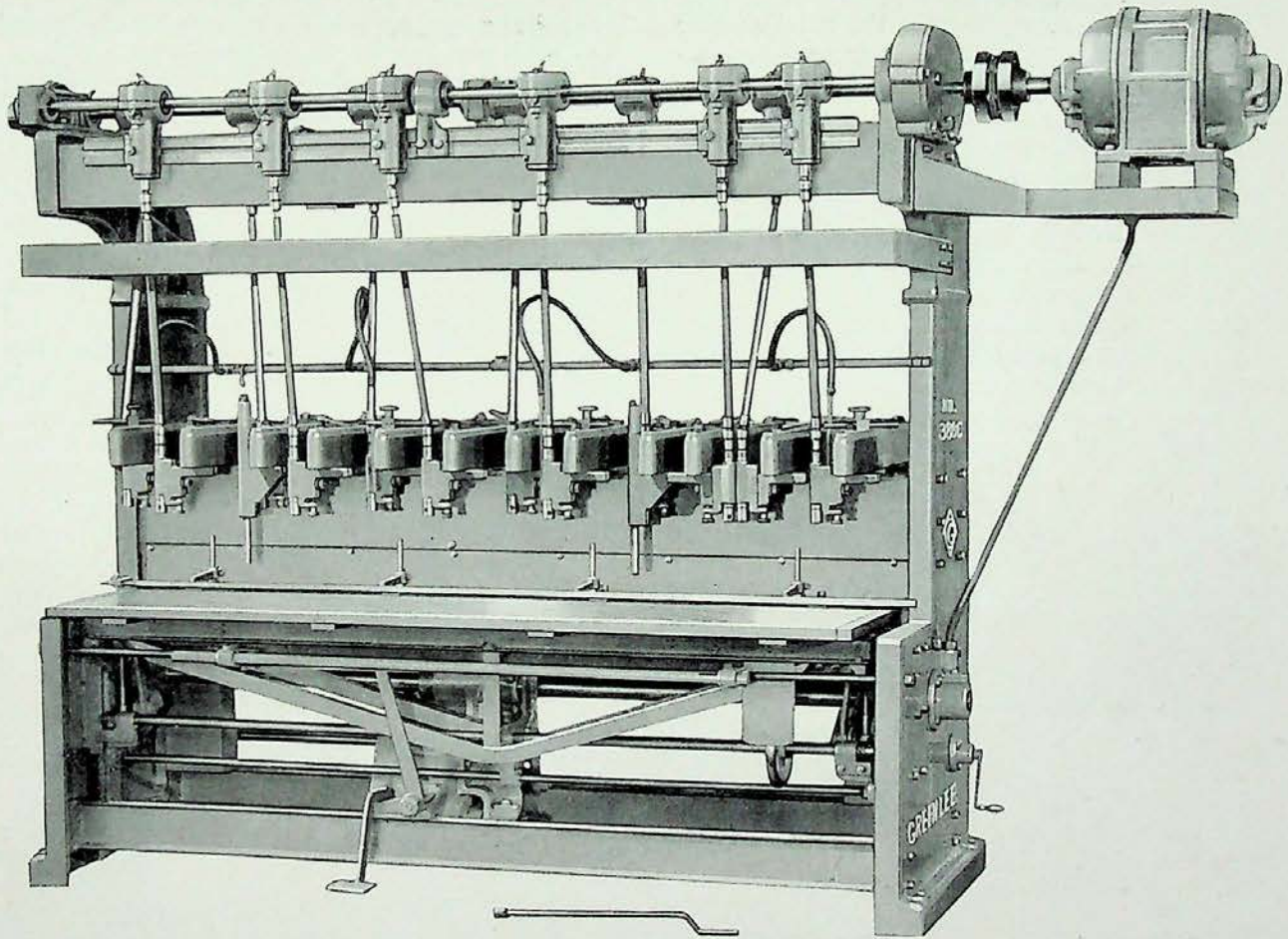
No. 370-C 4-ft. Borer with T and L pulleys.....	FEKUS
No. 370-C 5-ft. Borer with T and L pulleys.....	FEKYT
No. 370-C 6-ft. Borer with T and L pulleys.....	FELAN
No. 370-C 7-ft. Borer with T and L pulleys.....	FELEP
No. 370-C 8-ft. Borer with T and L pulleys.....	FELIS
Add for motor bracket and coupling on 370-C.....	FELYX
No. 370 4-ft. Borer with T and L pulleys.....	DUPUX
No. 370 5-ft. Borer with T and L pulleys.....	DUPYZ
No. 370 6-ft. Borer with T and L pulleys.....	DYHAB
No. 370 7-ft. Borer with T and L pulleys.....	DYHEC
No. 370 8-ft. Borer with T and L pulleys.....	DYHIF
Add for motor bracket and coupling on 370.....	DYJIG

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

No. 386 UNIVERSAL-SPINDLE GANG BORERS



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

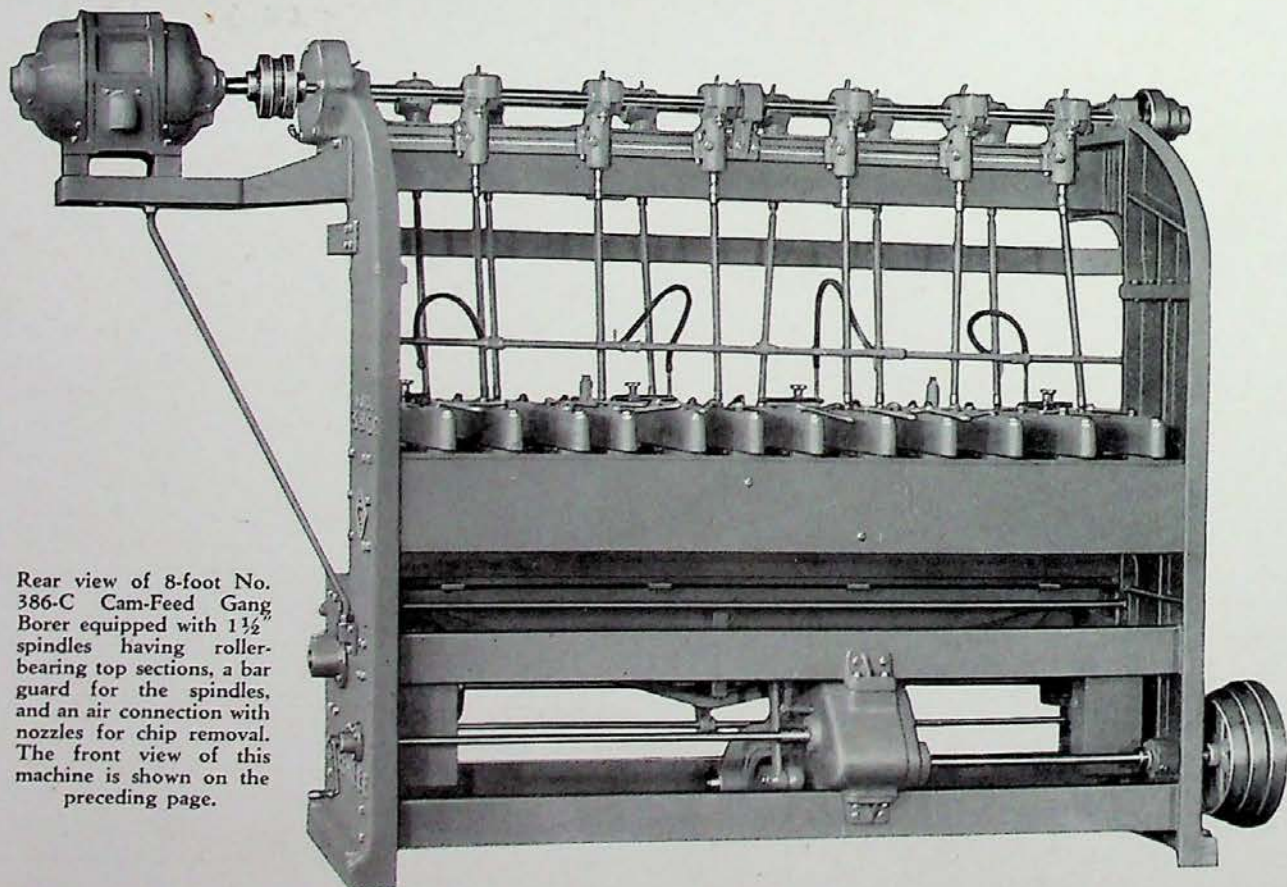
No. 386 UNIVERSAL-SPINDLE GANG BORERS

THIS type of universal-spindle machine is adapted to a greater variety of gang-boring work than any other on the market, due to its wide range and the convenience and simplicity of its adjustments. The conditions favoring it are where the holes are numerous, either located irregularly or in rows across the piece, on close centers, and where frequent changes in set-up are required. Such conditions are met with particularly in the manufacture of automobile bodies, farm implements and wagons, radio and phonograph cabinets, and certain furniture parts. For these and many other purposes, this type of borer is widely and most successfully used.

Contributing greatly to the wide adaptability of this type of gang borer are the many lengths in which it can be built, the variety of spindle

sizes available, and the styles of power table feed with which it can be equipped. When fitted with heavy spindles and screw feed, it is ideal for boring many of the medium heavy parts used in building railway cars, and it is being selected for that purpose more each year.

Universal spindles mean much in the way of increased range and convenience, since they can be quickly located at any point over the entire length and width of the table. The drive is from two splined parallel shafts, and the long connections between the universal joints avoid running them at sharp angles. The joints have capacity beyond that required for ordinary boring work, they run without play or looseness, and the working surfaces are hardened and properly lubricated.



Rear view of 8-foot No. 386-C Cam-Feed Gang Borer equipped with $1\frac{1}{2}$ " spindles having roller-bearing top sections, a bar guard for the spindles, and an air connection with nozzles for chip removal. The front view of this machine is shown on the preceding page.

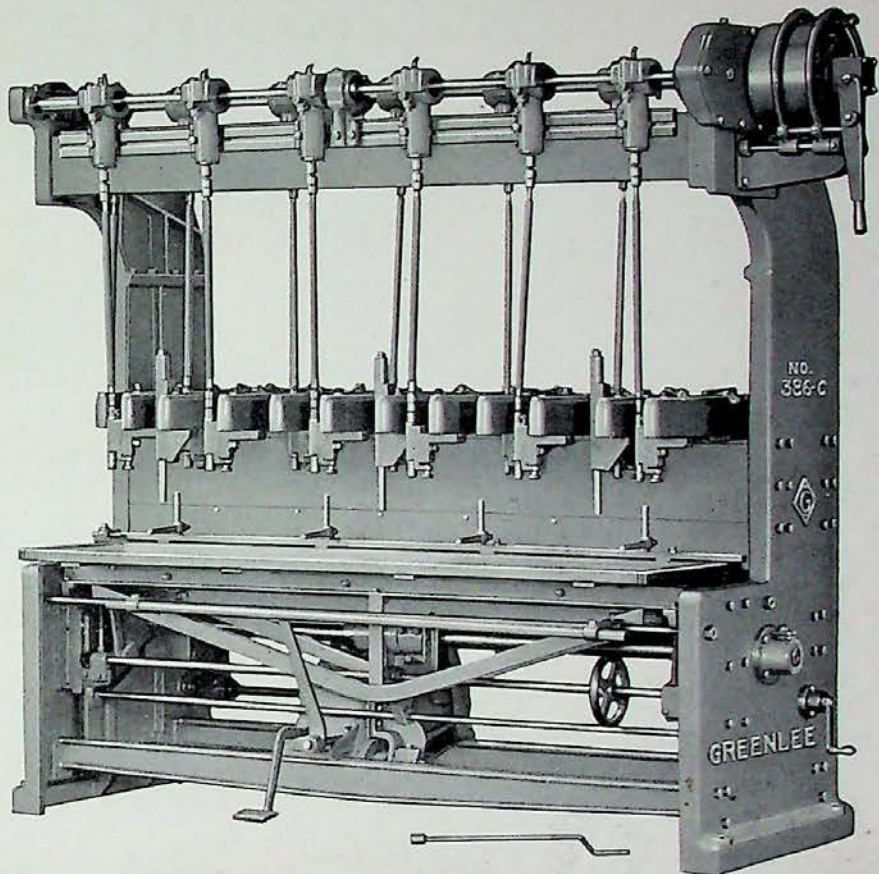
Frame The machine frame is deep and has heavily ribbed end sections with welded structural steel connections and rigid diagonal bracings. The end frames are extended forward and have gibbed ways to receive the two table knee castings which are joined by I-beams. At the top of the end frames are the drive-shaft bearings, and intermediate shaft supports are carried from the spindle rail. The spindle rail is a single-piece member, made up from two steel channels connected by welded plates to provide rigid strength and to maintain perfect alignment. On both the front and rear sides of the rail are welded cast-iron ways for the two rows of spindles.

In order to provide ample space between the universal joints of the spindles, and thus avoid running them at sharp angles, the machine frame is built high. Provision is made for convenience in shipping and installing, however, since the entire top section of the machine is removable.

Table The table is of steel frame construction and is regularly fitted with a glued-up hardwood top having metal fittings, such as a back fence, end stop and hold-down stops. When only such parts are to be bored, which do not require full support, the table is of open-work steel construction for ready chip clearance. It can have a lever-operated front clamp, or a special clamp, and other fittings can be furnished for either table as required.

Vertical adjustment of the table for proper working position is accomplished by a hand-wheel below the table and at the right-hand end. It operates two adjusting screws through self-cleaning spiral gears.

Divided-table machines for handling both long and short stock have been furnished to meet the peculiar needs of some concerns, but such an arrangement is not generally recommended. Those machines have geared screw feed for each table and are arranged so that the tables can

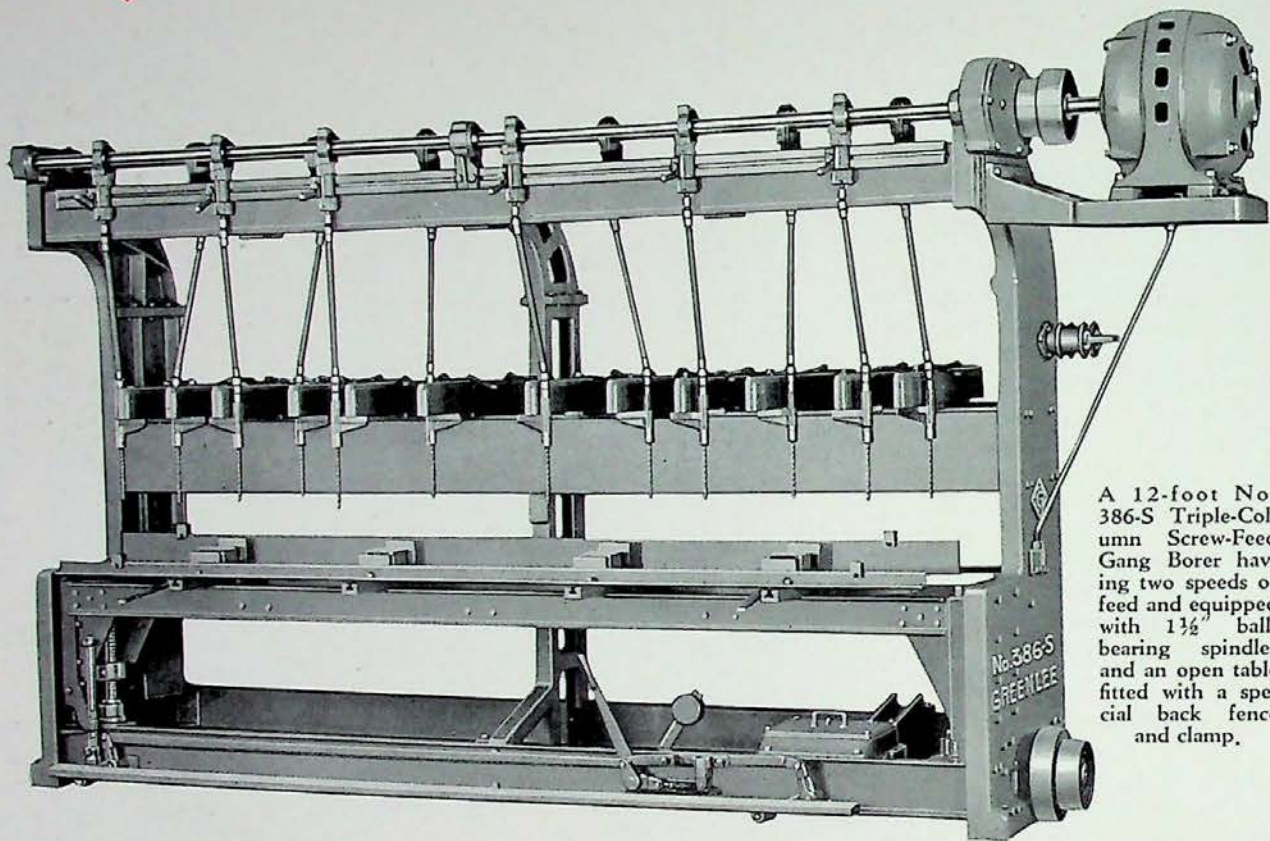


No. 386-C 8-foot Gang Borer with tight and loose pulleys for belt drive; equipped with vertically adjustable $1\frac{1}{2}$ " spindles having roller-bearing top sections, three spring plunger hold-downs and a hardwood table top.

be coupled together to operate as one unit when extra long parts are to be bored.

Table Feed For usual boring work on machines up to 12 feet in length, the table is fed to the bits by a cam mechanism which is noted for its accuracy and ease of control. It provides a uniform boring stroke, a slight pause at the top to allow the bits to clean up for accurate depth, a quick return stroke, and, when operating on continuous feed, a pause at the bottom of the stroke to give the operator time to replace the bored piece with a blank.

The control of the cam feed mechanism is simple and convenient. Pressing down on the foot pedal or pushing the handle bar to the left engages the feed for one complete stroke. For continuous feeding strokes, the handle bar is pushed to the left and turned for locking. Pushing the handle bar to the right instantly stops the feed at any point in the table stroke.



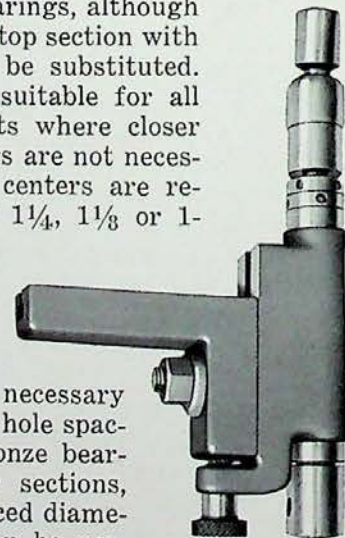
A 12-foot No. 386-S Triple-Column Screw-Feed Gang Borer having two speeds of feed and equipped with $1\frac{1}{2}$ " ball-bearing spindles and an open table fitted with a special back fence and clamp.

By jogging the handle bar, the table can be made to move a very small distance at a time for trying out the set-up, but as a further convenience, a crank is provided at the right-hand end of the machine frame for turning over the feed by hand.

Geared screw feed is regularly furnished on machines of greater length than 12 feet, unless the boring work is to be fairly light, and it is applied on the shorter machines for extra heavy work, such as regularly encountered in railway car shops. A foot lever extending the full length of the table controls this feed, and the regular arrangement is for the table to stop after completing each stroke. A convenient hand lever is also provided to start, stop, or reverse the feed from any position.

The feeding rates of both the cam-feed and screw-feed borers can be changed from that of the standard specifications, when necessary to meet special requirements. It is also possible to furnish screw-feed machines with two feeding speeds when required.

Spindles Standard spindles are for boring to $1\frac{1}{2}$ -inch minimum centers, and both the top and bottom sections are fitted with radial-thrust ball bearings, although the enclosed type of top section with roller bearings can be substituted. These spindles are suitable for all average requirements where closer than $1\frac{1}{2}$ -inch centers are not necessary. When closer centers are required, spindles for $1\frac{1}{4}$, $1\frac{1}{8}$ or 1-inch minimum centers are furnished. These are somewhat lighter and should not be specified, except when necessary to obtain the proper hole spacing. They have bronze bearings for the lower sections, because of the reduced diameter. All spindles can be provided with screw vertical adjustment of 2 inches to make for convenience in setting the bit for proper boring depth.



Bottom Section of $1\frac{1}{2}$ " Ball-Bearing Spindle with 2" vertical adjustment.

Spindles for 2¼-inch minimum centers are available for heavy boring on automobile body and railway car parts. They have roller bearings for both the upper and lower sections. For extra large bits, a back-geared, heavy-duty spindle can be furnished, which provides a slower bit speed than standard.

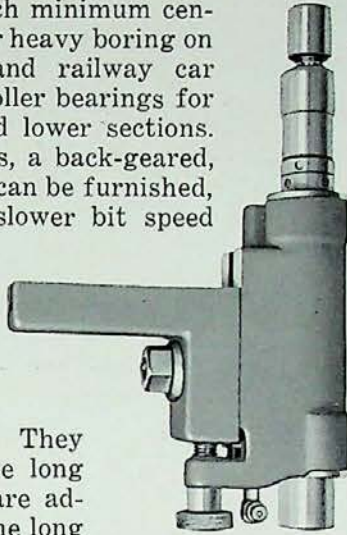
All spindles are made so that the lower sections are interchangeable between any of the upper sections. They are mounted on the long arm supports and are adjustable on them. The long arm supports are carried on the deep cross channels of the machine frame and are locked in place by clamp brackets and bolts having attached wrenches. Each arm is slotted for 24-inch cross adjustment and can be swung to any desired angle. When holes are in groups, two or more spindles can be mounted on one arm support.

Roller-bearing top sections, which can be furnished for any spindle, have housed gears running in grease, and rack and pinion adjustment lengthwise of the rail to keep the top sections in approximate line with the bottom to avoid un-

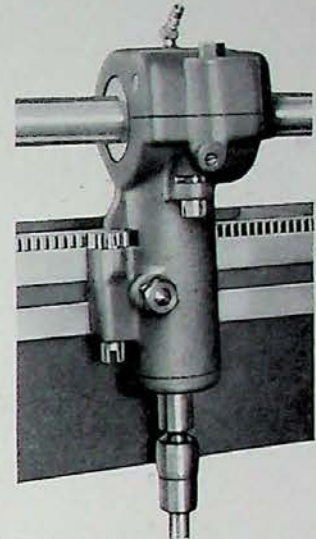
necessary angling. This adjustment is made by a crank fitting the pinion stud on the left side of the gear housing. This same crank works on the stud at the center of the housing to disengage the drive when any spindle is to stand idle.

Bevel-gear drive from the top shafts is used for all spindles. These gears are of hardened steel with accurately planed teeth to insure quiet running and maximum durability. Both gears are housed together to remain in perfect mesh when adjustment along the rail is made. Provision is made, however, for quickly disengaging the drive on any style of spindle when it is to stand idle.

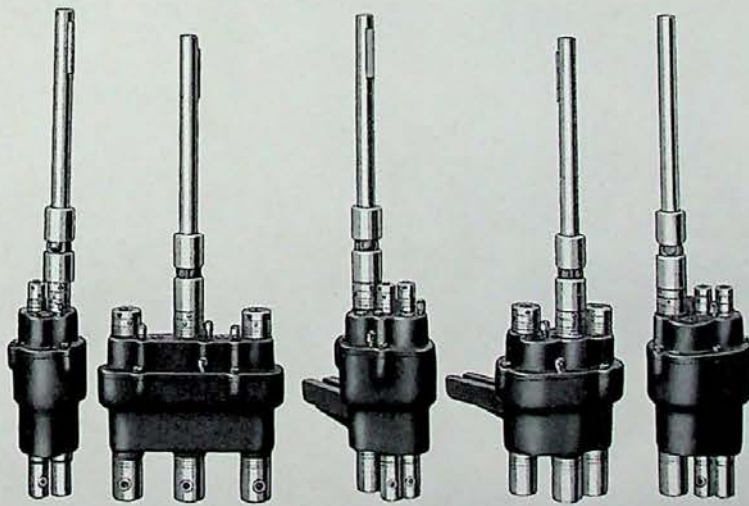
Clusters When extra close-center hole groupings are required, special clusters can be furnished. They are built to suit conditions, and the arrangement of spindles depends entirely on the work they are to do.



Bottom Section of 2¼" Roller-Bearing Spindle with 2" vertical adjustment.



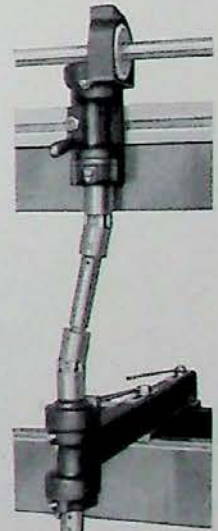
Roller-Bearing Top Section for drive of any standard spindle. Note rack and pinion adjustment and the stud for disengaging the drive.



Some examples of Special Fixed-Center Clusters for the No. 386 Gang Borers. These are driven by standard top sections and are made to suit requirements.



Spring Plunger Hold-Down for wide stock.



Special Heavy Universal Spindle with 1" socket.

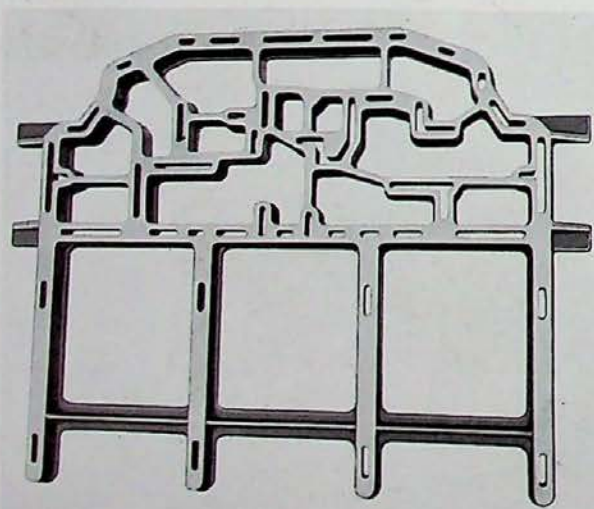
Clusters can be driven from the top sections of standard spindles, and they are mounted on the standard long arm supports.

Spring Hold-Downs A plunger type of spring hold-down is shown in one of the illustrations. These are mounted on the long arm supports and serve to hold wide stock to the table during the boring operation and while the bits are being withdrawn. From two to four are usually required, depending on the size of the parts to be bored.

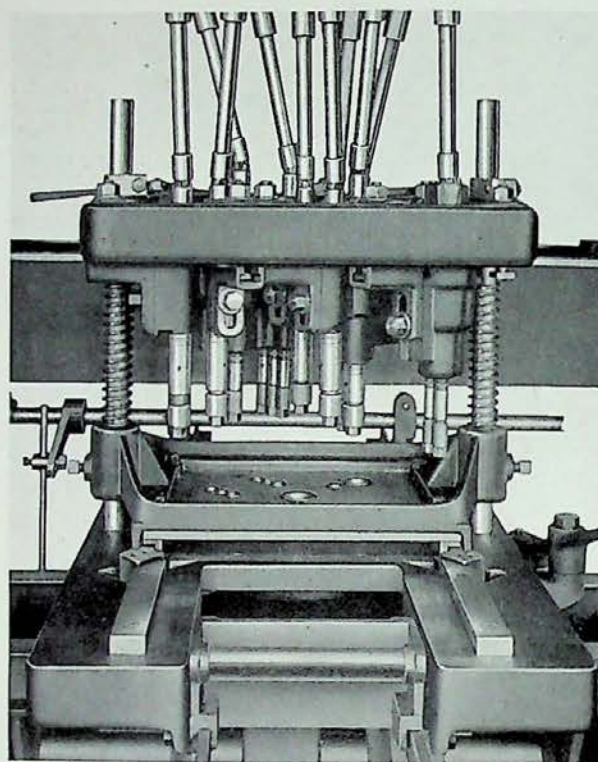
Bearings All rotating shafts in this gang borer run in either ball or roller bearings, except those of the small-diameter



Upper Section of a Special 4-foot No. 386 Gang Borer equipped with 45 Universal Spindles for boring automobile body dash boards.



A Special Spindle Supporting Bracket built for close and irregular grouping of a large number of spindles.

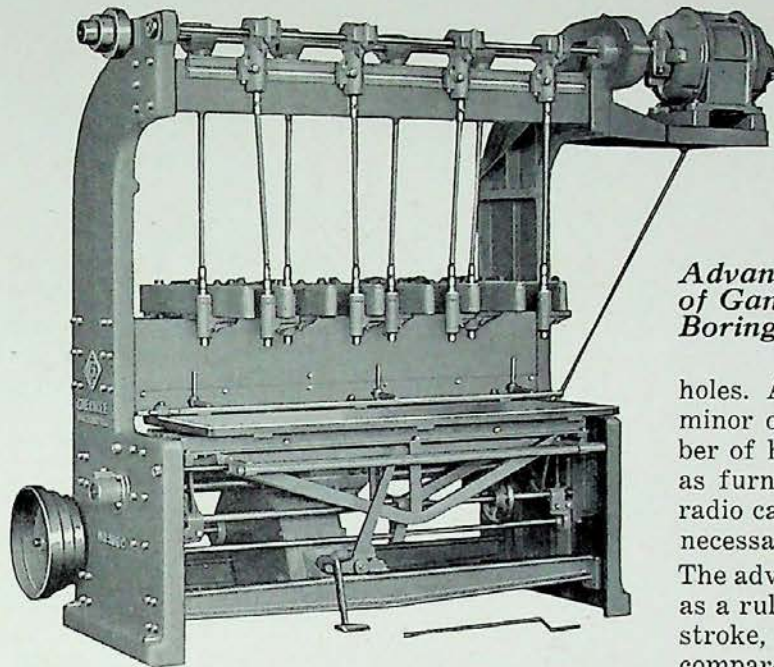


Part view of a Special No. 386 for boring phonograph motor boards; equipped with a spindle supporting frame and a removable jig having a boring template, a stock centering device and an arrangement for ejecting the bored parts at the rear.

spindles where bronze bushings are used for the lower sections. This use of antifriction bearings contributes much to the accuracy, low power consumption and long life of these machines, and they help reduce the maintenance cost to the lowest possible point.

Drive The spindle drive shafts at the top of frame should run 850 R.P.M. They are mounted in ball bearings and are arranged to be withdrawn endwise for removing or adding spindles. The machine can have tight and loose pulleys for belt drive or can be direct connected through flexible coupling to a motor mounted on an attached cast-iron bracket. When preferred to the standard direct coupled-drive, arrangements can be made for mounting the motor on top of the frame and behind the drive shafts for plain or V-belt drive or silent-chain drive. The motor size varies from $7\frac{1}{2}$ to 30-H.P., according to the work and number of spindles, but 10-H.P. is a common size for the No. 386-C Cam-Feed Borers.

Divided spindle drive for divided-table ma-



A Standard No. 386-C equipped with 2 1/4" Roller-Bearing Spindles having Roller-Bearing Top Sections. Note the long crank for adjusting the top sections and for disengaging their drive.

chines is provided by means of a rear attached base countershaft having two clutch pulleys to drive the spindles on one or both ends of the machine. This can have tight or loose pulleys for belt drive, or a coupling for direct connection to a motor running 1200 R.P.M. or less.

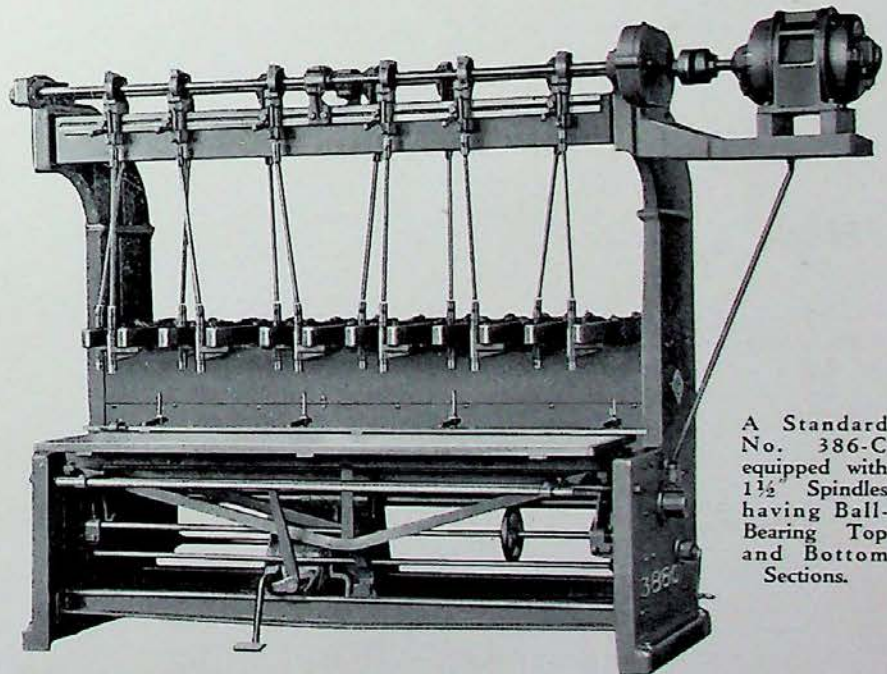
Additional Features This machine is, by far, the most versatile gang borer on the market, due to its various frame lengths, quick set-up features and its variety of spindles and feeds. But in order to broaden its field of application, many additional features can be added, as shown by some of the illustrations in this bulletin. These include cluster heads, extra heavy spindles, special spindles supporting frames, boring templates, and stock feeding and clamping devices. The first two machine views show an air connection with nozzles for chip removal, also a spin-

dle guard bar, all of which can be furnished as required. Special low tables can also be provided, as shown by the illustration on the last page, for boring in the tops of assembled radio cabinets or parts requiring an extra amount of clearance beneath the boring spindles and the table.

Advantages of Gang Boring

There are but few articles made in plants where wood is assembled into finished products which do not require the boring of holes. And in only the exceptional case is this a minor operation. When one considers the number of holes necessary for making such articles as furniture, automobile bodies, player pianos, radio cabinets, etc., it is readily understood how necessary it is to be efficient in boring work. The advantages of gang boring are many. Since, as a rule, all holes in a part can be bored at one stroke, production is increased enormously as compared to single-spindle machines. In addition, layout work is eliminated and accurate duplication of parts is assured. This matter of accuracy in hole location is of utmost importance in many classes of work.

The Greenlee No. 386 Borers provide all these advantages and, because of their superior mechanical features, they provide them to a degree not approached by similar machines on the market.



A Standard No. 386-C equipped with 1 1/2" Spindles having Ball-Bearing Top and Bottom Sections.

Specifications

Range With cam feed on lengths up to 12 feet, this borer has ample range for the usual requirements in the manufacture of automobile and truck bodies, furniture and similar products. Screw feed is usually required on the longer machines and is substituted on machines under 14 feet in length for extra heavy work, such as usually encountered in railway car shops.

Built in lengths from 4 to 16 feet, these gang machines have 24-inch cross adjustment for the universal spindles. Regularly, the 12-inch channels which carry the long arm supports are located so that 12¼-inch clearance is provided between the table at the low position and the nose of a standard solid spindle. When specified, the channels can be located 4 inches higher to give 16¼-inch clearance. These clearances are ¾ of an inch less when vertically adjustable spindles are used in the top position, or 2¾ inches less when at the bottom position.

Length of boring strokes:

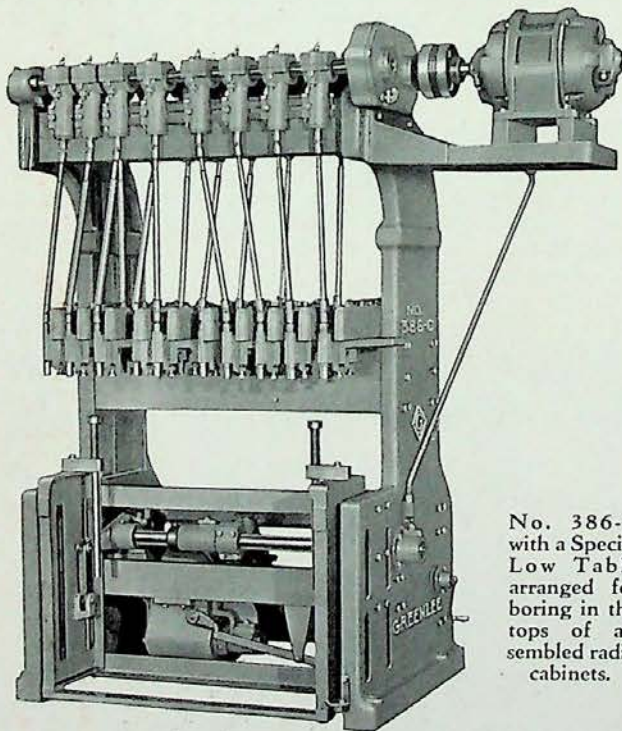
No. 386-C Cam Feed..... 3½" to 7"
No. 386-S Screw Feed..... 0" to 12"

Table strokes per minute:

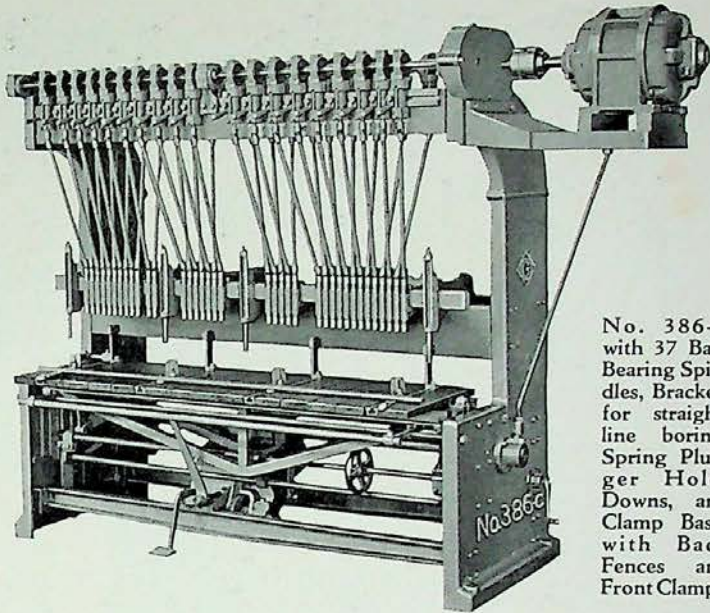
No. 386-C Cam Feed..... 8, 14 and 21

No. 386-S Screw Feed Borer regularly has one rate of feed, and the table automatically stops at the bottom of each stroke. It travels up 1" and back down 1" in a second, thus completing a 6" stroke in 6 seconds.

Cross adjustment of spindles..... 24"



No. 386-C with a Special Low Table arranged for boring in the tops of assembled radio cabinets.



No. 386-C with 37 Ball-Bearing Spindles, Brackets for straight-line boring, Spring Plunger Hold-Downs, and Clamp Bases with Back Fences and Front Clamps.

Spindle drive shaft speed..... 850 R.P.M.
Standard spindle speed..... 1620 R.P.M.
Overall depth of machine..... 54"

Overall length of machine:

With tight and loose pulleys it is equal to the rated boring length plus 36".

With attached motor bracket it is equal to the rated boring length plus 56".

Overall height..... 106¼"

Height to center of drive shaft..... 99¼"

Height of end frames with top section removed..... 75¼"

Height of table in low position..... 36¼"

Codes

No. 386-C 4-ft. borer with T and L pulleys DYNAL

No. 386-C 5-ft. borer with T and L pulleys DYNEM

No. 386-C 6-ft. borer with T and L pulleys DYNIN

No. 386-C 8-ft. borer with T and L pulleys DYNUS

No. 386-C 10-ft. borer with T and L pulleys DYPAN

No. 386-C 12-ft. borer with T and L pulleys DYPIS

No. 386-S 14-ft. borer with T and L pulleys FADOK

No. 386-S 16-ft. borer with T and L pulleys FADUL

Attached motor bracket and coupling DYPUV

Screw feed substituted for cam feed FADYM

Standard 1½" Spindle with ball-bearing top and bottom sections and arm support DYRES

Light 1¼" Spindle with ball-bearing top section, bronze-bearing lower section and arm support DYRIT

Light 1½" Spindle as above DYROV

Light 1" Spindle as above DYRUX

Heavy 2¼" Spindle with roller-bearing top and bottom sections and long arm support DYRYZ

Roller-Bearing Top Section for standard or light spindle FACEC

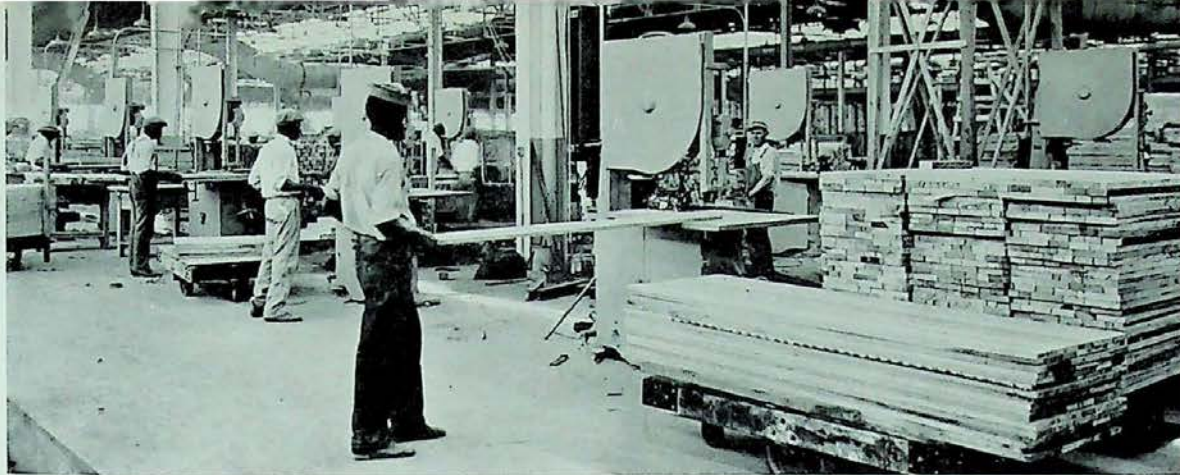
Screw vertical adjustment of 2" for lower section of any spindle FACOG

Long Arm Support omitted from any spindle FACYL

Spring Plunger Hold-down for mounting on a long arm support FADAC

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*



A Large Group of Greenlee Band Saws in a Southern Manufacturing Plant

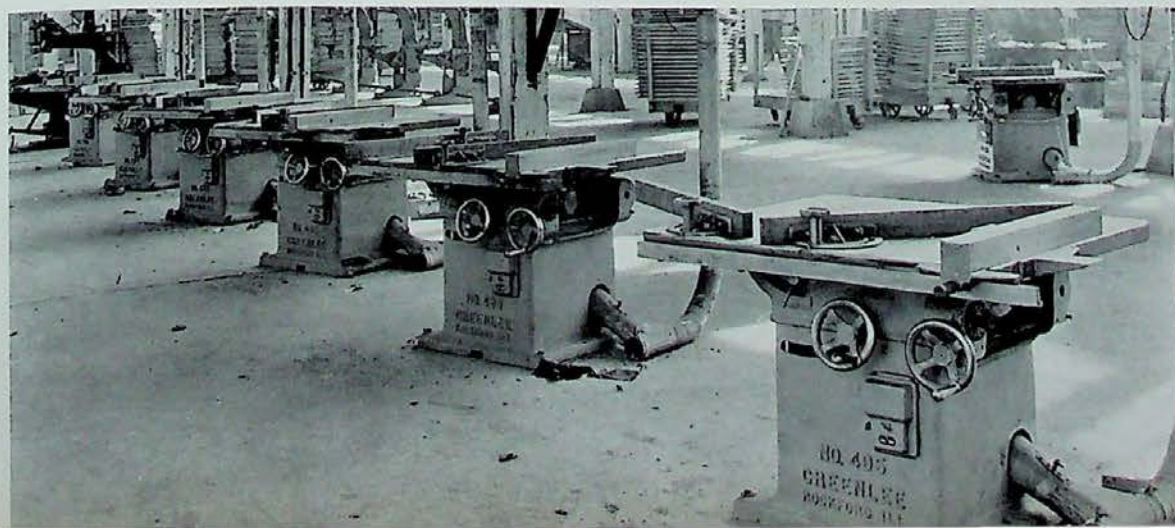
The first Self-Feed Rip Saw was built by Greenlee Bros. & Co. under the original patent of 1881. Since then more than twelve thousand Greenlee Self Feeders have been built, as well as many Hand-Feed Rip Saws, Railway Type Automatic Cut-off Saws, Saw and Dado Machines, Variety Saws, Double-Arbor Universal Saws, and Band Scroll Saws. These machines have carried the Greenlee name from coast to coast, and the service they have given has done much to enhance the Greenlee reputation for producing fine machinery and tools.

The purpose of this catalog section is to illustrate and describe the types and sizes of such saws as are used in general wood-working. Therefore, if the machine you are seeking is not shown here, we urge that you write to us about it, as it may be included in our line of equipment.

We would also call attention to the fact that the Greenlee Electric Double Cut-off Saws are shown in the catalog section devoted to Tenoners, etc., immediately following the Saw section. This is because that type of machine falls more nearly in the class of Double-End Tenoners, from the standpoint of design, the work it is called upon to perform and the many attachments that can be furnished for doing a great variety of operations.

The Greenlee Sawing Machines which are in active demand to meet present manufacturing conditions are modern designs in every respect, embodying ball-bearing arbors, built-in motors and other worth-while refinements. We urge that you study them carefully, and that you do not neglect to advise us if the type or range of machine you are seeking is not included in this catalog.

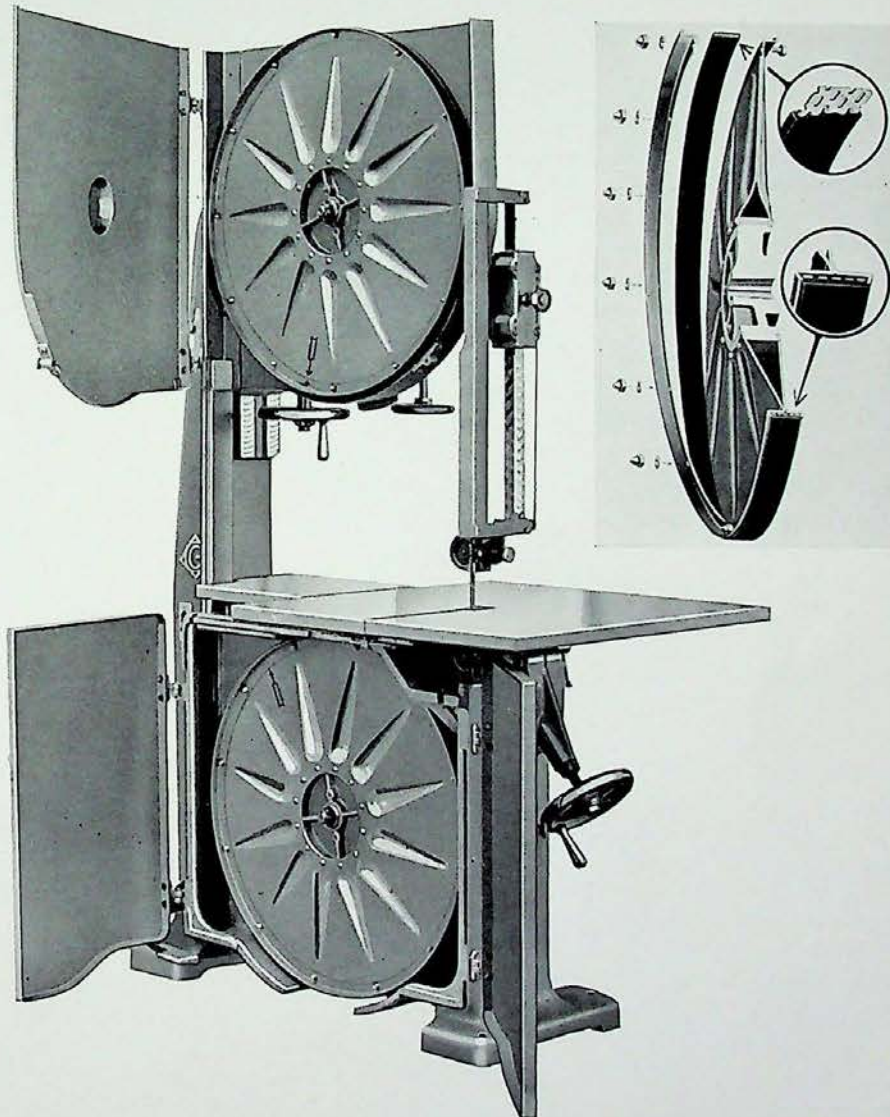
Seven of the Nineteen Greenlee Tilting-Arbor Saw Benches just after being installed in a Modern Plant



S A W S

Greenlee

No. 410 THIRTY-SIX-INCH BAND SCROLL SAW



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

No. 410 THIRTY-SIX-INCH BAND SCROLL SAW

CONVENIENT adjustments, correct details and expert workmanship are incorporated in this machine. In addition to being a general-purpose saw for all kinds of woodwork, it is an economical machine for cutting sheet metal, casting sprues, cloth, meat and numerous composition materials used in various industries. Its rugged design and dependable tension make it especially suitable for the unusual job. The table arrangement and equipment are subject to modification to meet special needs.

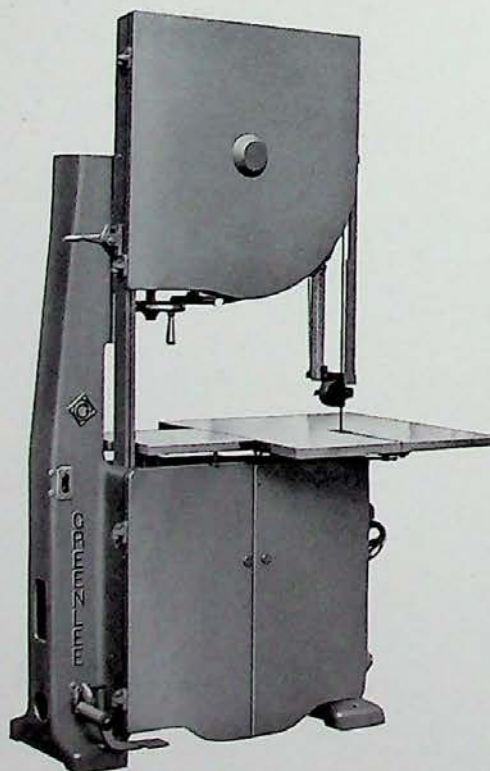
Band Scroll Saws followed certain constructional characteristics for many years. Conventional design included an extended frame arching over the table with a sliding or knife-edge upper wheel mounting, which soon lost its original accuracy, and a sluggish counterweight for applying the saw tension. Difficulty in maintaining wheel alignment, unequal tension and excessive saw blade breakage have been the inevitable result of using such equipment. Obviously, band saws needed improvement.

This need became more apparent as high production required faster saw speeds. It is necessary to do more than simply increase the wheel speed to obtain a successful high-speed band saw. The machine itself must be designed for this production work. Safety must be considered, accurate top wheel mounting is essential, and a sensitive tensioning device imperative. These requirements are met by the Greenlee.

Outstanding Improvements

This High Speed Band Saw is particularly well guarded to protect the operator, and care has also been taken to prevent snarling of the saw in case of breakage. The heavy frame is a cored box casting rigidly supporting the various units. The over-arm is a separate casting supported on long ways on the vertical column and does not move except when adjusting for the length of saw and its tension. Parallel links accurately control the top wheel movement, tension is supplied by a quick-acting spring, and an indicator makes it possible to maintain proper tension. Spindles are carried in adjustable Timken bearings, and the lower one is built directly into the motor, or carries the driving pulley. To these advantages is added the use of Carter Rigid Wheels and Quick-Change Tires.

Frame The frame is a heavy, one-piece casting, which forms a housing for the bottom wheel and provides a wide support on the floor. The cored box-like column has well proportioned ways for the vertically adjustable wheel arm, providing a rigid support for the top wheel. Incorporated within the frame is a sawdust duct arranged to conveniently connect with the exhaust system below the floor, at the floor surface, or up through the column to an overhead line. A special chute is provided for removing dust at the side when furnished for cutting metal or substances that can not be collected by the exhaust system. Dust is also collected off the lower wheel rim and tire by a special inlet.



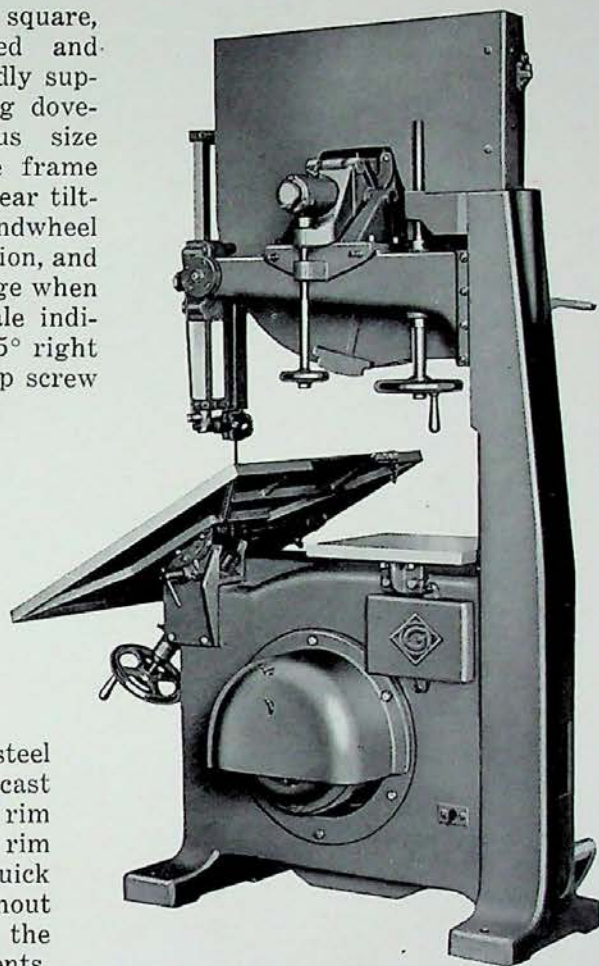
No. 410-M showing the Sturdy Vertical Column, the Brake Levers and the Convenient Push-Button Station. In the view on the preceding page, the Guards are open to show the Carter wheels.

Table The table is 36" square, accurately planed and well ribbed, and it is rigidly supported on a cradle having dove-tailed ways of generous size mounted directly on the frame and enclosing the worm-gear tilting mechanism. The handwheel is mounted at a fixed location, and its position does not change when the table is tilted. A scale indicates the table angle to 45° right and 7½° left, and a clamp screw locks the position.

Wheels The Carter Wheel, which is regular equipment, is an outstanding improvement in wheel construction and performance. It has a demountable rim for quick tire replacement, and the wheel is made with two rigid, pressed-steel welded discs on a heavy cast hub, giving a minimum of rim weight. One-half of the rim is detachable, permitting quick changing of the tire without special tools and without the use of troublesome cements. The tough tire is inseparably moulded around and through an endless perforated steel band with an equal amount of rubber all around the wheel. This steel band will hold a badly snagged tire together, which would otherwise be useless. There is less saw breakage, as tires are always snugly concentric, and the wheels run true and are perfectly balanced.

The wheels are interchangeable on the top and bottom spindles, having a tapered fit and are held by a key and locked nut. They are 36 inches in diameter and have 2-inch faces. Plain spoke wheels are available if desired. The heavy, high-grade spindles are mounted in adjustable Timken bearings, and each has an effective brake.

Tension and Tilting Device Tension is applied to the saw by raising the upper wheel arm and thus compressing a properly proportioned spring directly under the upper



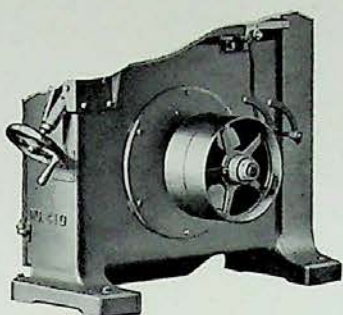
Rear View of No. 410-M with Table Tilted.

spindle bearing. A graduated scale and pointer just below the upper wheel guard makes it easy to bring the saw back to the proper tension after changing blades, eliminating the old method of hand testing. The spring instantly changes to offset tightening or slackening of the blade due to sawing conditions. The wheel alignment is maintained by parallel links which do not bind or restrict the movement in any way. The yoke containing the links and bearing is tilted as a unit by another handwheel, and the entire wheel mounting may also be adjusted on the arm to line up with the lower wheel. These features result in longer life for saw blades and tires.

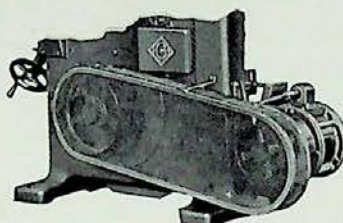
Power Feed A feeding device for ripping long pieces consists of an extra large table, upper and lower driven rolls directly behind the saw, motor drive and a special fence. The rolls can be aligned to lead against the fence and, after the stock is started, feed it on through the cut while the operator is picking up the next piece. Special forms attached to the fence especially adapt it to ripping curved work such as auto body bows.

Guides The guides furnished are regularly of the Wright pattern, but any standard type can be substituted. The top guide is mounted on a large square sliding member, which also supports the angle-iron saw guard. This guide bar unit is counterbalanced by a spiral spring controlled sheave on the wheel arm, so it is easily and quickly located. It is provided with a positive lock.

Guards Heavy pressed-steel guards enclose both wheels to provide full protection for the operator and to save saws. They are hinged and are easily opened for access to the wheels. The saw is also effectively guarded between the wheels. Special attention has been given to preventing saw dust from following the up side of the saw and interfering with operation.



Tight and Loose Pulley Drive on No. 410 Band Saw.



Belted Motor Drive on No. 410-B Band Saw.

Motor Drive

The motor can be of the built-in alternating-current type, interchangeable with the tight and loose pulley unit, or it can be belted from a motor mounted on a swinging bracket attached to the rear of the frame. The built-in motor can be 3, 5 or 7½-H.P., and the speed can be from 600 to 1200 R.P.M., although 900 R.P.M. is usual. The control is by push-button with thermal overload relays built into the frame, and the wiring is fully enclosed. Protection for the built-in motor is provided by a close-fitting cast-iron shield, which keeps out the saw dust.

Specifications

Wheels	36" dia. x 2" face
Main table size	36"x 36"
Auxiliary table size	19"x 16"
Tilting adjustment for main table	45° forward, 7½° back
Table height	40¾"
Maximum height of stock under guide	20"
This range can be increased on special order.	
Maximum width of stock between guard and saw	35¼"
Distance from front of table to center of saw	14"
Ripping gauge, when ordered	4" high x 16" long
Motor sizes and speeds for the No. 410-M Electric Saw—	
5-H.P., 900-R.P.M.; 3-H.P., 600-R.P.M.; 5-H.P., 600-R.P.M.;	
5-H.P., 720-R.P.M.; 5-H.P., 1200-R.P.M.; 7½-H.P., 900-	
R.P.M.	
Diameter of dust pipe outlet	4"

Net Weights in Pounds:

No. 410 with T and L pulleys	2400
No. 410-M Electric Machine with 5-H.P. motor	2600
No. 410-B for belted motor drive (no motor)	2450
No. 410-MP Power-Feed Saw	3800

Weights Boxed for Export:

No. 410 with T and L pulleys	3000
No. 410-M Electric Machine with 5-H.P. motor	3200
No. 410-B for belted motor drive (no motor)	3050
No. 410-MP Power-Feed Saw	4450

Box Measure in Cubic Feet:

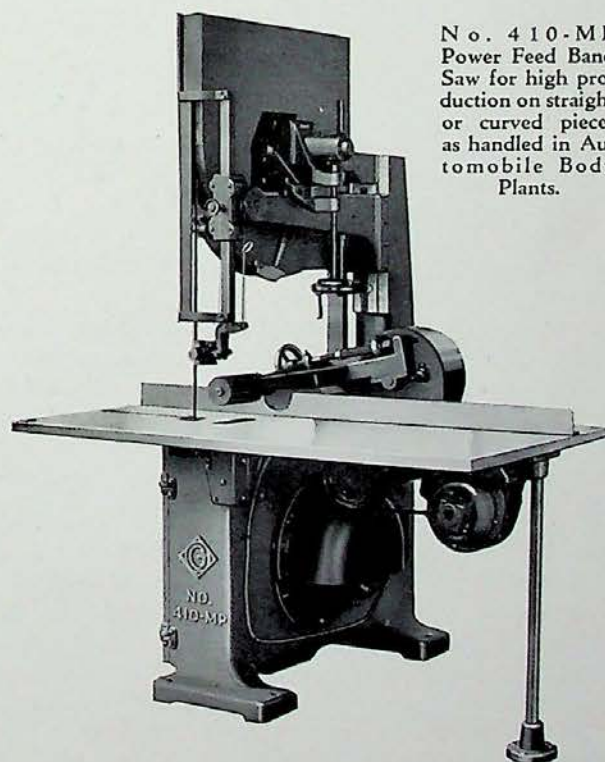
Nos. 410, 410-M and 410-B	120
No. 410-MP Power-Feed Saw	130

Floor Space:

No. 410 with T and L pulleys	63½" x 37½"
No. 410-M Electric Machine	63½" x 36"
No. 410-B for belted motor drive	71½" x 36"

Codes:

No. 410 with T and L pulleys	FOJUM
No. 410-M with 5-H.P., 900-R.P.M. motor	FOKAG
No. 410-M with 3-H.P., 600-R.P.M. motor	FOKEK
No. 410-M with 5-H.P., 600-R.P.M. motor	FOKIL
No. 410-M with 5-H.P., 720-R.P.M. motor	FOKOM
No. 410-M with 5-H.P., 1200-R.P.M. motor	FOKUN
No. 410-M with 7½-H.P., 900-R.P.M. motor	FOKYP
Ripping Gauge	FOLAK
Special High Frame for 25" high stock	FOLEL
Special High Frame for 30" high stock	FOLIM
No. 410-MP Power-Feed Band Saw	FOLON



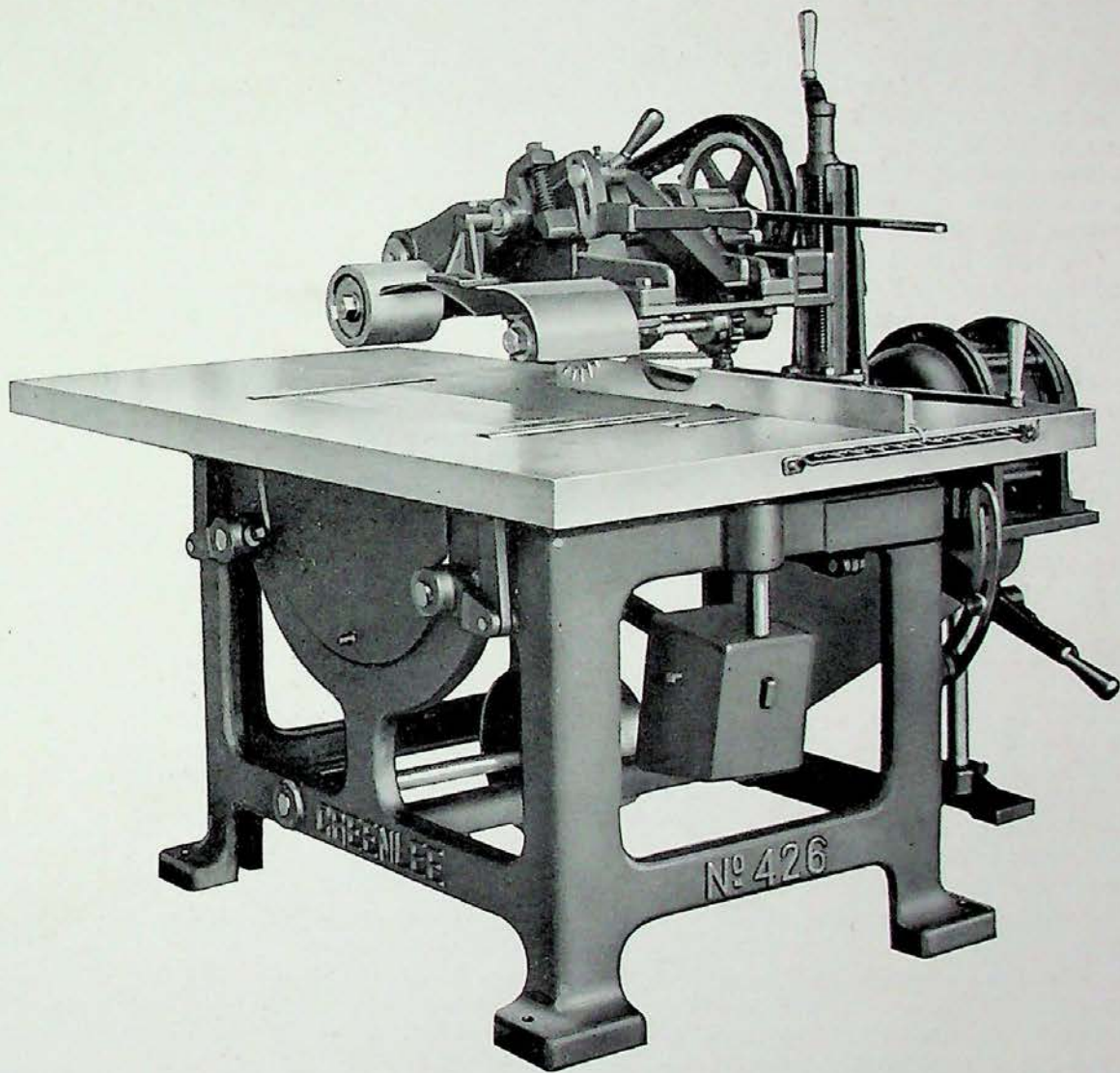
No. 410-MP Power Feed Band Saw for high production on straight or curved pieces as handled in Automobile Body Plants.

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

No. 426 TYPES OF SELF-FEED RIP SAWS



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

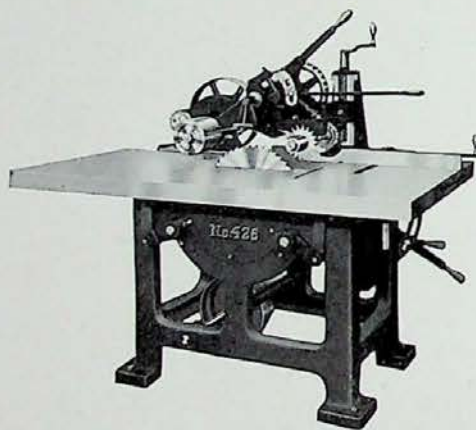
No. 426 TYPES OF SELF-FEED RIP SAWS

DESCRIBED in this bulletin are two Self-Feed Rip Saws of similar design and saw capacity, but differing in that the No. 426 type is intended, primarily, for use as a single-blade machine, while the No. 426-G is built to accommodate a gang of saws. Each machine has capacity for a 20-inch blade when used alone, and they have the same table size and feeding speeds. Ball-bearing arbors are usually furnished, but they can have babbitt bearings at a considerable reduction in price, except that the saws for built-in motor drive regularly have ball-bearing arbors.

These machines are an outgrowth of the first Self-Feed Rip Saw built by Greenlee under the original patent of 1881. That machine consisted of a light iron frame, a wood table and a simple feed works having a shaft with one feed spur. It ripped boards at a speed astonishing in comparison with hand feed, but experience soon developed many improvements. Since that time there have been more than twelve thousand Greenlee Self Feeders built, which accounts for the outstanding superiority of the line. Every useful detail has been developed, and this wide experience has permitted producing high-grade machines at a reasonable cost.

In no respect is a circular rip saw more indispensable than in gang ripping. The field is a wide one, too. Moulding, flooring and crating strips are very generally so cut, and box cleats, truck slats and wagon and wheel stock are often thus produced. In hardwood mills, furniture factories, sash and box plants or any shop where narrow strips are cut, there exists the possibilities of large economies by the use of a power-feed saw for single or gang ripping.

The No. 426-G Gang Ripper differs from the No. 426 Single-Blade Machine in having a wider feed works and an 8-inch length of saw collars for gang work. It also has an extra outside bearing at the nut end of the arbor to provide the necessary support for a wide gang of saws. The No. 426 Single-Blade Machine regularly has a 3-inch length of saw collars, but this can be increased at extra charge.

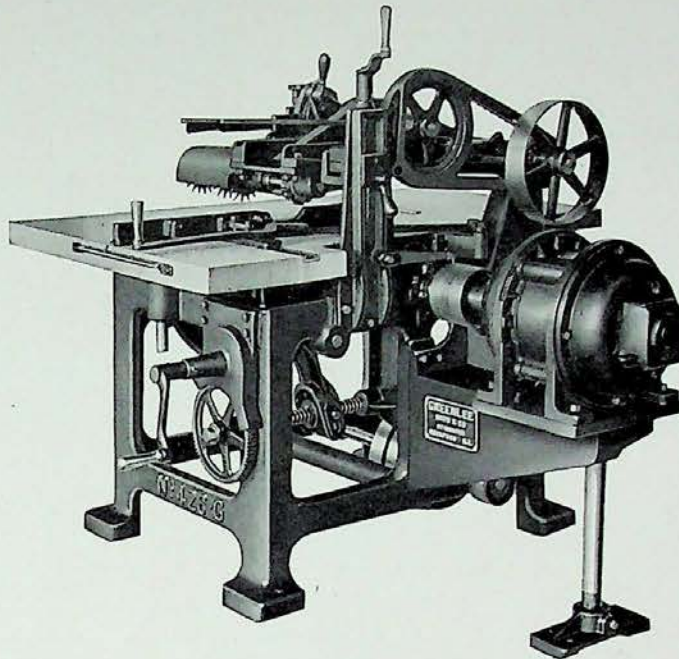


No. 426 Self-Feed Rip Saw with Guards Removed. This type of Machine is also shown on the preceding page with Guards and a Direct-Connected Motor.

Feed Mechanism On both types, the feed mechanism is carried from the machine frame so that no other adjustment is necessary when the table is raised or lowered to accommodate different thicknesses of stock. It can also be swung back to leave the table clear for hand ripping, as necessary when stock with a thickness beyond the normal range of the machine is to be cut.

The drive of the feed is from a set of three-step cone pulleys, and the spindles are driven by heavy sprocket chains. Spindle bearings adjust to take up slack in the chain, and a convenient lever operates a clutch for instantly starting or stopping the feed. Feed spurs, sprockets and chains are covered by metal guards.

The outfeed spindle has independent and automatic adjustment for safety and convenience in ripping. A smooth roll is regularly furnished for the out-feed spindle of the No. 426, while a sectional corrugated roll is standard on the gang machine. Either style can, however, be furnished on both machines. An adjustable pressure block hold-down attachment, located between the feed spindles, is regular equipment on the No. 426-G for ripping very short stock. Such an attachment is recommended for ripping



No. 426-G Self-Feed Gang Rip Saw with Direct-Connected Motor.

shorter than 16-inch stock on the No. 426, and it is supplied at extra charge. This attachment also eliminates danger of kick-backs.

Steel roller feed chains and special sprockets can be substituted at extra charge on these saws, when desired. They are especially recommended for machines where the sizes of feed pulleys have been changed to materially increase the feeding speeds.

Saw Arbor The saw arbor of each machine is turned from hammered crucible steel and is regularly reduced to $1\frac{3}{8}$ inches for the saw. It can have either ball or babbitt bearings, except on the built-in motor machines, where ball bearings are standard. On all ball-bearing machines, regardless of the method of drive, the saw arbor is carried in a one-piece yoke, which insures perfect alignment.

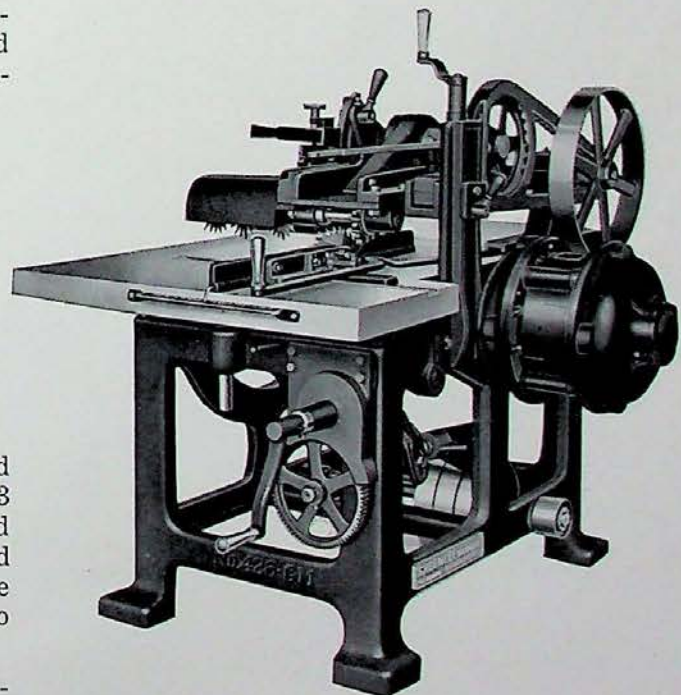
Table The table is of cast-iron, heavily ribbed and accurately finished. It is 40 x 63 inches overall and has a removable hardwood saw board. Inserted friction rolls are placed before and behind the opening. The saw gauge has quick adjustment by a lever, which also provides rigid locking.

Vertical adjustment of the table is by a quick-acting, counter-balanced lever device on the single-blade saws and by a geared screw mech-

anism on the gang machines. The lever raising device can, however, be substituted on the gang machines, if preferred. Heavy keys and set screws for the lever connections, also a guide post at the front and rear, hold the table rigidly in all positions.

Drive Various methods of drive are available for both styles of saws. Belt drive is had from a separate countershaft, which is furnished when specified, or it can be had by belting from a motor to the saw arbor pulley. This method has the advantage of providing an arbor speed suitable for the size of saw blade to be used.

Built-in motor drive on the Nos. 426-M and 426-GM machines provides a very compact unit, requiring small floor space. The arbor is carried in ball bearings mounted in a one-piece yoke, which forms the rear end shield to which the balance of the motor frame is bolted. This construction is absolutely rigid and eliminates all possibility of misalignment. The built-in motor has its rotor mounted directly on the ball-bearing arbor. It is furnished only for alternating current and of proper size for the work to be handled. The speed is 3600 R.P.M.



No. 426-GM Self-Feed Gang Rip Saw with Built-in Motor on the Arbor.

Direct-Connected motor drive is very common for both saws, when the motor speed is suitable for the size of blades to be run. It is provided for by fitting the machine frame with a supporting bracket and the arbor with a flexible coupling.

Specifications

Equipment The equipment includes 3 inches of arbor and feed spindle collars on the No. 426 type and 8 inches on the No. 426-G Gang Machines. One feed spur is regularly furnished with the No. 426 and three with the No. 426-G. A pressure block hold-down attachment is regular equipment on the gang machines, but is extra when specified for the No. 426. Countershafts, motor brackets and saw blades are extra on both machines.

Saw Blade Capacity Both the Nos. 426 and 426-G types have capacity for 20-inch saw blades, which permits cutting through 6-inch thick stock when used singly. The Nos. 426-M and 426-GM also have the same capacity, but because of the high arbor speed are not recommended for blades larger than 16-inch. In no case should large-diameter blades be used in gang, and 14-inch is the average size on the Nos. 426-G and 426-GM for the usual gang ripping. This size blade will cut through 3-inch thick material.

Ripping Widths All these machines have a maximum ripping width between the saw blade and the gauge of 15 inches, when the blade is against the fixed arbor collar. The Nos. 426 and 426-M regularly have a 3-inch set of filling collars, while the gang machines have an 8-inch set. The arbor length can be increased to take up to a 6-inch set of collars on the Nos. 426 and 426-M machines, but when wider than a 4-inch gang of saws are to be run, the regular gang machines are recommended.

Feeding Speeds With the arbor running 2100 R.P.M., the standard feeding speeds on the No. 426 and 426-G Saws are 68, 113 and 167 feet per minute. On the Nos. 426-M and 426-GM the feeds are 71, 115 and 173 feet per minute with the arbor running 3450 R.P.M. from the built-in motor. These speeds can be modified by a change in the feed pulley sizes, or by using larger or smaller in-feed spurs.

Standard arbor size for saw..... 1 3/8"
Other arbor sizes can be furnished.

Arbor pulley on belt-driven machines:

No. 426 8"x 7 1/2"
No. 426-G 8"x 8 1/2"

Countershaft for No. 426:

Tight and loose pulleys..... 12"x 8 1/2"
Drive pulley 24"x 7 1/2"

Countershaft for No. 426-G:

Tight and loose pulleys 12"x 8 1/2"
Drive pulley 24"x 8 1/2"

Belts for No. 426:

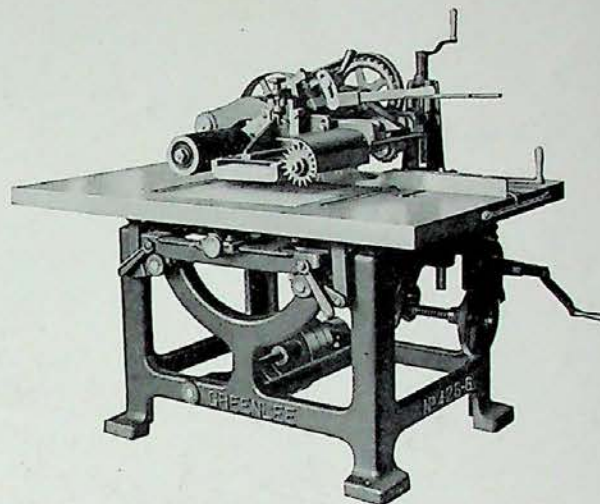
May be 6" or 7" for the arbor, 2 1/4" for the cone feed pulleys and 2 1/2" for the single feed pulleys.

Belts for No. 426-G:

May be 7" or 8" for the arbor, 2 1/4" for the cone feed pulleys and 2 1/2" for the single feed pulleys.

Net weights in pounds:

No. 426 without countershaft 2100
No. 426 with countershaft 2450



No. 426-G Self-Feed Gang Rip Saw Showing Adjustable Pressure Block Hold-Down for Ripping Short Stock.

No. 426 with attached motor bracket	2300
No. 426-M with built-in motor	2650 to 2800
No. 426-G without countershaft	2150
No. 426-G with countershaft	2500
No. 426-G with attached motor bracket	2350
No. 426-GM with built-in motor	2750 to 2950
Weights boxed for export	2900 to 3750
Box measure in cubic feet	124

Codes for machines with babbit bearings:

No. 426 without countershaft	FUJED
No. 426 with countershaft	FUJIG
No. 426 with attached motor bracket	FUJOK
Steel roller feed chains substituted on No. 426.....	FUJYM
Adjustable pressure hold-down attachment.....	FUKAD
No. 426-G without countershaft	FUMUP
No. 426-G with countershaft	FUMYS
No. 426-G with attached motor bracket	FUNAL
Steel roller feed chains substituted on	FUNIN

Codes for machines with ball-bearing arbor:

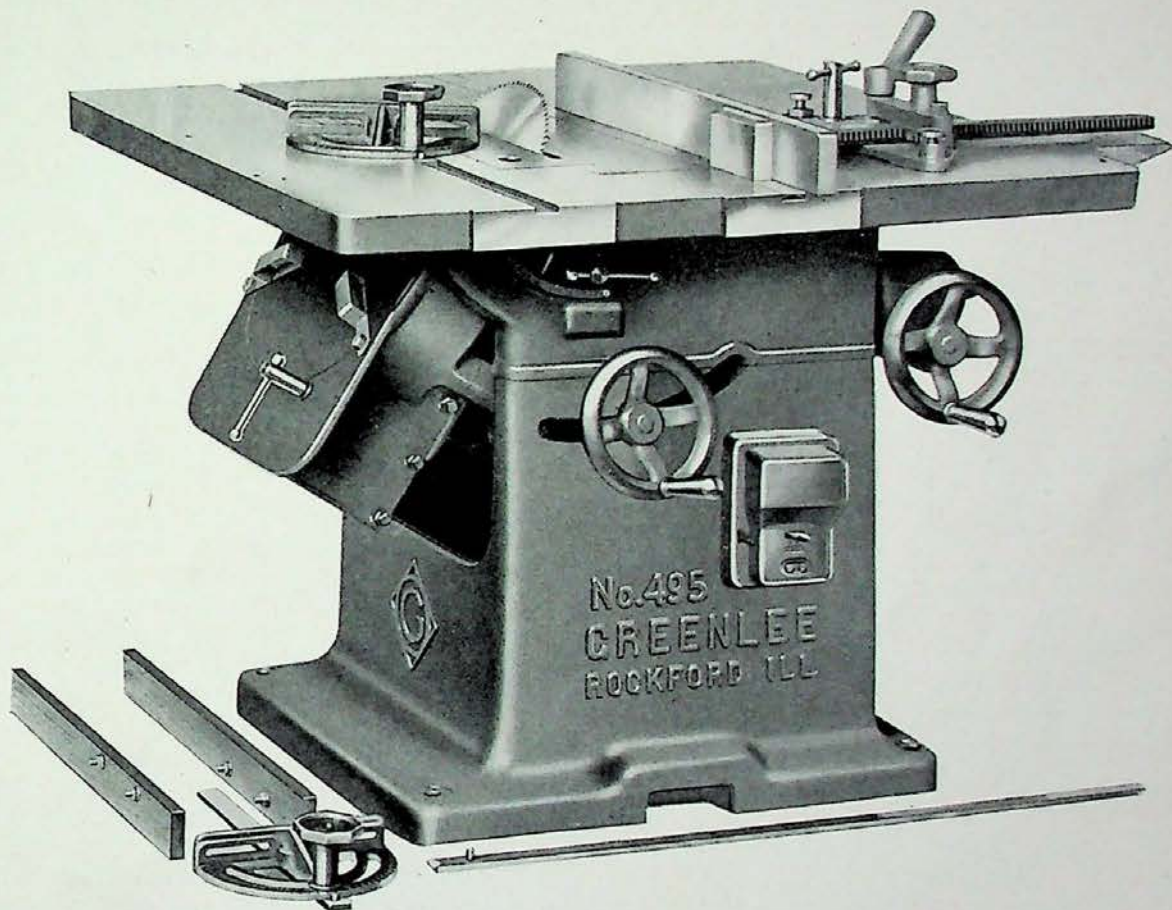
No. 426 without countershaft	FUKOL
No. 426 with countershaft	FUKUM
No. 426 with attached motor bracket	FUKYN
No. 426-M with built-in 7 1/2-H.P. motor	FULEK
No. 426-M with built-in 10-H.P. motor	FULIL
No. 426-M with built-in 15-H.P. motor	FULOM
Adjustable pressure hold-down attachment	FULYP
Steel roller feed chains substituted	FUMAK
No. 426-G without countershaft	FUNYT
No. 426-G with countershaft	FUPAN
No. 426-G with attached motor bracket	FUPEP
No. 426-GM with built-in 10-H.P. motor	FUPOT
No. 426-GM with built-in 15-H.P. motor	FUPUV
No. 426-GM with built-in 20-H.P. motor	FUPYX
No. 426-GM with built-in 25-H.P. motor	FURAP
Steel roller feed chains substituted	FURIT

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

No. 495 TILTING-ARBOR VARIETY SAWS



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

No. 495 TILTING-ARBOR ELECTRIC VARIETY SAWS

THE Greenlee No. 495 types of Tilting-Arbor Saw Benches are built with two styles of tables, as shown in the illustrations. The standard No. 495 has a one-piece, fixed table, suitable for general variety sawing, while the No. 495-S machine has a roller-mounted, sliding table section to the left of the saw blade to make for greater efficiency on long runs of cutting-off, dadoing, etc.

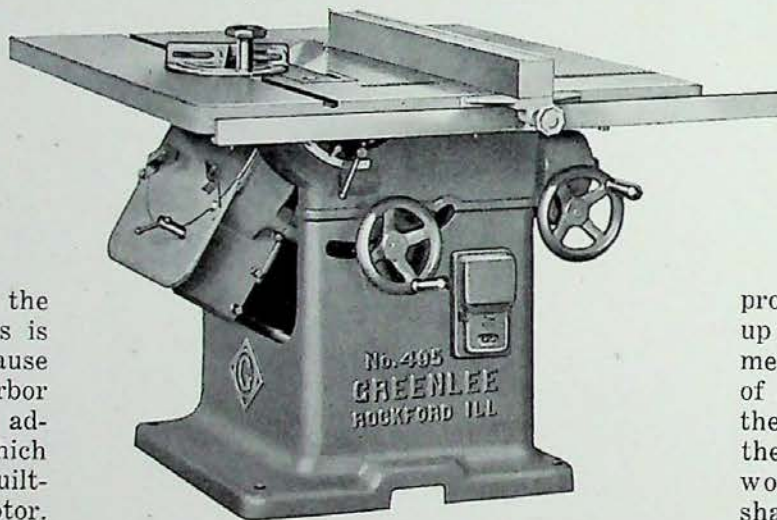
Both machines will handle ripping, cross-cutting, dadoing, mitering, etc., rapidly and accurately. Of great importance is the fact that the table is always horizontal and always at the same height. This is made possible because of the tilting-arbor which has vertical adjustment and on which is mounted the built-in, 3600 R.P.M. motor.

In addition to permitting the arbor to be of the tilting type, the built-in motor eliminates all belts, reduces the required floor space, saves power, and provides a constant saw speed. The entire machine is correctly designed and accurately constructed, possessing every desirable feature for miscellaneous work in any class of shop.

Frame The frame consists of a sturdy base to which is firmly bolted the top section supporting the arbor carriage cradle, giving unusual rigidity. An important feature is the built-in telescopic saw dust pipe, terminating in a stationary outlet at the rear and providing for easy connection to the exhaust system, without the use of flexible joints. This is a very convenient arrangement and saves money, as the pipe can be passed through the floor at

the base of the machine or arranged to go straight up to the ceiling beside the saw for direct connection to the shavings removal system.

The design of the base is such that it provides perfect stability, at the same time allowing ample foot room for the operator while working in any position at the table. This is important from the standpoint of safety and convenience.

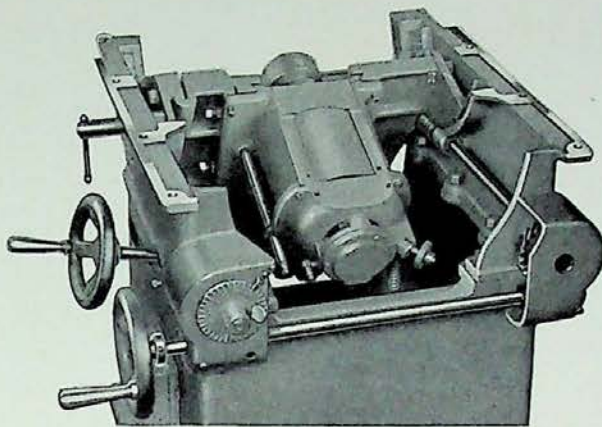


No. 495 with Front-Mounted, Double-Faced Square Ripping Gauge.

Arbor Carriage Cradle The arbor carriage cradle is made with a segment at each end, and these are mounted in circular taper-grooved ways with provision for taking up wear. Both segments have a portion of a worm gear cut on the lower surface, and these mesh with two worms mounted on shafts which are connected through covered spiral gears. This connected adjustment, which is controlled by

a conveniently located handwheel at the front of the machine, eliminates all tendency toward twisting or springing and provides quick and easy tilting of the carriage to 45 degrees for bevel sawing. A positive lock is provided to hold the setting after the adjustment is made.

Arbor Carriage The arbor carriage is mounted in adjustable gibbed ways on the cradle and has vertical adjustment of 3" by means of spiral gears, an Acme-thread screw and a handwheel at the front. This adjustment can be quickly and accurately made, and a positive lock holds the setting. The entire construction of carriage and cradle affords a rigid mounting for the arbor, this being essential for accuracy and speed.



Upper part of No. 495 with table removed. Note the arrangement for tilting the arbor, the graduated dial for accurate setting, and the convenient arbor lock for use in changing saw blades.

The Dial Micrometer

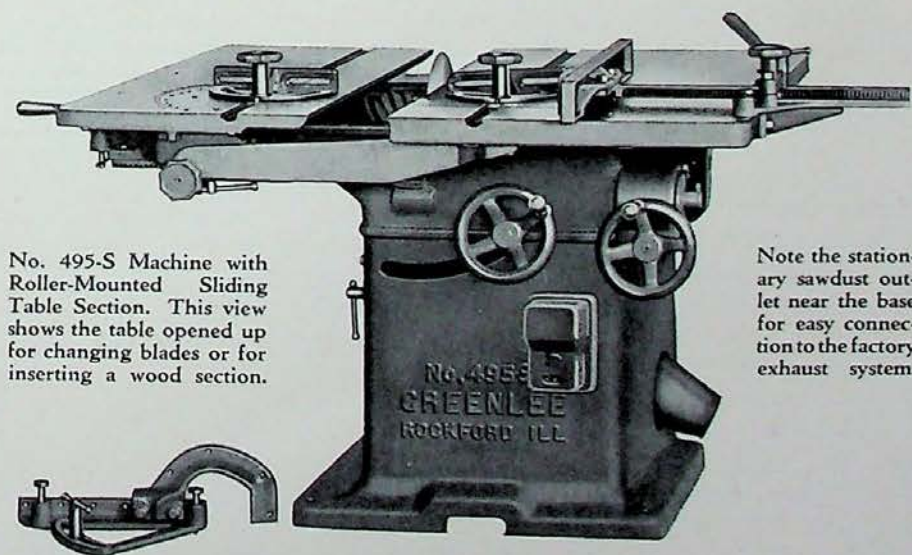
In order to secure absolute accuracy in tilting the saw arbor to the proper angle, a dial micrometer is provided, which is graduated to $\frac{1}{12}$ of a degree. This is a convenience in cutting such angles as $22\frac{1}{2}$ degrees, as it permits setting the arbor to the required fraction of a degree without the usual time-consuming, cut-and-try methods or guess work.

Saw Arbor

The saw arbor runs in selected, precision ball bearings in the carriage. These are lubricated by high-pressure grease gun, a method that is efficient, economical and convenient. The arbor is regularly reduced to $1\frac{1}{4}$ inches for the blade and is fitted with three $\frac{1}{2}$ -inch filling collars. Dado head extension sleeves and detachable ends can be furnished as required. The detachable arbor ends can be of any practical diameter or length and are applied the same as shaper spindle tops. The saw runs in a cast-iron hood having a detachable cover for removing the saw blade. A spring plunger lock is provided for the arbor for maximum convenience in removing saw blades or cutter heads.

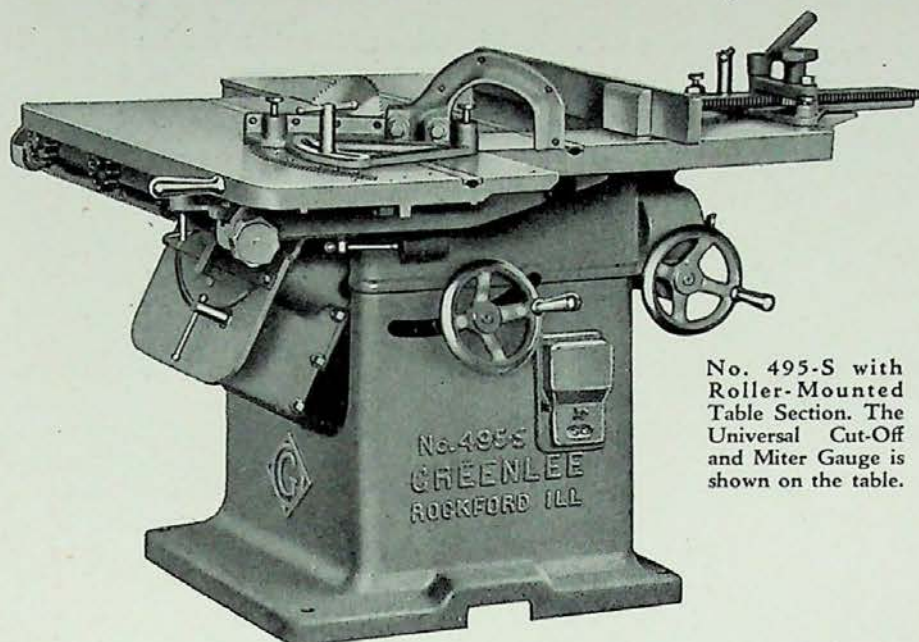
Table The table of the standard No. 495 is 44 inches wide, 40 inches deep and $34\frac{1}{2}$ inches high. The gauge extension increases the total width to 50 inches. It is rigidly constructed, finely finished and is always mounted in a stationary position. The top is graduated for ripping width, it can have plain or T-slots for the cut-off gauges, and is fitted with a removable well hole plate which entirely surrounds the saw slot. The standard well hole plate is of cast-iron, but a hardwood plate can be used and is regularly furnished on machines for automobile body work. Extension brackets, 16 inches long, attached to the side of the table to rip 36 inches in width with a plain side-mounted ripping gauge can be furnished at extra cost, and extensions can also be applied to the front of the stationary table to increase the range of cross cutting.

The No. 495-S machine has a 47-inch wide table, or 53 inches if the gauge extension is included. The roller-mounted sliding section to the left of the saw is 20 inches wide and has sufficient travel to cut 1"x 32" wide stock with a 14-inch saw blade. Rack and pinion adjustment is provided for opening up the table at the saw line to put on heads or to insert a wood section for use with dado heads. The sliding table rides on five antifriction bearings formed from continuous sections of steel roller chain. This arrangement provides for easy movement and accurate cutting. With its complement of gauges, this type of table fits the machine for fast and accurate work in any class of shop.



No. 495-S Machine with Roller-Mounted Sliding Table Section. This view shows the table opened up for changing blades or for inserting a wood section.

Note the stationary sawdust outlet near the base for easy connection to the factory exhaust system.



No. 495-S with Roller-Mounted Table Section. The Universal Cut-Off and Miter Gauge is shown on the table.

Electrical Equipment

The built-in motor mounted on the saw arbor is a 5-H.P., 3600 R.P.M., alternating type for 220 or 440-volt, 2 or 3-phase, 60-cycle current. Convenient push-button control is at the front of the machine. Protective relays are included, and all wiring is enclosed within the frame. Motors for other current specifications can be furnished on special order.

Specifications

Range

The range is for a 16-inch saw blade with a maximum projection of $4\frac{3}{16}$ inches with the arbor horizontal, but a 14-inch blade is standard and provides a projection of $3\frac{3}{16}$ inches. With a 14-inch saw next to the fixed collar of the regular arbor, $2\frac{1}{4}$ -inch thick stock can be cut with the arbor tilted to 45 degrees. The ripping width is 27 inches to the right and $13\frac{1}{2}$ inches to the left of the saw with the front-mounted, double-faced gauge, or 24 inches to the right and 12 inches to the left with the plain side-mounted gauge. Extension brackets to increase the ripping width with the side-mounted gauges can be furnished when required for extra wide stock.

Equipment

The equipment regularly consists of one plain side-mounted ripping gauge, two swivel cut-off gauges, two filling strips, one clearance block, a well hole plate, two $\frac{1}{2}$ -inch saw arbor collars, built-in piping, and one 14-inch cut-off saw blade. In addition to this, the No. 495-S is equipped with the universal cut-off and miter gauge. The other styles of ripping gauges will be furnished when specified, also a saw splitter.

Gauges

The ripping gauge is regularly of the plain side-mounted type with an accurately fitted guide, and rack and pinion adjustment. It can be furnished as a bevel ripping gauge when required. Some prefer the double-faced, front-mounted gauge shown in one of the photographs. This can be used on either side of the saw on the stationary-table machine, and it provides for adjustment over practically the entire width of table.

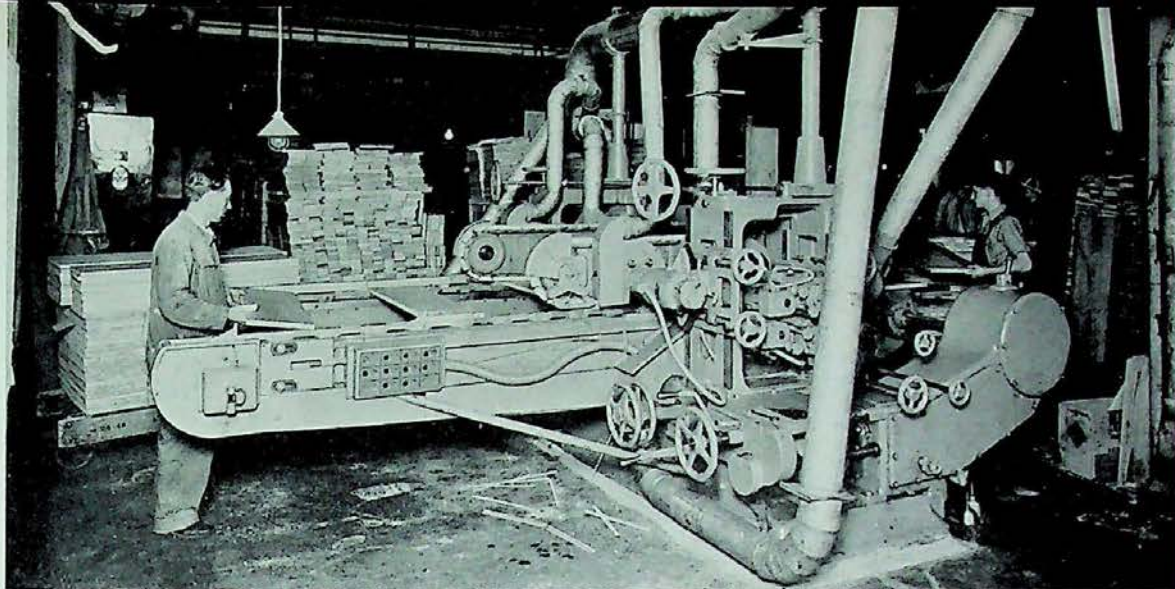
The slide cut-off gauges are regularly carried in T-slots machined in the table, although plain slots can be provided when wanted. The gauges are 2 inches high, 10 inches long and swivel to 80 degrees each way. A 30-inch removable hardwood extension is furnished for each.

A universal cut-off and miter gauge is part of the equipment of the No. 495-S machine, as shown in the photographs. It is 2 inches high at the low part, $6\frac{1}{2}$ inches high at the saw, and 17 inches long. It is drilled to permit attaching a wood facing, through which the saw or head cuts its own slot after necessary adjustments are made. This provides full support for stock being worked, regardless of its height.

	495	495-S
Table Size	44"x 40"	47"x 40"
Table size including gauge extension	50"x 40"	53"x 40"
Table height	34 $\frac{1}{2}$ "	34 $\frac{1}{2}$ "
Distance from saw line to left edge of table	17"	20"
Tilting adjustment for arbor	45°	45°
Diameter of arbor where saw goes on	1 $\frac{1}{4}$ "	1 $\frac{1}{4}$ "
Maximum saw projection with 14" blade	3 $\frac{3}{16}$ "	3 $\frac{3}{16}$ "
Maximum saw size	16"	16"
Diameter of outlet pipe	4"	4"
H. P. of built-in motor	5	5
R. P. M. of motor	3600	3600
Net weight in pounds	1400	1550
Weight in pounds boxed for export	1825	2000
Measure in cu. ft. boxed for export	58	65
Floor space (including table travel on 495-S)	50"x 40"	53"x 74"
Code with regular equipment	GEHYN	GELEM

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U.S.A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*



Greenlee Double-End Tenoner in a West Coast Furniture Plant

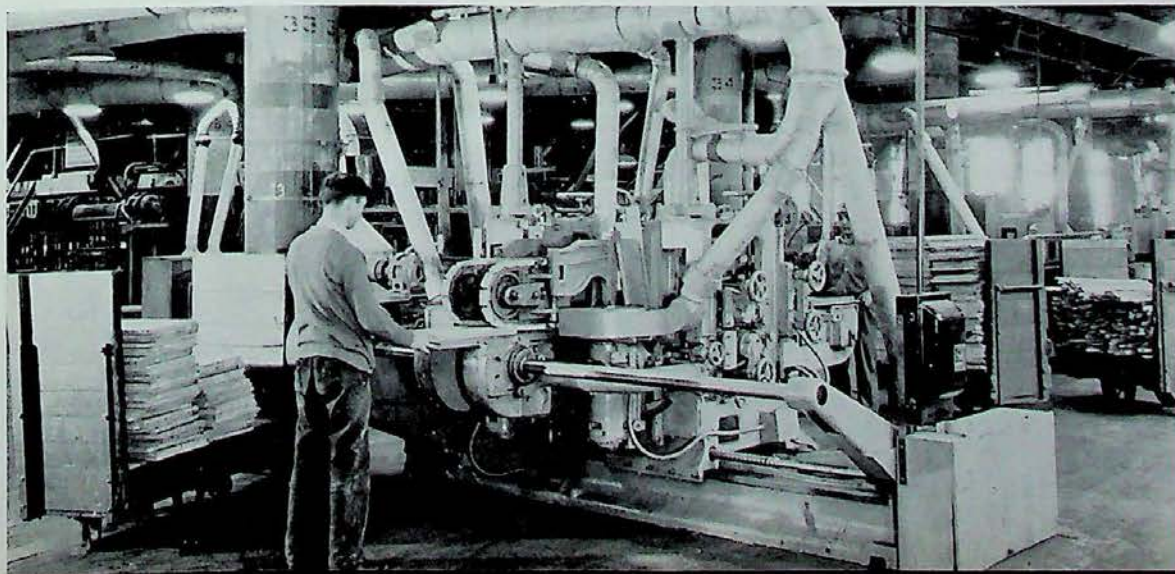
In this section of the catalog we show our Single and Double-End Knife Tenoners, Single-End Saw Tenoners, Electric Double Cut-off Saws and certain special Sash and Door Machines. We do not include our heavy Car Shop Tenoners, and those interested in such machines should write to us for literature describing them.

Our line of Tenoners for sash, door, furniture, automobile body and other general requirements includes single-end machines of both the full electric and belted types, also an Electric Double-End Tenoner, which is known throughout the woodworking industry as the most highly developed machine of its kind on the market. It is built in a variety of lengths and widths and can be fitted with attachments for doing many operations at a reduction in cost as compared to using various hand-feed machines.

Because of a close similarity of design and of the operations it will perform, the Greenlee Electric Double Cut-off Saw is grouped with the Double-End Tenoner in this section. It is built to accommodate fewer cutting units, but can be fitted with many of the attachments used on the tenoner and is capable of doing such operations equally as well.

The group of Special Sash and Door Machines includes Sash Relishers, Door Relishers, Combination Relishers and Mortisers, Sash Dovetailers, Sash Frankers and Sash and Door Clamps. Many of these were originated by Greenlee Bros. & Co., and all are favorably known by users throughout the world. The complete line is not, however, included in this catalog, and you are urged to write us if the particular machine you are interested in is not found here. Just advise us regarding your needs.

Seventeen Greenlee Double-End Tenoners are in this Radio Manufacturing Plant

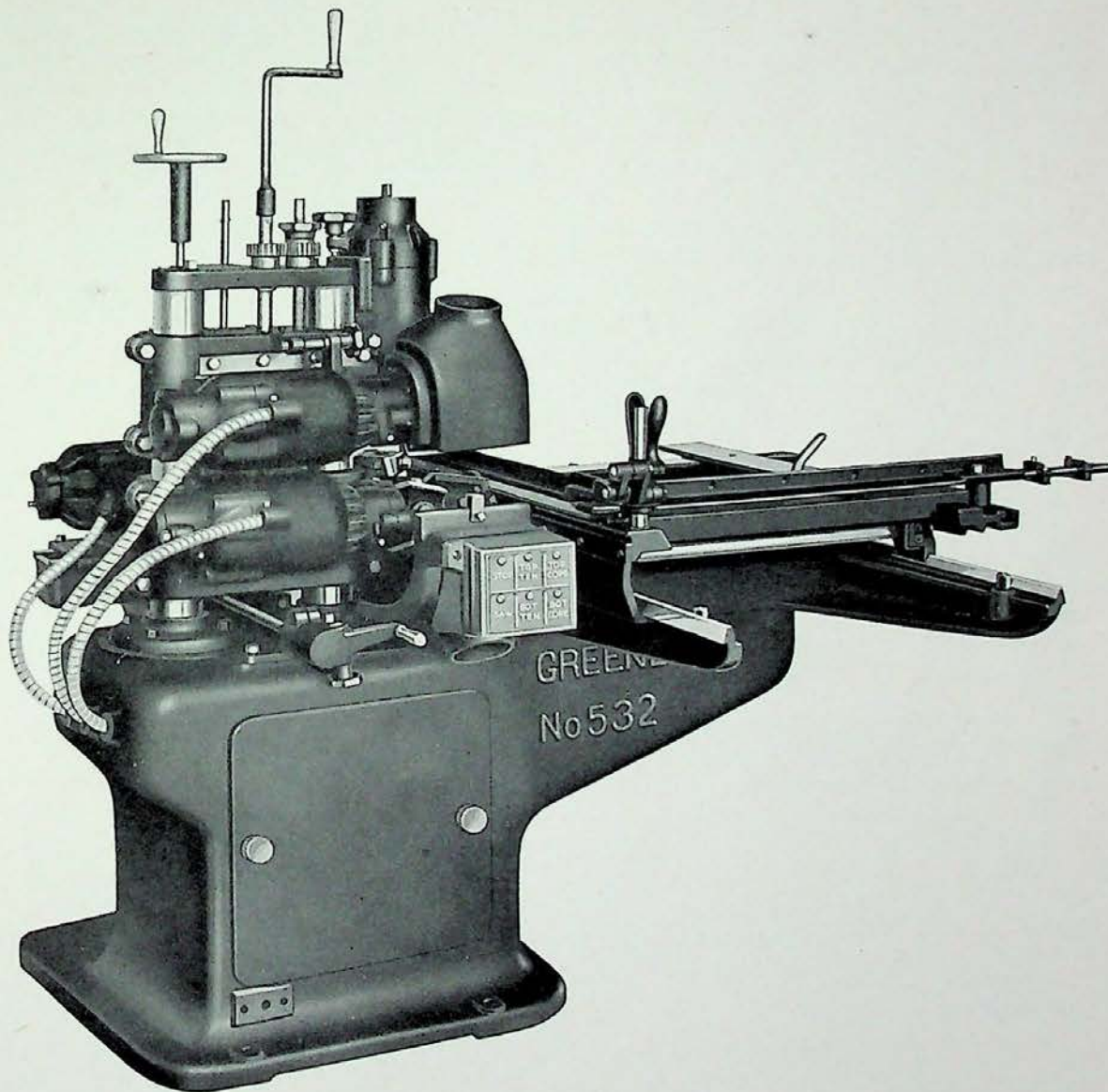


TENONERS

SPECIAL SASH & DOOR MACHINES
ELECTRIC DOUBLE CUT-OFF SAWS

Greenlee

NOS. 530 AND 532 SINGLE-END TENONERS



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

NOS. 530 AND 532 SINGLE-END TENONERS

EXCEPT for the method of drive, these single-end tenoners are of the same general design, and they have the same range and capacity. The No. 530 has belt-driven spindles, either from the attached base countershaft or from a motor mounted within the base, while the No. 532 is a full electric machine, entirely without belts. Because of these arrangements, their advantages are available for all shops, regardless of the kind of power used.

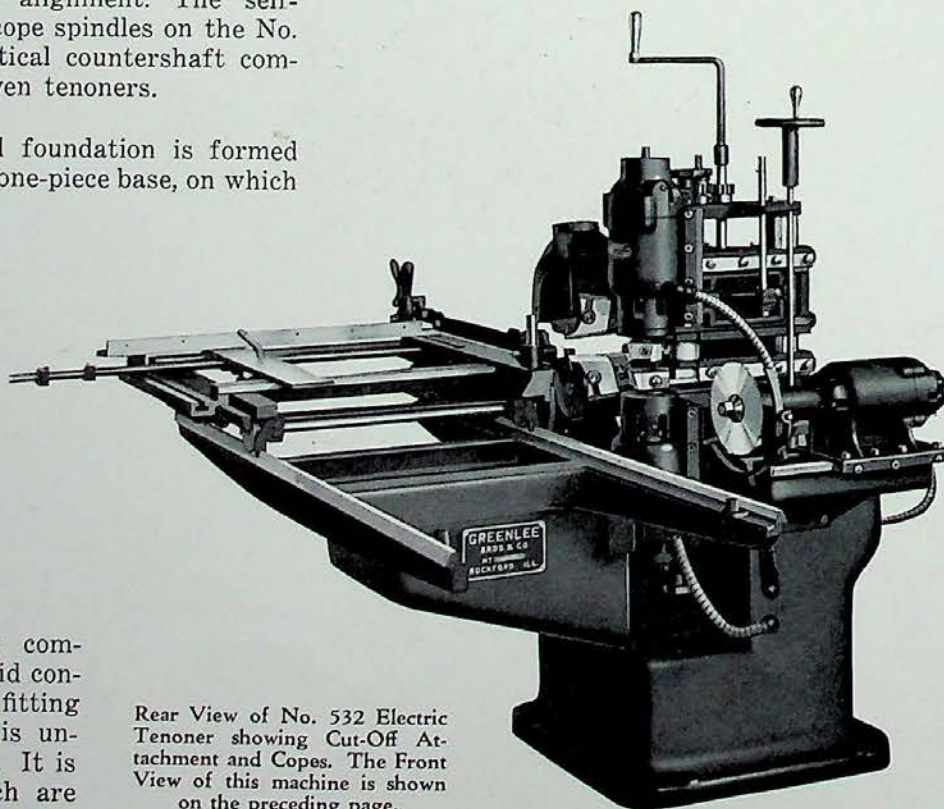
Compactness is one of the important advantages of these tenoners. This feature not only saves floor space, but it avoids unnecessary and useless travel of the table. The cylindrical columns which carry the tenoning head slides help secure the close-coupled mounting and provide exceptional rigidity. These columns are turned and ground to perfectly fit the accurately bored and reamed holes in the slides, and this mounting guarantees permanent alignment. The self-contained drive of the cope spindles on the No. 530 eliminates the vertical countershaft commonly used on belt-driven tenoners.

Frame A substantial foundation is formed by the heavy one-piece base, on which are mounted the two widely spaced cylindrical columns, the cut-off attachment bracket and the table roller tracks. These tracks are cast in one piece for permanent alignment and are carefully machined. Ample foot room around the machine base makes for convenient operation and easy adjustment.

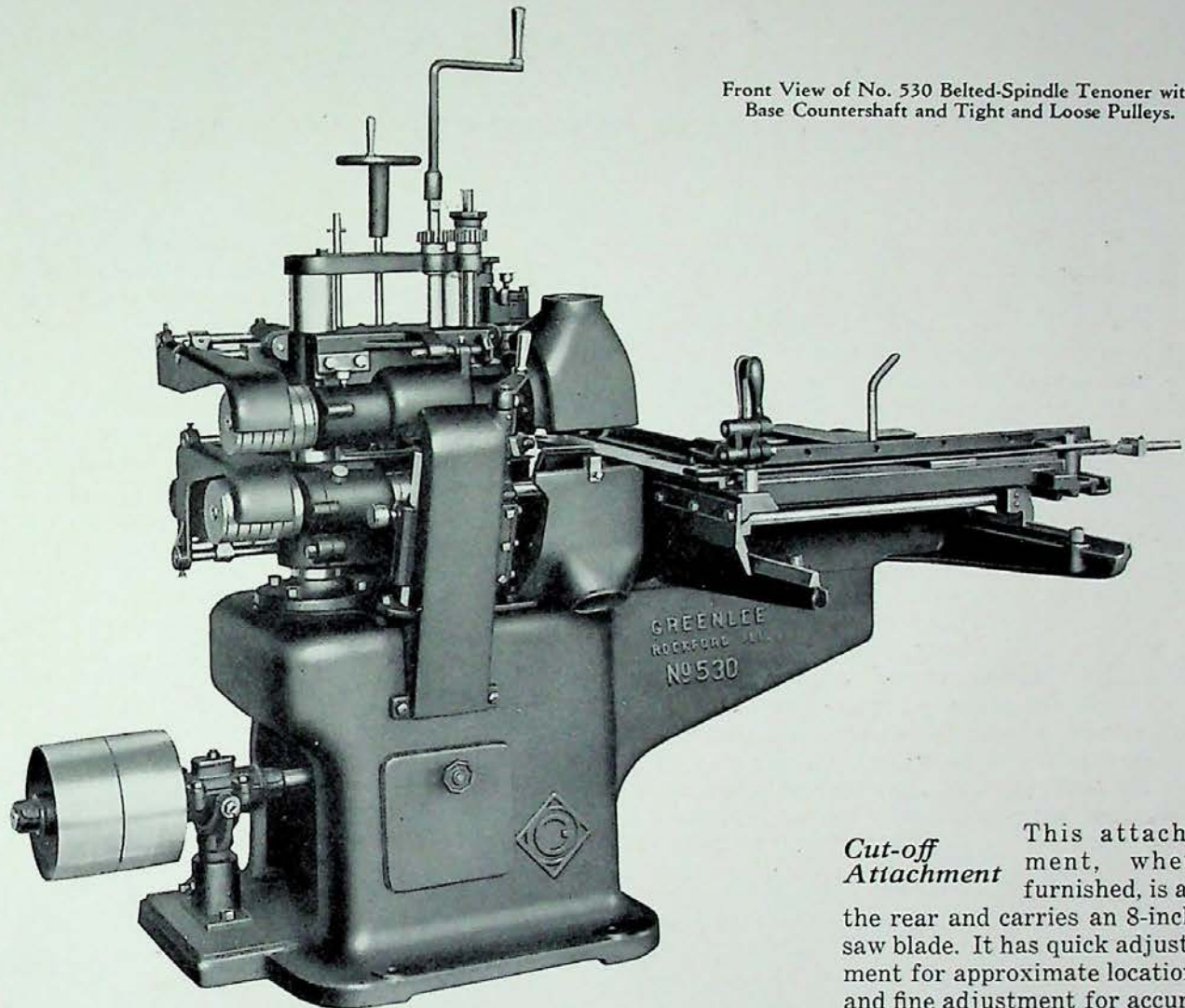
Table Light weight combined with rigid construction and accurate fitting insures a table which is unusually easy to operate. It is carried on rollers which are

mounted in a sub-frame to shorten the tracks as much as possible. Stops for the table travel are provided, and it is gibbed to prevent any tendency toward tipping. The tracks are cast in one piece to maintain perfect alignment, and one is of the inverted V-type to guide the rollers without collecting dust. Further protection is provided by a dust shield attached to the table. The table is equipped with an improved quick-acting clamp, a fence for straight or angle tenons, an angle stop rest, and a false sliding table part to form the outer working edge and carry the stop rod.

Tenoning Units The mounting of the tenoning units on the vertical cylindrical columns affords an excellent means of guiding and clamping the carriages, resulting in the greatest possible accuracy of work. The top and bottom carriages have combined vertical



Rear View of No. 532 Electric Tenoner showing Cut-Off Attachment and Copes. The Front View of this machine is shown on the preceding page.



Front View of No. 530 Belted-Spindle Tenoner with Base Countershaft and Tight and Loose Pulleys.

adjustment, but this can be instantly disconnected for independent adjustment of each spindle. This has the advantage that the tenon can be raised or lowered, relative to the table, without disturbing its thickness, or the thickness can be quickly changed as desired. Fine screw endwise adjustment is provided for the top spindle carriage to permit lining up its heads with those of the lower spindle.

Cope Units

The slides for the top and bottom cope carriages are attached to the top and bottom tenon carriages respectively, so that when the tenon heads are moved, the cope heads travel with them, saving much time in changing the set-up. Independent horizontal and vertical adjustment is also provided for each cope unit on both machines.

Cut-off Attachment

This attachment, when furnished, is at the rear and carries an 8-inch saw blade. It has quick adjustment for approximate location and fine adjustment for accurate setting. On the No. 532, this adjustment is made from

the front of the machine. By moving a lever on the No. 530, the drive of the cut-off attachment is disengaged. This is a convenient feature and one that is unusual in belted tenoners. Separate control is also provided on the No. 532.

Bearings All spindles of both machines run in selected, precision ball bearings enclosed in dust proof cases and having grease gun lubrication. This provides for continued accuracy and low power consumption.

Heads Single or double tenon heads, 6 inches in diameter, can be furnished as required. The latter are used for making tenons longer than $3\frac{3}{4}$ inches at one pass of the table. Cope spindles will take slotting saws up to 9 inches in diameter.

Drive for No. 530

The belt drive arrangements for the spindles of the No. 530 are very simple and efficient, eliminating the usual vertical countershaft at the rear. A countershaft with but one drive pulley is mounted within the base and is fitted with tight and loose pulleys. When individual motor drive is wanted, the countershaft is replaced by a standard 1200, 1500 or 1800-R.P.M. motor with a crowned-face pulley for the tenon spindle belt.

All belts may be made endless, as tighteners are provided for each. Both tenon spindles are driven by a single belt from the countershaft, and the cope spindles are belted from the tenon spindles over adjustable ball-bearing idlers. The trim-saw spindle is driven by throwing its belt in contact with the tenon spindle belt, and a convenient lever is provided for starting and stopping.

Drive for No. 532

All belts are eliminated on the No. 532 Tenoner, since it is an electric machine with motor-on-the-spindle drive. This has advantages from the standpoint of power consumption, maintenance and convenience of operation. It eliminates belt upkeep, and only those spindles in use need be run.

Each spindle has the rotor of a $1\frac{1}{2}$ -H.P. motor mounted on it. They run 3600 R.P.M. and are regularly furnished for 220 and 440-volt, 2 or 3-phase, 60-cycle current. Push-button control is provided, and the starters have relay protection, instead of ordinary fuses.

Specifications

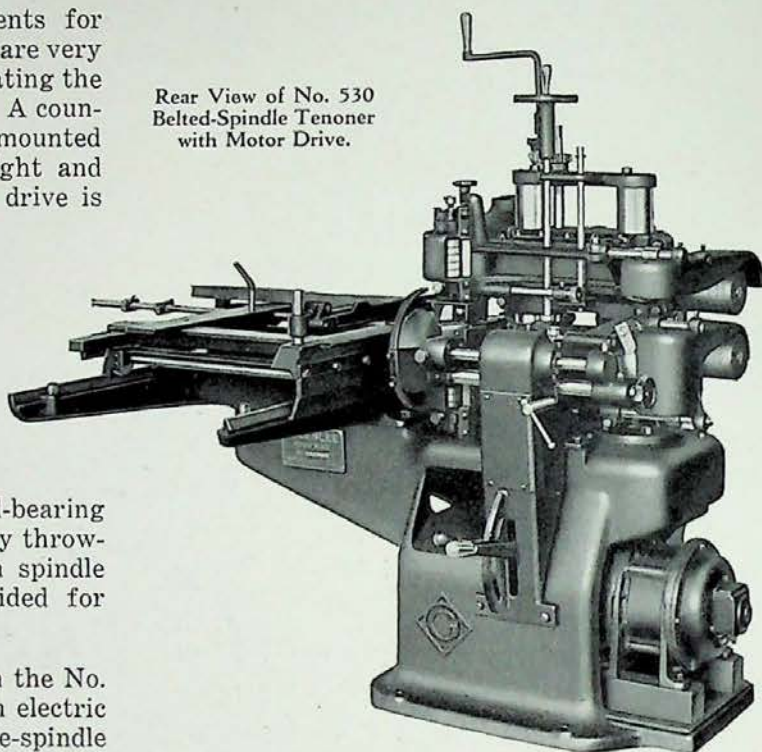
Equipment

Both machines are regularly equipped with single tenoning heads, cope heads, the table outfit, and a set of wrenches. When furnished, the cut-off attachment has an 8-inch saw blade.

Range

When single heads are used, tenons up to $3\frac{3}{4}$ inches long can be cut with one pass of the table, or up to $7\frac{1}{2}$ inches with two passes. Double heads cut 6-inch tenons

Rear View of No. 530 Belted-Spindle Tenoner with Motor Drive.



with one pass, or $7\frac{1}{2}$ -inch with two. Heads open up for 5-inch thick tenons and the standard machines will work stock up to 24 inches wide.

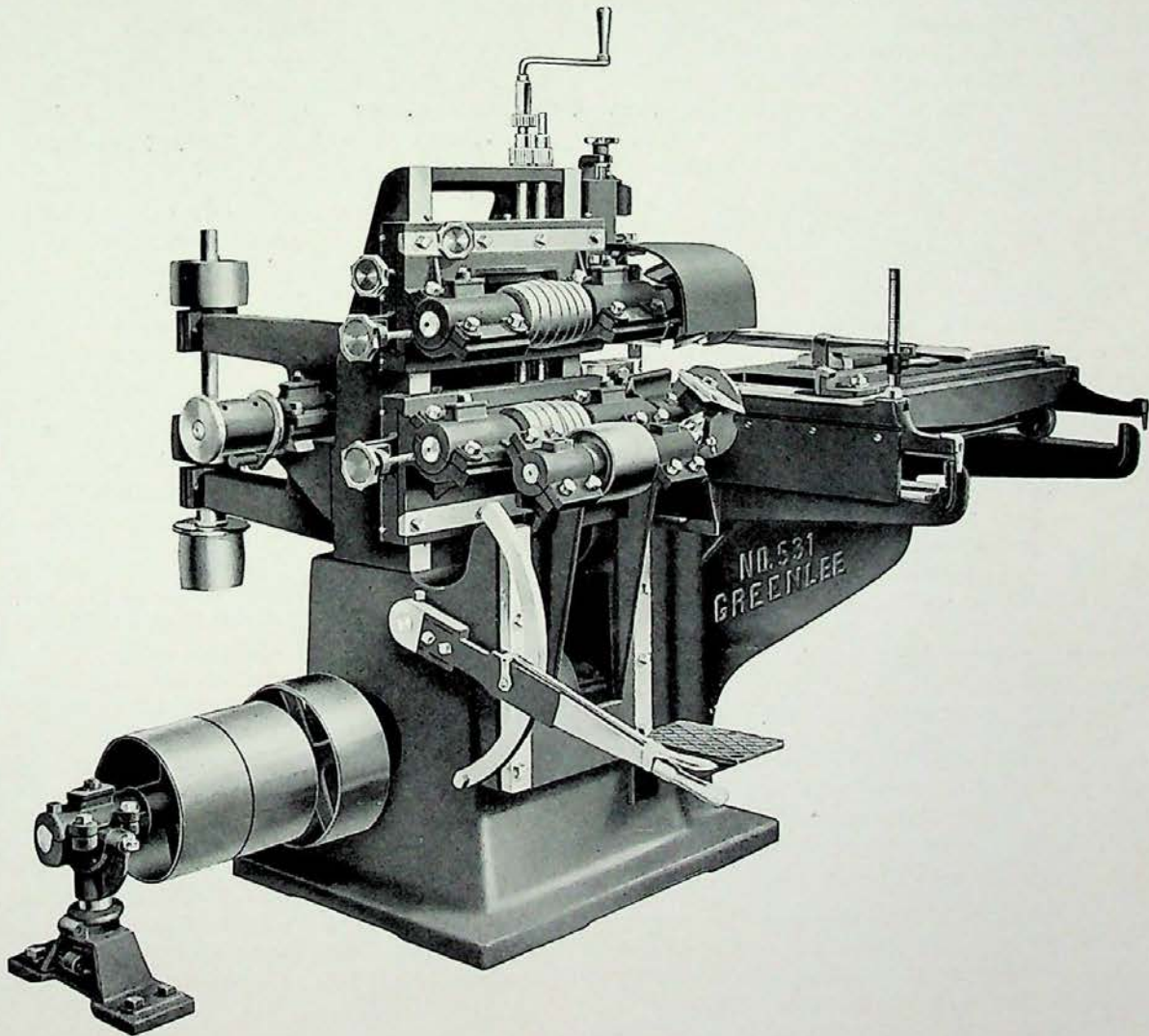
Net weight in pounds:	
No. 530	2450
No. 532	2450
Weight in pounds boxed for export:	
No. 530	3200
No. 532	3200
Measure in cu. ft. boxed for export:	
No. 530	110
No. 532	110
Additional weight in pounds for trim saw:	100
Floor space for maximum table travel:	
No. 530 with T and L pulleys	6'-6" x 6'-8"
No. 532	5'-4" x 6'-8"
Codes for No. 530:	
No. 530 with top and bottom cope attachments	GINEP
No. 530-A with one cope attachment	GINIS
No. 530-B without cope attachments	GINOT
Cut-Off Attachment	GINYX
Countershaft omitted	GIPAP
Set of inside tenoning heads to increase range for cutting 6" long tenons	GIPES
Codes for No. 532:	
No. 532 with top and bottom cope attachments	GORYZ
No. 532-A with one cope attachment	GUJYL
No. 532-B without cope attachments	GUKYM
Cut-Off Attachment	GULYN
Set of inside tenoning heads to increase range for cutting 6" long tenons	GUMYP

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

NO. 531 BELT-DRIVEN SINGLE-END TENONER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

NO. 531 BELT-DRIVEN SINGLE-END TENONER

THIS medium heavy machine has long held an enviable position among belt-driven tenoners for sash, door, implement, automobile body, cabinet and furniture work. It differs chiefly from others in being heavier, stronger and more complete in its mechanical details. Perfect work is assured by its wide belts, large spindles, high cutting speeds and fine adjustments. Beyond this, its exceptional sturdiness of frame and details guarantees continued satisfactory service.

Greenlee Single-End Tenoners are also built with full electric drive, eliminating all belts, for use where proper alternating current is available. These are built in two sizes, and the range of the smaller one is duplicated in a belt-driven tenoner, which is suitable for general use in the manufacture of sash, doors, furniture, etc.

Tenoning Units Tenoning spindles run in two long self-oiling bearings on an extra-large yoke casting fitted in gibbed ways to provide lateral adjustment for both tenoning heads. The headstocks have independent and connected vertical screw adjustment on ways 18 inches wide.

Perfect belt adjustment is provided for the tenoning spindles by a quick release lever, which automatically locks in position for any desired tension. This overcomes the annoyance of weighted or screw tighteners.

Cope Units Cope spindles, when furnished, are on independent yokes, providing vertical and horizontal adjustments, but supported from the main headstocks, so that they adjust vertically with the tenoning spindles.

The vertical countershaft for the cope spindle is mounted on a long and extra heavy double bracket and runs on a supporting ball bearing, thus avoiding usual bearing troubles. The belt from the main countershaft passes over an adjustable idler for correct direction and tension.

Cut-Off Attachment

The cut-off saw attachment is placed at the rear of the machine. It has adjustable stop collars, quick adjustment for rough location, and fine screw movement for accurately setting the saw in the required cutting position.

Table

The table is mounted on anti-friction rollers set on widely spaced centers. It is thus perfectly supported and secured to the ways, which are extra long. It has stops, a track guard and cleaning device, adjustable fence for straight or angular work, and a very handy hold-down.

Motor Drive

Individual motor drive is had by coupling direct to the base countershaft at the tight and loose pulley end or beneath the table at the opposite end. The usual motor size is 5-H.P., and it can have any speed from 850 to 1500 R.P.M.

Range

The range is for cutting 7½-inch long tenons at one pass with the double heads or 9½-inch long with two passes. The table travel allows 26-inch width of stock to be tenoned, and the heads will open more than 5½ inches. When provided with a special collar, the cope spindle will swing a 13-inch slotting saw for cutting to a depth of 5 inches.

Equipment

Standard equipment includes such heads with a set of knives for each as are specified with the machine, a saw with the cut-off attachment, wrenches, and 12 x 6½-inch tight and loose pulleys on the countershaft, which should run about 900 R.P.M.

Weights and Codes

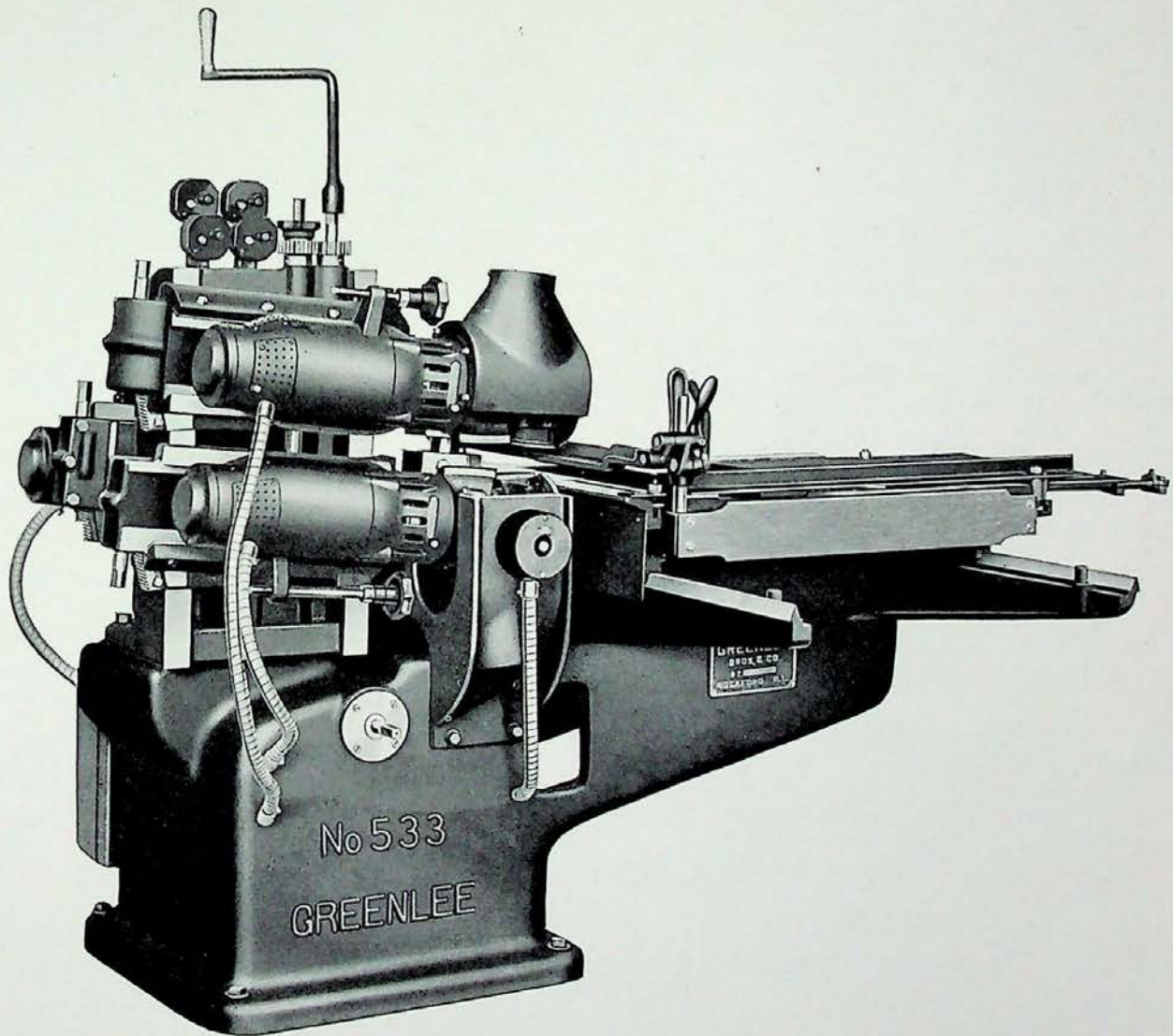
Net weight in pounds of No. 531 with copes.....	3250
Net weight in pounds of No. 531-B without copes.....	2850
Extra weight for addition of cut-off attachment.....	150
Weight of No. 531 boxed for export.....	3950
Weight of No. 531-B boxed for export.....	3550
Box measure in cu. ft.	131
No. 531 with copes.....	GIPYZ
No. 531-B without copes.....	GOJYM
Add for cut-off attachment.....	GOKEG

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

Nos. 533 AND 534 ELECTRIC SINGLE-END TENONERS



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

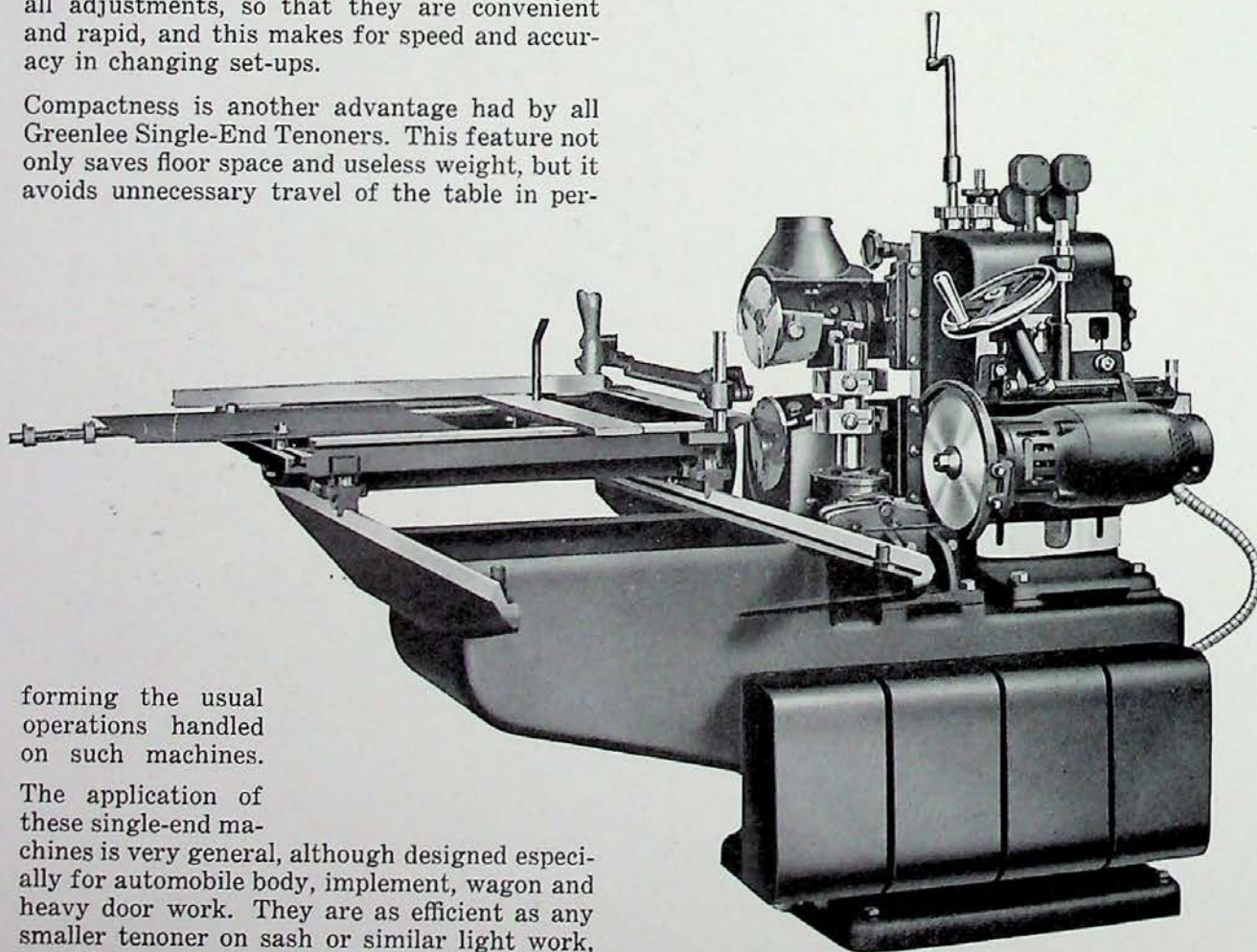
Nos. 533 AND 534 ELECTRIC SINGLE-END TENONERS

THE Heavy Single-End Tenoners described in this bulletin embody the very latest improvements in the design and construction of machines of this type. In addition to their wide range and capacity, their outstanding features include ball bearings for all spindles to lower the power consumption, built-in motors to eliminate all belts, and tilting adjustment for all spindles, so that angle tenons can be made on the horizontal table without the use of special forms. Particular attention has been given to all adjustments, so that they are convenient and rapid, and this makes for speed and accuracy in changing set-ups.

Compactness is another advantage had by all Greenlee Single-End Tenoners. This feature not only saves floor space and useless weight, but it avoids unnecessary travel of the table in per-

forming the usual operations handled on such machines. Those tenoners, however, do not have tilting adjustment for the spindles.

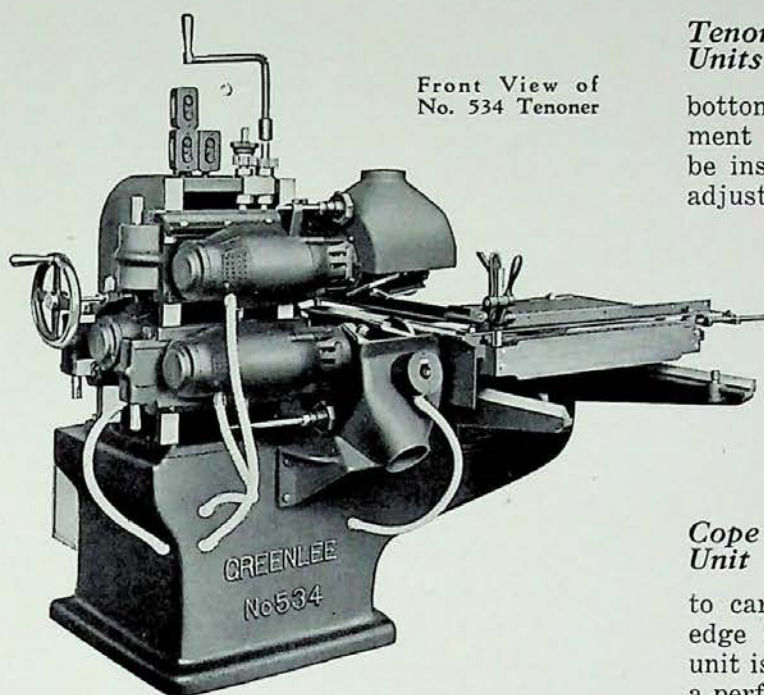
The Nos. 533 and 534 Tenoners are of the same general design, except that the frame column has been modified on the No. 534 in order to house the cut-off attachment within it, when a machine is not required with a cope spindle. The No. 534 is built without the cope attach-



forming the usual operations handled on such machines.

The application of these single-end machines is very general, although designed especially for automobile body, implement, wagon and heavy door work. They are as efficient as any smaller tenoner on sash or similar light work, but when a machine is wanted exclusively for such requirements, we recommend our smaller pattern No. 532, which also has built-in motors,

Rear View of No. 533 Tenoner showing Cope Spindle and Cut-Off Attachment. The front view is shown on the preceding page.



Front View of
No. 534 Tenoner

Tenoning Units

The tenoning units are mounted on vertical dovetail ways on the front of the column. The top and bottom carriages have combined vertical adjustment by hand crank from above, but this can be instantly disconnected for the independent adjustment of each. This has the advantage that the position of the tenon can be raised or lowered without disturbing its thickness, or the thickness can be quickly changed as desired. Tilting adjustment is provided by pivoting a set of dovetail ways on the carriage, and these carry the motor housing which has fine-screw endwise adjustment.

Cope Unit

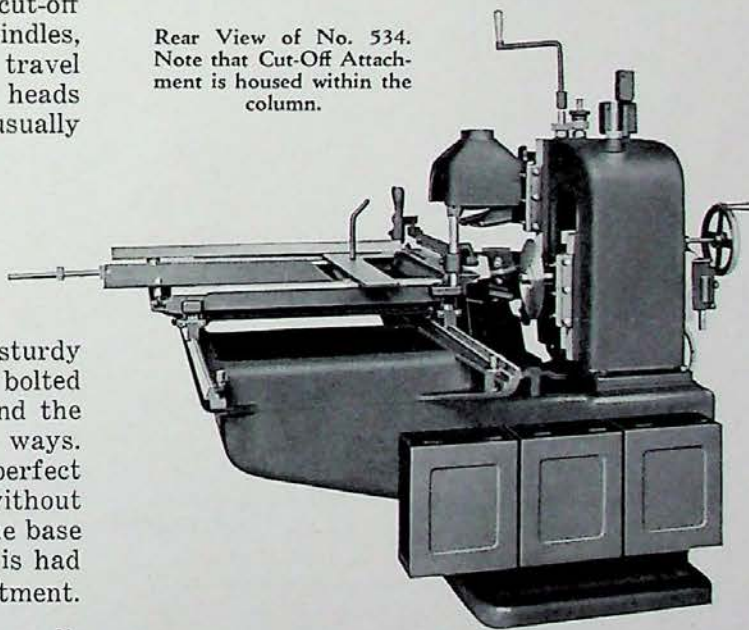
The single cope unit of the No. 533 machine is designed to carry two coping heads and it can be arranged to carry a slotting saw. Shaping cutters for edge moulding can also be used. The entire unit is housed within the main frame to insure a perfectly rigid mounting, and convenient ver-

ment, and this change in location of the cut-off saw places it close to the horizontal spindles, thus eliminating all unnecessary table travel in moving the stock from the tenoning heads to the saw. This arrangement is the one usually installed in automobile body plants, unless a vertical spindle for coping work is required. When such is the case, the No. 533 should be specified.

Frame A heavy, one-piece casting with a well proportioned extension for the table ways forms a sturdy base for these machines. To this base is bolted the rigid, upright casting, or column, and the one-piece yoke, which carries the table ways. The entire frame is designed to provide perfect rigidity for the high-speed spindles, without giving the machine excessive weight. The base is wide spreading, but ample foot room is had for convenient operation and easy adjustment.

Spindles All spindles are of extra large diameter, they are accurately ground to size and run in large-diameter, precision ball bearings, which are perfectly lubricated with but very little attention. Since each spindle carries the rotor of its motor, all belts are eliminated, and this feature in connection with the ball-bearing construction reduces the power consumption to an absolute minimum.

Rear View of No. 534.
Note that Cut-Off Attachment
is housed within the
column.



tical and longitudinal adjustments are provided, as well as tilting adjustment to conform to the angle of the tenoning spindles.

The No. 533 Tenoner is regularly furnished with the cope spindle, although it can be omitted. When a machine is wanted without a cope spindle, the No. 534 should be specified, unless it is intended to later apply this spindle.

Cut-Off Saw

The cut-off saw unit is mounted at the rear of the column on the No. 533 tenoner, but is housed within it on the No. 534, in order to locate it close to the horizontal spindles and thus shorten the table travel. Convenient endwise, vertical and tilting adjustments are provided in the same manner as for the tenoning spindles. A 10-inch diameter saw blade is standard for both machines.

Tilting Adjustment

Tilting adjustment for all the spindles is arranged by pivoting each slide on its carriage. The adjustment is quickly made by a crank which operates a worm on the slide, working in conjunction with a portion of a worm gear mounted on the end of the carriage. The tilting adjustment is to 15 degrees in either direction. All parts are carefully machined and scraped to provide accurate bearing surfaces.

Table

Light weight combined with rigid construction and accurate fitting insures a table which is unusually easy to operate. It is carried on rollers which are mounted in a sub-frame to shorten the tracks as much as possible. Stops for the table travel are provided, and

it is gibbed to prevent any tendency toward tipping. The tracks are cast in one piece to maintain perfect alignment, and one is of the inverted V-type to guide the rollers without collecting dust. Further protection is provided by a dust shield attached to the table. The table is equipped with a parallel-motion type of work clamp suitable for wide or narrow stock, a fence for straight or angle tenons, an angle stop rest, and a false sliding table part to form the outer working edge and carry the stop rod.

Motors and Control

The motors are of the built-in type with the rotors mounted on the machine spindles. They are enclosed, and each one is provided with a fan for ventilation. They are regularly carried in stock for either 220 or 440 volt, 2 or 3 phase, 60 cycle alternating current, and their speed is 3600 R.P.M. All motors are regularly 4-H.P.

Each motor has a separate start and stop push button station, and a master stop station is also provided for stopping all motors at once. Relays provide over-load and under-voltage protection, and no fuses are used. All wiring for the electrical equipment is in flexible conduit.

Specifications

Equipment

Each machine is equipped with such tenon and cope heads as specified, a set of knives for each head, a saw blade for the cut-off attachment, the table outfit, exhaust hoods for the tenon heads, a set of wrenches, and the complete electrical equipment. Three-knife wing-type tenon heads are regularly furnished, but three-knife round heads can be substituted without extra charge.

Range

With double heads, as regularly furnished, tenons up to 7½-inch length can be cut with one pass of the table or up to 10½-inch with two passes. Tenoning head spindles have sufficient vertical adjustment to provide a 6½-inch opening between the heads, and the table travel permits working 24-inch wide stock. Table end stops adjust for lengths of 6 feet and under. Cope Heads up to 10" diameter can be used on the No. 533, and the spindle will swing a 13" slotting saw. All spindles tilt 15° in either direction.

Net weight in pounds:

No. 533 with cope spindle.....	3100
No. 533 without cope spindle.....	2800
No. 534 without cope spindle.....	2800

Weight in pounds boxed for export:

No. 533 with cope spindle.....	3750
No. 533 without cope spindle.....	3400
No. 534 without cope spindle.....	3400

Measure in cubic feet boxed for export:

No. 533 with cope spindle.....	120
No. 533 without cope spindle.....	120
No. 534 without cope spindle.....	120

Codes:

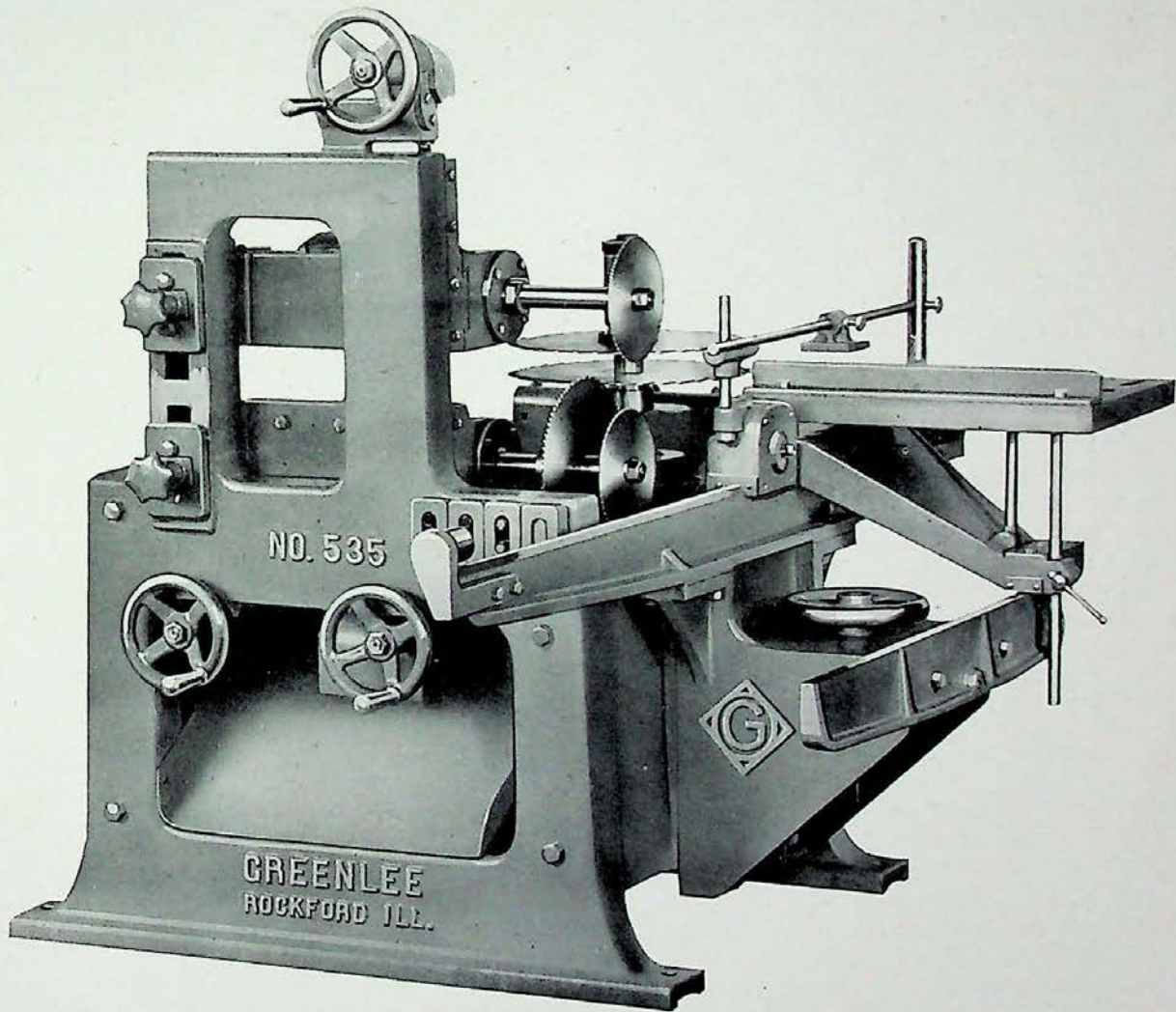
No. 533 with cope spindle.....	GURYX
No. 533 without cope spindle.....	GUSYZ
No. 534 without cope spindle.....	GYKEC
Cut-off attachment omitted.....	GYKIF
Inside heads omitted.....	GYKOG
Three-knife round tenon heads substituted.....	GYKUK

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

No. 535 ELECTRIC SAW TENONER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

No. 535 ELECTRIC SAW TENONER

THE Greenlee Electric Saw Tenoner described in this bulletin incorporates all the latest features in design which make for compactness, accuracy, convenience of operation and low power requirements. It is a beltless machine, since each saw spindle is individually driven by a built-in motor, and this reduces the required floor space and permits placing it in any position with reference to other equipment.

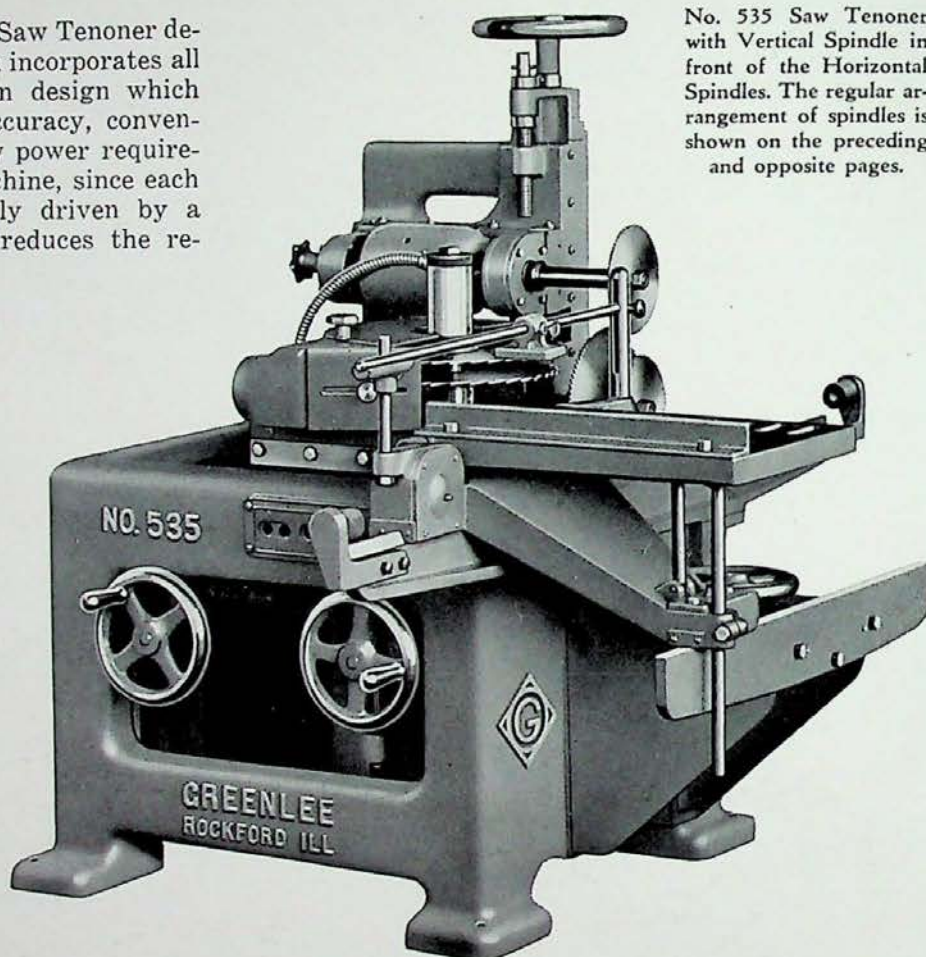
The application of the Greenlee Saw Tenoner is limited to the making of tenons and other cuts where formed or coped shoulders are not required, since all cuts are made by circular saws instead of knife heads. As a result, its greatest field of usefulness is in the making of parts for automobile and truck bodies.

Heavy tenoning is required of a machine in the body industry, and the saw type of tenoner will make them faster and with less power than any knife tenoner.

This is because the stock is removed in the form of a solid block instead of being cut up into shavings.

The standard arrangement of spindles on this machine is for the vertical spindle, which carries the two splitting saws, to be at the rear of the horizontal spindles. This means that the shoulder cuts are made first and that the stock is removed by the splitting saws. When preferred, however, the vertical spindle can be located in front of the horizontal spindles, so that the splitting cuts are made first. With this arrangement an auxiliary, front-mounted cut-off

No. 535 Saw Tenoner with Vertical Spindle in front of the Horizontal Spindles. The regular arrangement of spindles is shown on the preceding and opposite pages.



attachment can be furnished for cutting off straight or angle pieces before passing through the splitting and shoulder saws.

Frame The design of the frame is such that perfectly rigid mounting is had for the saw units and work table, preventing vibration and providing for accurate operation under heavy cuts. It is well supported on the floor, and one side frame is extended at the top to provide a substantial mounting for the slides which carry the housings of the horizontal arbors.

Saw Units Each saw arbor is driven by a built-in motor, the rotor of which is mounted directly upon the arbor. Complete ball-bearing mounting is provided, and the rotor is enclosed by a housing, which has forced ventilation.

The slides on which the top and bottom horizontal arbor housings are mounted have handwheel vertical adjustment for locating the shoulder saws to suit the depth of cut. Horizontal adjustment for the top housing is also provided, so that the top shoulder saw can be lined up with the lower one or located for making offset tenons. The lower arbor also carries the saw for trimming the end of the tenon.

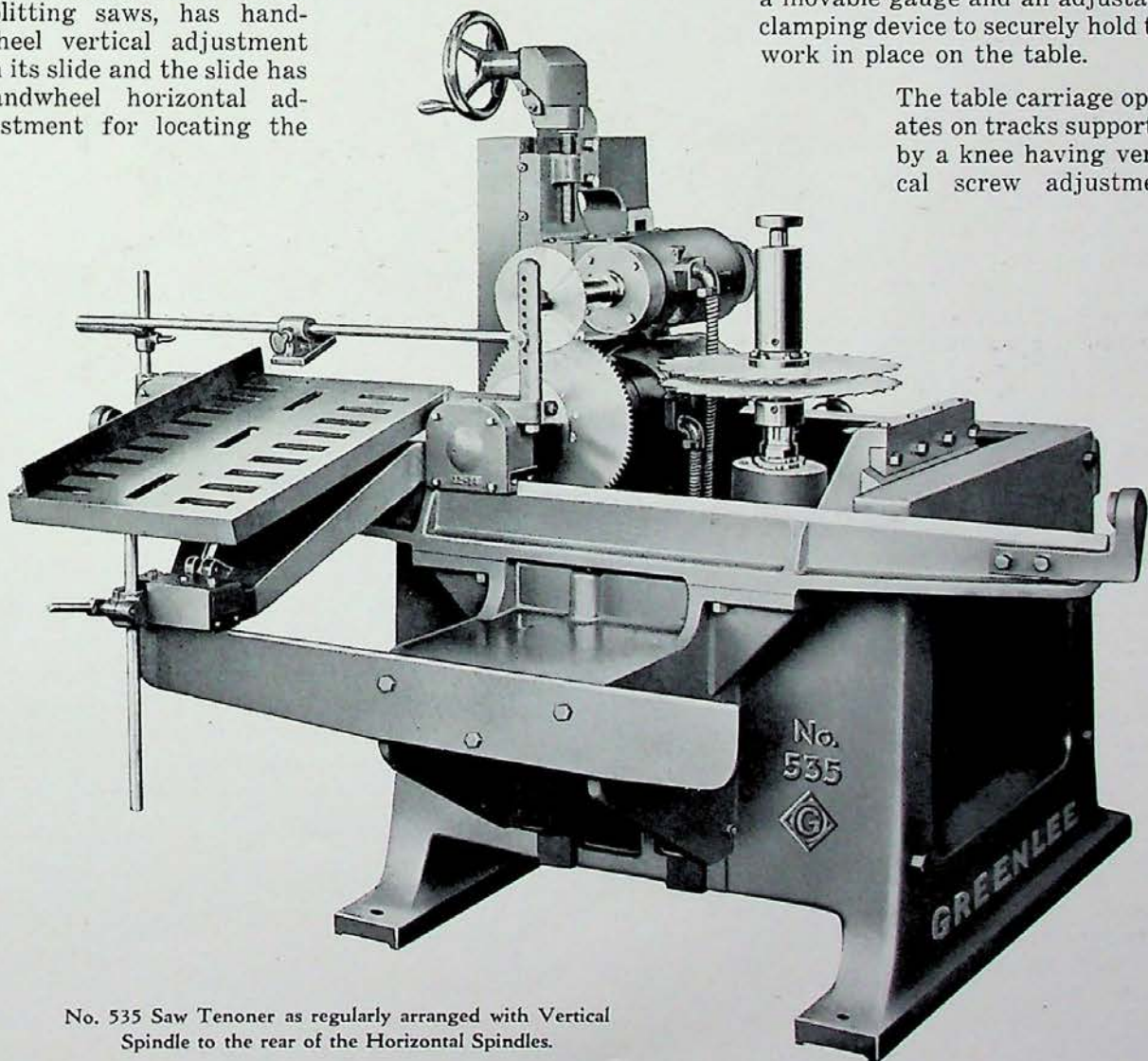
The housing for the vertical arbor, which carries the splitting saws, has handwheel vertical adjustment on its slide and the slide has handwheel horizontal adjustment for locating the

saws the proper distance from the table edge. A screw adjusting sleeve readily spaces the saws as required.

All saw arbors are made from high-carbon steel, which is uniform in quality and temper. They are accurately finished by grinding and are carefully balanced. Each arbor runs in two self-oiling ball bearings, designed especially for high speed.

Table Mounted on an intermediate carriage to provide tilting adjustment above or below the horizontal up to 22 degrees, the table is thus arranged for making the angle of tenon required. It is heavily ribbed and is slotted for clamping forms or fixtures on its surface. The equipment consists of a movable gauge and an adjustable clamping device to securely hold the work in place on the table.

The table carriage operates on tracks supported by a knee having vertical screw adjustment

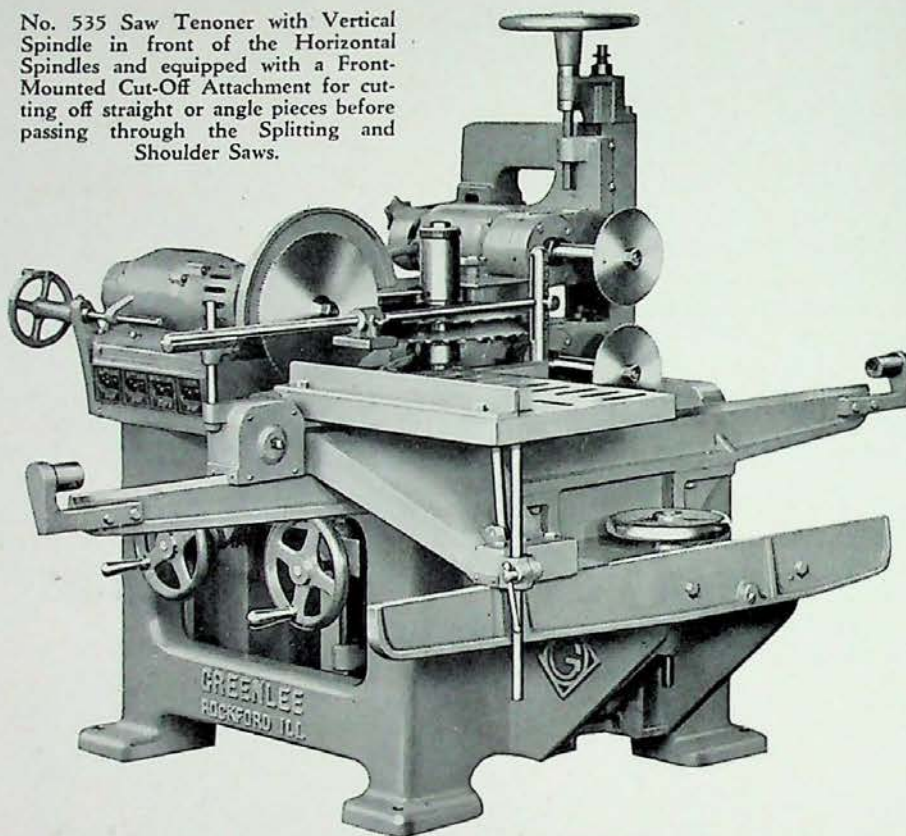


No. 535 Saw Tenoner as regularly arranged with Vertical Spindle to the rear of the Horizontal Spindles.

by a handwheel. It is mounted on ball-bearing wheels for ease of operation and to prevent wear. The upper wheels run on an inverted V-track, and the wheel cases are equipped with scrapers to keep the tracks clean.

Motors and Controls All motors are regularly furnished for 220 or 440-volt, 2 or 3-phase, 60-cycle alternating current, and they are of the built-in type with rotors on the spindles. The control is by individual push-button start and stop stations at the operator's position, and the magnetic switches, which have thermal relays for overload and under-voltage protection, are enclosed in a cabinet at the rear of the machine frame.

No. 535 Saw Tenoner with Vertical Spindle in front of the Horizontal Spindles and equipped with a Front-Mounted Cut-Off Attachment for cutting off straight or angle pieces before passing through the Splitting and Shoulder Saws.



Specifications

Range Tenons from $\frac{3}{16}$ to 2 inches thick can be made on this machine with the standard 12-inch diameter cut-off saw. If a 14-inch cut-off saw is used, 3-inch thick tenons can be cut. The maximum length of tenon that can be made is 6½ inches.

Equipment Standard tenoners are equipped with 5-H.P., 3600-R.P.M. motors for the horizontal spindles, and 7½-H.P., 3600-R.P.M. motor for the vertical spindle. In addition to starters, other equipment includes two 8-inch shoulder saws, one 12-inch cut-off saw, and two 16-inch splitting saws.

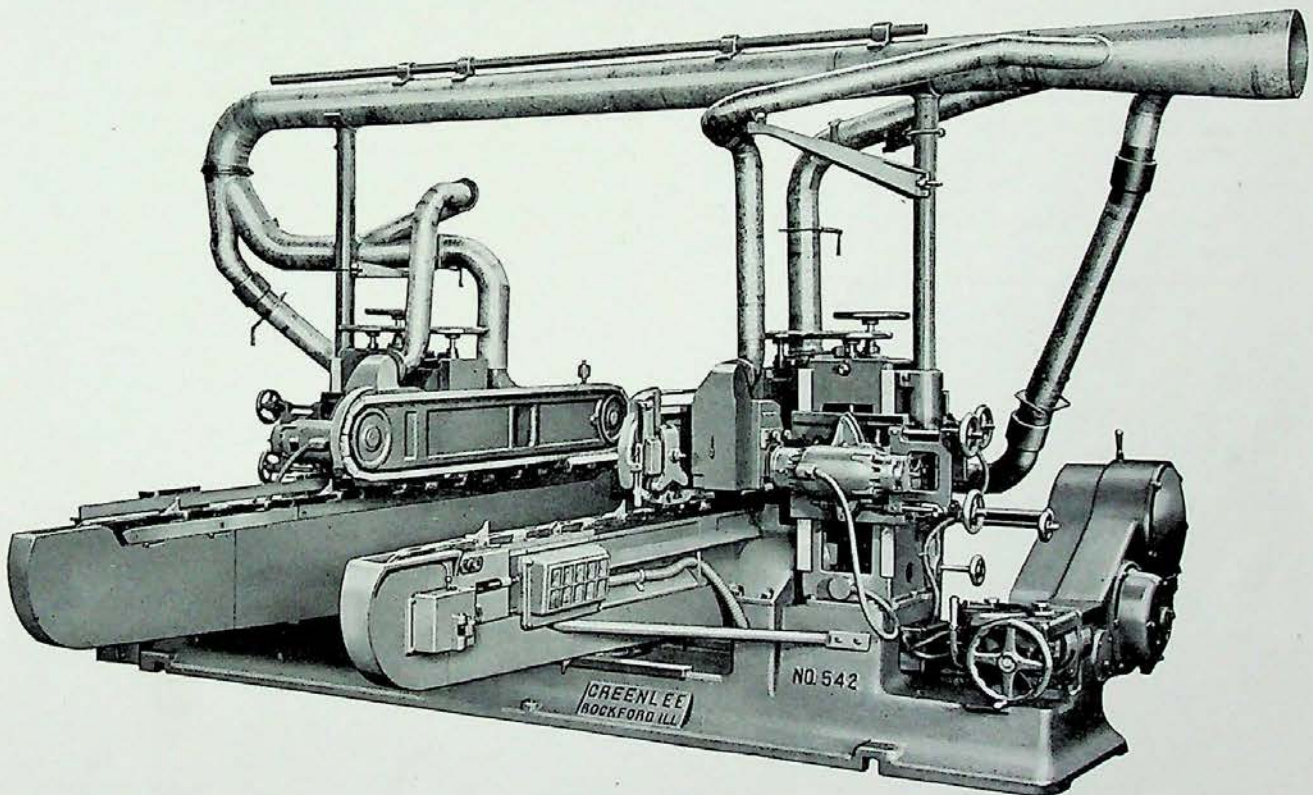
Table size.....	24" wide x 18" deep
Table travel.....	42"
Net weight in pounds.....	3400
Weight in pounds boxed for export.....	4000
Box measure in cu. ft.	103
Floor space.....	about 5½ x 6 ft.
Code for No. 535 (Specify spindle location)....	GYLAC
Code for auxiliary cut-off attachment on machine with vertical spindle in front of horizontal spindles.....	GYLED

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

No. 542 ELECTRIC DOUBLE CUT-OFF SAW



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

No. 542 ELECTRIC DOUBLE CUT-OFF SAW

THIS Double Cut-Off Saw was designed to satisfy the need for a machine with less cutting units than are regularly had on our No. 545 Double-End Tenoner. Since the operations done on it are the same as many of those performed on the Greenlee Double-End Tenoner, it is natural that its design should incorporate the important features that have contributed so much to the success of that machine.

The arrangement of machine most commonly specified includes vertical copes in addition to the front cut-off saws, although it can be furnished only for cutting off. Attachments for dadoing and other special operations can be applied, and various combinations of chain beams, columns and hold-downs are available.

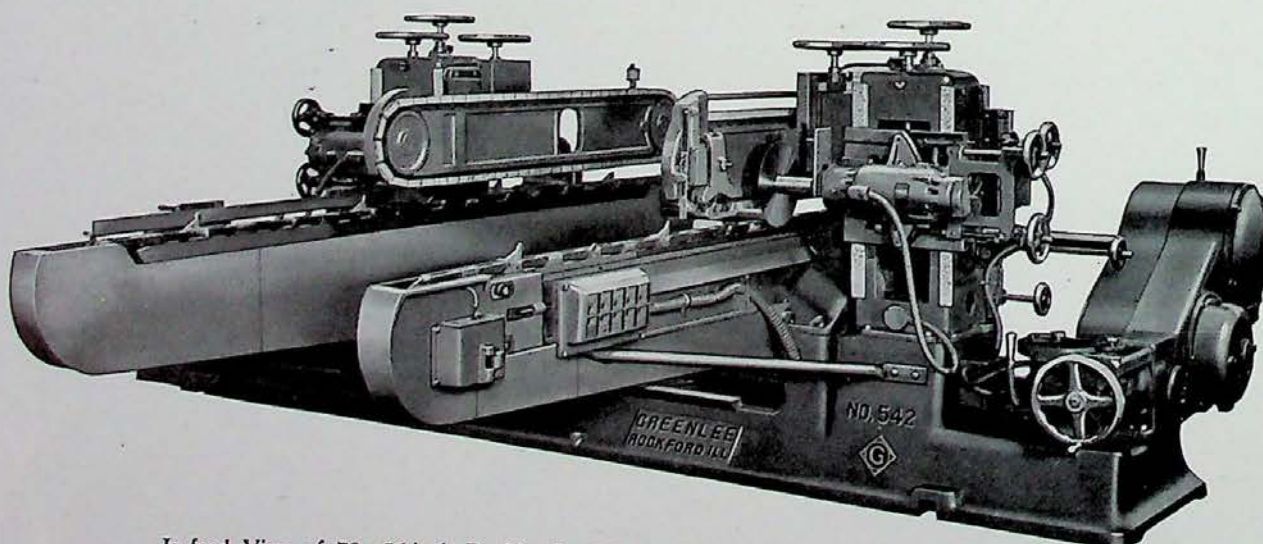
Machine Base The heavy, one-piece bed casting consists of a combination of longitudinal and crosswise I and channel sections with a box-type raised structure at the right end, which carries the stationary column and chain beam. To the right of this is mounted the dust-tight gear case and motors. Seven standard lengths are available to provide different maximum distances between the cutting

units. The top of the bed is closed by boiler plate sectional covers to keep out shavings and dirt.

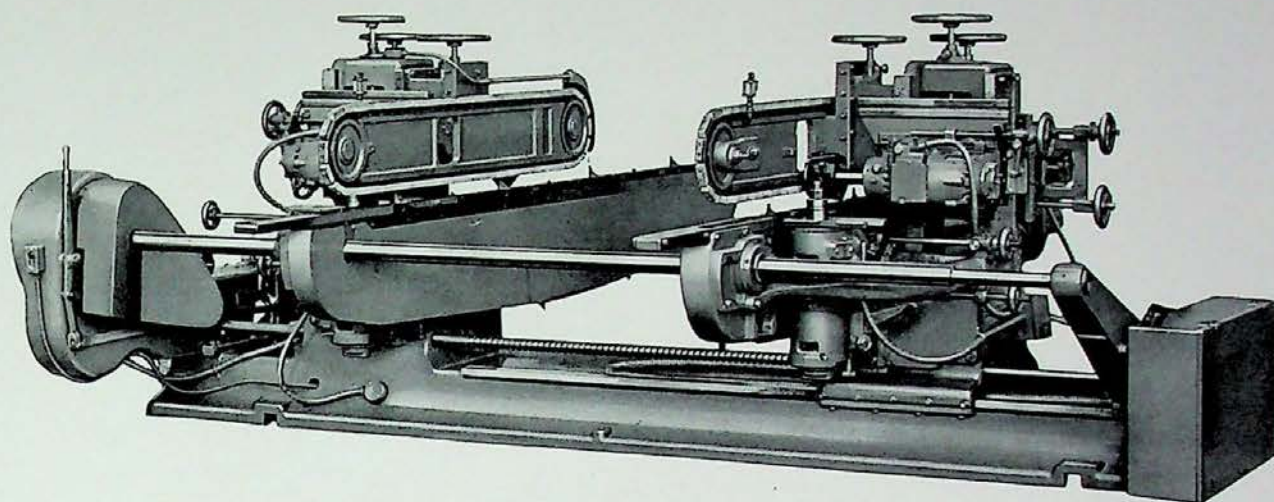
Columns Each column consists of a heavy box-type casting on which are machined ways for the cut-off units and dado attachment. Like the No. 545 Double-End Tenoner, this machine is designed with the right-hand column stationary and the left-hand one adjustable, this being an exclusive feature of Greenlee machines of this type. By this arrangement all controls, both electrical and mechanical, are grouped at the operator's natural position. In addition, it simplifies the electrical connections and provides less weight for the movable housing.

Feed Chains and Beams Feed chains are made of high carbon steel links and drill rod pins, and the center links have an inverted V milled in the bottom side to fit a corresponding V on the replaceable track. This construction entirely eliminates all sidewise creeping of the chains.

Lubrication of the chain links and V-tracks is accomplished by force-feed oilers, which pump the oil through tubes to a point at the top of



In-feed View of 78 x 56-inch Double Cut-Off Saw. This same machine with Built-in Exhaust Piping is shown on the preceding page.



Rear view of a 78 x 56-inch Double Cut-Off Saw with Copes and Top Horizontal Cutter Head Spindles

the V-way below the front of the pressure beam. A convenient regulator governs the flow of oil.

Feed chains are furnished with either plain or corrugated surface, and either type can be fitted with fixed, adjustable, or drop dogs. The smooth chain with fixed dogs is standard, but corrugated chains are recommended where large panels are machined without dogs.

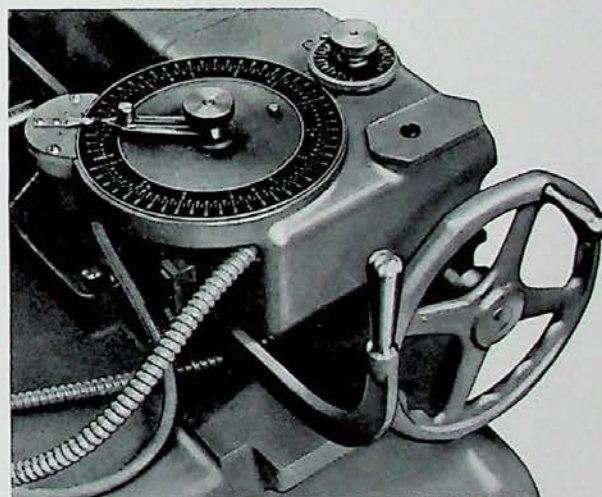
Provision is made for quickly adjusting the right-hand chain with reference to the other for lining up the dogs or for staggering them to run stock through on an angle. A worm and worm gear mechanism rotates the right-hand feed sprocket by means of a square end on the worm shaft. Graduations on the housing of the unit show the chain adjustment in inches, and a dial on the worm shaft registers intermediate settings in sixty-fourths of an inch.

Pressure Beams

The pressure beams are mounted on heavy brackets bolted to the columns and have vertical screw adjustment by handwheels. They are regularly fitted with traveling chains having rubber hold-down pads, but spring steel hold-downs can be substituted for the chains at a reduction in price. Each beam has a hold-up shoe which insures square cutting by forcing the stock against the dogs before it is engaged by the rubber pads.

Feed Chain Drive

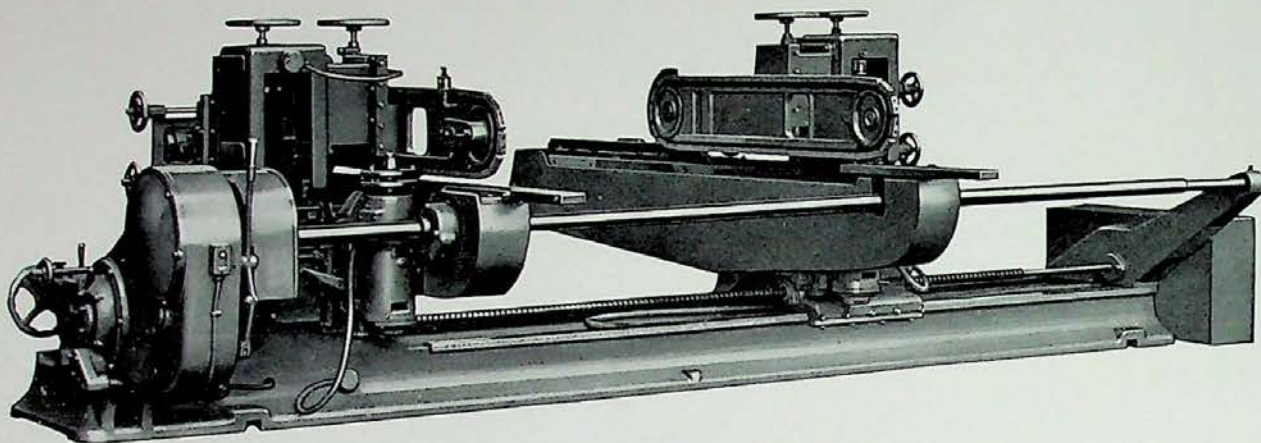
The 2 $\frac{3}{4}$ -inch feed shaft runs in roller bearings and drives the four-toothed chain sprockets, which have inserted hardened steel teeth. This



Two Dials at operator's position show exact setting for distance between saws. The large pointer is set to desired location and control button pressed to bring the movable housing to its place. Final precise setting is then made by the handwheel.

shaft is driven from a motor through a pair of two-step cone pulleys and a single train of spur gears carried on anti-friction bearings and running in oil. The gears are enclosed in a dust-tight case securely mounted on the machine base. Two speeds of 20 and 35 feet per minute are regular, but others up to 50 feet can be had by changing pulley diameters or using a two or four-speed motor.

A combination start, stop, and safety rattle clutch is also enclosed in the gear case. It is so designed that in case of a jam it will slip and warn the operator to disengage it.



Rear View of a 120 x 40-inch Double Cut-Off Saw with Copes.

Column Adjustment

Power adjustment of the movable column for distance between saws is exceptionally rapid and convenient. Two dials at the operator's position show the setting to one sixty-fourth of an inch, with ample space between the graduations for setting to a fraction of one sixty-fourth. It is only necessary to set a pointer on the large dial, push the control button, and the housing moves to the position, stopping automatically. The final, precise setting is made by the handwheel and small dial. Short machines may have only hand adjustment at a reduction in price, but it is not recommended where frequent changes are necessary.

Motors and Control

Like the Greenlee Double-End Tenoner, this is a full electric machine with motor-on-the-spindle drive. Motors are regularly furnished for 220, 440 or 550-volt, 2 or 3 phase, 60-cycle current. Push button start stations are in a panel on the right-hand chain beam.

An auxiliary, adjustable safety stop is mounted on the front of the right-hand pressure beam and can be set to admit only one piece of stock under the beams. This prevents jams and protects the operator. A lever lock prevents accidental starting of any motor while set-ups are being made, and a master stop station is also provided at the rear of the machine.

Attachments and Extra Features

Various attachments can be added to the machine for handling additional operations, such as relishing, single or double notching, dadoing, scoring and dovetailing. A conveyor can be had for offal where machines have only cut-off saws, and refuse cutters can be added for converting to chips what would otherwise be trimmed off in long strips.

Built-In Piping

A system of built-in piping can be furnished when desired for connection to the shavings exhaust system. This consists of hoods for the cutters with complete piping mounted on the machine frame and terminating in a single outlet. It saves installation time, besides providing a sure and efficient system without the necessity of experimenting. The shavings hoods with fittings for attaching can be furnished without the piping, if preferred.

Range

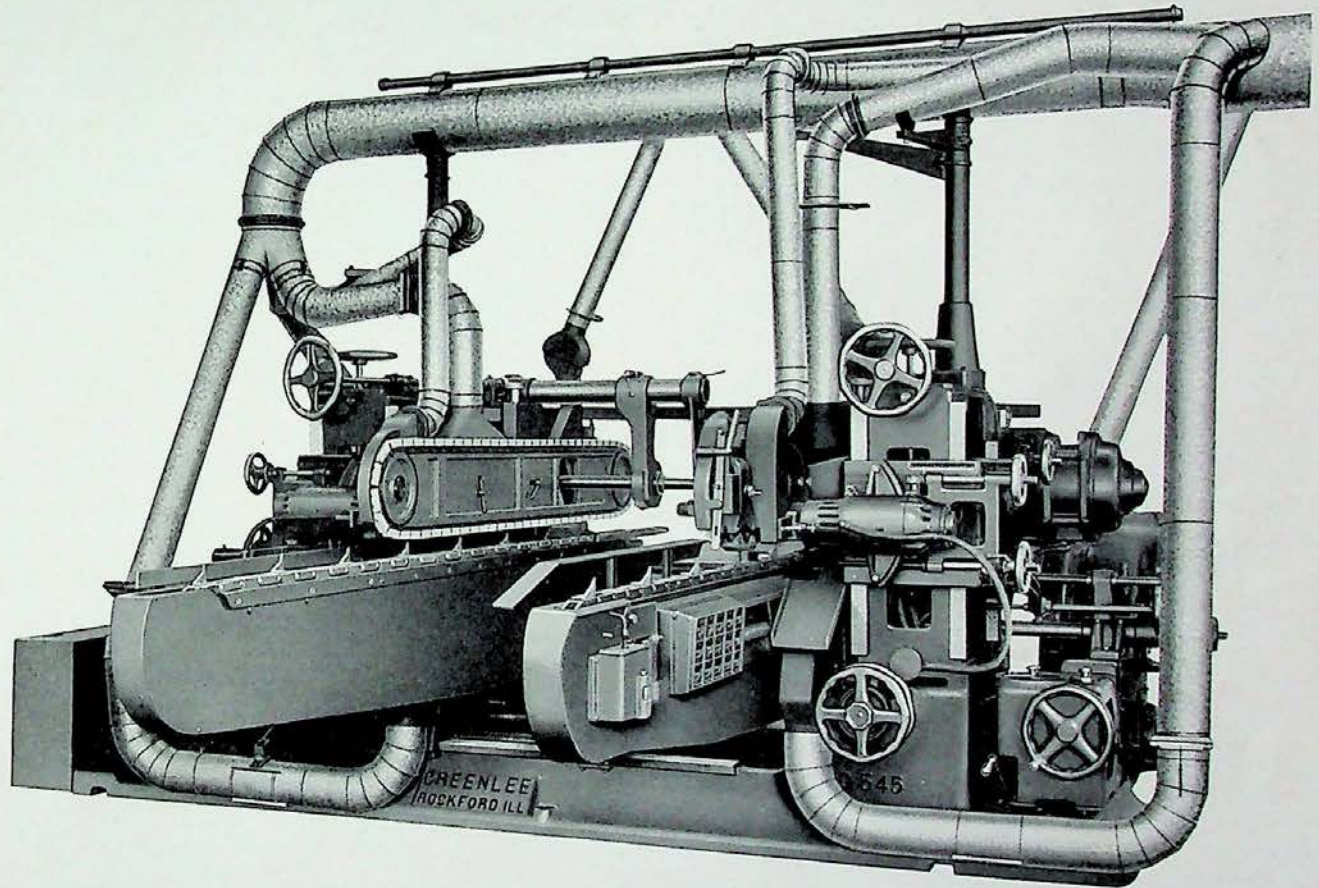
Regularly built in lengths for maximum distances between saws of 48, 60, 78, 90, 120, 144 and 168 inches with saws set close to the chain beams, this machine has capacity for 7-inch thickness under the pressure beams and is built to take widths of 40, 56 and 72 inches. These widths are increased 4 inches when the machine is arranged for copes and jump dado. Saws can be extended 9 inches toward the front for double cutting of 12-inch wide random-length stock.

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

Greenlee

No. 545 ELECTRIC DOUBLE-END TENONER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

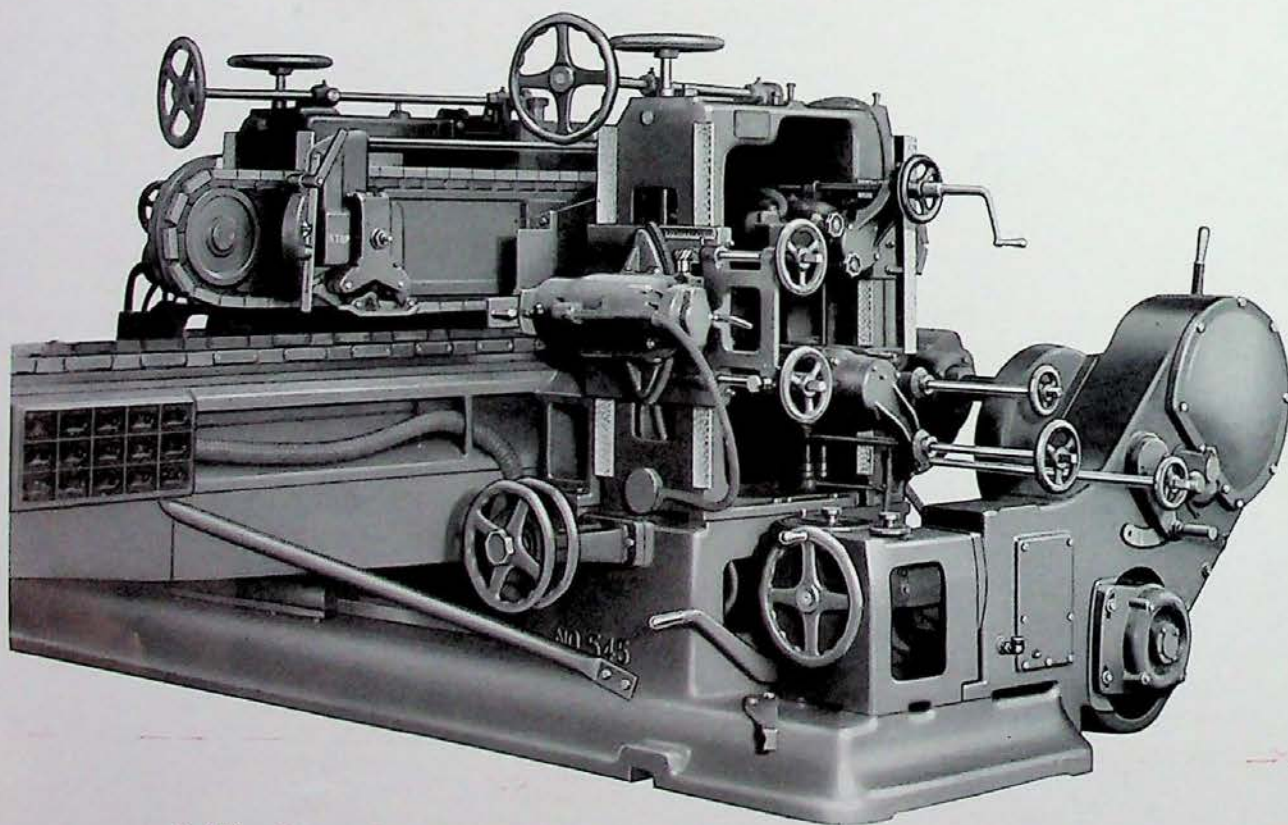
No. 545 ELECTRIC DOUBLE-END TENONER

WHEN the development of this machine was undertaken, it marked the beginning of a new era in Electric Double-End Tenoner design. It was brought out with the express purpose of placing on the market a strictly high-class machine for full electric drive, which would be superior from the standpoint of weight, accuracy, ease of set-up and general all-around efficiency, and which would fully meet the requirements for manufacturing sash, doors, furniture, automobile bodies and radio cabinets, as well as many other products requiring a variety of operations.

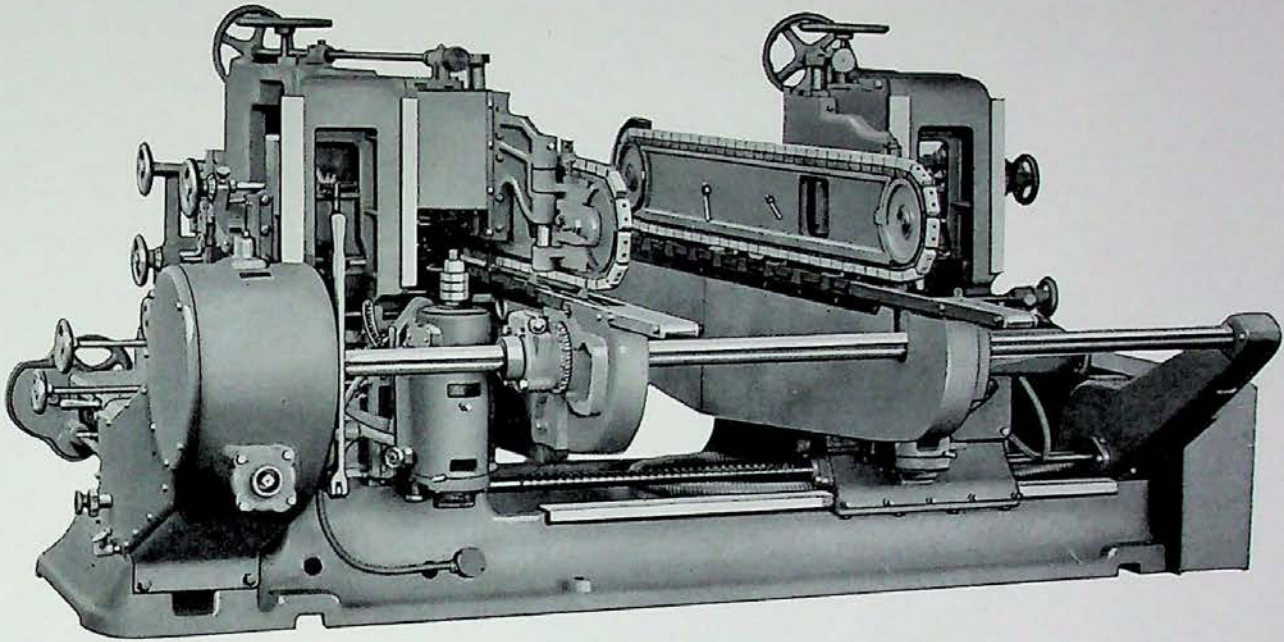
That success has been fully realized in the carrying out of this ideal is proved by the per-

formance of every machine built since the design was completed. The machine quickly won the confidence of the entire woodworking industry, and users have been practically unanimous in acclaiming it as the finest woodworking tool that they have ever seen.

Outstanding Improvements Improvements over other Double-End Tenoners involve many features, some of which are radical departures from the accepted standards of the past, and all of which make for more convenient operation, faster production and longer life. Many of these improvements are original Greenlee features, and many are found only on the Greenlee Tenoner.



End View Showing Stationary Column, Feed Box, Dials for Setting Movable Column, Push-Button Panel on Chain Beam, Safety Stop on Hold-Down Beam, Lock for Cut-Off Saw Arbor, and Square Ends for Crank on all Adjusting Screws for Cutter Units.



Rear View of 48" x 44" Machine.

Chief among the outstanding improvements is the arrangement which places the stationary column at the right-hand end of the machine. This simplifies the electrical connections and groups all controls, both mechanical and electrical, at the regular position of the operator. Other important features include anti-friction bearings throughout, simple and efficient lubrication, micrometer dials throughout to secure exact location for all adjustments, improved feed chain and beam construction, greater accessibility, easier adjustments, built-in exhaust hoods and piping, and heavier and more rigid construction of the entire machine.

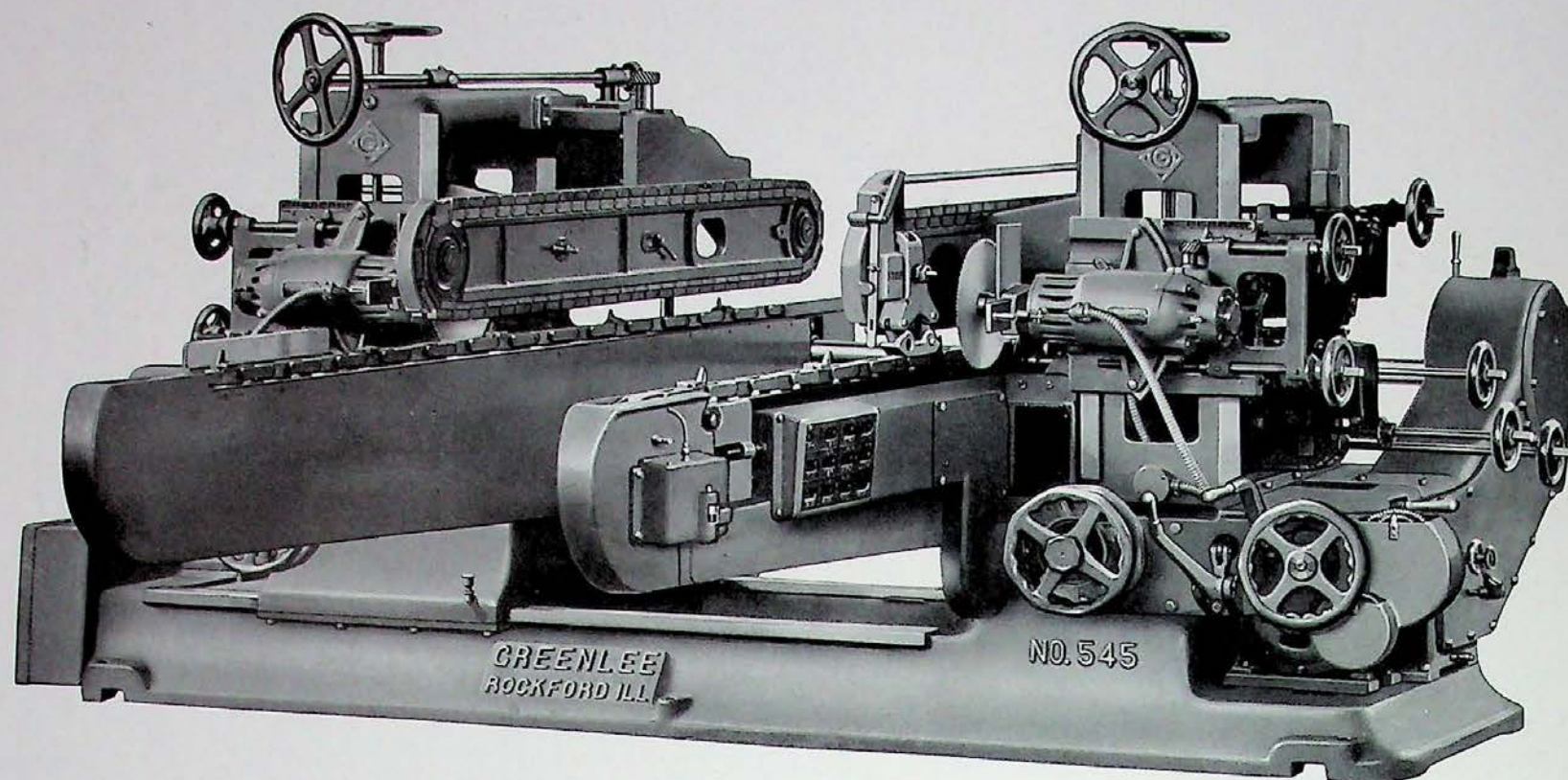
Machine Base The base of the No. 545 is a heavy one-piece casting made up of a combination of I and channel-beam longitudinal sections tied together by channel-section cross girts and a box-type raised structure at the right-hand end, on which the stationary column, chain beam and feed mechanism are mounted. The top is closed by boiler plate sectional covers to keep out shavings and dirt. It is made in any desired length for different maximum distances between tenon shoulders, as shown in the specifications.

Columns Each column consists of a heavy box-type casting on which are machined the ways for carrying the tenoning

carriage slides, cut-off attachments, pressure beam hinge brackets and the dado attachment. The right-hand column is made stationary and the left-hand one adjustable which is contrary to the practice of other builders. This, however, permits grouping all controls, both electrical and mechanical, at the operator's natural position, which is at the stationary end.

In addition to the convenience of control, other advantages are derived from this arrangement. The only flexible electrical connections required for the movable housing are those from the starter cabinet to the terminal box for the motors, and these are enclosed in one heavy armored cable which is looped on top of the cover plates of the base where it is entirely out of the way. Also, in this arrangement, the movable housing is lighter, because of the gear case being on the right. In addition, the operator is not required to change his position or to move the stock trucks when the housing is adjusted back and forth.

Feed Chains and Beams Feed chains are made of steel, and the center links have an inverted V milled in the bottom side to fit a corresponding V on top of the chain beams. This construction eliminates the necessity of using side guides, since the V-ways hold the chains in perfect alignment. The V-ways on the beams are renewable and are made of



[4]

Above is shown a 60"x 44" Greenlee Electric Double-End Tenoner with tilting spindles for all cutters, but without special attachments. In this photograph can be seen many of the features which make the Greenlee the leader in the Double-End Tenoner field. Note the stationary column on the right, which permits grouping all controls, both electrical and mechanical, at the operator's natural position—to the right of the right-hand chain beam. This feature contributes much to the general superiority of the entire design.

Note, also, the graduated dials, which show the distance between the cutter heads; the V-ways for the feed chains, which keep them in correct alignment; the convenient adjustments for pressure beams and cutter head spindles; and the sturdy and clean-cut appearance of the entire machine.

These and many other improvements contribute to the ability of the Greenlee to cut production costs by doing faster and more accurate work, by saving time on set-up changes, and by reducing the cost of upkeep.

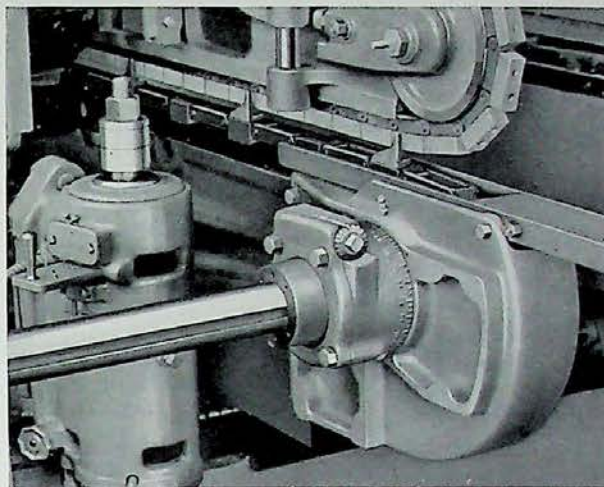
bronze, except the portion at the front which extends beyond the pressure beams. This reduces friction and makes for long life.

Provision is made for quickly adjusting one chain with reference to the other for lining up the dogs or for staggering them to run stock through on an angle. The adjusting unit is on the rear of the right-hand chain beam and consists of a worm and worm gear mechanism which rotates the feed sprocket. One turn of the square projection of the worm shaft moves the chain $\frac{1}{2}$ inch. Graduations on the housing show the setting to $\frac{1}{2}$ of an inch, and a dial on the worm shaft gives intermediate settings to one sixty-fourth of an inch.

Lubrication of the chain links and V-ways is accomplished by force-feed oilers which pump the oil through tubes to a point at the top of the V-way, just in front of the pressure beam. Each pump unit is mounted on the side of its chain beam and operates only with the feed. A regulator is provided to govern the flow of the oil.

Corrugated feed chains can be furnished when required and are usually desirable for sizing or shaping work. Plain fixed dogs are regularly furnished but other styles, such as drop dogs, adjustable dogs, clamping dogs, etc., can be furnished as specified. When required, fixed dogs and drop dogs can be arranged alternately, spaced 8 or 16 inches apart.

The chain beams are heavily ribbed I-section castings, which are so proportioned that they are perfectly rigid regardless of their length. They are mounted on top of the column bases, and projections on the sides are bolted to the columns, thus securely tying the entire unit together. The sides of the



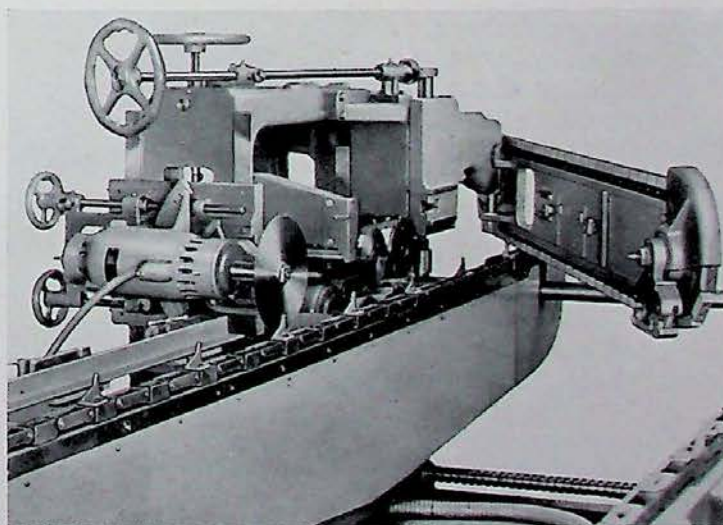
Rear of right-hand chain beam showing worm and worm gear mechanism for adjusting the chain to line up the dogs of one chain with reference to the other, or for staggering them to run stock through on an angle.

chain beams are covered by removable sheet metal guards, which prevent dust and dirt from getting on the slack side of the chains. As a further precaution in keeping them clean, each chain beam is fitted with a felt wiper to wipe the chain links just before they engage the infeed sprocket.

Pressure Beams

The pressure beams are carried by vertically adjustable brackets mounted on the sides of the columns at the rear of the machine. Each one is pivoted to swing out from its column, like a gate, for full access to the heads. Each beam is rigidly clamped to its column by two T-bolts with attached wrenches, one in a machined pocket in the bracket and the other at a guide near the front of the column.

Vertical adjustment of each pressure beam is by handwheel at the front, which adjusts the bracket through self-cleaning spiral gears and a screw. One turn of the wheel moves the beam $\frac{1}{8}$ of an inch, and a graduated scale indicates its



Showing Pressure Beam swung out for full access to the heads.

setting. A positive lock is provided for securing the handwheel after the adjustment is made.

The pressure beam chains travel with the work and run on flat ways, which are lubricated by sight-feed oilers. Chains are fitted with rubber hold-down pads to prevent marring the stock. Each beam has an adjustable drag shoe mounted at the front end to bring the work in contact with the feed chain dogs before engaging the pressure beam chain.

Feed Chain Drive Sprockets, mounted on roller bearings in the chain beams and having inserted, hardened steel teeth, drive the feed chains from the $2\frac{3}{4}$ -inch shaft, which runs in ball bearings in the feed box and is driven by a large-diameter gear housed therein. The feed box is mounted on the machine bed and encloses the change gear transmission. Three feeding speeds are provided by a conveniently located lever.

Hand operation of the feed chains is provided to make for convenience in changing set-ups. This is by means of a convenient crank, which is applied through a guarded opening in the feed box of the machine. It is also used when it is desirable to reverse the travel of the chains for any purpose.

The feed clutch is of the safety type, which throws out against spring pressure and rattles in case of overload from stock jamming or from any other cause. In this way it protects against breakage and warns the operator to fully disengage it. It is controlled by a lever at the operator's position, and a similar one at the rear also provides control from the outfeed side.

All gears and shafts in the feed box are designed and constructed to provide long life and a trouble-free, dependable mechanism that compares favorably with the transmission of a fine automobile. All

bearings are of the ball or roller type, and efficient, automatic lubrication is provided for all of them and for all the gears.

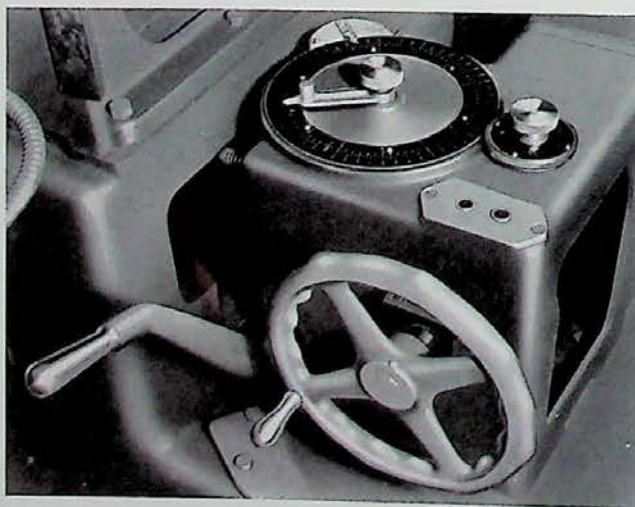
Column Adjustment Dials

Of great importance in changing the set-up are the two graduated dials which show the exact distance between the cutter heads. They are conveniently located just back of the handwheel, which is used for the final precise setting. The large dial shows the setting in feet and inches and the small one in sixty-fourths of an inch. Since the space on the dial, representing one sixty-fourth of an inch of movement of the housing, is $\frac{1}{4}$ inch, it is very easy to make the setting to a small fraction of one sixty-fourth of an inch.

For further convenience in operation, these dials are arranged so that they can quickly be reset in order that their reading may correspond to the actual distance between cutters after the spindles are tilted, or after any change is made in set-up of the heads.

This dial system corresponds to the micrometer adjustment screws on high grade metal-working machinery, and it is more exact and dependable than any other method. The proper method of handling is to open the machine beyond the desired spacing and then adjust back to the exact required position, since this takes up all slack in the moving parts.

Bearings All bearings for spindles and drive shafts are of either the ball or roller type, which makes for low power requirements, long life, accuracy and a minimum cost of maintenance. Except for those in the feed box, for which full automatic lubrication is provided, these bearings are fitted for high pressure grease gun lubrication, a method that has proven most efficient, economical and convenient.



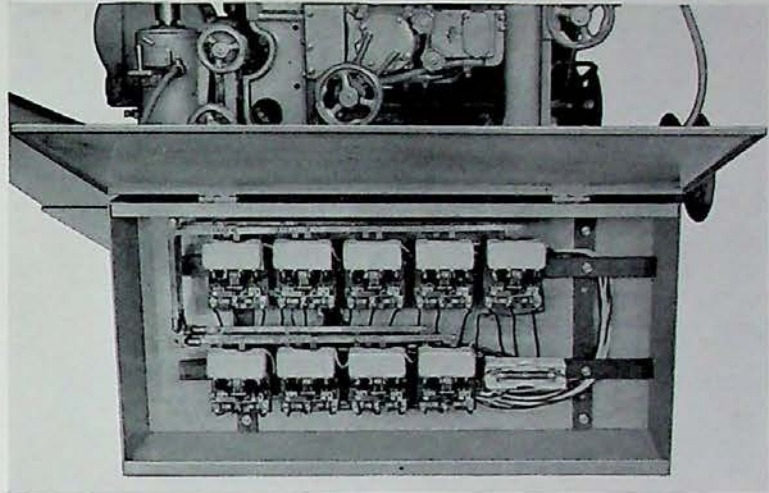
Two graduated dials at the operator's position show the exact setting for distance between cutter heads. The handwheel is for the final, precise setting.

Motors The Greenlee Double-End Tenoner is a full electric machine, which means that motor-on-the-spindle drive is employed for all cutter heads. They are regularly furnished for 220, 440 or 550 volt, 2 or 3 phase, 60 cycle current, to run 3600 R.P.M., although provision can be made for high frequency operation of any motor when required. For automobile body and other heavy work, motors larger than the standard 5-H.P. size can be furnished, as shown in the specifications.

Motor Control Start and stop push buttons for all motors are located in a panel on the right-hand chain beam, convenient to the operator, and three master push buttons are provided for stopping all motors at once. One is in the panel on the chain beam, another at the position of the off-bearer, at the rear, and the third is mounted on the front end of the hold-down beam in connection with an adjustable safety stop, which can be set to admit any desired maximum thickness of stock. It also serves as a safety device for the operator, and when set-ups are being made, a lever lock prevents the accidental starting of any motor. The magnetic switches are enclosed in a steel cabinet attached to the left end of the machine base. Interlocking wiring gives full protection to the machine, so that when any motor cuts out, all are stopped. Each starter is labeled to show which motor it controls, making it easy to locate the one requiring attention.

Wiring from the push buttons to the starter cabinet and from cabinet to motors on the stationary housing are enclosed within two heavy conduits located in the machine base beneath the steel cover plates, where they are fully protected and out of the way. All wires from starter cabinet to the movable housing are enclosed in a large flexible conduit, which is looped on top of the cover plates of the base, where it is free to coil and uncoil as the housing is adjusted back and forth. Connection to the main power line is made through an opening in the switch cabinet.

Tilting Adjustment for Spindles Tilting adjustment is standard for the cut-off and cope spindles and can be furnished for all the tenoning spindles. In all cases

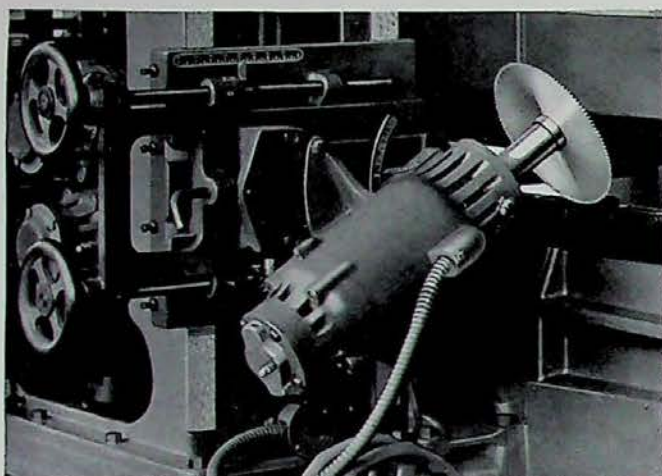


Steel Control Cabinet attached to left end of the machine base.

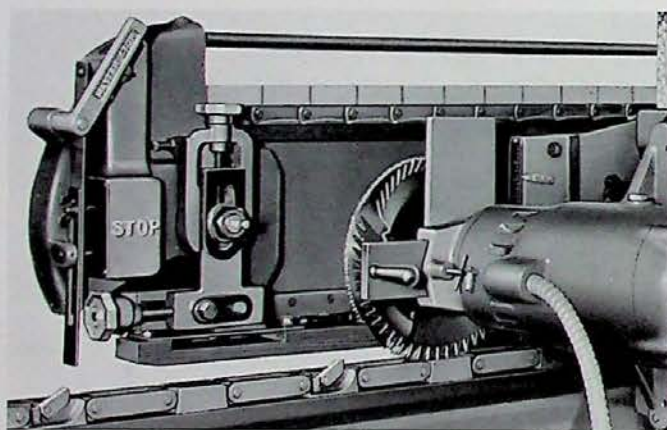
the spindle housing is pivoted on its carriage so that the tilting adjustment is independent of the horizontal and vertical adjustments. This arrangement simplifies the set-up, saves time and makes for accuracy. A graduated scale and a pointer is provided for each to show the setting.

Cut-off Saws The cut-off saw units are mounted on vertical dovetail ways on the front of the columns. A vertical slide with screw adjustment from above, by handwheel, is mounted on these ways and is fitted with dovetail ways for the horizontal slide, on which the motor housing is pivoted. The horizontal and tilting adjustments are by handwheels at the side, and convenient scales and dials are provided for making the set-up. Each saw arbor is provided with an attached lock wrench to lock the arbor when blades are being changed. When not in use, the lock wrench is positively held away from the saw arbor.

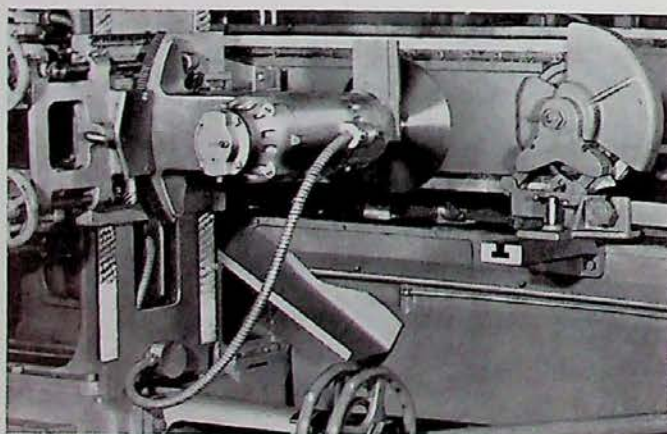
The saws regularly cut from above, but they will cut from below if desired. Non-tilting spindles can also be furnished, and provision can be made for locating the saws more to the front when multiple cutting of wide stock in random lengths is required. Refuse cutters are furnished when required to convert the offal to shavings. Reference to the photograph of this attachment, on the following page, will show that chipbreaker shoes are then applied to the pressure beams. These have convenient vertical and endwise screw adjustment for proper location.



Showing Tilting Adjustment for Cut-Off Saw.



Showing Refuse Cutter and Chipbreaker Shoe. Note the Drop Dogs on the Feed Chain.



Showing Cut-Off Saw extended to front, also extended handwheels for adjusting the tenon units. Right-hand saw unit, where multiple cutting is done, has same construction. A drop dog on a feed chain is also shown here.

Tenoning Units The tenoning units are mounted on vertical dovetail ways and are located between the vertical members of the columns. Their design is similar to that of the cut-off saws, but tilting adjustment is not provided, except when so specified. Vertical adjustment is from double handwheels at the front, one being for the top spindle and the other for the bottom spindle. These wheels are graduated for exact setting and can be quickly locked together so that both spindles adjust as one unit.

Cope Units These units are at the rear of the machine columns and are carried by brackets securely bolted to the columns and to their bases. The horizontal slide is mounted on ways on the bracket and has a set of vertical ways on which the vertical slide is mounted. On this slide is pivoted the motor housing to permit tilting for angle cuts.

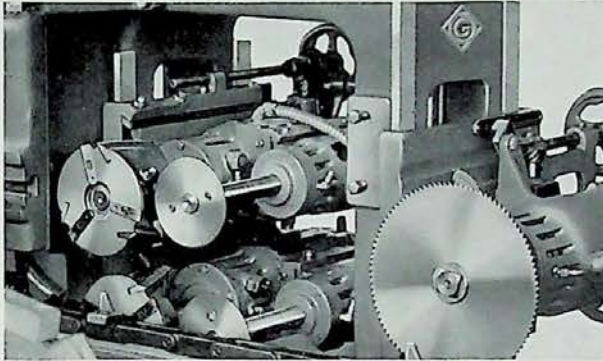
The cope motors are regularly run at 3600 R.P.M., but provision can be made for high-frequency operation, in order to increase the spindle speed. Spindles can be furnished with the detachable shaper-type tops of required size, and they are regularly equipped with a lock wrench mounted through the motor housing for locking the spindle while heads are being changed. When not in use, the lock wrench is positively held clear of the spindle.

Convenience and Accessibility The constant aim of the designers of the Greenlee Electric Double-End Tenoner has been to make every adjustment convenient and rapid, and every part accessible, so that set-up time and maintenance cost will be reduced to an absolute minimum. Complete success has been realized in this endeavor, as can be seen from the many illustrations on these pages.

All grease gun connections are brought to the outside of the machine where they are plainly visible and within easy reach. This speeds up lubrication and eliminates all unnecessary exposure of hands and arms to the cutter knives. Another illustration is found in the design which permits removing any spindle with its rotor, simply by taking off the end cover of its housing.

Attachments and Extra Features

When the design of this tenoner was undertaken, provision was made for the application of various attachments to handle a wide variety of operations, which are not adaptable to the standard cutting-off, tenoning, and coping units. So versatile is this machine with standard equipment, and so broad is its application with the extra attachments, that it really is mis-



View from Cutter-Head End of Tenoning Units showing Scoring Saw Attachments.

leading to refer to it simply as a double-end tenoner. It is, primarily, a double-end tenoning, cutting-off, sizing, end shaping and coping machine, but the improved attachments which can be added, make it much more and to a very high degree of perfection.

Among the most important attachments which can be furnished are those for dadoing, scoring, dovetailing, notching and relishing. The possibilities of these and of special cutter heads for the standard spindles are so broad that it is impossible to do more than merely refer to them within the limits of a bulletin of this kind. It should be mentioned, however, that the making of slots for clamp nail joints, lock corners, and other special joints for furniture and automobile body parts are one of the important applications of the Greenlee Tenoner with special cutters on the standard spindles.

Scoring Attachments When scoring attachments are added to the Greenlee Tenoner, much time is saved in changing the set-up, because they are mounted directly upon the tenoning motor housings to adjust with them. Independent horizontal and vertical adjustment is provided, however, so

that their spindles can be moved with reference to the tenoning spindles.

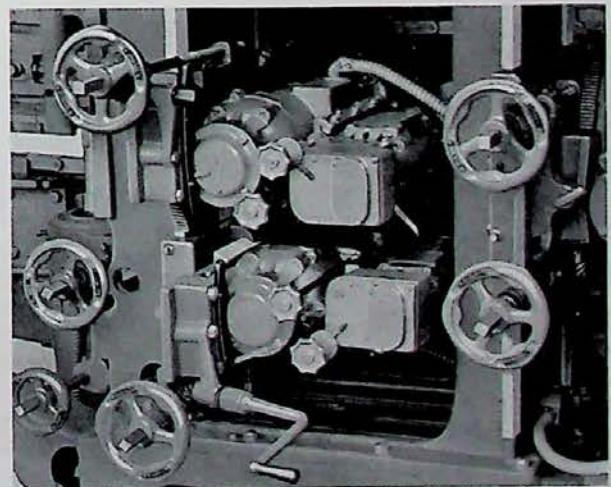
Scoring saws are used to cut through the veneer in advance of the tenoning heads to prevent tearing in cutting the tenon. On the Greenlee Tenoner, the scoring saws run in the same direction as the feed, so that the scoring saws themselves will not tend to tear the veneer.

Motors for all scoring attachments are $\frac{3}{4}$ -H.P. and run 3600 R.P.M. Spindles have the same ball-bearing construction as others on this machine and are lubricated in the same manner. All tenoning motor housings for 5-H.P. motors are machined for scoring attachments, so that they can be added later if their need develops.

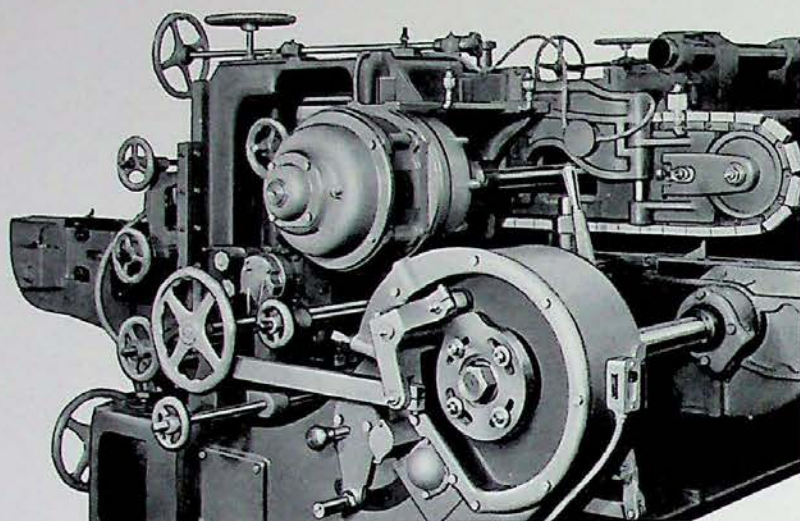
When required, separate mounting and larger than standard units can be provided.

Dado Attachment The dado attachment can be either the jump or stationary type, and the jump dado can

be set for stationary dado work. The jump dado will cut any groove reasonably spaced between the pressure beams, and it is arranged so that grooves up to $1\frac{3}{4}$ inches wide can be cut outside the pressure beams. The jump is controlled by a cam on the feed chain drive shaft, and this can be furnished to space the jump at intervals of 16 or 32 inches of chain travel. Special back gearing can be provided for greater distances.



View from Motor End of Tenoning Units showing Scoring Saw Attachments mounted on them. Note square ends on screws for convenient adjustment for all spindles.

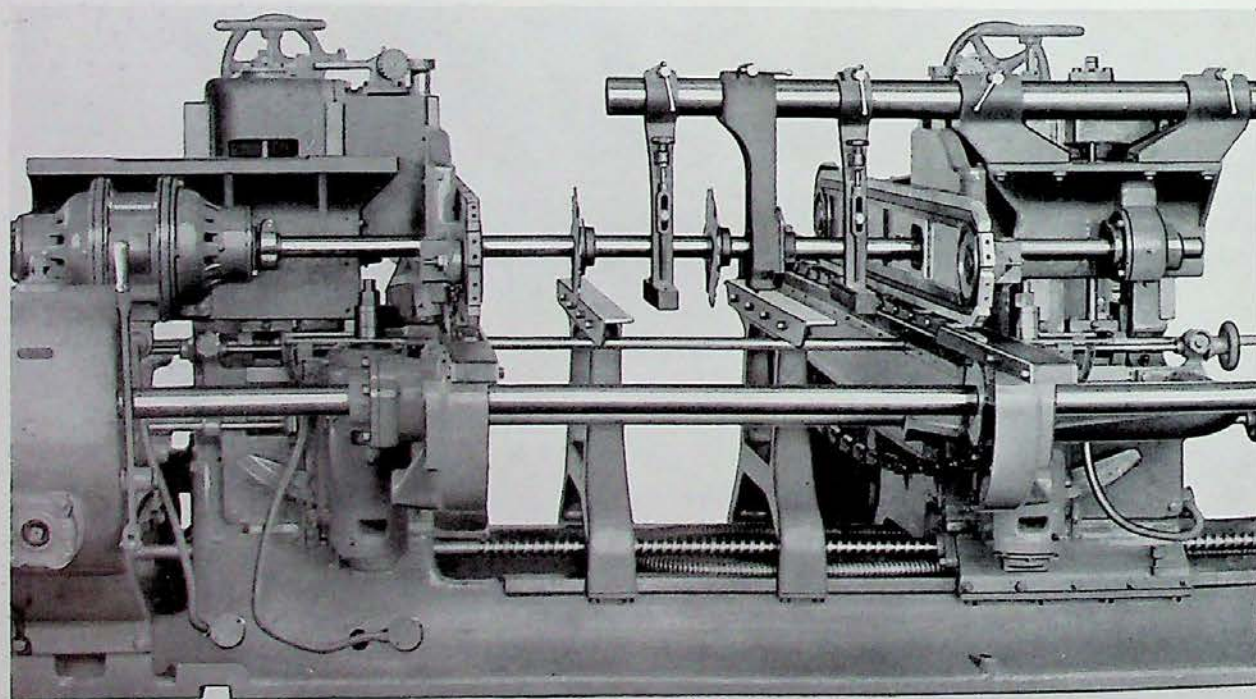


View showing Jump Dado Motor and the Cam Construction.

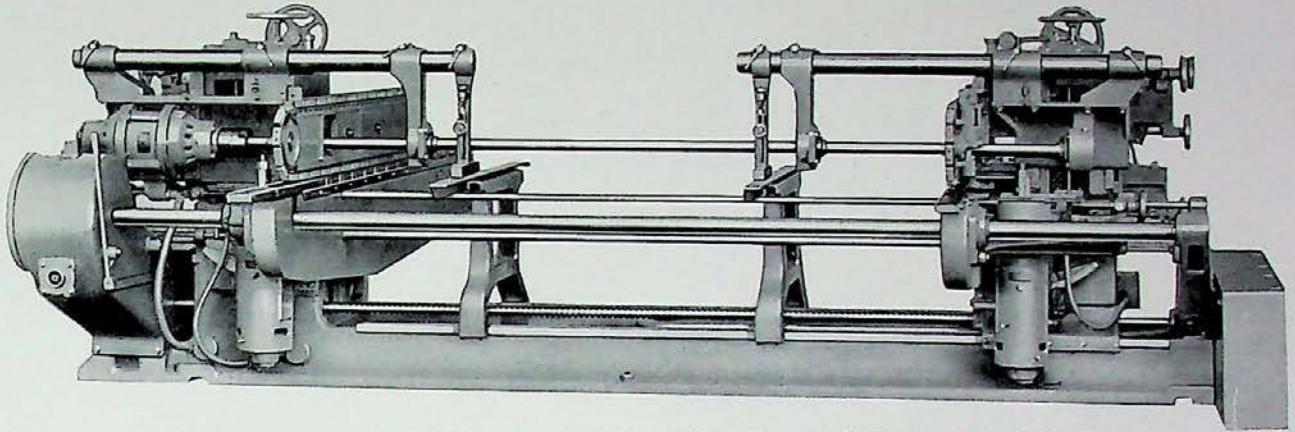
$\frac{3}{4}$ of an inch. To make for convenience in changing cutters, the shaft is arranged to pass through the motor, providing for the changing of cutters from either end. For long work, the dado shaft should be equipped with an overhead steady bearing. It is supported by an extended hollow shaft which is mounted on one of the dado slides. For extra long work, two steady bearings should be used, one being carried from each slide. When the chain beams are close together, the overhead steady bearings can be placed outside the columns to support the ends of the dado shaft.

The cam is made up of two plates, providing for adjustment in the length of cut. This permits the making of a groove open at one end, or of having the cutter drop into the work and out again for making a groove which is blind at both ends. Vertical adjustment of 4 inches is provided for the dado shaft, and the jump is

Lower stock supports and hold-down shoes are also equipment for use in dadoing thin stock. The lower supports keep the stock from sagging under the cutters, and the shoes steady it and keep it from springing up into the heads. Lower stock supports can be furnished with vertical adjustment for handling curved or bowed stock.



Rear View of Machine showing Jump Dado, Dado Shaft Overhead Steady Bearing, two Lower Stock Supports and two Top Hold-Down Shoes.



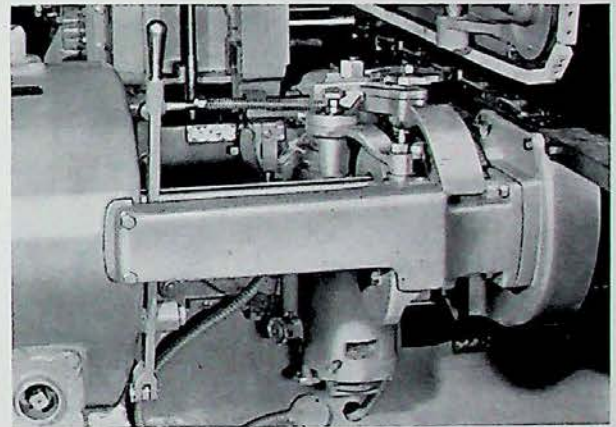
Rear View of Long Machine showing application of two Dado Shaft Overhead Steady Bearings when set up for working long stock.

Sleeves for grooving saws up to 2 inches wide can be supplied with set screws for fastening to the shaft, but for wider than 2-inch, self-centering sleeves are recommended.

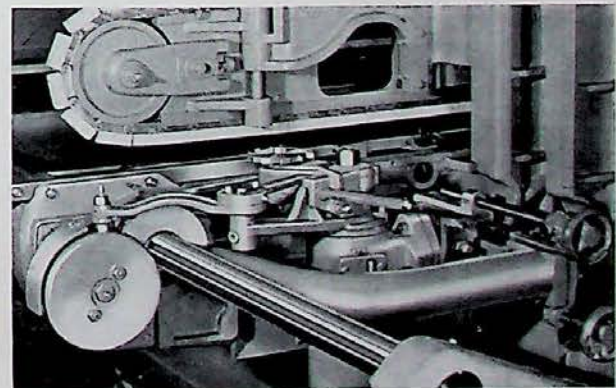
The dado motor is regularly a $7\frac{1}{2}$ -H.P., 1800 R.P.M., but 10-H.P. can be furnished. It has separate control from the push-button panel on the chain beam.

Relishing Attachments The purpose of the relishing attachments is to trim tenons so they will fit into blind dado grooves, as in cabinet and similar lines of work. Each attachment is built in one complete unit so that it can be quickly mounted for use, or removed when not required. They are driven by the cope spindles, and the main bracket is mounted on the cope motor housing. The gears for the drive of the cutter run in oil and are enclosed in a dust tight housing. The usual cutter size is 6 inches in diameter and $\frac{1}{2}$ inch in thickness. It runs at 4800 R.P.M. when the cope spindle is running at 3600 R.P.M.

The action of the relishing attachment is controlled by a cam driven from the feed drive shaft. Adjustment can be made for relishing tenons on two or four corners, and with the distance between the dogs of 16 and 32 inches. This spacing can be made 32 and 64 inches on special order, and 44-inch wide machines only can be arranged for 24 and 48 inch spacing. The cutter is held to the work by a heavy spring and is forced away from it by the cam and lever arrangement.

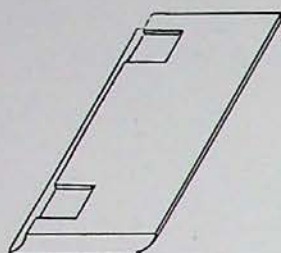


Relishing Attachment on the Stationary-Column End of the Machine.

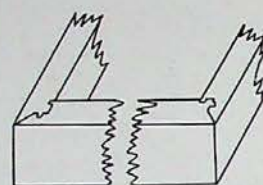


Relishing Attachment on the Movable-Column End of the Machine. This view shows its mounting on Cope Attachment, also the cam mechanism for controlling its action.

Some Typical Cuts and Joints made on the Greenlee Tenoner



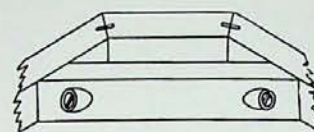
DROP LEAF



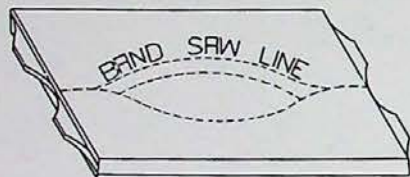
MITRE LOCK JOINT



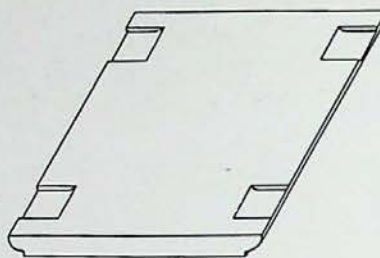
DOVETAIL JOINT



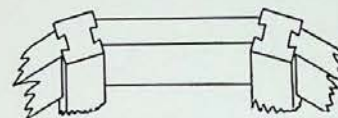
MITRE JOINT



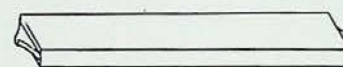
CABINET PART



DROP LEAF TABLE TOP



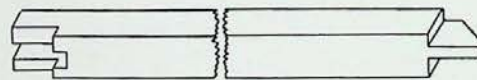
DOVETAIL JOINTS



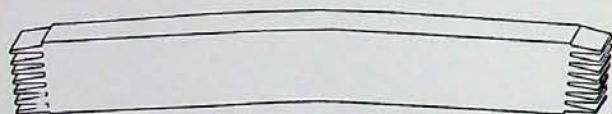
CABINET PART



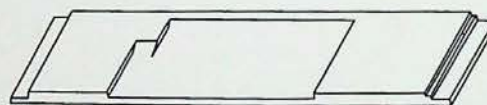
DOOR LOCK PILLAR



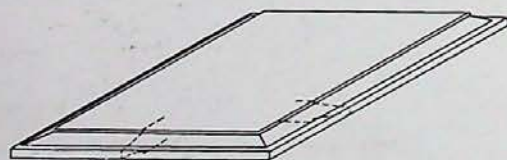
BODY PART



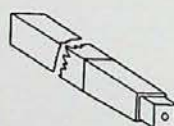
PART OF ROOF RAIL



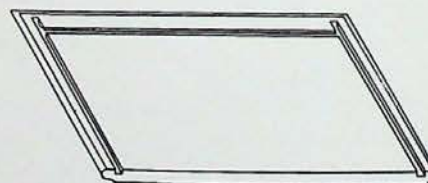
LOCK BOARD



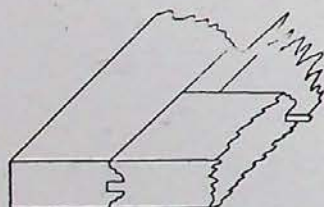
DOOR PANEL



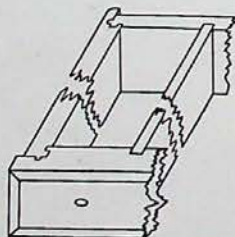
TAPERED LEG



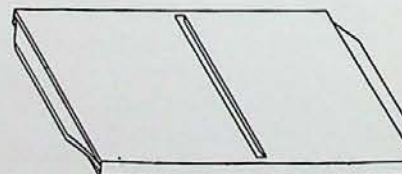
CABINET PART



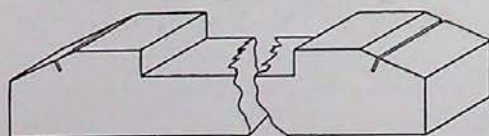
DOOR JOINT



LOCK JOINTS



CABINET PART



CABINET PARTS SHOWING CLAMP NAIL GROOVES-HANDLED IN ONE OPERATION

Dovetailing Attachments

The dovetailing attachments are mounted on the chain beams near the copes and are belt driven from removable pulleys on the cope spindles, running 7200 R. P. M. when the cope spindles are running 3600 R.P.M. These attachments need not be removed from the machine, since vertical adjustment provides for lowering them below the chains where they are out of the way.

The usual procedure in cutting a dovetail slot is to cut a straight groove of proper depth and throat width with a cutter on the lower tenon spindle, and then complete the slot with a dovetail bit in the spindle of the attachment.

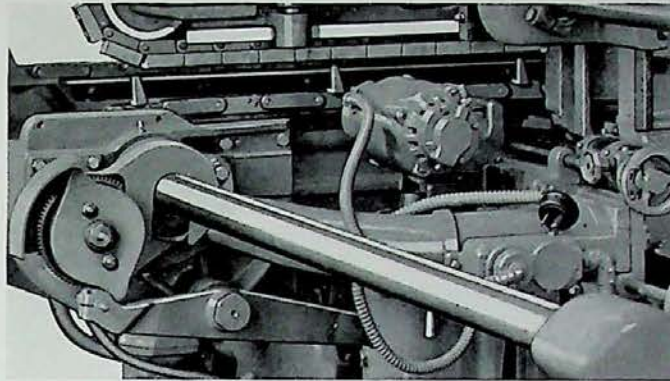
Notching Attachments

The notching attachments are mounted on the cope brackets when the copes are adjusted out of the way. They are motor-on-the-spindle units, having 1½-H.P., 3600 R.P.M. motors, and the heads are 5 inches in diameter. Electrical control is from the cope stations, and connection is made to the plug-in socket after disconnecting the cope lead.

Cams control the movement of the notching motor housing and are adjustable for depth of notch. Special cams can be made according to requirements. Any depth of cut up to 1¼ inches can be made, and the notch can be any width up to 3 inches. To prevent tearing veneer along the edges of the notch, an adjustable wooden chipbreaker shoe is placed beneath the stock.

Stock Centering Gauge and Core Gauge

The adjacent photograph shows a stock centering or veneer gauge. This is used for cutting at equal distances from butt veneer joints or from the center of pieces being run. It is furnished only when specified and regularly both long and short blades are supplied for accurately centering the stock. To gauge from the end of the core of veneered pieces, when sizing material, where the



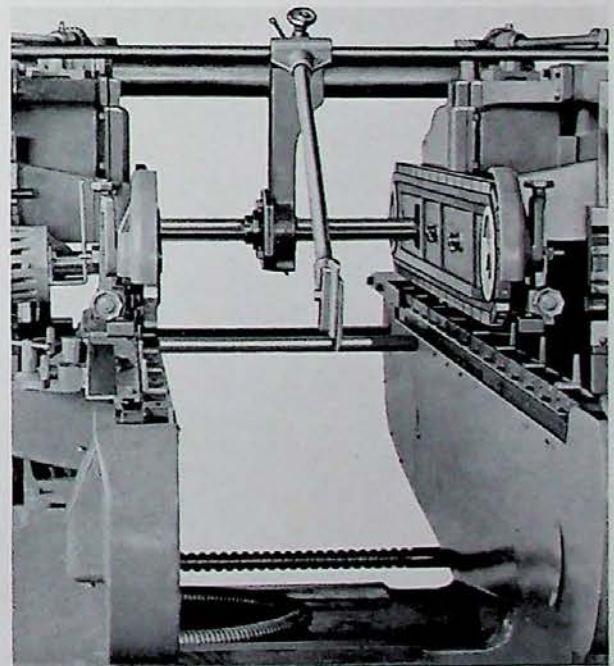
Showing Notching Attachment mounted on Cope Bracket, and Cam Mechanism which controls its action.

veneer is over-hanging, a core gauge is required. This is combined with the lumber gauge on the Greenlee Tenoner and is furnished as regular equipment on machines for furniture work.

Built-In Piping

A system of built-in piping has been scientifically worked out for this machine and

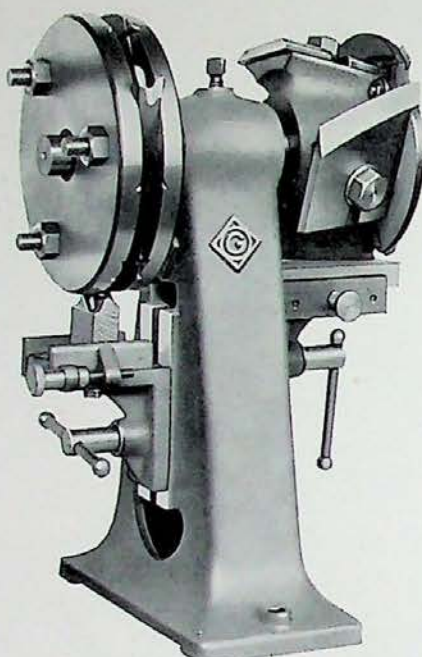
can be furnished when desired. It consists of hoods for the cutters with complete piping mounted on the frame and terminating in a single outlet for connection to the shavings exhaust system. It saves installation time, besides providing a sure and efficient system without the necessity of experimenting. Hoods for the cutters can be furnished without the piping if preferred, and other special arrangements can be made to meet any unusual requirements of the purchaser of this tenoner.



Stock Centering or Veneer Gauge. Behind this can be seen a Dado Shaft Overhead Steady Bearing. At the left is shown the Combination Lumber and Core Gauge.

All hoods are made of heavy sheet steel with welded joints. The piping is of galvanized iron, well riveted and soldered. All pipes leading from cutters are provided with convenient air cut-outs, and perfect swivel joints take care of all adjustments. Sliding clean-out covers are provided where necessary. The outlet is regularly at the right-hand end of the machine, but it can be placed at the opposite end, and a short right-angle connection can be provided when needed.

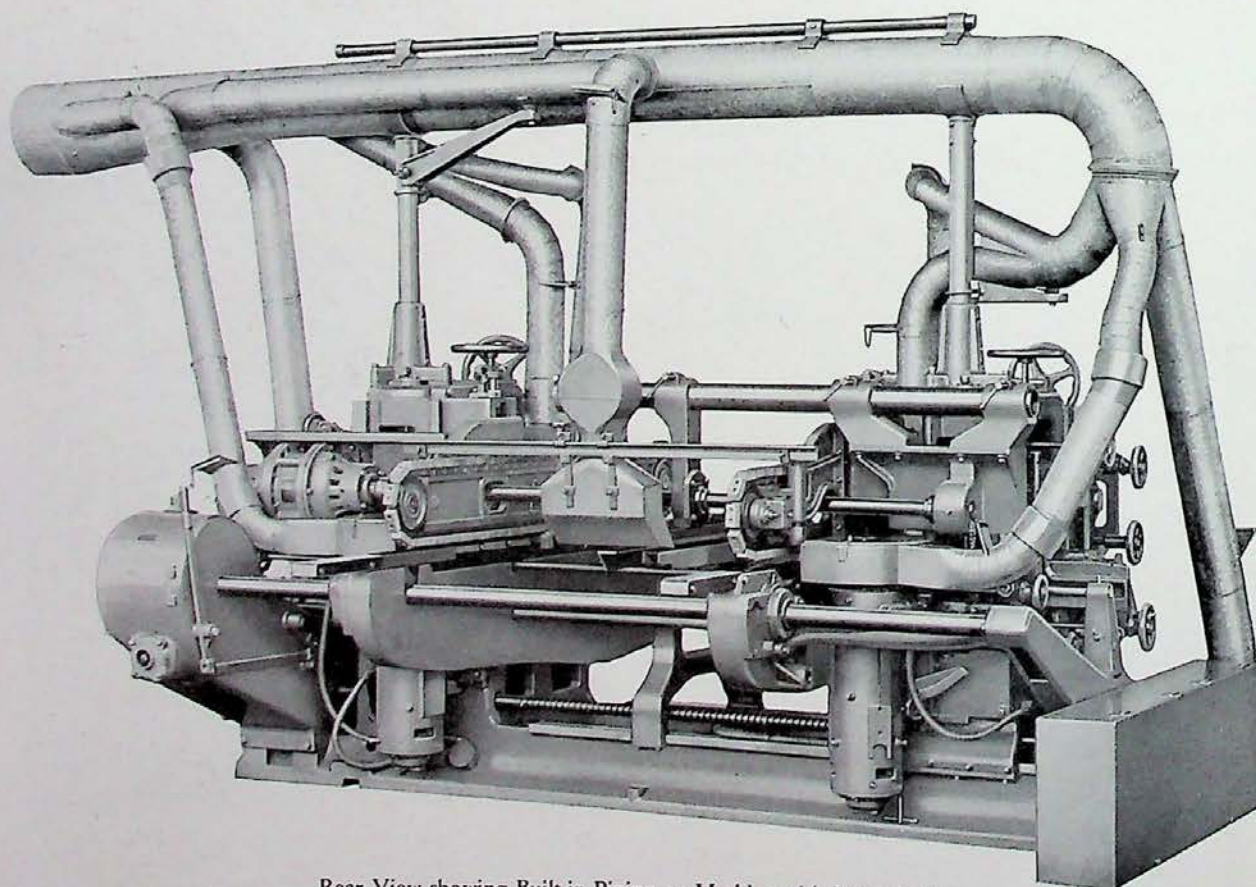
The scientific working out of this piping system means much from the standpoint of efficiency in shaving removal. Its present state of perfection has been reached through extensive experiments extending over a number of years.



Knife-Setting Stand with a Shaper-Type Cope Head and a Tenoning Head on the Arbor.

This means that a purchaser of a Greenlee Double-End Tenoner can install this standard piping with the assurance that he will have the most efficient system obtainable, and one that properly meets every condition within the range of the machine.

Time is also important in the piping of a machine of this kind. If the standard piping is ordered with a Greenlee, it is only necessary to assemble it on the machine after placing in position. After that, the connection to the factory exhaust system can quickly be made by any sheet-metal man. This is in direct contrast to the planning and experimenting which is required after installing the machine, if the piping is to be made up locally.



Rear View showing Built-in Piping on Machine with Jump Dado.

Outfeed side of the Greenlee in the cabinet department of a radio manufacturing plant. Ten of these Tenoners were installed in this plant and seven more were on order at the time this photograph was made.

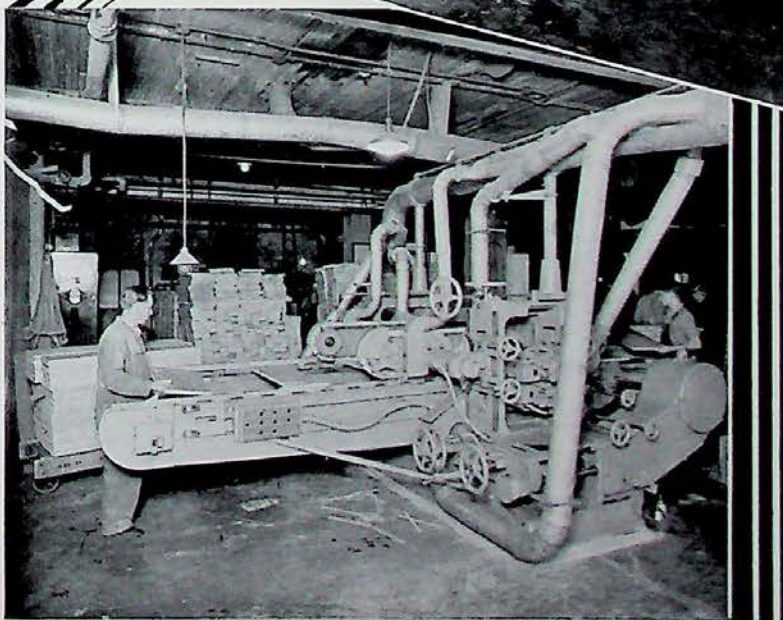
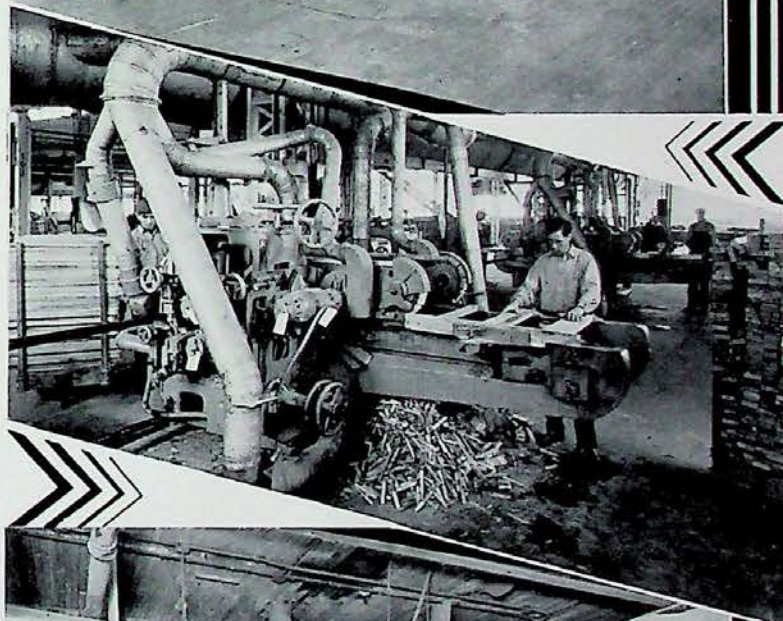
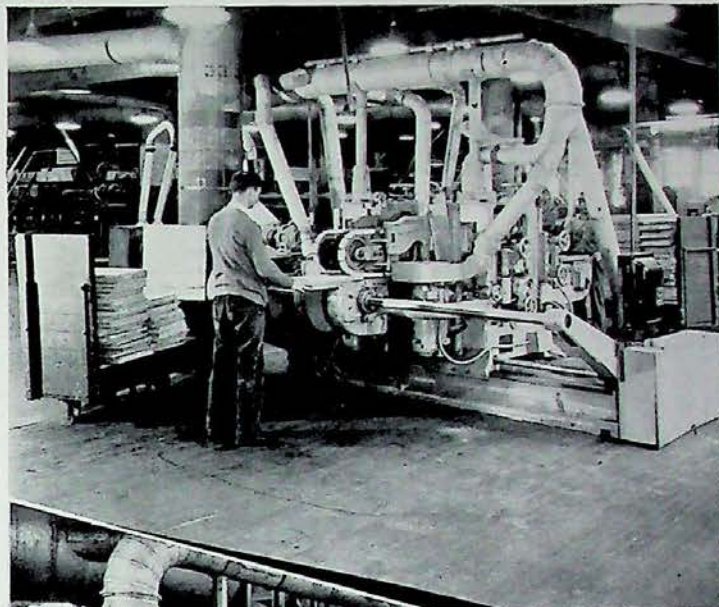
▼ ▼ ▼

Greenlee Double-End Tenoners are used in practically all the important plants of the country. Here are two of them in a modern plant in the South.

▼ ▼ ▼

In the furniture field, the Greenlee is known for its accuracy and the fine quality of its work. This photograph shows one in an up-to-date furniture plant of the far West.

▼ ▼ /



Specifications

Equipment The standard equipment includes horizontal top and bottom tenoning spindles, tilting cut-off saws, and tilting copes, all with 5-H.P., 3600 R.P.M. motors; a separate feed motor, one set (four) $3\frac{3}{4}$ " (or $1\frac{3}{4}$ ") face three-wing single tenon heads, two 12" cut-off saws, knife setting stand, and a set of necessary wrenches.

Range The standard No. 545 Tenoner is built in lengths for maximum distances between tenon shoulders of 48", 60", 78", 90", 120", 144", 160" and 192", but greater lengths can be furnished to order. Chain beams can be furnished for maximum widths of stock of 28", 44", 60", 76" and 92". As regularly furnished, 4" is the minimum distance between tenon shoulders.

Cut-off Saws Spindles $1\frac{5}{16}$ " dia.
reduced to 1" for saws.
Vertical adjustment 8"
Horizontal adjustment 8"
Tilting adjustment 45° up or down,
regularly, but 65° available if required.
Thickness of cut with 12" blade $4\frac{1}{2}$ "
Standard motor size 5-H.P.
Other size motors available $7\frac{1}{2}$ and 10-H.P.

Tenoning Units Spindles $1\frac{5}{16}$ " dia.
Vertical adjustment
Top 7" bottom 3"
Horizontal adjustment Top 7"; bottom 7"
Tilting adjustment down (motor end)
Top 8° ; bottom 8°
Tilting adjustment up (motor end)
Top $22\frac{1}{2}^\circ$; bottom $22\frac{1}{2}^\circ$
Size of heads for 5-H.P. motor $7\frac{1}{2}$ " dia. x
 $1\frac{3}{4}$ " or $3\frac{3}{4}$ " face single and $7\frac{1}{2}$ " face double
Size of heads for $7\frac{1}{2}$ -H.P. motor same as
above, but $8\frac{1}{2}$ " dia.
Standard motor size 5-H.P.
Other sizes available $7\frac{1}{2}$ and 10-H.P.

Cope Units Spindles $1\frac{5}{16}$ " dia.
reduced to $1\frac{1}{4}$ " for heads.
Standard space under the nut $5\frac{1}{4}$ "
Collars
One each $\frac{1}{2}$ ", 1" and $1\frac{1}{2}$ " thick by $2\frac{5}{16}$ " dia.
Vertical adjustment $3\frac{1}{2}$ "
Horizontal adjustment 8"

Tilting adjustment: The angles at which the spindles can be adjusted depend to such an extent upon the size of head, distance from chain beam, and length of spindle top, that it is impossible to give maximum angles which are accurate for all conditions. In general, however, spindles having motors of any size will tilt toward the chain beams (cutter head end) to 45° and away from them to 25° . Spindles with 5-H.P. motor can be furnished for 65° tilt if required. Variations in these angles will be found under certain conditions, and accurate data should be obtained from us for the particular conditions under which they are to operate.

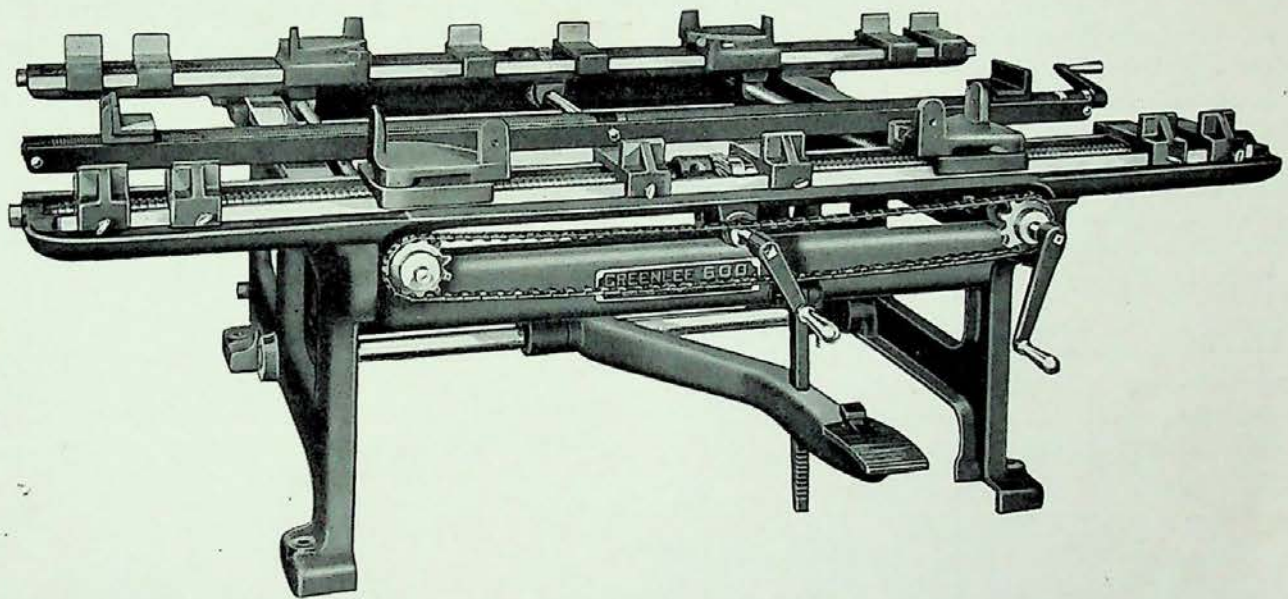
Standard motor size 5-H.P.
Other sizes available $7\frac{1}{2}$, 10, 15, 20 and 25
Net wt. standard machine 13,500 to 18,000 lbs.
Weight boxed for export 16,000 to 21,000 lbs.
Measure boxed for export 518 to 821 cu. ft.
Floor space required for width of machine
From 10 ft. 10 in. to 16 ft. 10 in.
Floor space required for depth of machine
From 10 ft. $10\frac{1}{2}$ in. to 16 ft. $2\frac{1}{2}$ in.

Code Words: 48"x 44" standard machine. GYPUP
60"x 44" standard machine. GYRAL
78"x 44" standard machine. GYPON
90"x 44" standard machine. GYREM
120"x 44" standard machine. GYRIN
144"x 44" standard machine. GYROP
160"x 44" standard machine. GYPEL
192"x 44" standard machine. GYPIM
Add for 28" width. GYRUS
Add for 60" width. GYRYT
Add for 76" width. GYSAN
Add for 92" width. GYSEP

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.
Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing

Greenlee

Nos. 600, 601 AND 602 SASH AND DOOR CLAMPS



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

Nos. 600, 601 AND 602 SASH AND DOOR CLAMPS

HALF a century ago Greenlee produced the first single-motion sash clamp. It has been widely imitated, but today the improved Greenlee Clamps continue in leadership. Simplicity of construction and operation, accuracy, quickness of adjustment and single-motion clamping obtain the efficient production so essential to economical sash and door manufacture.

The Single Motion Clamps, invented and introduced by Greenlee, have an adjustable rail with quick screw adjustment, and they are operated by a foot pedal. The sash clamps have swivel corners which square the sash and apply pressure from two directions simultaneously. The No. 600 is a combination sash and door clamp, the No. 601 is a heavy pattern door clamp of large range, and the No. 602 is designed for sash only.

Frame The frames of all three machines possess the rigidity of construction so necessary to accurate clamping. Each has two heavy end frames securely connected by three wide cross girds. Frame parts have deep,

thick ribs so that the guides and rails can not twist out of true when the clamping is heavy.

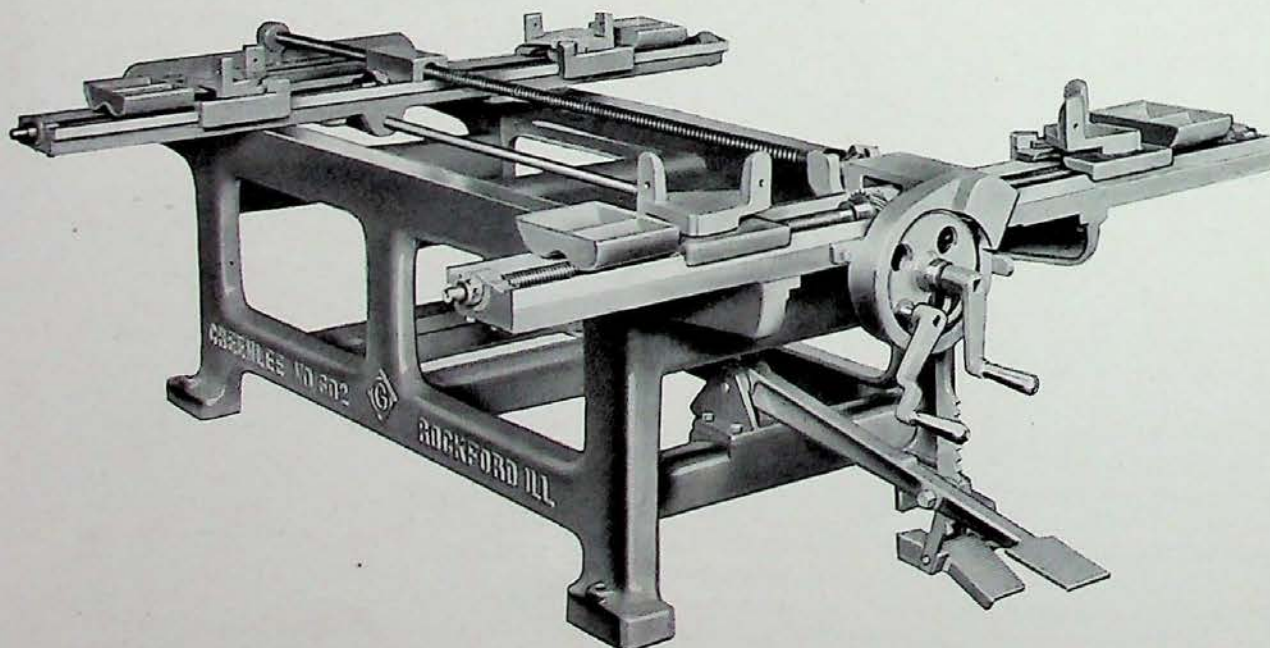
Swivel Corners

The swivel corners for clamping sash are mounted on trunnions in their bases and swing easily under segment gibs which prevent springing. They are easily detached to permit using either of the two sizes of corners which can be furnished. Standard corners are made to apply more pressure on the sides of sash, but special corners can be furnished when necessary. Provision is made for applying wood facing when desirable.

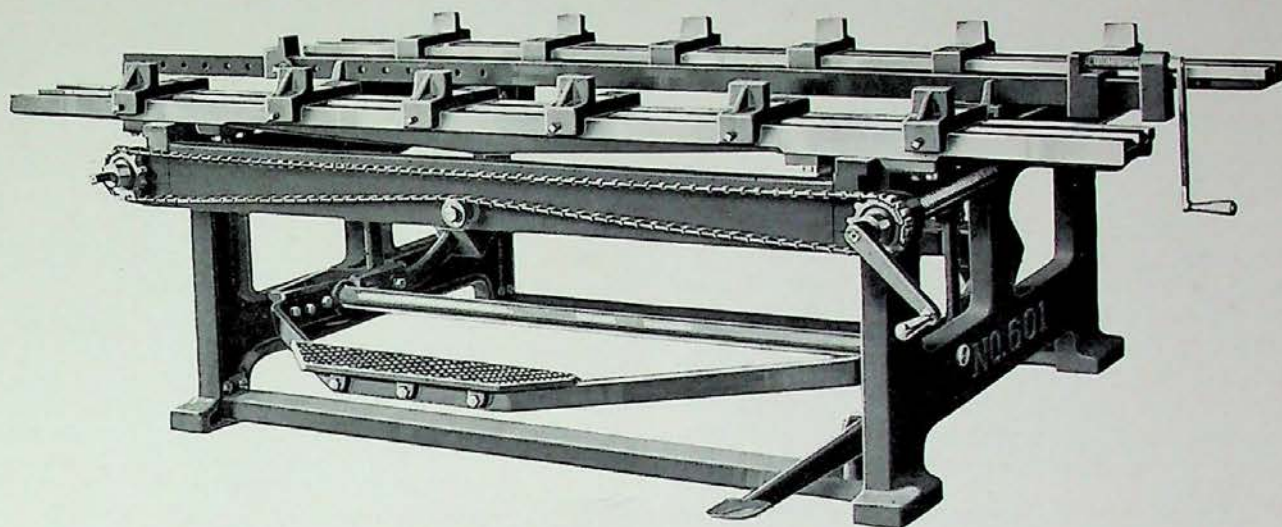
The corner bases are carefully machined, accurately fitted to the rails and gibbed to prevent rising when pressure is applied. All four are quickly adjusted for larger or smaller sash by connected screws.

Door Dogs

The dogs are machined and fitted to bring all the clamping faces exactly in line. They are adjustably mounted on the rails, are locked by thumb screws, and



No. 602 Quick-Adjustable Sash Clamp. On the preceding page is shown the No. 600 Combination Door and Sash Clamp, which also has quick adjustment.



No. 601 Heavy Single-Motion Door Clamp.

are easily removed or mounted in position. These dogs can be made in many special styles to suit various requirements.

No. 600 Combination Sash and Door Clamp

Both swivel corners and door dogs are furnished on this versatile machine, making it especially desirable for the small shop or as an auxiliary clamp for additional capacity in larger factories. With these needs in mind our engineers have made a careful analysis which has resulted in a machine light enough to handle sash rapidly and yet strong enough for the average run of doors.

Rails The rails are strongly ribbed with wide planed faces to give a firm seat to the dogs and corner blocks. The front rail is attached to the frame, while the rear one slides on ways with long guides to keep it parallel.

Operation It is practically as rapid as the single purpose machines, and accuracy and convenience have not been sacrificed. In changing from doors to sash the clamping dogs are quickly removed. The sash corner blocks and bases then drop into place over the nuts and permanently remain in square relation. One crank adjusts all four sash corners to or from the center line, while the other moves the rear rail forward or back. Both cranks are at the operator's position. Pressure on the foot treadle brings the corner blocks into play, and the sash is squeezed square and true. After nailing, a touch of the pedal releases the pressure and the sash is taken out.

Range Sash up to 4 feet 6 inches wide by 7 feet long can be clamped, and doors of the same width and about 6 inches longer can be handled. With special dogs used in combination with the swivel corners, frames such as greenhouse sash can be successfully clamped. Machines of this type with increased range can be furnished on special order.

No. 601 Heavy Single-Motion Door Clamp

A single-purpose machine is usually the best. This heavy door clamp is the logical choice for larger factories, particularly for mortise and tenon door work. The superiority of our clamp is due to much more rigid and heavy framework than usual, to accurately adjusted parts, and to our method of carrying all strains on steel bars with the cast-iron frames under compression only. Set-up changes are easily made.

Rails The rails are wide and heavy with fish-belly webs to prevent spring. They connect to the tension rods with double webbed yokes and are planed to receive the dogs. Cast steel dogs are seldom necessary, but they can be furnished at extra charge.

Adjustment and Operation The adjustment of the rear rail is quickly made by means of a crank which operates the long square-thread screws. The end clamp bar has adjustment for any height of door. Sprocket chain connection is used for the two adjusting screws so that both will operate together and keep the rails parallel. A release

pedal is furnished so that the clamping lever can be quickly released by pressure of the foot.

Range This clamp is for widths from 14 inches to 4 feet 6 inches, and the rails are 9 feet 3 inches long. The end clamp bar opens up to 9 feet 6 inches and its clamping jaw has 4-inch movement by crank and screw. The opposite dog is readily located by a steel pin in any of the fourteen holes spaced 3 inches apart. Special range can be provided in a larger clamp built only to order and at extra cost, which will open up to 6 feet wide and which has 10-foot 4-inch long rails. Its end clamp bar will take doors 10 feet 6 inches high.

No. 602 Quick-Adjustable Sash Clamp

Clamping sash appears so simple that some makers use very crude equipment. But efficiency results from speed and accuracy, and speed means quick action and quick adjustment. Accurate clamping is the other requirement for efficiency, and this demands firmly supported swivel corners located square with each other and always remaining so. This clamp has them.

Rails The cross rails are strongly ribbed and allow for clamping five-foot widths. Square work is sure because the swivel corners must remain correct, and the rear rail has extra long guides fitted to the frame to keep it parallel to the front rail. Double pin pockets are provided on each corner base to hold the

supply of nails, and there are center supports for pinning the bars. An additional set of long swivel corners can be furnished at extra cost.

Operation Quick operation is obtained by the single motion principle. The clamping is done by simply pressing down the foot lever, doing so carefully while tapping any joints that fit too tightly. A pedal is provided to release the foot lever and open up the clamp after the sash is nailed. In clamping, the screw is drawn forward by the foot lever, and a spring and release returns it ready for the next sash.

Quick Adjustment Quick adjustment means considerable time saved in the shop making a variety of sash, and the changes for both height and width are made by means of two cranks at the operator's position. The rear rail is controlled by a coarse screw so geared that each turn of the long-arm crank moves this rail 2 inches forward or back for a change in height of sash. The adjustment for width is made by the short-arm crank, which is connected through spiral gears to the right and left-hand screw carried by each cross rail. These adjust all four swivel corners simultaneously and keep them in square relation.

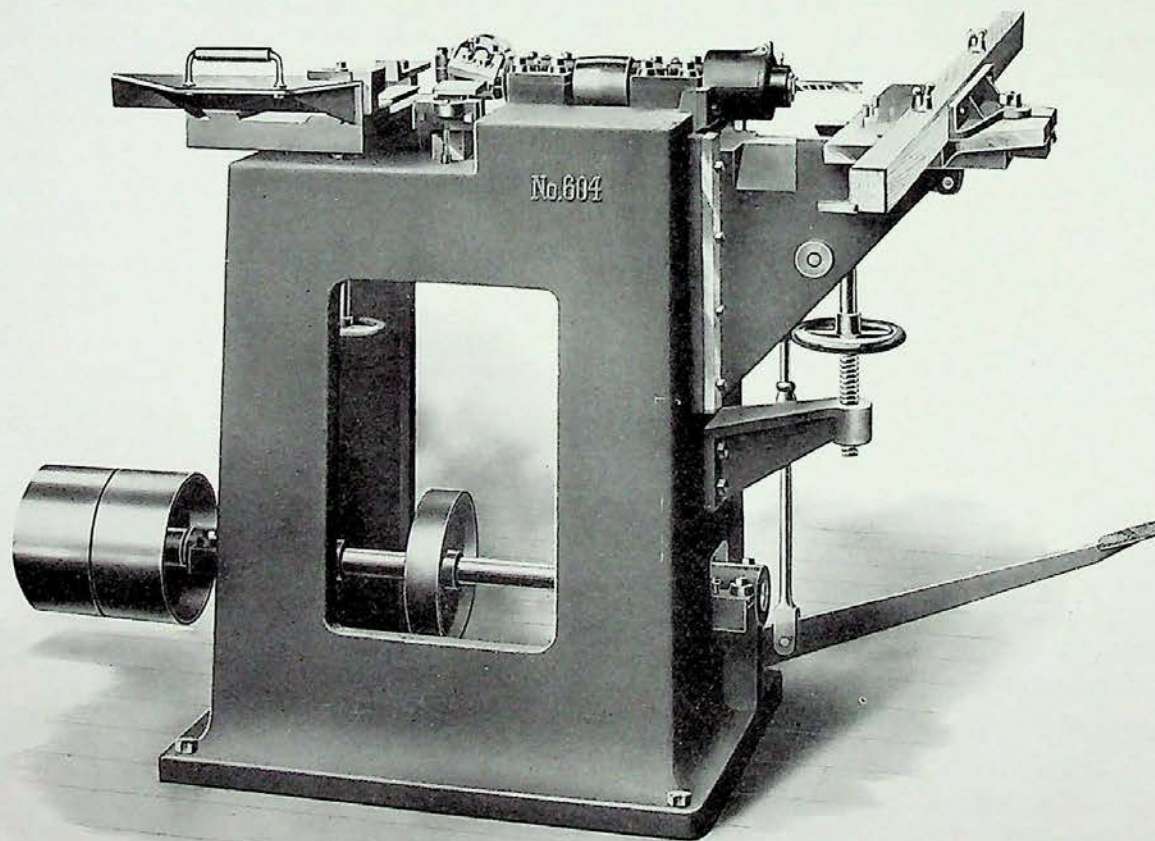
Range Sash up to 5 x 7 feet can be clamped on this machine. When required, a cross clamp bar can be furnished at extra charge for clamping extra large sash having heavy bars.

Weights, Measures and Codes

Machine	No. 600	No. 601	No. 602
Floor space	7'-10"x 6'-3"	10'-0"x 6'-6"	6'-6"x 8'-6"
Net weight in pounds	2300	2900	1500
Boxed weight in pounds	3000	3600	2050
Box measure in cubic feet	60	98	80
Code for clamp with regular equipment	HOPYT	HORUV	HOSOV
Code for end clamp bar for doors	HORIS		
Code for auxiliary cross clamp bar			HOSYZ

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*



No. 604 SASH RELISHER AND MORTISER

SEE DESCRIPTION ON BACK OF THIS PAGE

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS

No. 604 Sash Relisher and Mortiser

Illustration on reverse of this sheet

OUR various Combined Relishers and Mortisers are so generally used in sash and door factories that they require little description, but we here show our latest Sash Machine. The original Sash Relisher and Mortiser was exhibited by us at the 1876 Philadelphia Exposition where it aroused universal interest and received the highest awards. Its practical value has since been fully demonstrated and no sash maker can afford to be without it.

The Originality of that machine consisted in the use of not only a hollow chisel and a bit for mortising, but also of a cutter head in combination with a bit for relishing tenons on sash and blind rails. For these particular operations there is an evident advantage in combining them on one machine, and this is one of the few combination machines that has proven its general convenience and economy by almost universal adoption.

Mortising is performed on one table where the operator is removed from the relishing side of the machine and can work independently. The advantage of the hollow chisel for this class of work is universally admitted, and it does clean and accurate mortising without previous boring.

Relishing is handled on a table near the opposite end of the frame and can be carried on while the mortising is done. This table slides in dovetail ways and its movement toward the cutter head and bit is regulated by stops. It is adjustable vertically for thickness of sash.

The Mortising Table is fed by a foot lever which is adjustable in its stroke. The knee support for the table has vertical adjustment in gibbed ways. The table is provided with an adjustable fence, a lay-out gauge and holding stops.

The Hollow Chisel is held in a convenient socket and its bit runs in the main spindle of the machine which is supported in double boxes and belted from beneath.

The Relishing Head is fitted at the opposite end of the mortising bit spindle, while at right angles the relishing bit spindle is driven from the lower countershaft. The chip breaker for the head is adjustable for the thickness of tenons, and the size of the bit used will allow the relish to fit the sticking of the stiles.

Other Attachments for routing blind rails, relishing door rails or cutting wedges, also power feed for mortising table, may be furnished with our No. 605 machine shown on another sheet, but are not added to this No. 604 pattern.

A Sash Relisher Only is built as our No. 604-A or in a double end machine as our No. 612 type. The latter is recommended for use in connection with one of our automatic mortisers where the output is large.

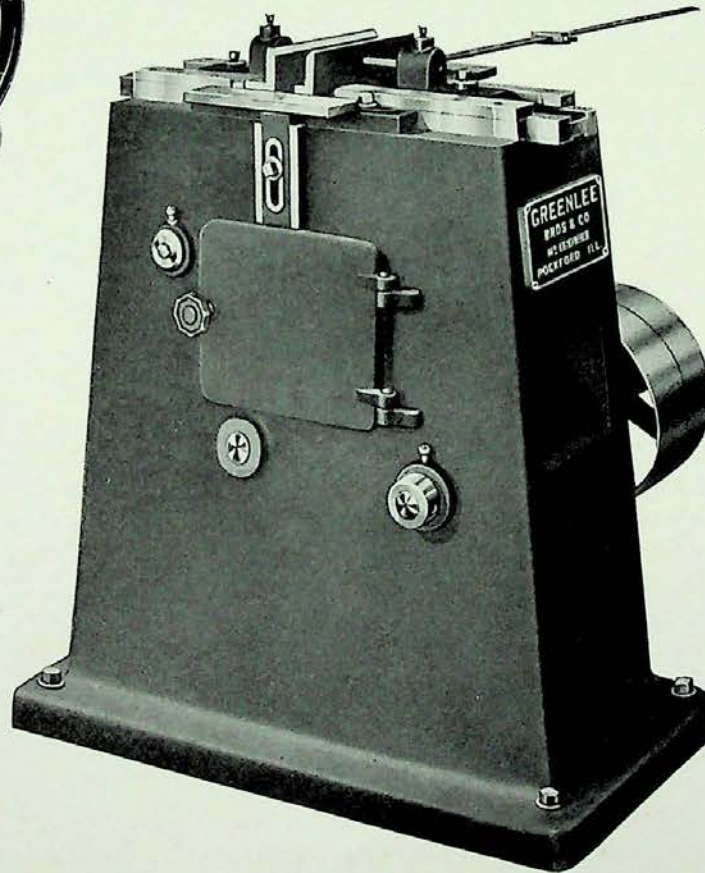
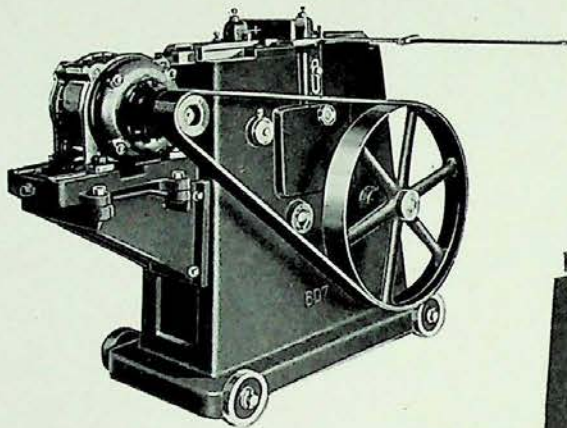
The Range is sufficient for handling any ordinary sash or blind relishing and mortising. For a large volume of heavy and hardwood work, we offer separate power feed machines for the highest efficiency.

The Equipment includes two hollow chisels with bits, a relishing head with knives, relishing bit, tool sockets, lay-out gauge, stops and wrenches. The countershaft is attached and has 9x4-inch tight and loose pulleys regularly running 1000 R. P. M. The speed may be increased to 1200 R. P. M. for direct coupled motor drive.

No. 604 Relisher and Mortiser. Weight in pounds 975 net; gross 1325 boxed; measure 42 cubic feet. Code, QUADRUPEL.

Greenlee

NO. 607 IMPROVED AUTOMATIC SASH FRANKER



Greenlee
BROS. & CO. 
ROCKFORD, ILLINOIS, U.S.A.

Greenlee

NO. 607 IMPROVED AUTOMATIC SASH FRANKER

THIS Automatic Sash Franker was originated by us many years ago and is now widely used. Its unique mechanical movement has never been duplicated, and it offers the only economical method for performing this operation, since foot power mortisers or single-chisel machines cannot compare with it.

The operation of franking is encountered in making both the stiles and the bars of small-light sash, and also in other lines of special work, such as sled runners, where very thin mortises are necessary. Our method of doing this is superior, due to the fact that while a solid chisel is the best form of tool for this work, it is necessary to use it in special form and to use two chisels in opposition to each other, in order to remove the core from the cut without tearing.

General Design

The arrangement of a reciprocating chisel ram moving in planed ways on top of the machine and actuated from a specially formed cam, which varies the rate of this movement, is the essential feature of this franker. The cam is fitted in the large gear, driven from the pinion on the main shaft.

This improved design differs from the original type of franking machine built by us for many years, in substituting the more mechanical arrangement of a double-faced cam and roller guides for the rocker arms.

Frame

The frame is of cored box construction, cast in one piece and substantial in form. Chutes are provided for the discharge of all chips; and the working parts, cams and gears are thus thoroughly protected from dirt and encased to provide safety while in operation.

Stroke

The stroke is made by advancing one chisel until more than half way through the piece, and then as it is withdrawn,

the opposite chisel is forced through the stock, driving out the core by its quick final movement. Face plates shaped to conform to the sticking prevents the stock from tearing out when the core is removed.

Chisels

The chisels are held in plain chucks on the ram and are forged from tool steel with cutting edges on each side tapered back toward the center. They are usually of a width equal to three times their thickness.

Portability

A portable machine is illustrated on the preceding page. It has the advantage that it can be placed behind whatever sticker is being run on stock requiring franking, and operated by the man taking away from the sticker.

Range

The range is regularly for mortising in stock not over $1\frac{1}{2}$ inches thick and with chisels up to $\frac{3}{4} \times \frac{3}{16}$ -inch size. On special order, machines can have heavier details to permit the use of somewhat larger chisels. With the countershaft running 225 R.P.M., a fast operator can handle 45 pieces in sash work. Slower speeds are often advisable for hardwood or on more exacting work.

Drive

The attached countershaft has $12 \times 3\frac{3}{4}$ -inch tight and loose pulleys to run from 150 to 225 R.P.M. When motor driven, an attached bracket is provided as shown in the illustration on the preceding page.

Weights and Codes

Net weight of No. 607 with tight and loose pulleys.....	900
Net weight of No. 607-M with motor bracket.....	975
Net weight of No. 607-MP Portable Franker.....	1000
Weight of No. 607 boxed for export.....	1100
Weight of No. 607-M boxed for export.....	1175
Weight of No. 607-MP boxed for export.....	1200
No. 607 with tight and loose pulleys.....	HYMUL
No. 607-M with motor bracket.....	HYMYM
No. 607-MP Portable Franker with motor bracket.....	HYNAD
Add for machines with increased chisel capacity.....	HYNEG

GREENLEE BROS. & CO., ROCKFORD, ILLINOIS, U. S. A.

*Machinery for Planing, Shaping, Mortising, Tenoning, Boring and Sawing
Tools for Mortising, Boring and Routing*

