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BULLETIN No. 309

"A

AMERICAN"

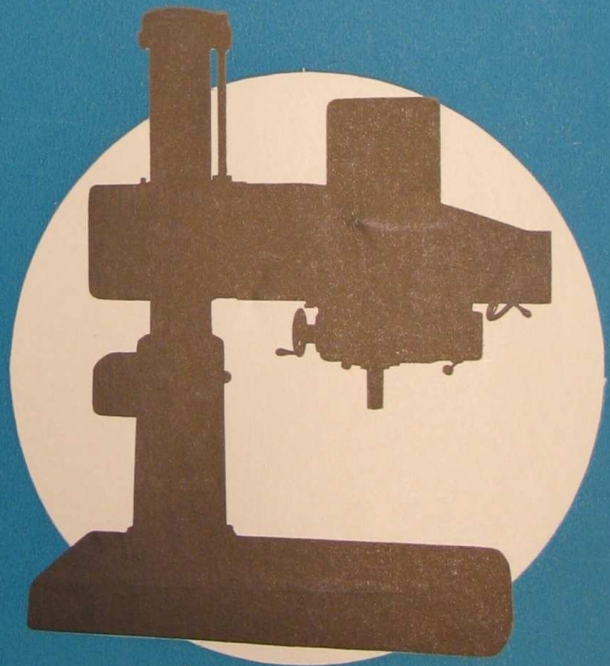
12-SPEED

HOLE WIZARD

THE
NEWEST
NEW
RADIAL

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BUILT
IN
3-FOOT
AND
4-FOOT
SIZES

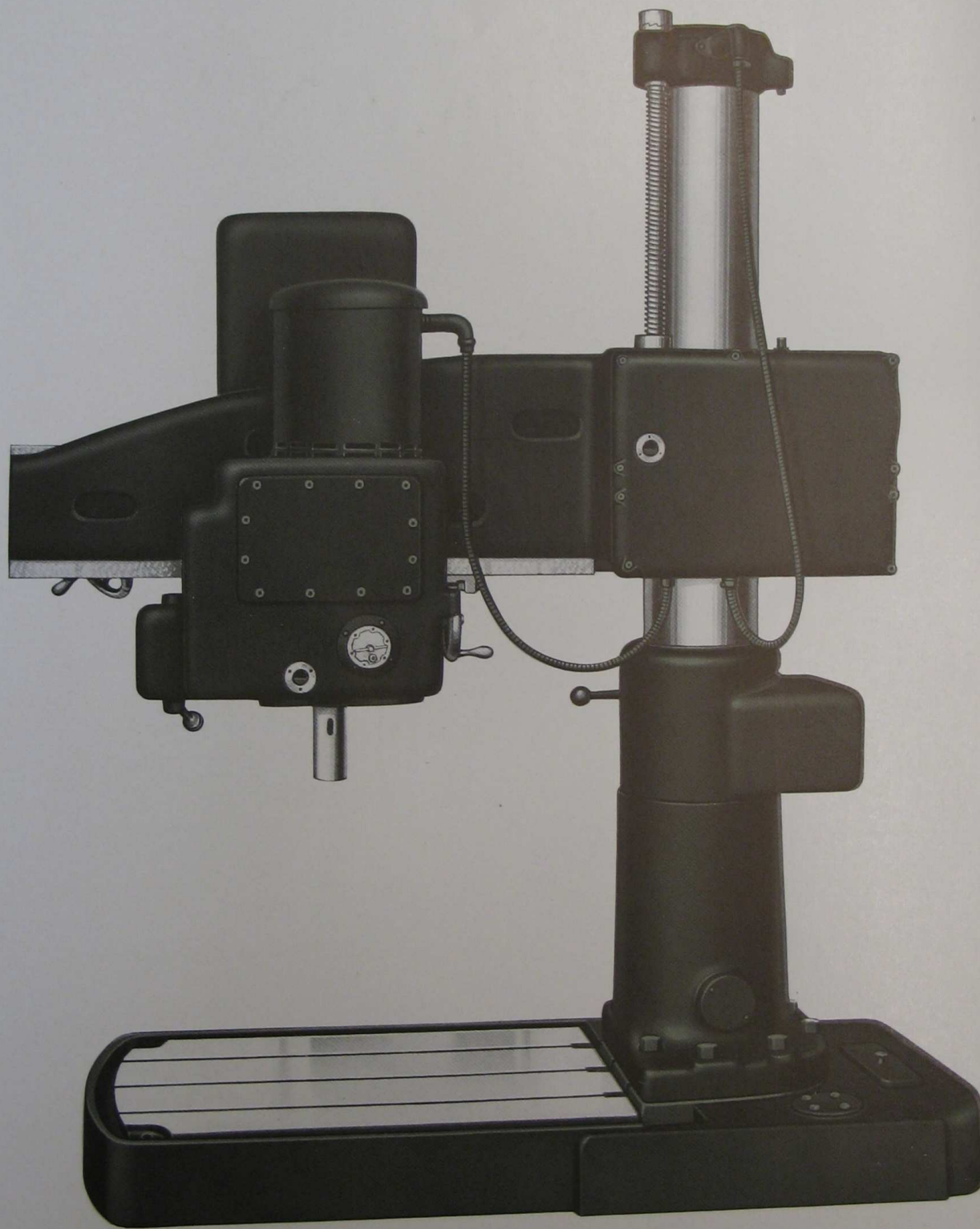


THE AMERICAN TOOL WORKS COMPANY

LATHES RADIALS SHAPERS

MAIN OFFICE AND WORKS

CINCINNATI, U. S. A.



1022-3

"AMERICAN"

HOLE WIZARD

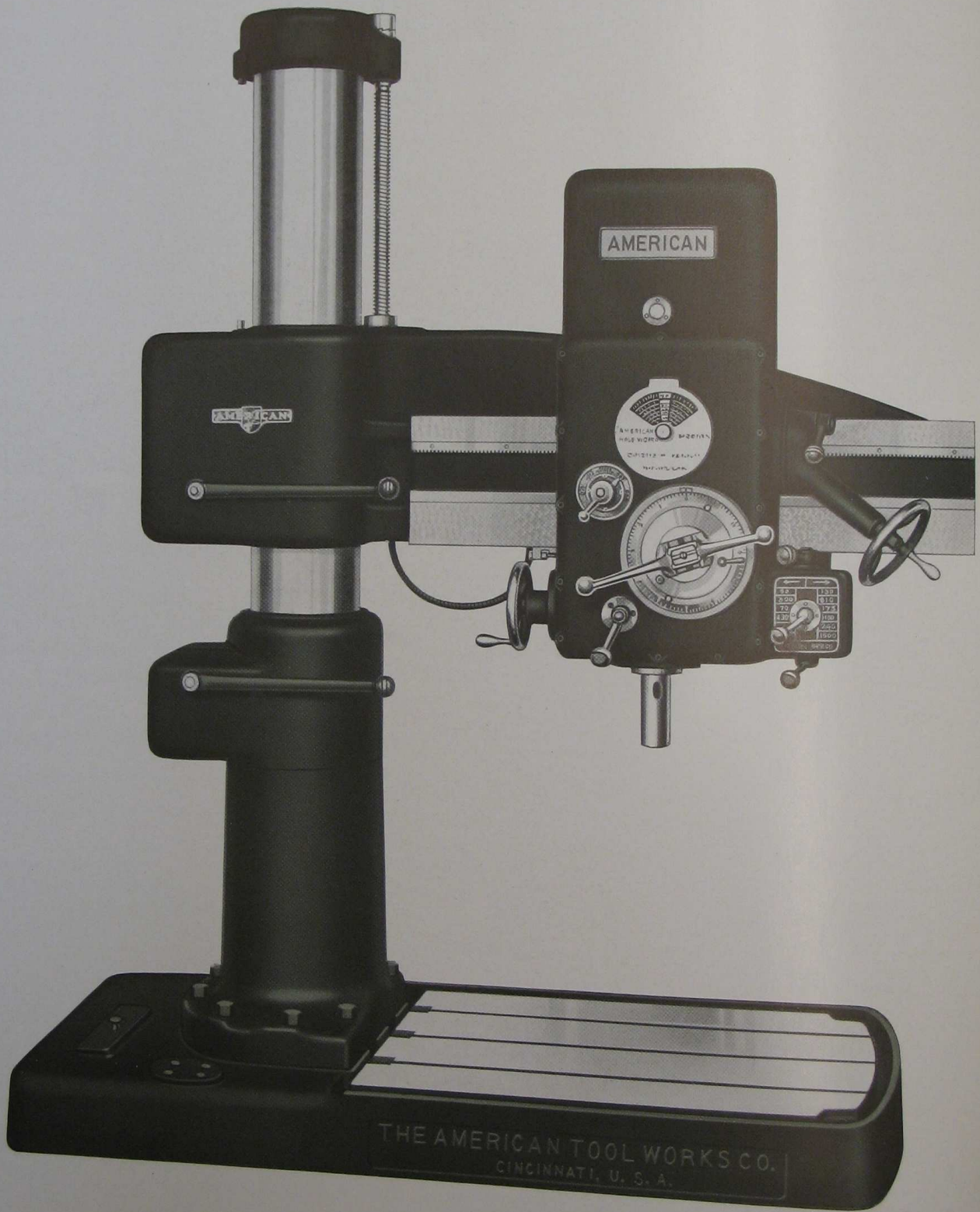


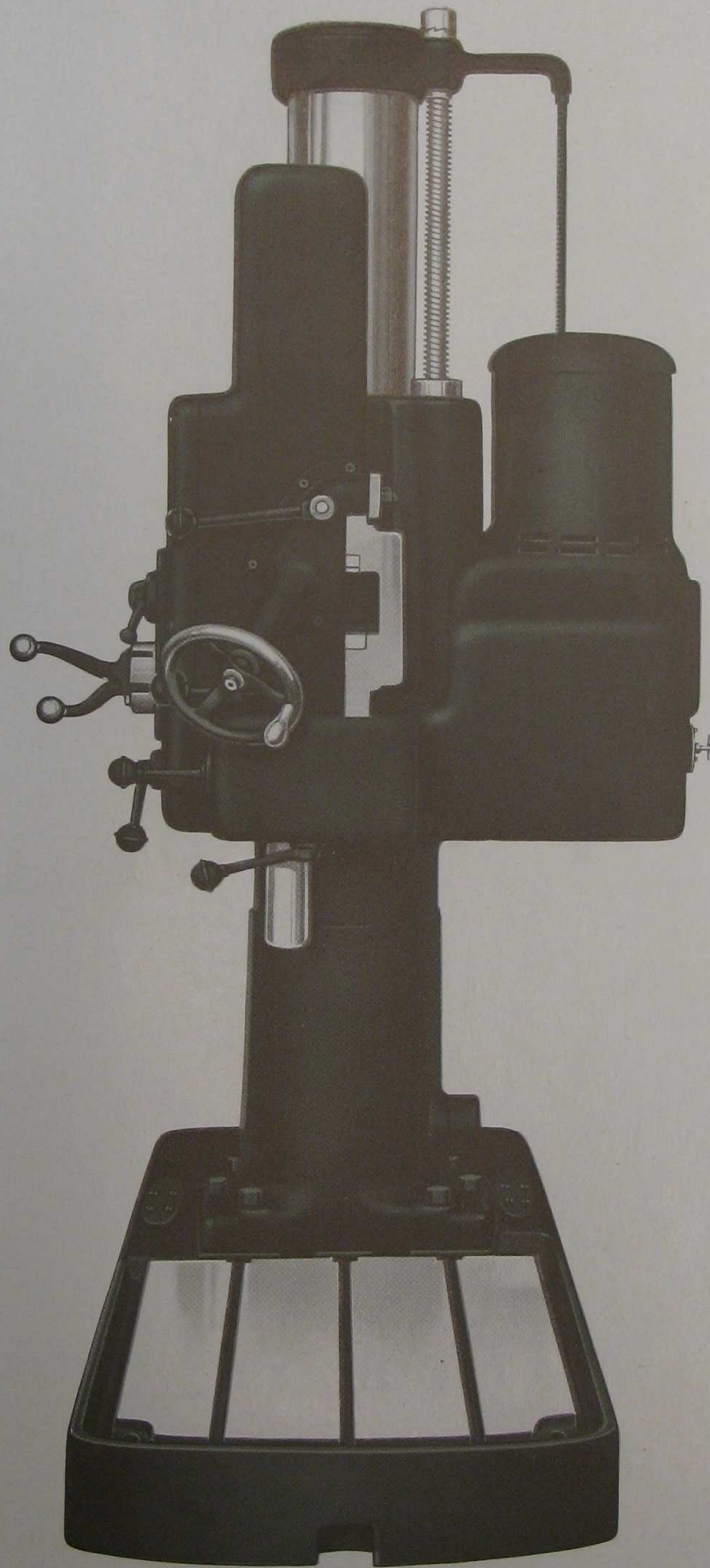
THE

NEWEST

NEW RADIAL

BUILT WITH 3-FOOT AND 4-FOOT ARMS
9-INCH DIAMETER COLUMN



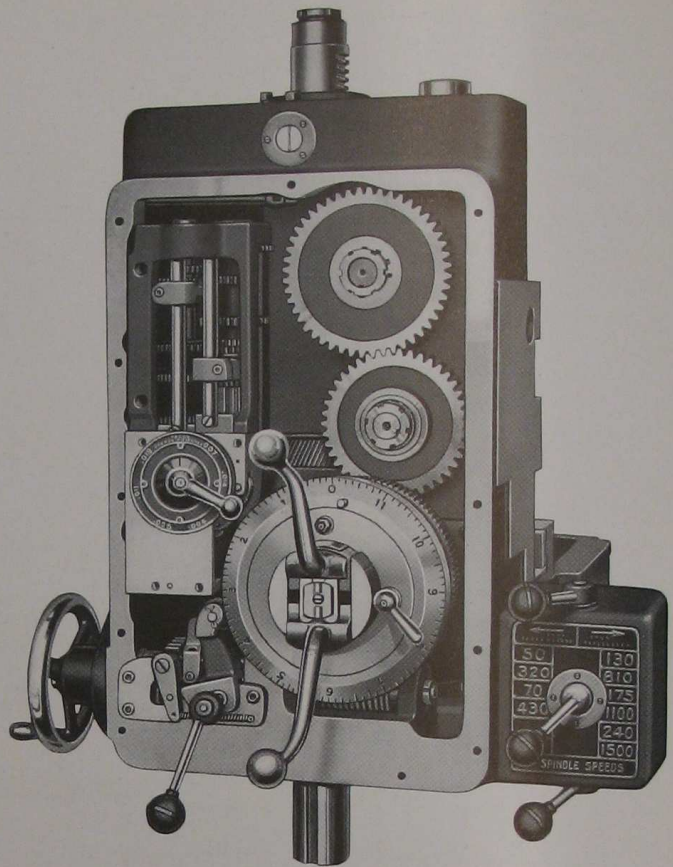


HIGHER SPEEDS

Higher speeds—lower drilling costs—less operating effort and minimized maintenance are both the purpose and basis of the new “American” Hole Wizard.

ITS CAPACITY

Proportioned for and equipped with a 5 horse power, built-in motor, the economical drilling capacity of this machine is approximately 2 inches diameter in cast iron and 1½ inches in steel, and the tapping capacity 2-inch tap in cast iron and 1½-inch tap in steel. Variation in metal density and hardness will naturally influence these capacities.



Front of Head with cover removed

Twelve (12) spindle speeds in geometrical progression are provided covering a standard range of 50 to 1500 r.p.m. By the use of pick-off gears this range may be changed to suit a variety of requirements. For example, if a higher speed range be desired, a range of 70 to 2100 r.p.m. or 100 to 3000 r.p.m. can be provided.

OPTIONAL RANGES

SPEED RANGE A.....	R. P. M.....	1500	1102	810	594	436	320	235	173	127	93	68	50
	Drill Diam.....	$\frac{3}{16}$ "	$\frac{1}{4}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ "	$\frac{7}{8}$ "	1¼"	1¾"	2¼"	Speeds suitable for spot facing and boring		
SPEED RANGE B.....	R. P. M.....	2100	1540	1132	832	610	448	329	241	177	130	95.5	70
	Drill Diam.....	$\frac{1}{8}$ "	$\frac{3}{16}$ "	$\frac{1}{4}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ "	$\frac{7}{8}$ "	1¼"	1¾"	2¼"	Speeds for spot facing and boring	
SPEED RANGE C.....	R. P. M.....	3000	2204	1620	1188	872	640	470	346	254	186	136	100
	Drill Diam.....	$\frac{3}{32}$ "	$\frac{1}{8}$ "	$\frac{3}{16}$ "	$\frac{1}{4}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ "	$\frac{7}{8}$ "	1¼"	1¾"	2¼"	Facing and boring

NOTE: The drill diameters shown are based on approximately 80 ft. cutting speed.

OPTIONAL RANGES

These may all be considered standard ranges for the purchaser to choose from in order that he may select the range best suited to his work. This flexibility of speed range is an outstanding advantage offered by the "American" Hole Wizard.

These speed ranges are based upon the use of a 60-cycle alternating current motor. If different cycle motors are used, these ranges will vary somewhat.

The entire range of twelve (12) spindle speeds is secured by two conveniently located direct reading levers located at the lower right-hand side of the head. The simplicity of the speed control members, coupled with the direct reading feature, make speed selection and setting practically instantaneous.

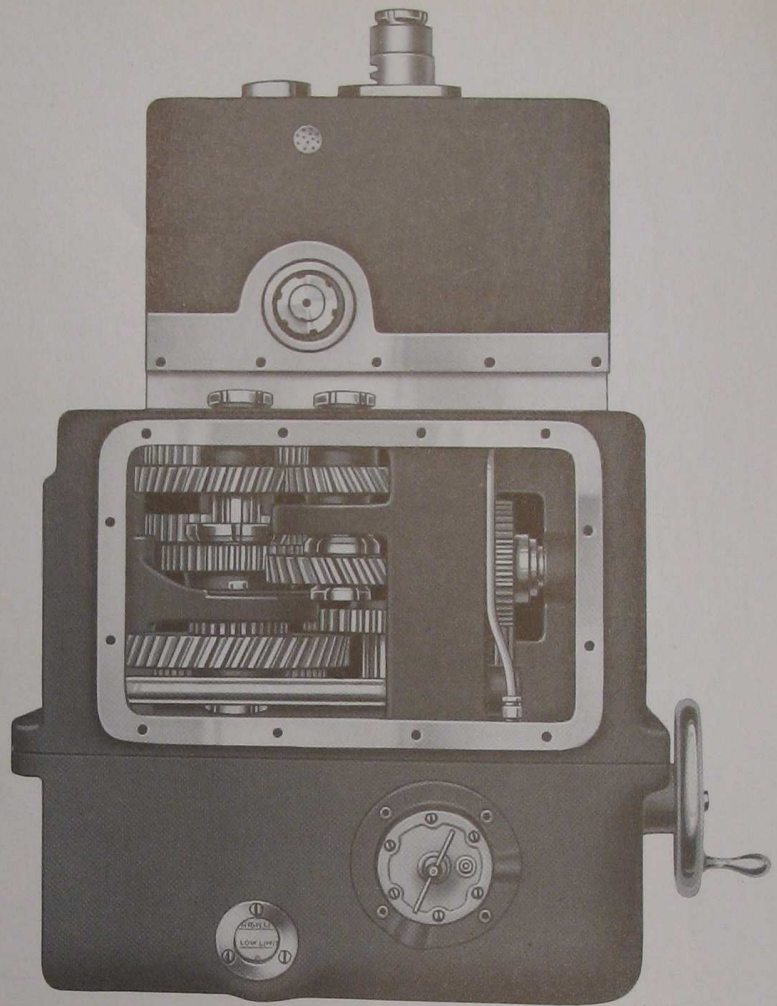


Fig. No. 1

This illustration shows the substantial construction of the main drive transmission. The entire mechanism is anti-friction mounted. All gears are hardened and ground. The slip gears are spur type with rounded teeth. The shaft connecting gears are 23° helical. The shafts are hardened with multiple splines and lands ground for highly accurate gear fits and easy shifting.

SPINDLE REVERSE FOR TAPPING

The complete elimination of the orthodox tapping attachment is a decided triumph in simplification. The spindle reverse required for tapping is accomplished by means of an almost instantaneously reversing motor. This electrical unit is guaranteed to reverse the spindle when running at the highest speed from full forward to full reverse in approximately 2½ seconds.

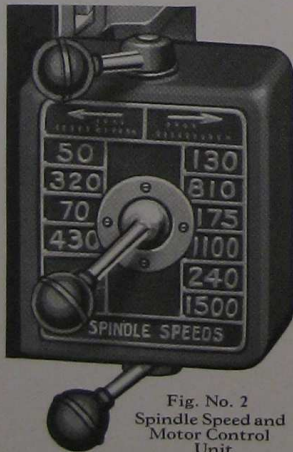
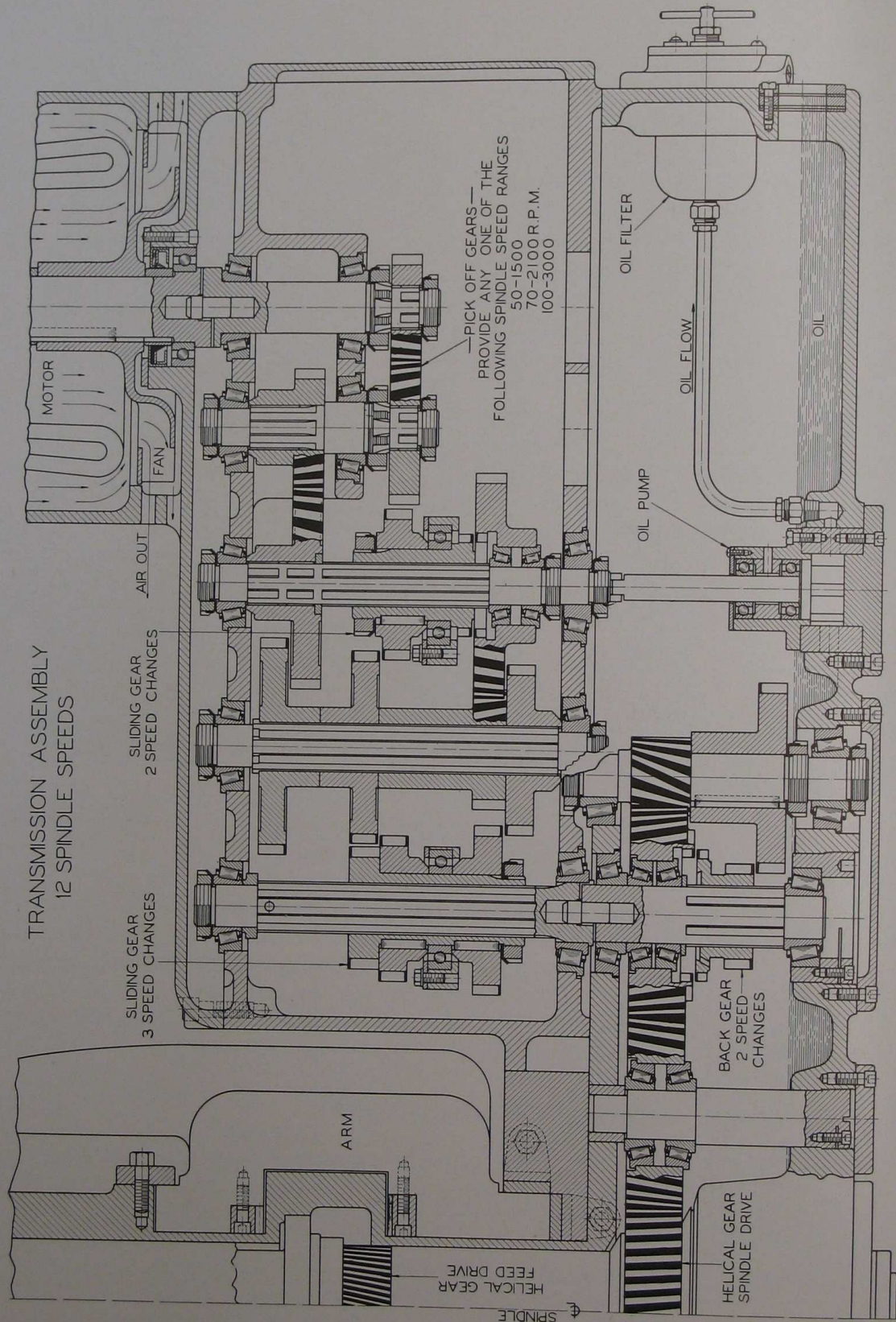


Fig. No. 2
Spindle Speed and
Motor Control
Unit

START, STOP AND REVERSE

The start, stop and reverse for the spindle are secured directly thru the driving motor. A small motor control lever is located directly below the speed control levers in the most natural and convenient location for the operator, which operates a double Pilot Control Switch in conjunction with a Magnetic Reversing Switch. This entire unit is simple, dependable, foolproof and requires no adjustment.



Head transmission diagram showing mechanism for securing 12 spindle speeds.

HEAD—100% ANTI-FRICTION AUTOMATICALLY OILED

The head, which is 100% anti-friction and automatically oiled by means of pump lubrication, is mounted on two large anti-friction bearings which roll on a hardened steel guideway located at the lower portion of the square type arm, which provides the narrowest possible guideway for the head mounting. Traverse along the arm is accomplished manually by means of a large hand-wheel located at the lower right-hand side of the head, one revolution of which moves the head three inches. This anti-friction design of head-mounting on the arm insures the greatest ease of movement—and a minimum amount of effort to start the head from a stationary position. All speed-changing mechanism is located within the head casting as is also the spindle feed unit, consequently both speed and feed controls are entirely from the head.

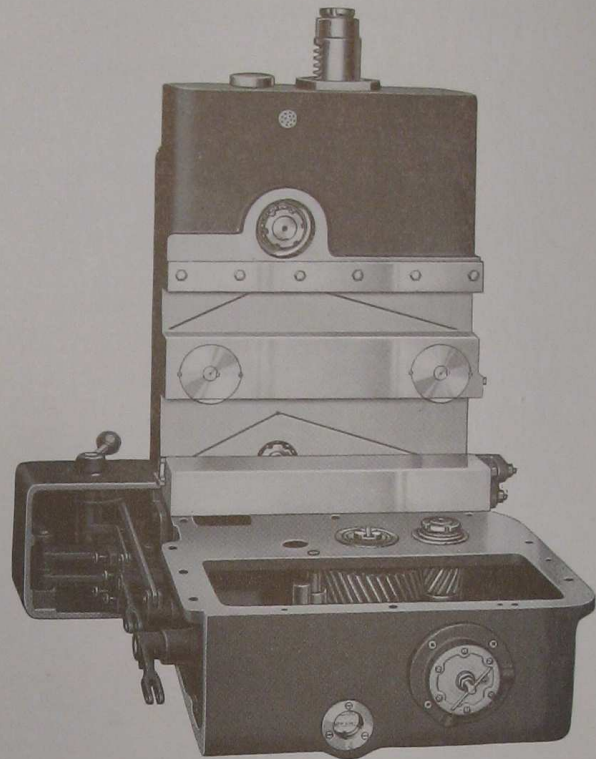


Fig. No. 1

Showing roller mounting of head on arm, the gib application, the oil level gauge, the metal oil filter and the helical gear spindle drive

The design of the head mechanism is simple and substantial. The fewest possible members are employed to produce the results desired. They are all of generous proportions and are guaranteed to possess an ample factor of safety beyond the maximum service for which the machine is designed.

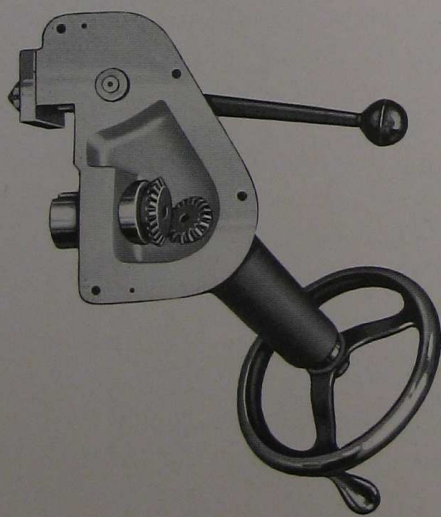


Fig. No. 2

Anti-friction head traversing unit and head clamp with actuating lever

All shafts are made of hardened alloy steel, with multiple splines and lands ground for highly accurate gear fits and easy shifting.

HARDENED AND GROUND GEARS

All gears in the head mechanism are made from Chrome Manganese steel forgings heat treated and oil hardened. The main drive transmission gears have ground teeth. After grinding, each gear is finish lapped under a light predetermined load in the most modern of gear-lapping machines, resulting in the smoothest and quietest gear transmission possible to produce.

SPINDLE AND SPINDLE SLEEVE

The construction of the spindle assembly is an outstanding achievement. The spindle is made of "NITRALLOY" steel nitrated for extreme surface hardness, thereby minimizing wear and the danger of scoring or seizing. It is ground accurately its entire length with the minimum permissible allowance for the sliding fit in the sleeve.

The spindle sleeve is also made of hardened "NITRALLOY" and honed to size. This sleeve is mounted in precision Timken roller bearings and provided with means for convenient adjustment to compensate for wear.

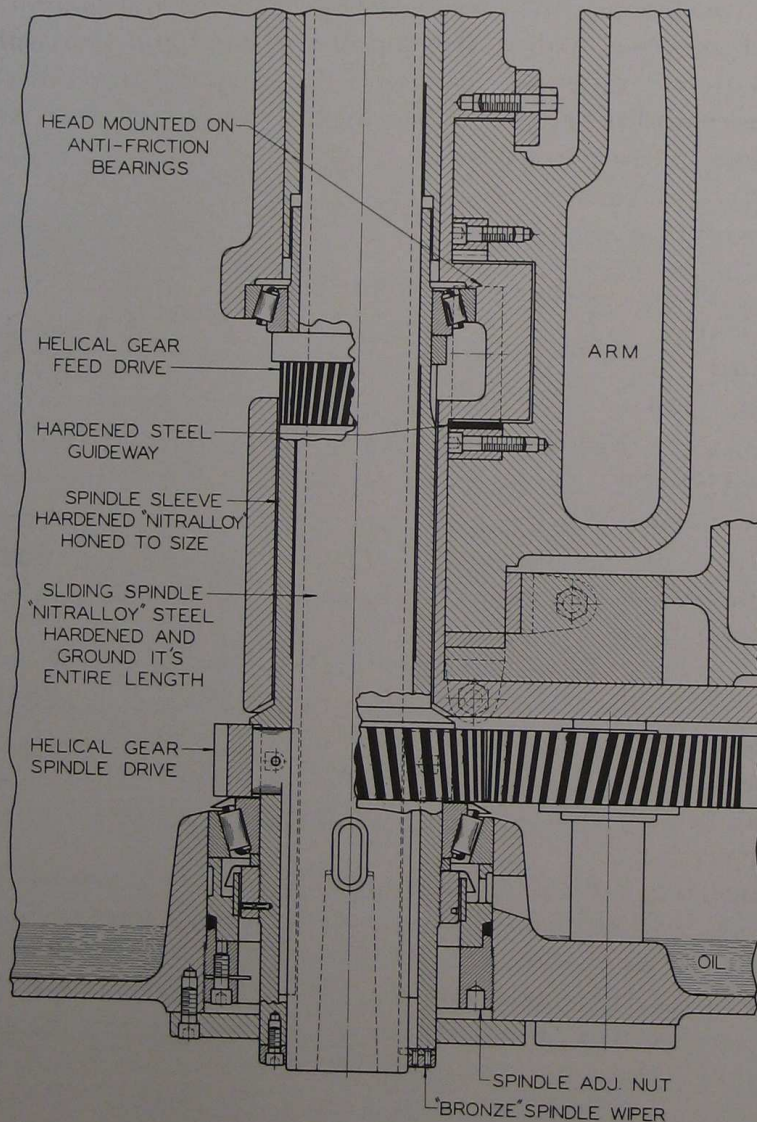


Fig. No. 2
Diagram of spindle assembly

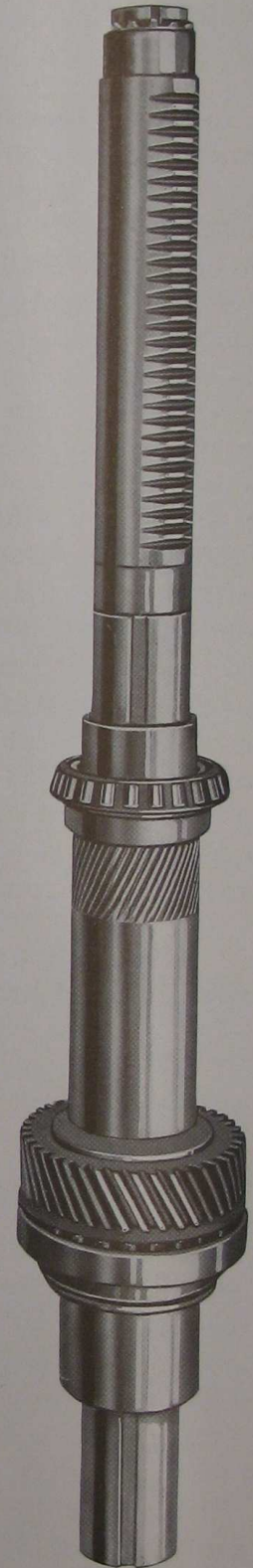


Fig. No. 1
Spindle unit showing integral feed rack, helical gear drive and adjustable Timken roller bearing mounting.

SPINDLE DRIVE

The drive to the spindle is through hardened and ground helical gears insuring a smooth, vibrationless power transmission. The drive occurs at the bottom of the head—the closest possible point to the work, thus minimizing the torsional or twisting effect upon the spindle and completely eliminating all tendency of the spindle to chatter under service. The principle of the lower spindle drive is well known to radial drill builders and users alike, so it is hardly necessary to discourse further upon its advantages. Suffice it to say that the lower spindle drive is a thoroughly tried construction which from years of usage has been found highly satisfactory.

AUTOMATIC OILING

The entire head mechanism is automatically oiled by a pump circulating system. The oil which is carried in the bottom of the head casting is circulated by means of a pump which forces the oil to the top of the head and transmission case through a built-in oil filter to thoroughly cleanse it. From these points the oil cascades down over the gears and bearings. The functioning of the oiling system is indicated by a flow gauge in the head casting directly in front of the operator.

POWER FEEDS

Six (6) rates of geared power feed are provided including .004", .007", .011", .014", .018" and .025" per revolution of the spindle. All power feeds are produced by a sliding gear feed unit in which the gears are hardened and ground and the entire unit anti-friction mounted. It is oiled automatically by the pump circulating system of the head. All feeds are direct reading, the position of the dial indicating the feed in use.

The connection between the feeding unit and the spindle is through a highly efficient band type friction, adjustable from the outside, which is also completely anti-friction mounted and provides a safety feature which protects the entire transmission against accidental or careless overloading.

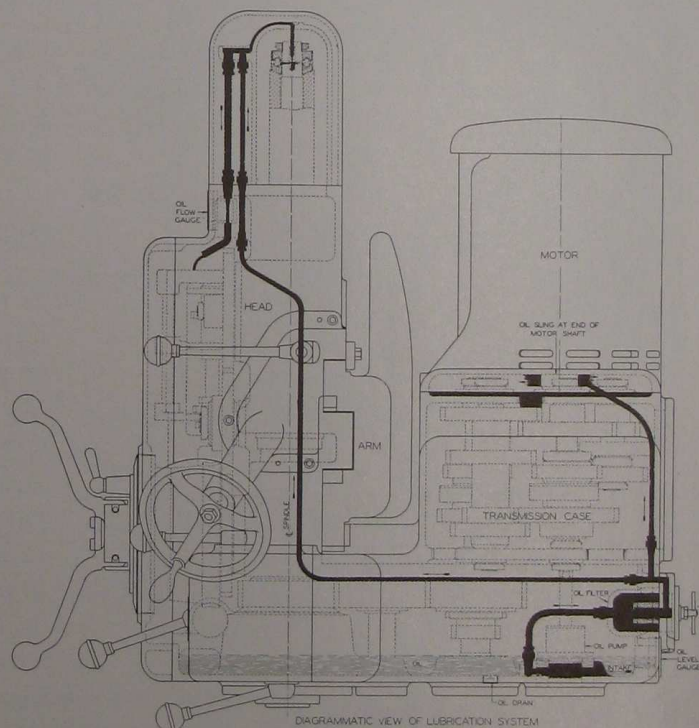


Fig. No. 1
Diagram showing automatic circulating oiling system for the entire head mechanism

HAND FEED TO SPINDLE

An exceptionally convenient hand feed unit is provided in addition to the power feed. This is actuated by means of a hand wheel located most conveniently for the operator at the left side of the head where it is entirely free from interference with any of the other operating members. This hand feed is essential for boring, spot facing and counterboring operations. A valuable safety feature is incorporated in this unit which automatically disconnects the hand wheel when the power feed is engaged, which permits the hand wheel to remain stationary when feeding the spindle by power, thus completely eliminating the danger to the operator of a revolving wheel. This is a patented feature and a valuable one.

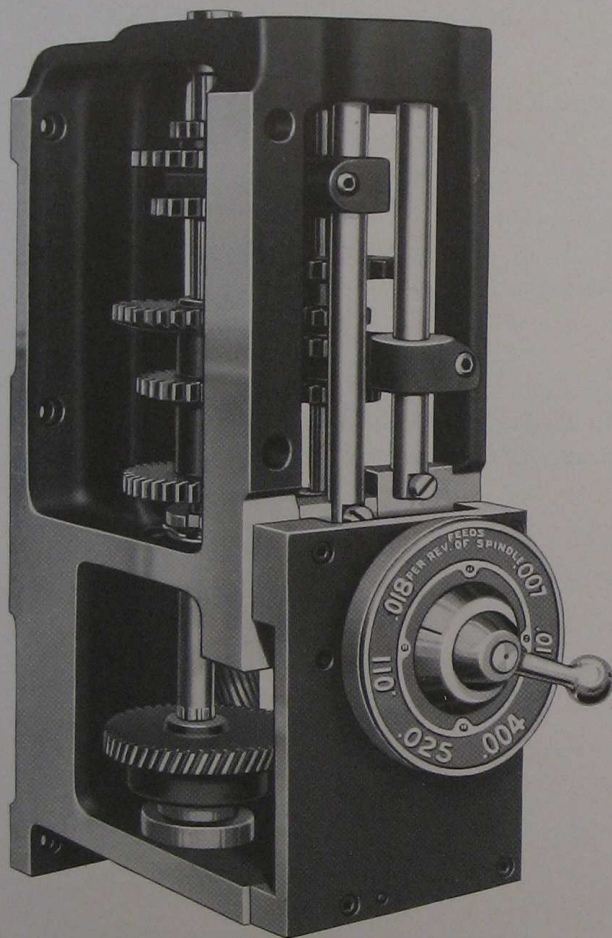


Fig. No. 1

Simple and compact slip gear feed unit—anti-friction mounted—automatically oiled, showing control lever and graduated feed index dial.

to the revolving elevating nut which operates on a stationary elevating screw. The entire unit is anti-friction mounted and runs in oil. A convenient directional control lever at the front of the arm girdle operates the elevating unit and also automatically clamps and unclamps the arm in unison with the elevating mechanism, making it impossible to raise or lower the arm while bound to the column, also preventing operation of the drill with the arm loose on the column.

AUTOMATIC FEED TRIP

A greatly improved automatic trip for the feed has been made a feature of real operative value. It operates up to 12" at one setting—the full travel of the spindle, is positive in action and will trip accurately at the depth for which it is set. A safety stop is provided for tripping the feed at the extreme travel of spindle. All settings are made from zero and indicated on a large graduated dial which makes it very simple for the operator.

ELEVATING MECHANISM

Power elevating and lowering for the arm are provided as standard equipment. The power elevating and lowering are accomplished by means of a small $\frac{3}{4}$ horse power ball bearing, rolled shell type motor and reversing drum neatly built into a compact unit at the rear of the arm girdle and connected

ELEVATING MECHANISM

A very effective safety unit is provided in the form of an angular clutch at the top of the stationary elevating screw which automatically disengages and instantly stops the functioning of the elevating mechanism if the arm, the tool or the head is accidentally permitted to strike the work while being lowered. This is an automatic protective feature of inestimable value.

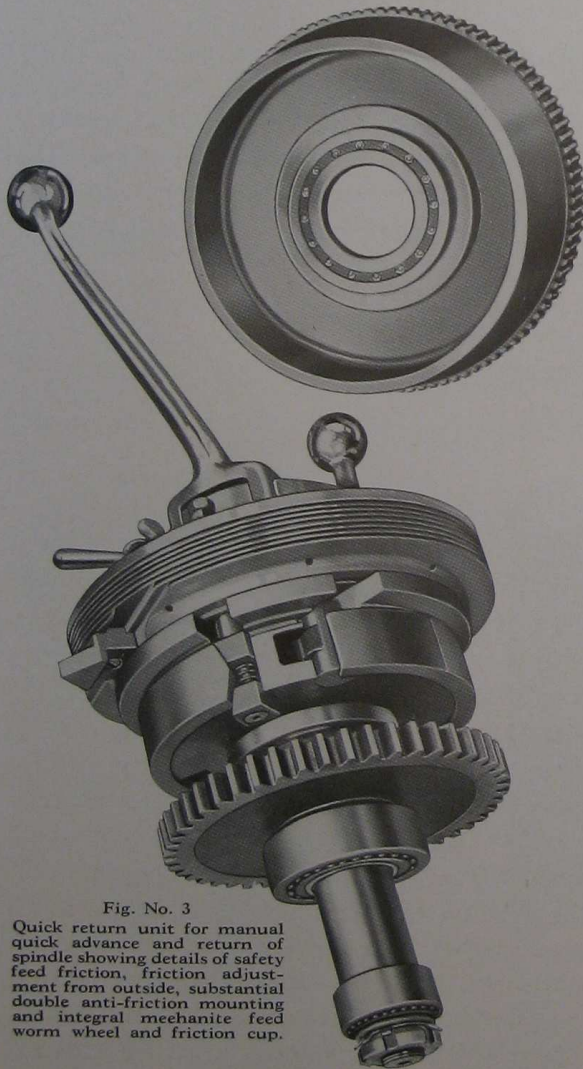


Fig. No. 3

Quick return unit for manual quick advance and return of spindle showing details of safety feed friction, friction adjustment from outside, substantial double anti-friction mounting and integral meehanite feed worm wheel and friction cup.

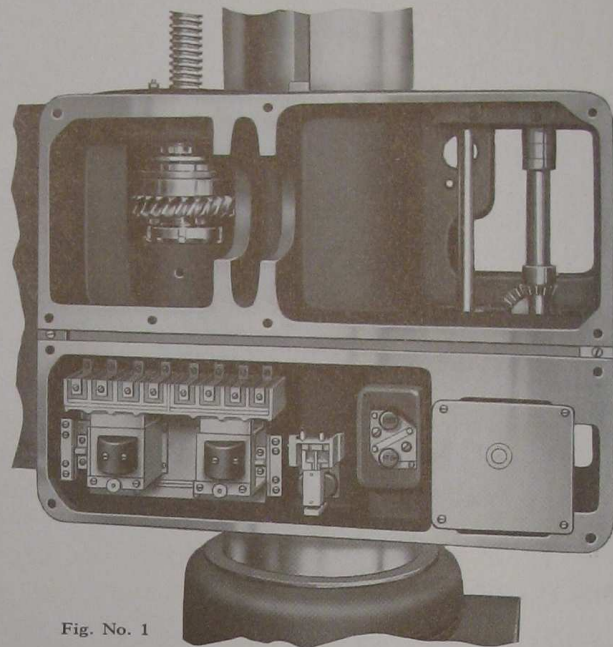


Fig. No. 1

Interior of elevating unit on back of arm showing complete housing-in of both mechanical and electrical mechanism, insuring freedom from dirt and accident.

COLUMN CLAMP

The column is easily and quickly clamped and unclamped by an impingement type of clamping mechanism controlled by a conveniently located lever at front of column operating in the vertical plane. A very short movement of this lever solidly clamps or completely loosens the column.

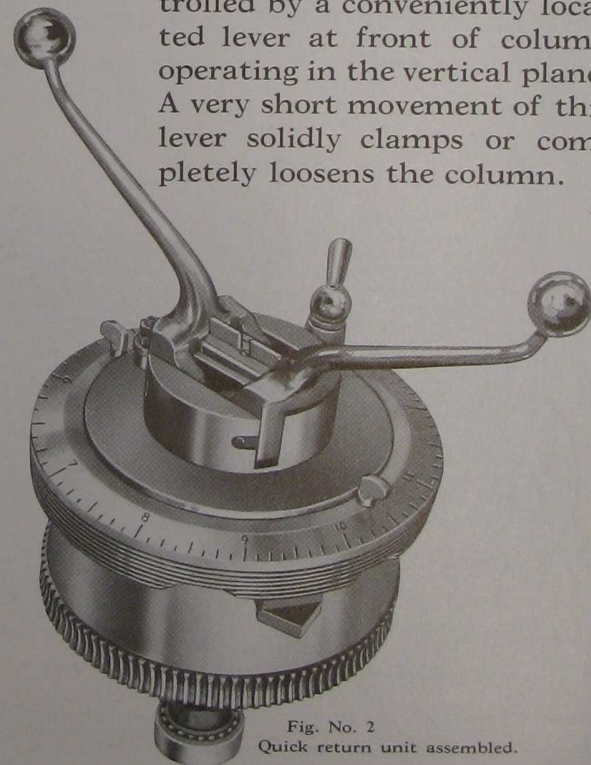


Fig. No. 2

Quick return unit assembled.

ELECTRO-TAPPER

For Faster and Better Tapping of Both Open and Blind Holes

The "American" Electro-Tapper is a semi-automatic tapping unit for application to the "American" Hole Wizard. It is an auxiliary tapping mechanism, furnished only on order, for high-speed tapping of duplicate open or blind holes.

The depth of the tap travel is controlled by an adjustable stop collar which is set for the desired depth. When that point is reached the collar contacts and trips a limit switch, instantly reversing the driving motor which in turn reverses the rotation of the spindle and backs out the tap. When the tap clears the work, the spindle continues to rotate, but ceases to feed. The operator then raises the spindle by means of the quick-return levers until a second stop collar contacts and again trips the switch, which reverses the motor, causing the spindle to rotate again in the forward direction ready for the next hole.

The Electro-Tapper is furnished in addition to the standard manual tapping mechanism, but the two are interlocked to prevent possible conflict. Two manual control levers are incorporated in the mechanism, one for starting and stopping, and the other for reversing the direction of the motor. By the use of these two levers the operator has complete control of the spindle independent of the adjustable stop collars. For fast, accurate, low-cost tapping, the "American" Electro-Tapper is a marvel of efficiency.

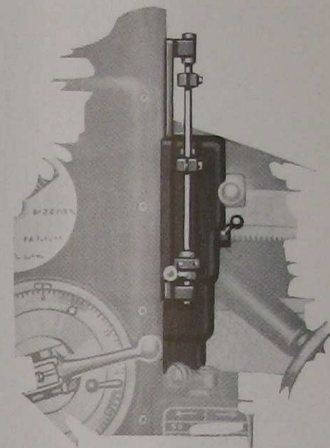


Fig. No. 1—Electro-Tapper

MOTOR DRIVE

This machine is built only in the motor driven type, the cost of the electrical equipment being included in the selling price of the machine. The most

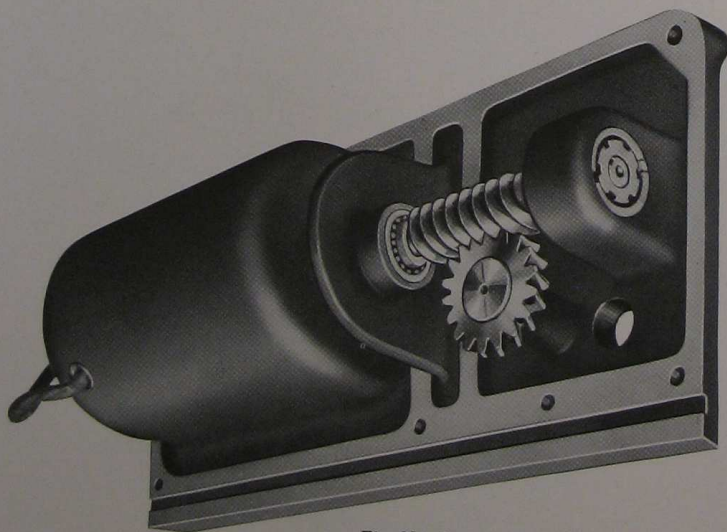


Fig. No. 2

Showing built-in $\frac{3}{4}$ horse power, ball bearing, rolled shell type reversing motor and hardened and ground elevating worm with outboard support anti-friction mounted.

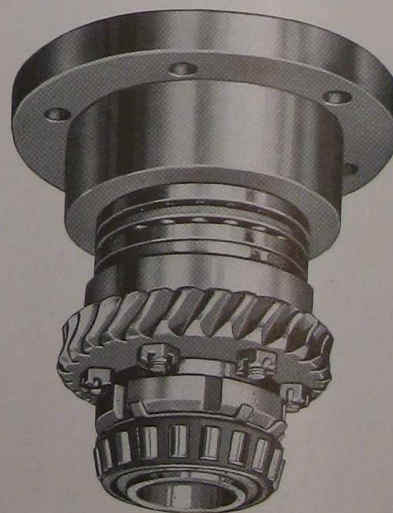


Fig. No. 3

Revolving elevating worm, driven by hardened nut, anti-friction mounted, and ground worm and special hard worm bronze worm wheel; all automatically oiled.

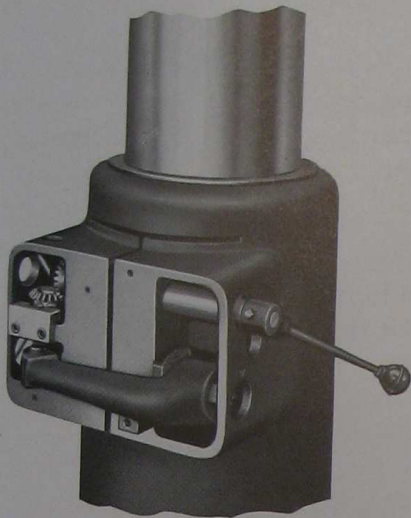


Fig. No. 1

"Finger Tip Control" Column Clamp Unit completely housed in and free from dirt and accident—may be operated with one finger.

MOTOR DRIVE

modern ball bearing, rolled shell type of 5 horse power, shaftless motor is used and is built in as an integral part of the head. Alternating Current Motors of various current characteristics are available to suit customers' electrical service. The start, stop and reverse of the motor are secured through a universally recognized high quality magnetic reversing switch operated by a lever located just below the gear shifting box most conveniently for the operator. The electrical equipment is thoroughly protected by overload and under-voltage safety features. Direct Current Motors cannot be used.

TABLES

Several different styles of tables have been developed for the customer to select from in order to best accommodate his particular class of work. These tables are all considered extra equipment and are finished only on specific order.

PLAIN BOX TABLE

The plain box table, illustrated by Fig. No. 2, provides two large working surfaces, one horizontal and one vertical, both with Tee slots for clamping the work. This table is clamped to base by T-bolts, and can be quickly removed when desired.



Fig. No. 2
Plain Box Table



Fig. No. 3
Universal Table

UNIVERSAL TABLE

The universal table, Fig. No. 3, page 15 is used for angular work settings. It consists of a standard base, on which is mounted a tilting work table of two surfaces. Either face may be set in a vertical position by means of a segment and worm. This arrangement, together with a T-handle wrench, makes it very easy to move the table when carrying a heavy load. Working table can be securely clamped by two bolts, thereby relieving the work and segment of undue strain, since they are self-locking in themselves. Graduations on the segment show the angle at which the table top is set. The table is located on the base in the same manner as the plain box table.

SWINGING BOX TABLE

This style of table, shown by Fig. No. 1, swings around the column, and can be swung out of the way when it is desired to place work on the base. It has two working surfaces, both supplied with parallel Tee slots.



Fig. No. 1—Swinging Box Table

WORM SWIVELING TABLE

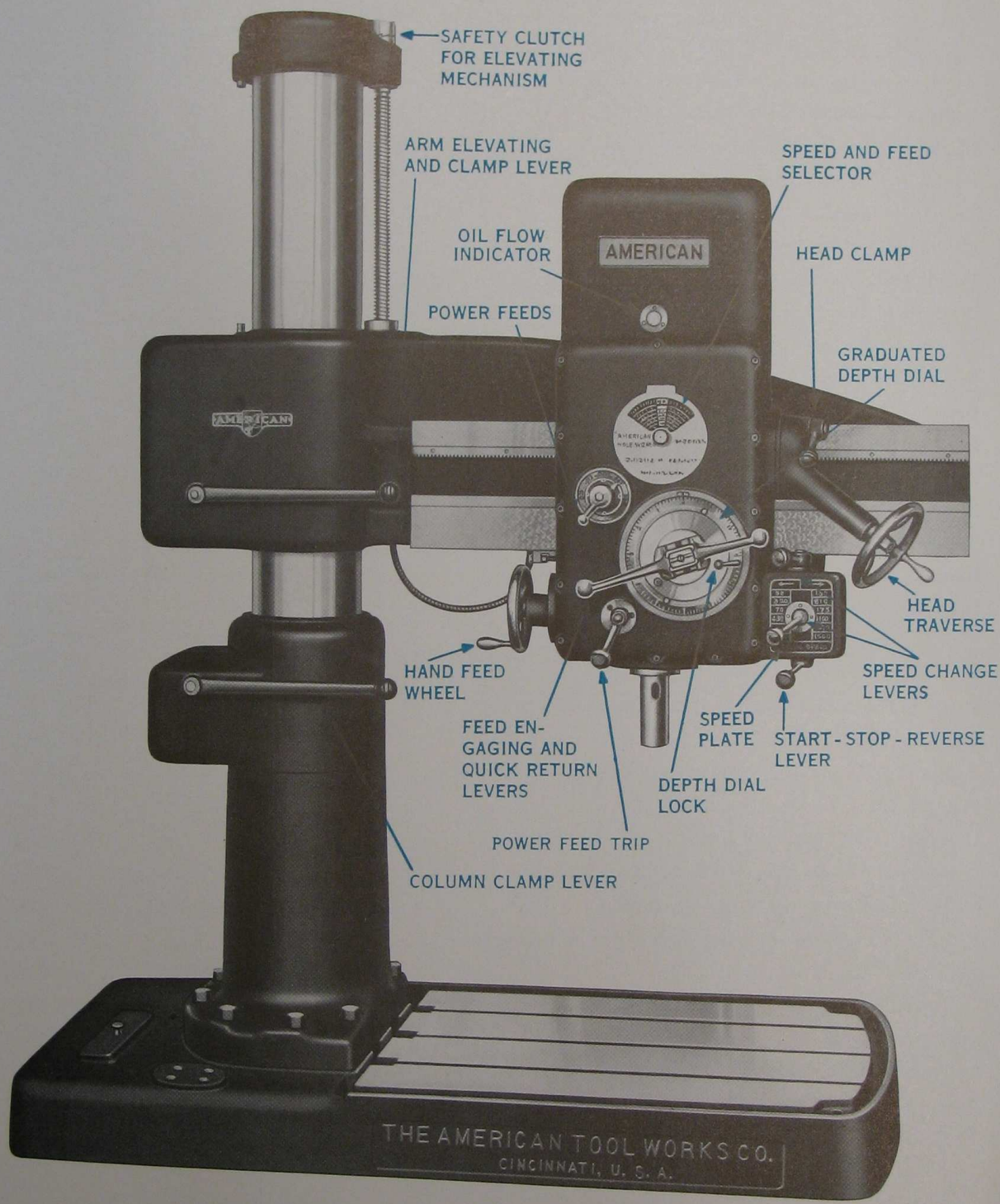


Fig. No. 2—Worm Swiveling Table With Round Table Mounted

When desired by customer we are prepared to furnish a worm swiveling table, shown by Fig. No. 2 but without round table. This table has Tee slots and working surface similar to the swinging box table, and can be rotated in a complete circle by means of an enclosed worm and worm wheel. Provision has been made for clamping it at any desired angle, and a graduated scale on the table stump is provided for convenient and accurate settings.

ROUND TABLE ON SWINGING BOX OR WORM SWIVELING TABLE

For some classes of work it is desirable to use an auxiliary round table that may be revolved. We are prepared to supply such a table for application to either the swinging box or worm swiveling tables as shown by Fig. No. 2.



SPECIFICATIONS

	3-Foot	4-Foot
Drills to Center of Circle on Base or Table.....	72"	96"
Maximum Distance, Spindle to Base.....	51"	51"
Minimum Distance, Spindle to Base.....	14"	14"
Traverse of Spindle.....	12"	12"
Minimum Distance, Spindle to Column Stump.....	10 $\frac{3}{4}$ "	10 $\frac{3}{4}$ "
Hole in Spindle, Morse Taper Number.....	4	4
Diameter of Spindle at Point of Drive.....	2 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "
Traverse of Head on Arm.....	25 $\frac{1}{4}$ "	37 $\frac{1}{4}$ "
Traverse of Arm on Column.....	25"	25"
Bearing of Head on Arm.....	16"	16"
Bearing of Arm on Column.....	18"	18"
Height of Drill over Column.....	91"	91"
Extreme Height of Drill over Spindle.....	96 $\frac{1}{4}$ "	96 $\frac{1}{4}$ "
Number of Power Feeds.....	6	6
Range of Power Feeds.....	.004" to .025"	.004" to .025"
Number of Spindle Speeds.....	12	12
Range of Spindle Speeds..... Any one of the following.	50-1500 70-2100 100-3000	50-1500 70-2100 100-3000
Height of Base.....	6"	6"
Working Surface of Base.....	30"x42"	30"x54"
Radius to Clear Extreme Point of Head on Arm.....	65 $\frac{3}{4}$ "	77 $\frac{3}{4}$ "
Plain Box Table (Height—Top Surface).....	18"—20"x24"	18"—20"x24"
Universal Table (Height—Top Surface).....	21 $\frac{3}{4}$ "—20"x24"	21 $\frac{3}{4}$ "—20"x24"
Swinging Box Table (Height—Top Surface).....	24"—16"x37"	24"—16"x37"
Worm Swinging Table (Height—Top Surface).....	26 $\frac{3}{4}$ "—16"x31 $\frac{1}{4}$ "	26 $\frac{3}{4}$ "—16"x31 $\frac{1}{4}$ "
Round Table Mounted on Swinging or Worm Swiveling Table.....	24" Dia.	24" Dia.
Net Weight.....	5400 lbs.	5600 lbs.
Crated Weight.....	5650 lbs.	5850 lbs.
Boxed Weight.....	6350 lbs.	6550 lbs.
Cubic Feet—Boxed.....	170	195