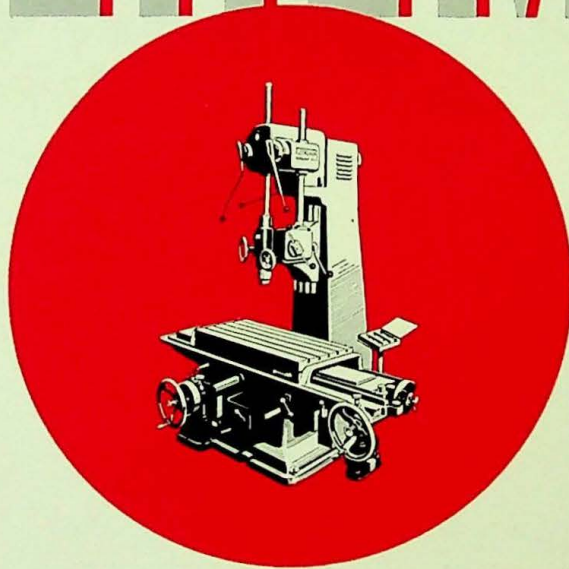
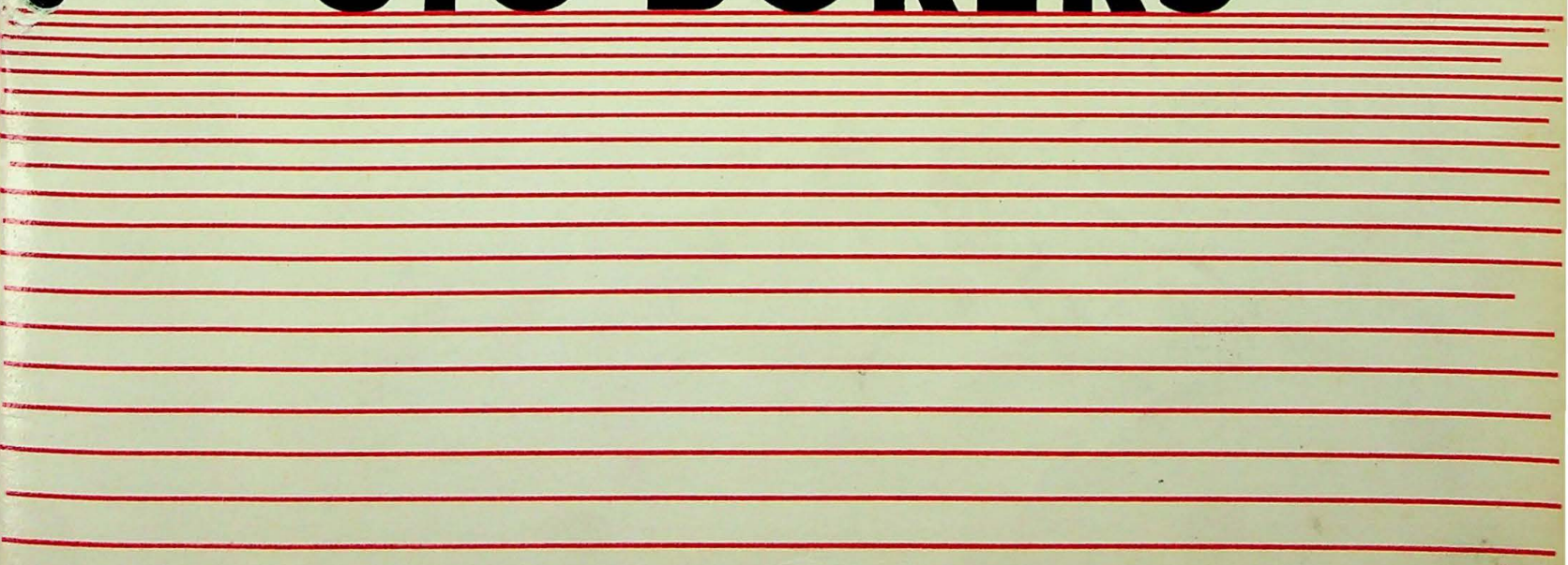


CLEEREMAN

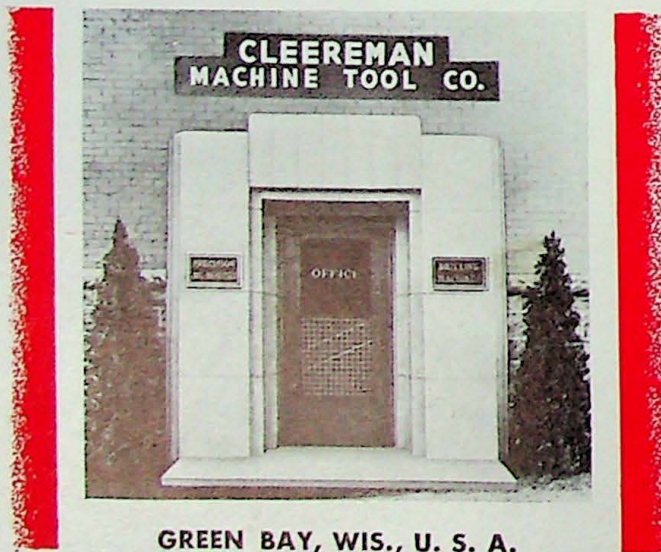


JIG BORERS



Since 1908 the Cleereman Machine Tool Company of Green Bay, Wisconsin, has been building fine machine tools.

Cleereman Jig Borers embody all of the experience and craftsmanship derived from these many years of successful manufacture in the field of maximum precision.



GREEN BAY, WIS., U. S. A.

CLEEREMAN JIG BORERS *for*

Precision Locating . . . Drilling . . . Boring . . . Reaming
. . . and Checking without the use of either jigs, fixtures,
or the necessity of previous layout—

IN THE TOOL ROOM

The jig borer, designed and constructed to perform with extreme precision, is an absolute necessity in the tool room. No other machine tool can approach the speed and accuracy of the jig borer for locating and boring holes in jigs, fixtures, dies, gages, and experimental parts, and for checking work performed in other machines. The Cleereman Jig Borer has built into it every necessary device and control to give it speed of operation and life-long accuracy.

IN THE PRODUCTION SHOP

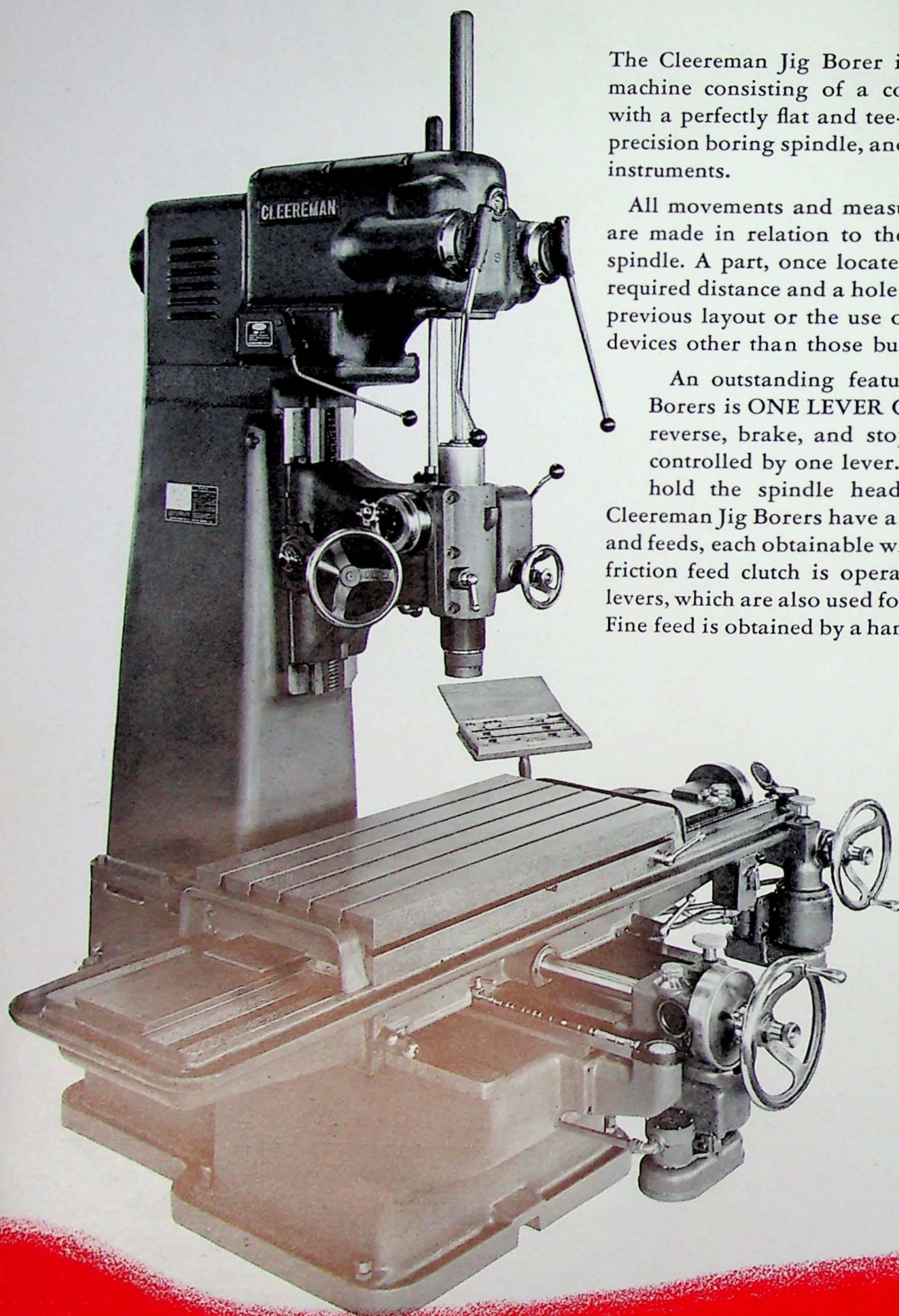
The characteristics of speed, precision and low work-cost make the Cleereman Jig Borer equally indispensable in manufacturing departments, where it economically performs small lot production without the usual costs of layout time and jig or fixture manufacture. Its extreme accuracy is such that parts of assemblies will match perfectly, and interchangeable replacement units may be made at any time.

CLEEREMAN MACHINE TOOL CO.

Plant: Green Bay, Wisconsin, U. S. A.
affiliated with

BRYANT
Machinery & Engineering
Company

Cleereman Jig Borers



The Cleereman Jig Borer is a precision boring machine consisting of a compound work table with a perfectly flat and tee-slotted top surface, a precision boring spindle, and precision measuring instruments.

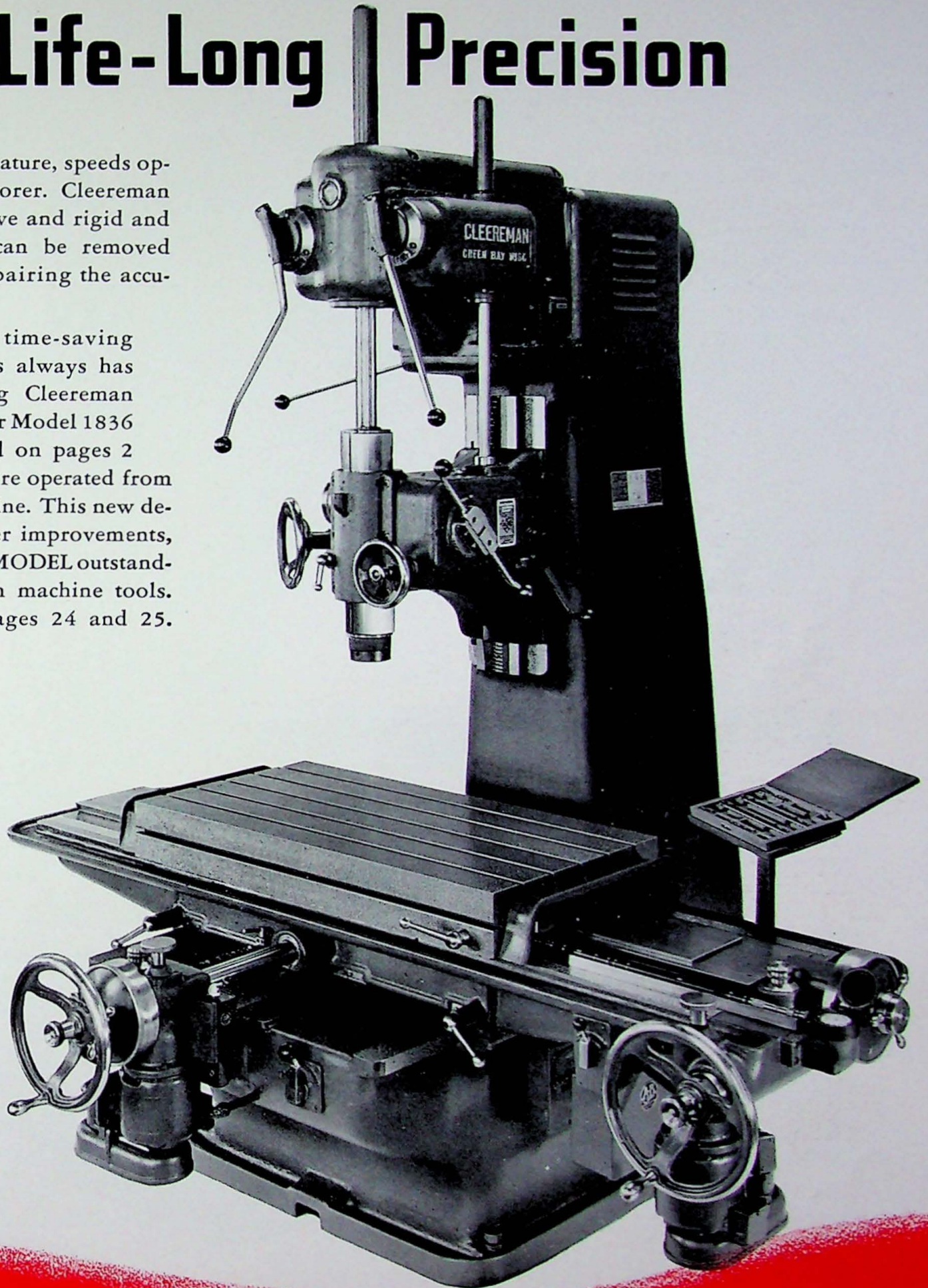
All movements and measurements of the table are made in relation to the vertical axis of the spindle. A part, once located, can be moved any required distance and a hole bored, without either previous layout or the use of tools or measuring devices other than those built into the jig borer.

An outstanding feature of Cleereman Jig Borers is **ONE LEVER CONTROL**. Forward, reverse, brake, and stop of the spindle are controlled by one lever. Single binder levers hold the spindle head, table, and saddle. Cleereman Jig Borers have a wide range of speeds and feeds, each obtainable with a single lever. The friction feed clutch is operated by either of two levers, which are also used for quick hand traverse. Fine feed is obtained by a handwheel. Feed reverse,

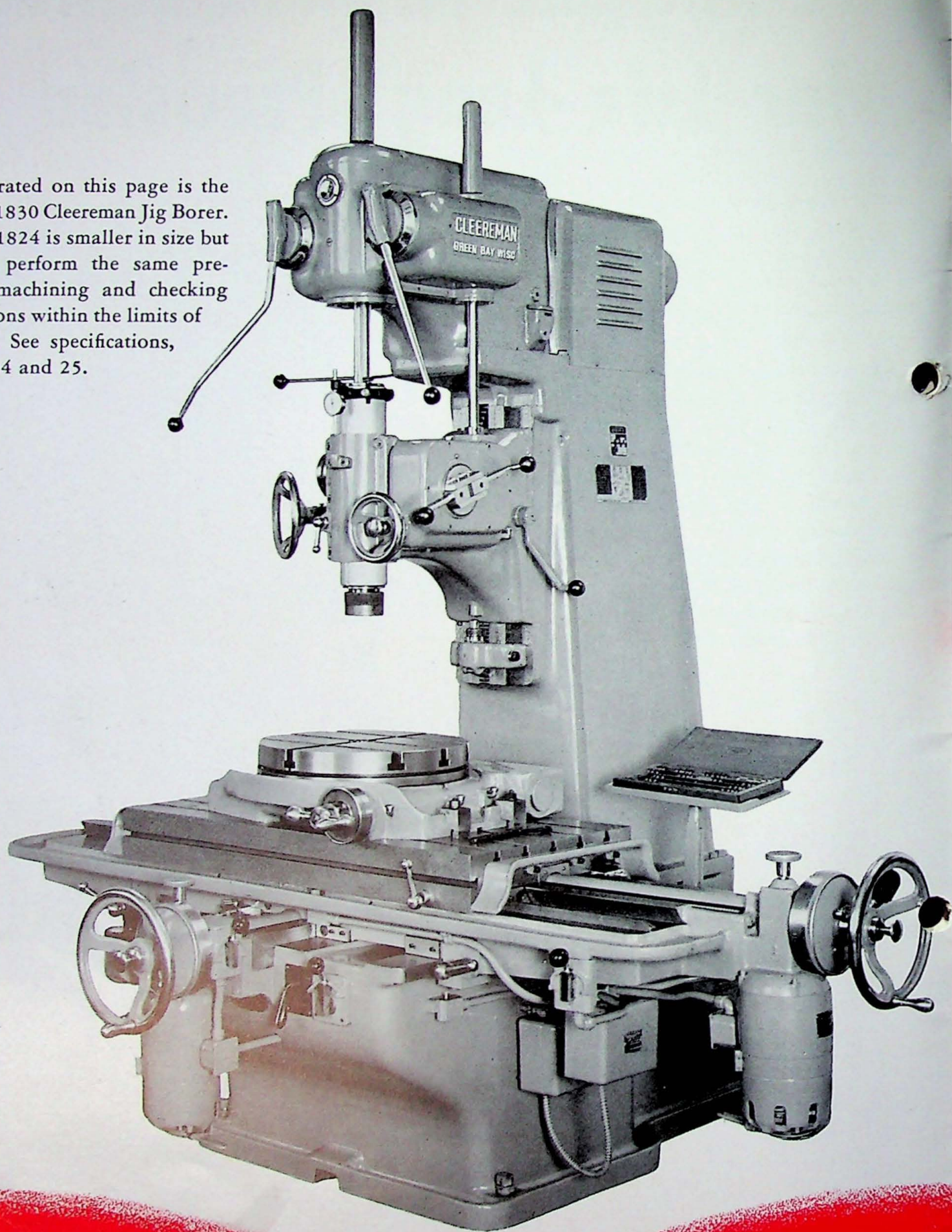
Are Engineered and Constructed for Life-Long Precision

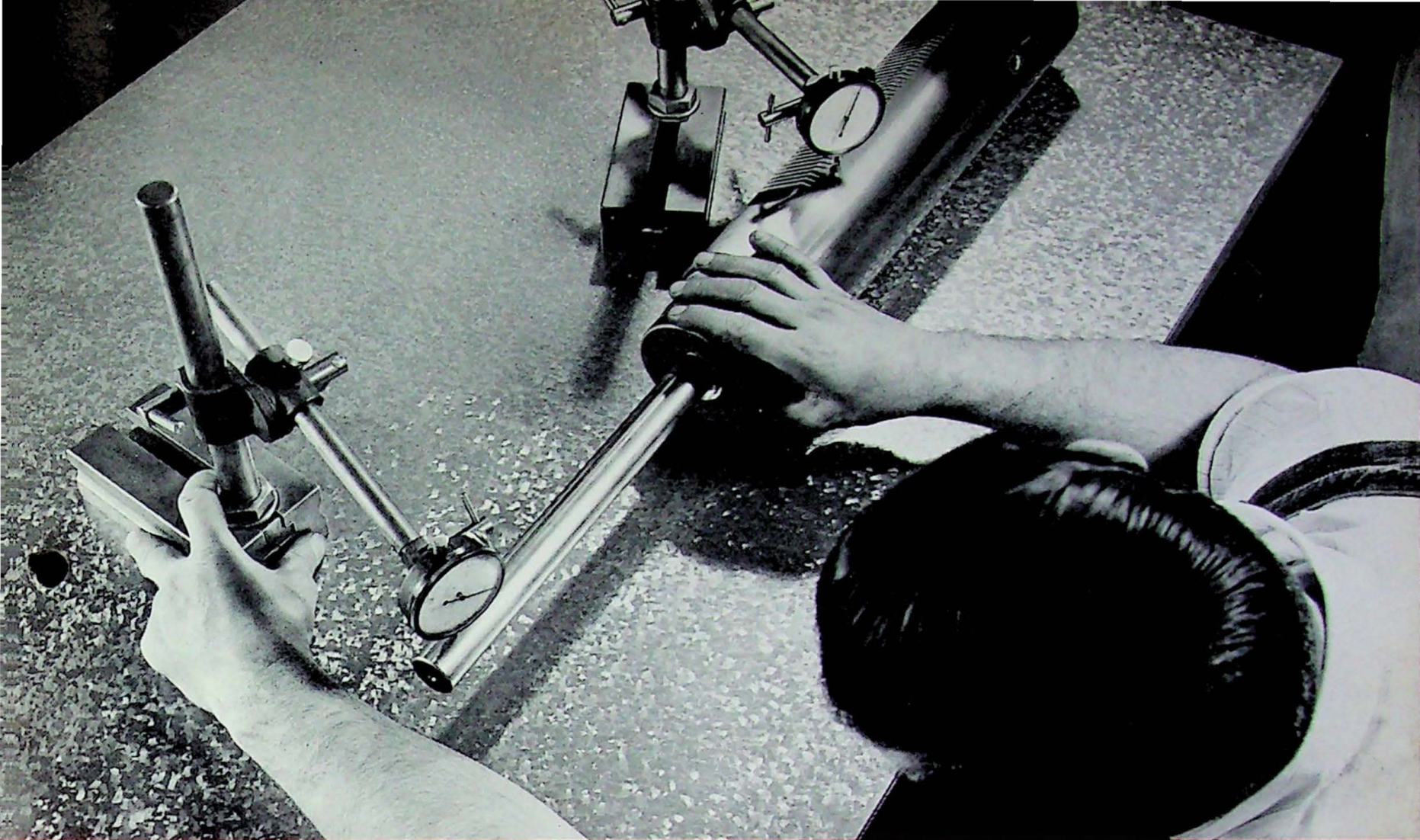
another Cleereman feature, speeds operation of the jig borer. Cleereman Jig Borers are massive and rigid and as a result, metal can be removed rapidly without impairing the accuracy of the machines.

Convenient and time-saving grouping of controls always has been an outstanding Cleereman feature. On the Master Model 1836 Jig Borer (illustrated on pages 2 and 3) all controls are operated from the front of the machine. This new design, plus many other improvements, makes the MASTER MODEL outstanding among precision machine tools. See specifications, pages 24 and 25.



Illustrated on this page is the Model 1830 Cleereman Jig Borer. Model 1824 is smaller in size but it will perform the same precision machining and checking operations within the limits of its size. See specifications, pages 24 and 25.



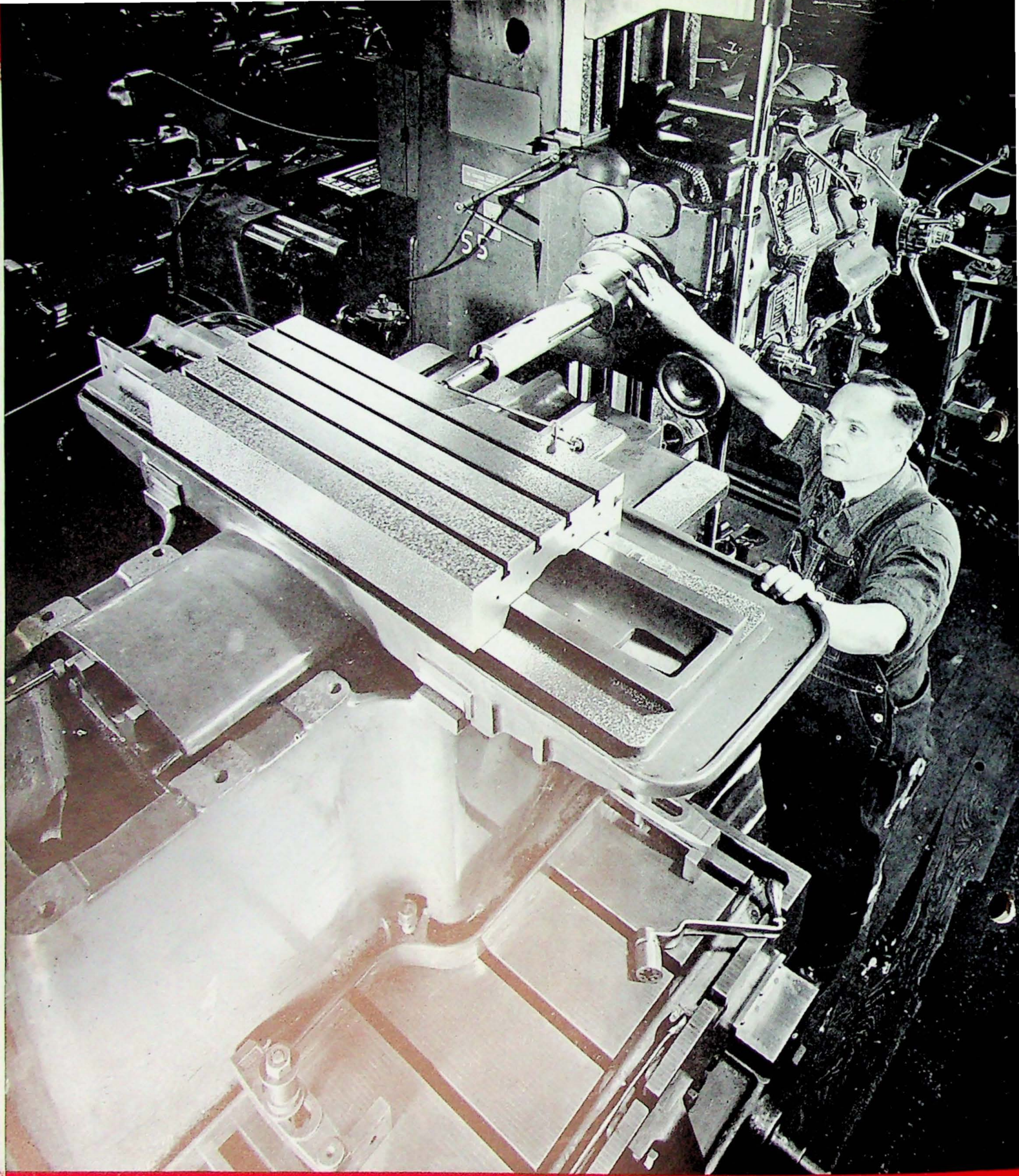


Precision-A Cleereman Tradition

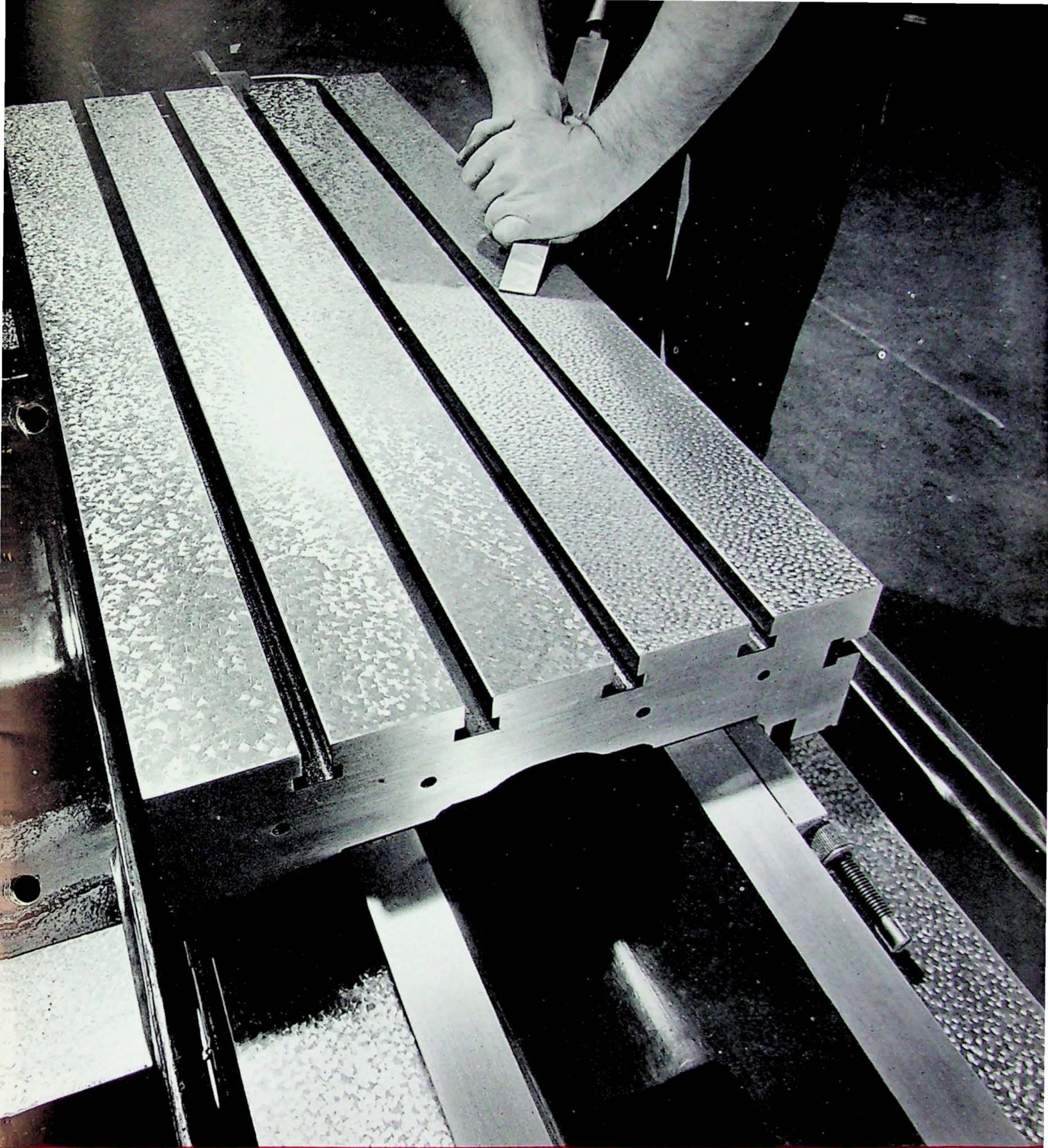
Every machining operation and every inspection at the Cleereman plant is pointed toward the ultimate precision of the finished machine. The illustration shown above is an example of the extreme measures taken to assure unvarying precision. The hardened spindle is assembled in a nitrided quill and is precision ground while running in its own ultra-precision bearings. The quill is also ground on its outside diameter when running on its own bearings. The assembly is then checked on a precision surface plate to locate points of eccentricity or taper in the quill and to be sure that the axis of rotation of the spindle is exactly in the center of the quill. Final correc-

tion is made by hand lapping the hardened outside surface of the quill. This is the kind of precision that has made the Cleereman Jig Borer possible.

The tradition of precision at the Cleereman plant has been a primary guiding force since 1908. A large percentage of Cleereman craftsmen have been with the company for many years. They are men who are thoroughly indoctrinated with the methods and necessity for extreme accuracy. New craftsmen, who come to work at Cleereman, are thoroughly schooled in precision methods and quality of product. Precision at Cleereman is a tradition—the guide for each work day.



The Precision turn assembly is used to form curved surfaces for final milling, boring, drilling, and tapping operations.



Clearman Jig Borer tables are hand scraped for uniform bearing and extreme accuracy of alignment. This Meehanite casting resists wear and abrasion, resulting in extra long life of the precision surfaces.

Precision Built for Precision Work

All the important castings on Cleere-man Jig Borers—base, saddle, table, column, and spindle head—are made of Meehanite. These castings are close grained, have great strength, high resistance to abrasion and wear, and are extremely stable. All castings are first rough machined, then normalized to relieve casting and machining strains, and finally finish machined.

BASE—The base of the Cleere-man Jig Borer is a heavily ribbed, rigid box section, containing a cast-in coolant sump. It is provided with five leveling screws for accurately leveling the machine and maintaining alignment of the column.

Ways for the saddle are broad and flat, and are fitted with wipers. The guide in the center of the base is very long in proportion to its width. Four flat ways guard against possible deflection of the saddle and table.

SADDLE—The saddle is a deep section casting, especially ribbed to reduce deflection when heavy work is placed near the ends of the table. The ways for the table are long, supporting the table for its full travel. The center guide bearing is extra long to in-

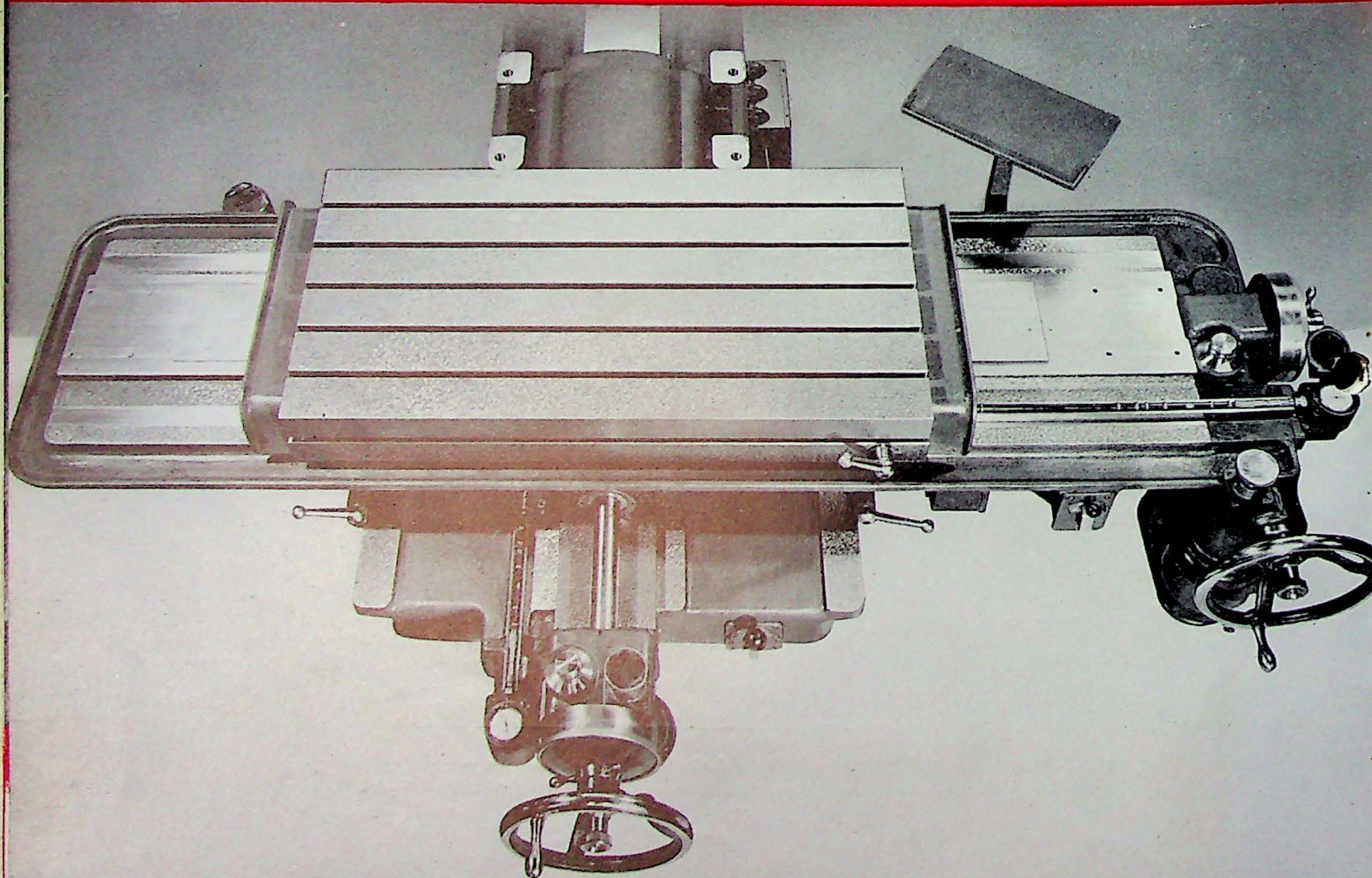
sure the long precision of the right angle machine movements. The saddle is provided with an adjustable gib.

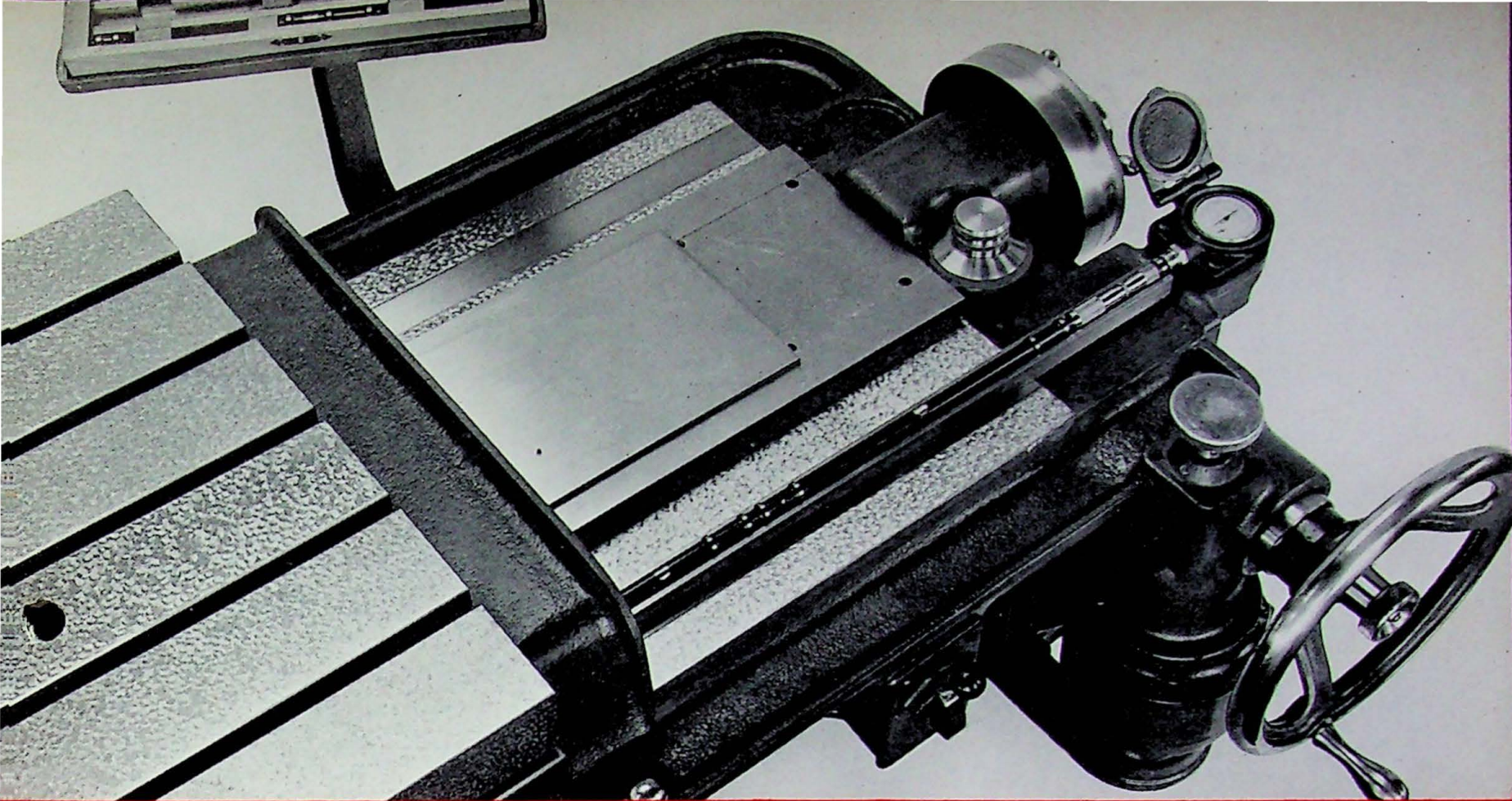
The Cleere-man table is extra deep to prevent any tendency to distort when clamping work. It is accurately guided on the carriage by a long and narrow dovetail guide. After the table surface and front face have been scraped, the tee-slots are finished to precision alignment.

COLUMN—The column is a heavy box section casting, well ribbed, and accurately mounted with locating dowels on scraped pads on the rear of the base. Broad flat ways, a narrow guide, and an adjustable taper gib are provided for the sliding spindle head. A rack and pinion, set in the center of the guide, permit vertical adjustment of the head. The top of the column provides a mounting for the transmission head, with an extension to the rear of the transmission case for mounting the motor. The counter-balance for the spindle head and quill is contained within the column and is accessible through a covered opening in the rear of the column.

POWER-RAPID TRAVERSE—On Cleere-man machines, power rapid traverse is accomplished by

Base assembly of the Master Model 1836 Cleere-man Jig Borer. All controls are at the front.





Right hand end of the Master Model 1836 Jig Borer table showing convenient location of controls and dials.

means of built-in vertical motors which drive the lead screws through worm gearing. Positive braking is attained by electrical plugging switches driven by the motors. This design eliminates shock caused by the action of mechanical braking; and, the fine-feed handwheel remains free for final adjustment.

Selective engagement of either hand traverse or power rapid traverse is provided by a clutch operated by a hand knob in the center of the hand traverse wheel.

The handwheel is disengaged and does not rotate when power rapid traverse is engaged. Finish adjustments are made by the fine-feed handwheel after using the power rapid traverse, without operating any clutches or switches. A reversing switch controls direction of travel and built-in limit switches prevent over travel.

On Cleereman machines equipped with end measuring rods, a limit switch is built into the dial indicator housing to stop the rapid traverse motor before contact between the measuring rods and the plunger of the dial indicator.

A great advantage of this system is the pre-setting for hole location; that is, while one hole is being bored, the gage rods may be reset for the next hole location, thereby saving the operator's time. Final adjustment is made by the fine-feed handwheel. All settings can be made by this method without shifting a clutch or using the regular hand traverse. These Cleereman features lower operator fatigue and reduce set-up time to the minimum.

MEASURING EQUIPMENT—Cleereman Jig Borers may be equipped with either, or both, of two types of measuring instruments in common use: precision lead screws; or, end measuring rods.

PRECISION LEAD SCREWS—Machines equipped with precision lead screws have hardened and ground tool steel screws, guaranteed to be accurate within 0.0001" in any one inch and within 0.001" in any 24". These screws operate in long Meehanite nuts for easy movement. They are mounted in a pair of pre-loaded precision ball bearings which eliminate end play and camming action. A bearing at the free end of the screw prevents sag. Screws are of large diameter to prevent impairment of accuracy under load and are adequately guarded to protect them from dirt and chips.

Readings are made on large diameter dials on which the 0.001" graduations are 0.100" apart. Verniers permit measurements to 0.0001", and fine-feed handwheels are provided to make final adjustments. Scales with adjustable pointers are fitted in the ways to facilitate quick checks on measurements on the Model 1830 Jig Borer. Rotary graduated dials replace the scales on the Master Model 1836.

Suitable brackets and troughs, adjustable rod stops, dial indicators graduated to 0.0001", inside micrometers reading to 0.0001", and gage rods are included with jig borers equipped with the end measuring system. Rods are furnished in 1", 2", 3", 6", and 12" lengths for each direction of table travel, which permit setting the table within 0.0001" in either direction.

The Cleereman Transmission

Spindle speeds in a variety of ranges are available on the Cleereman Jig Borer. With a single speed motor, there are 12 speed changes available in either of two ranges. A two-speed motor, available at only slightly higher cost, doubles the number and range of speeds. The 24 speed changes are also available in either of two ranges. Nine feed changes in several ranges are suitable for any jig boring work or manufacturing operation. See specification for speeds and feeds, pages 24 and 25.

Sliding gears are employed in the spindle drive so that only the driving gears are in mesh at any one time. All shafts are multi-splined and mounted on ball bearings. Drag and wear on the shifter forks are avoided by horizontal mounting of the shafts and gears. The final drive to the spindle is through precision made spiral bevel gears. The entire transmission is an integral assembly which is placed in the head as a unit.

Sliding selective type gears are used in the feed gear box. They are mounted on multi-splined shafts. The assembly is ball bearing mounted in the feed gear box which is mounted on the head as an independent unit.

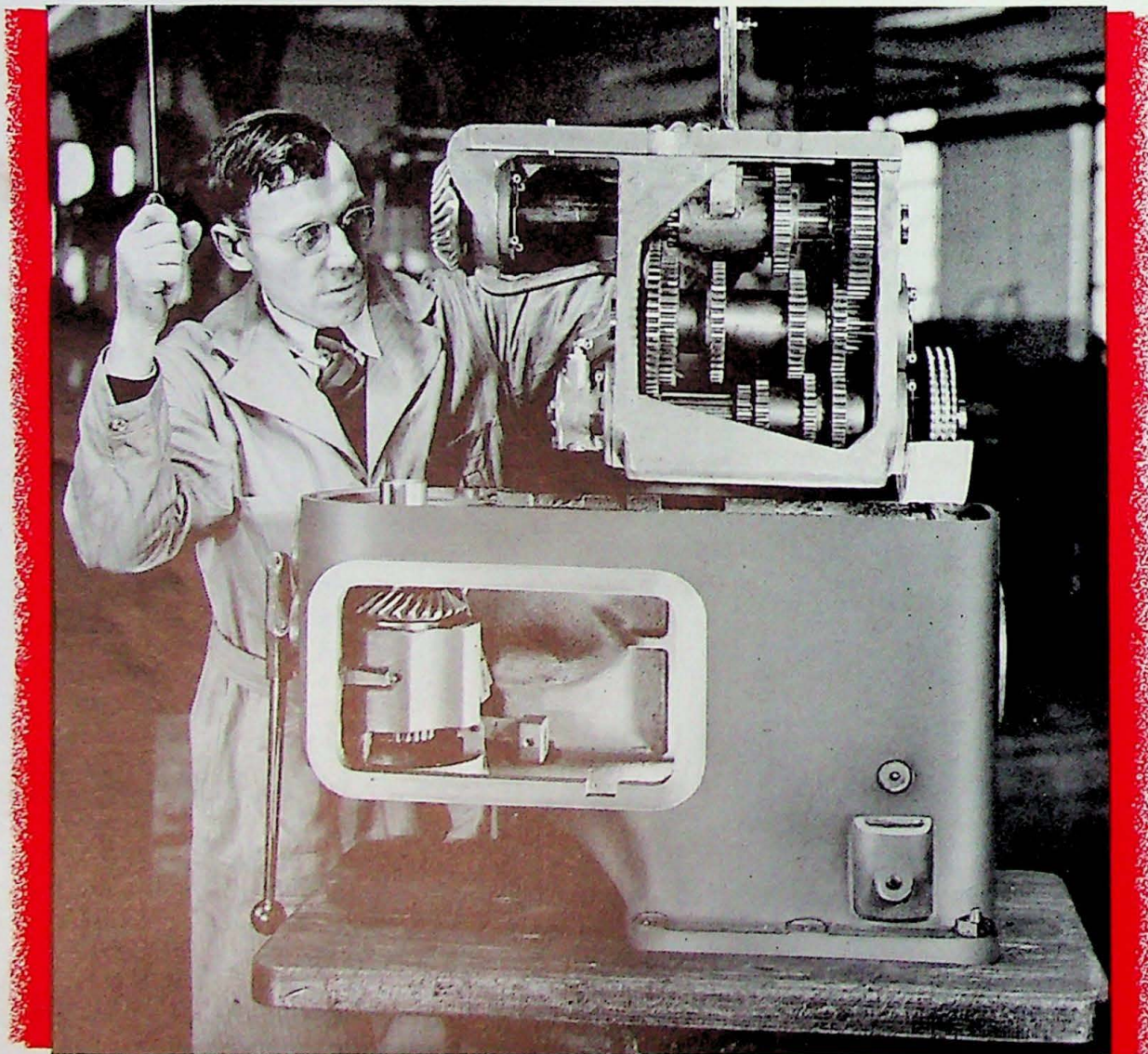
MOTOR DRIVE—A standard, open type, ball bearing motor with integral disc brake is mounted on the top of the column at the rear of the transmission head. Motor and transmission are connected by a multiple strand roller chain drive, which transmits power without slip or vibration and does not require adjustment.

A 2 H.P. constant torque, 1800/900 RPM two speed motor is recommended. This type motor provides 24 spindle speeds which may be had in either of two ranges—25 to 1000 RPM, or 37 to 1500 RPM.

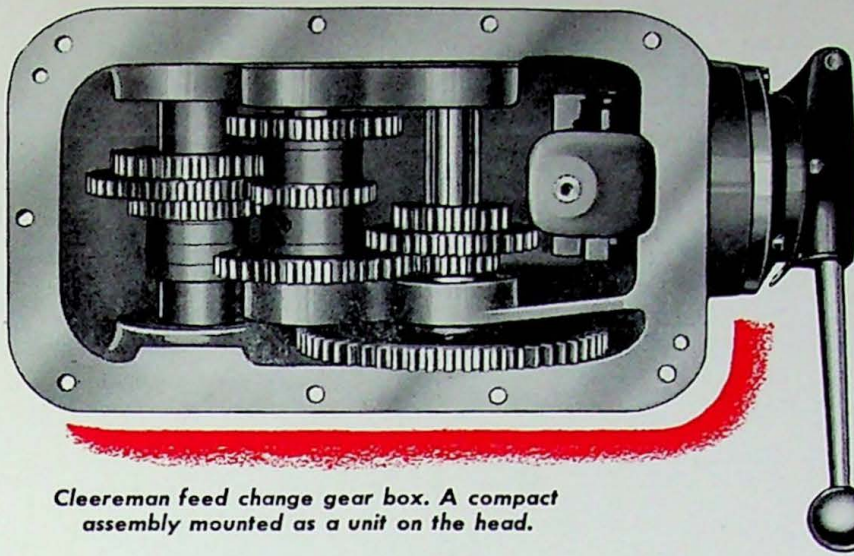
When this wide range of speed is not required a 2 H.P., 1200 RPM motor may be used to obtain 12 spindle speeds either in the range of 50 to 1000 RPM, or 75 to 1500 RPM.

Cleereman recommends a magnetic reversing starter, which provides instant reversal of the spindle, for completing tapping operations at one setting.

VIBRATIONLESS OPERATION—From motor shaft to spindle, special consideration has been given to the type of connection best suited to eliminate vibration—roller chain initial drive, cross-shaved gears, lapped spiral bevel gears, and a non-metallic spider coupling, which isolates the spindle from the



The Cleereman transmission is mounted in the head as a complete unit.



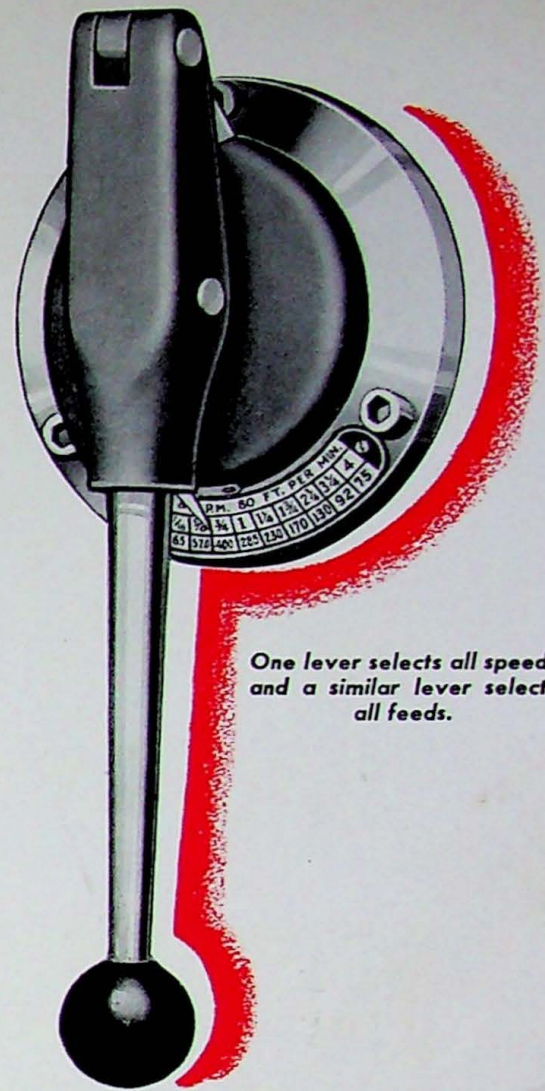
Cleereman feed change gear box. A compact assembly mounted as a unit on the head.

transmission and relieves the spindle of all driving stresses and vibration, delivering pure torque to the spindle. Each of these drives has been selected by Cleereman from the standpoints of reliability, smooth flow of power, and freedom from vibration and pulsation. They achieve smooth, silent flow of power to the spindle—an outstanding characteristic of Cleereman Precision Jig Borers.

CONTROLS—Convenient grouping of control levers and ease of operation always have been outstanding features of Cleereman Jig Borers. They reduce operator fatigue, save time, and result in increased work output.

FEED CLUTCH—Cleereman Jig Borer features of great importance are the smooth feed and the ease and speed of operation of the feed clutch. An adjustable friction clutch is used to engage the power feed, and the same turnstile levers used for hand spindle traverse are also used to engage the feed clutch. The spindle can be fed down by hand by either one of the turnstile levers until the tool practically touches the work. Thrusting outward on the lever engages the power feed. The one lever and one motion are so convenient and simple that the operator need not take his attention from the work when starting a cut.

This Cleereman construction is particularly important when boring small holes. It saves time and prevents snapping fine tools, which is a problem with other types of clutches.

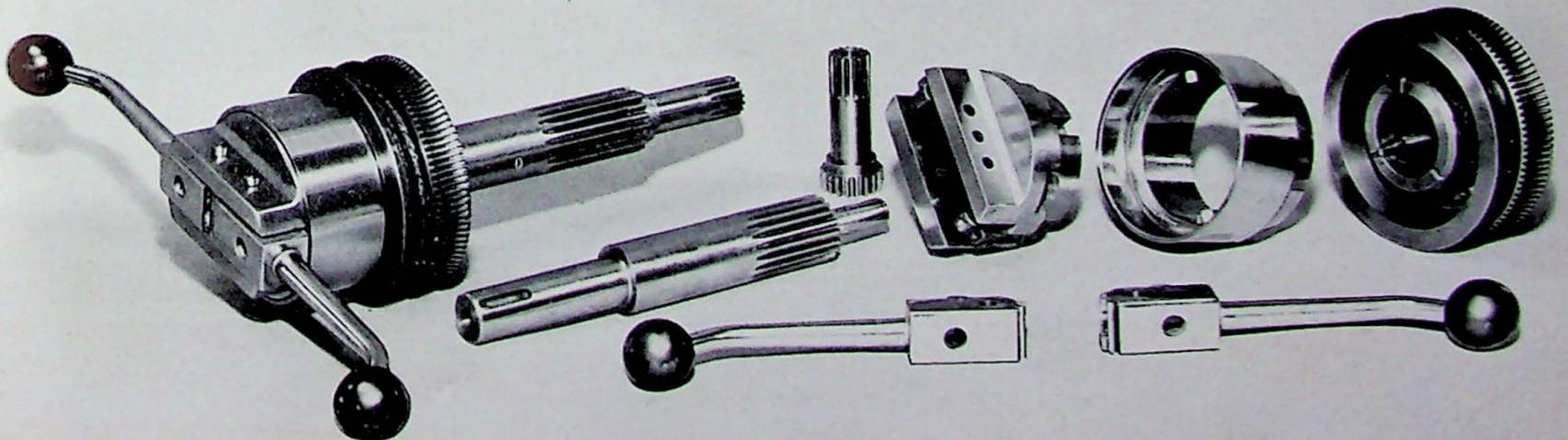


One lever selects all speeds and a similar lever selects all feeds.

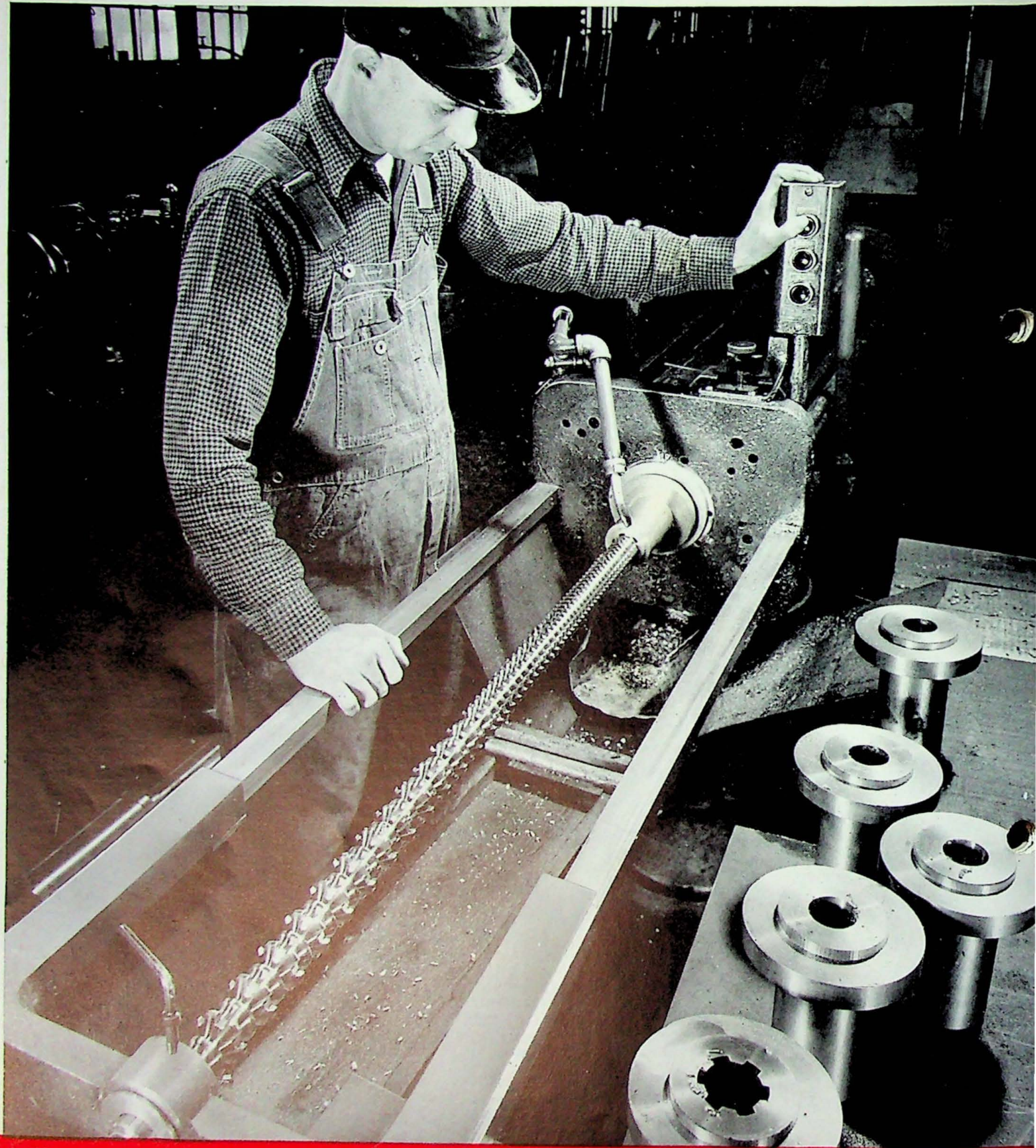
Feed reverse, incorporated in the power feed, is operated by a push-pull knob in the center of the fine-feed handwheel. When the knob is pulled outward the mechanism is set for downfeed; when pushed inward, the mechanism is set for up-feed. A middle or neutral position is provided to disconnect the power feed for hand feeding operation.

The power feed, at both the lower and upper limits of spindle travel, is disengaged by safety trip dogs which are built into the feed depth gage. This gage may also be set to disengage the power feed at any predetermined depth up to the full travel of the spindle.

Friction feed clutch and quick traverse unit.



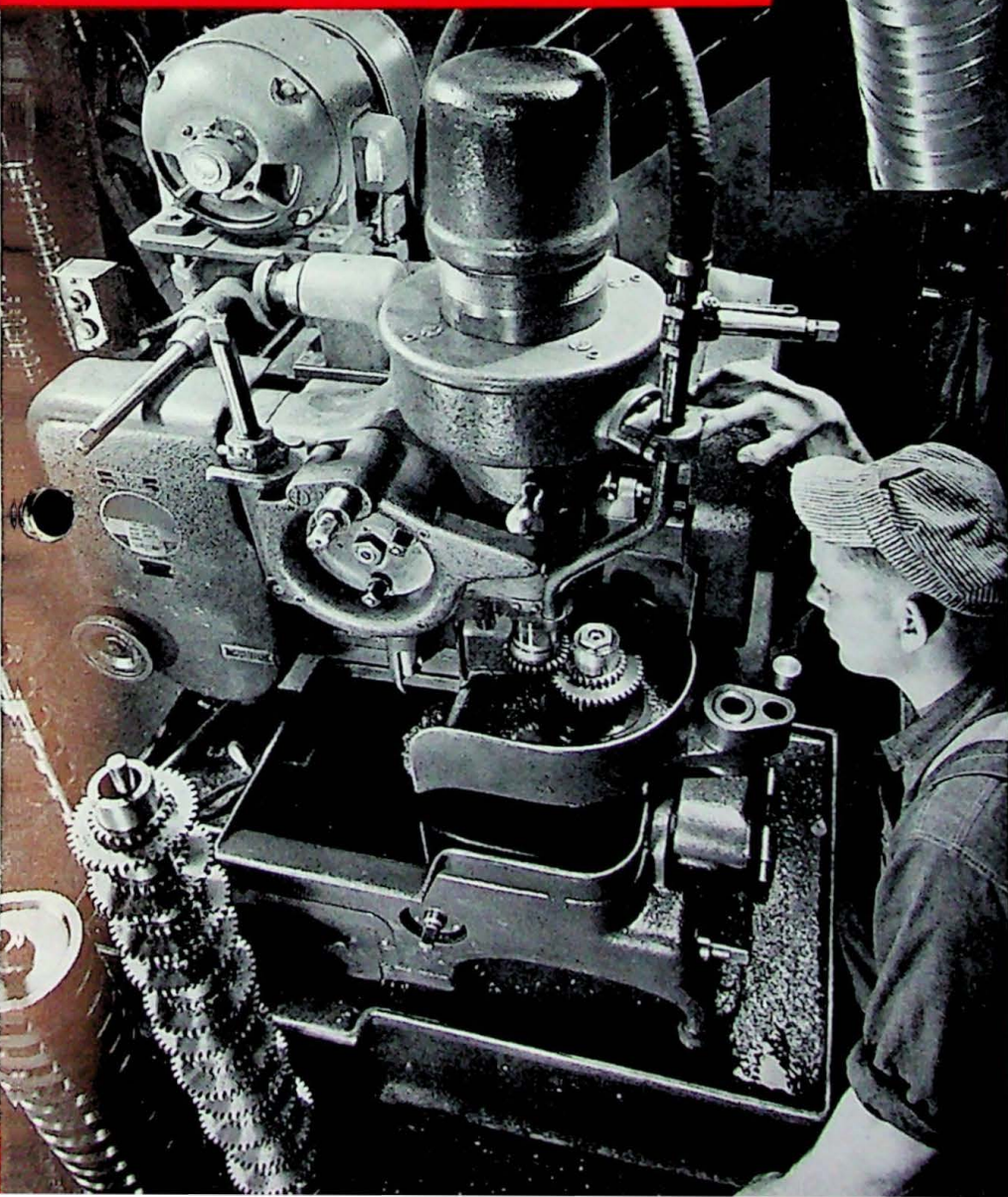
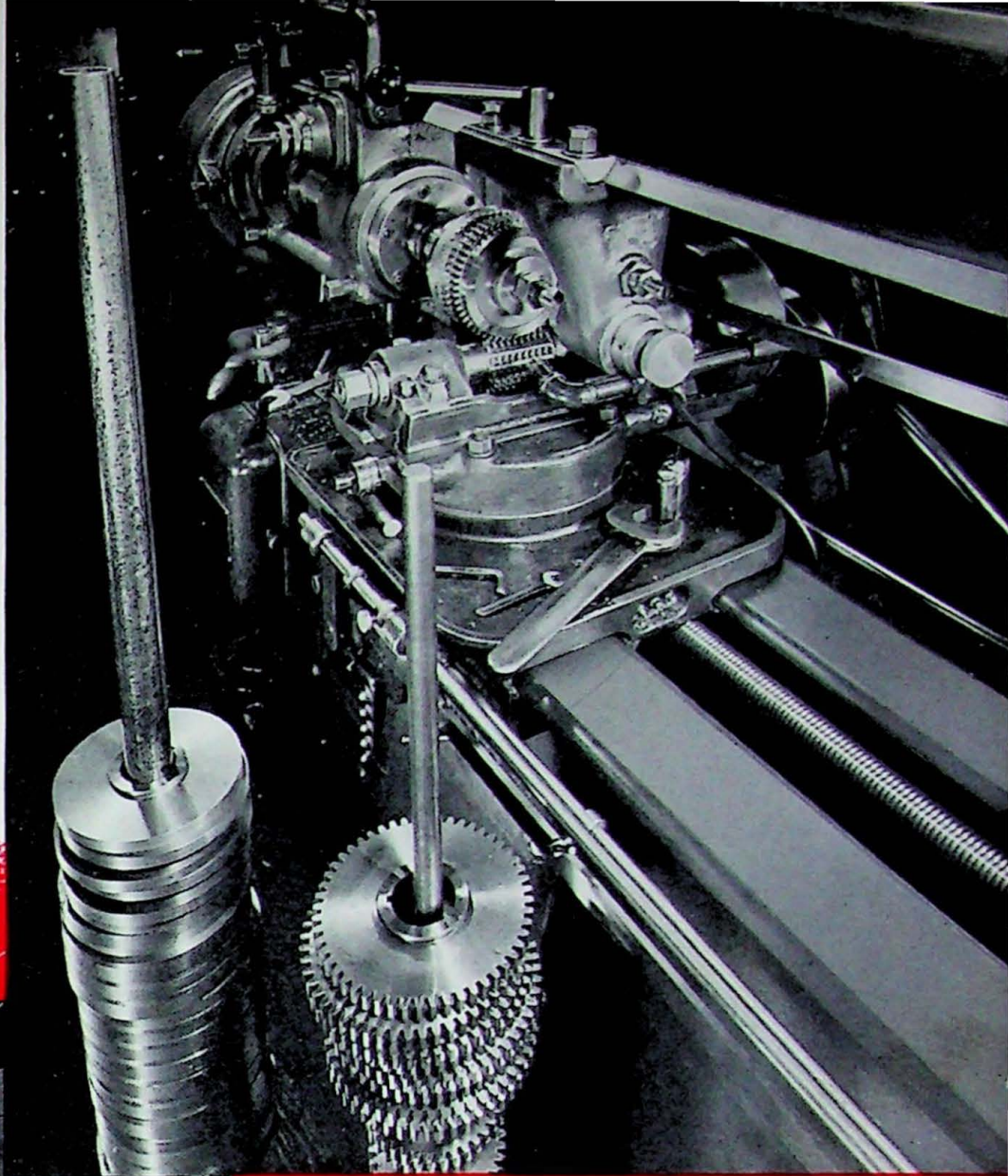
Cleereman Precision Gears *for*



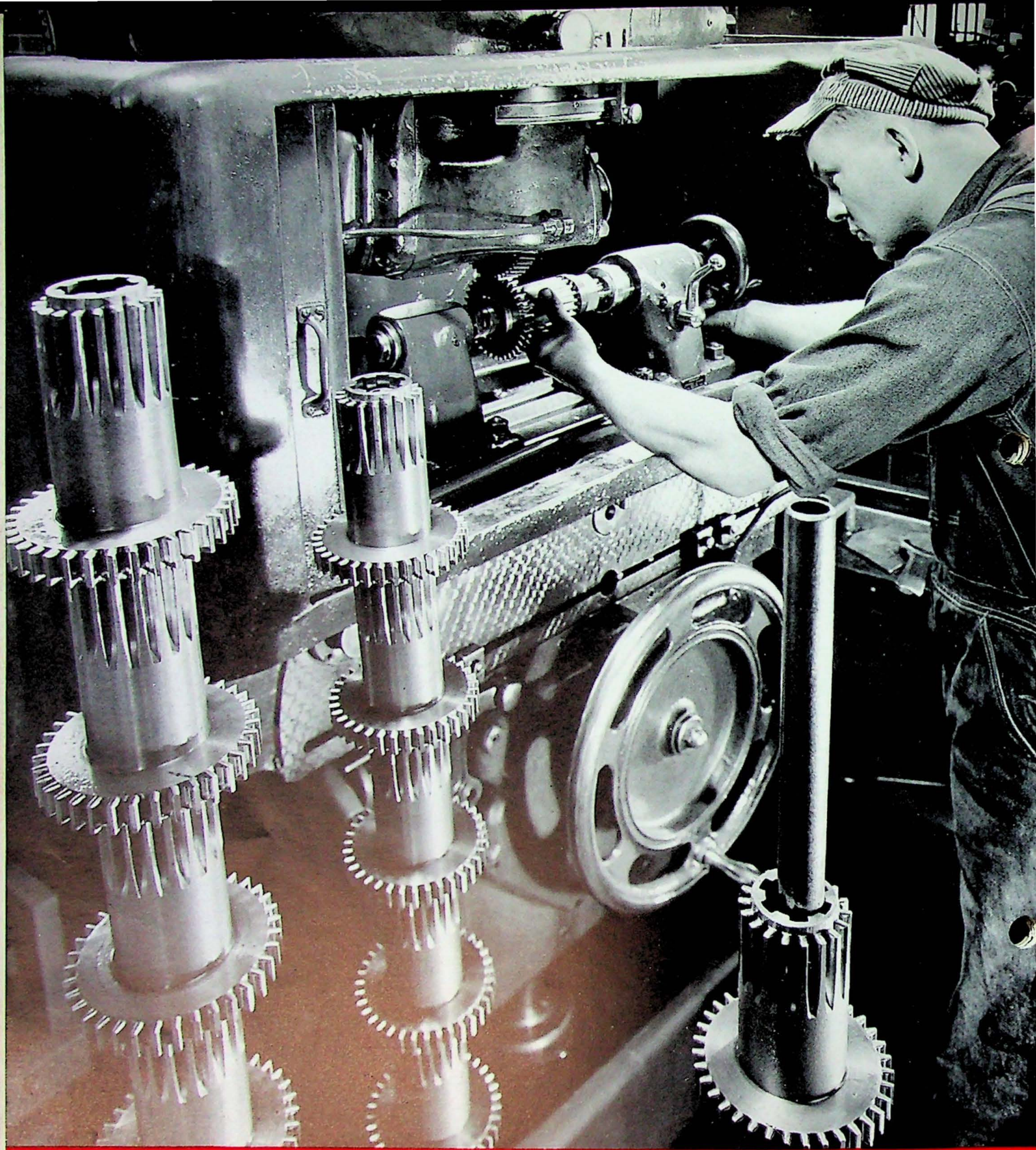
Broaching splined holes in gear blanks. All finishing operations—turning, hobbing, cross shaving, etc.—are carried out from these accurately broached holes.

Precision Operation

*Most Cleere-man gears are generated
on modern gear hobbing machines.*

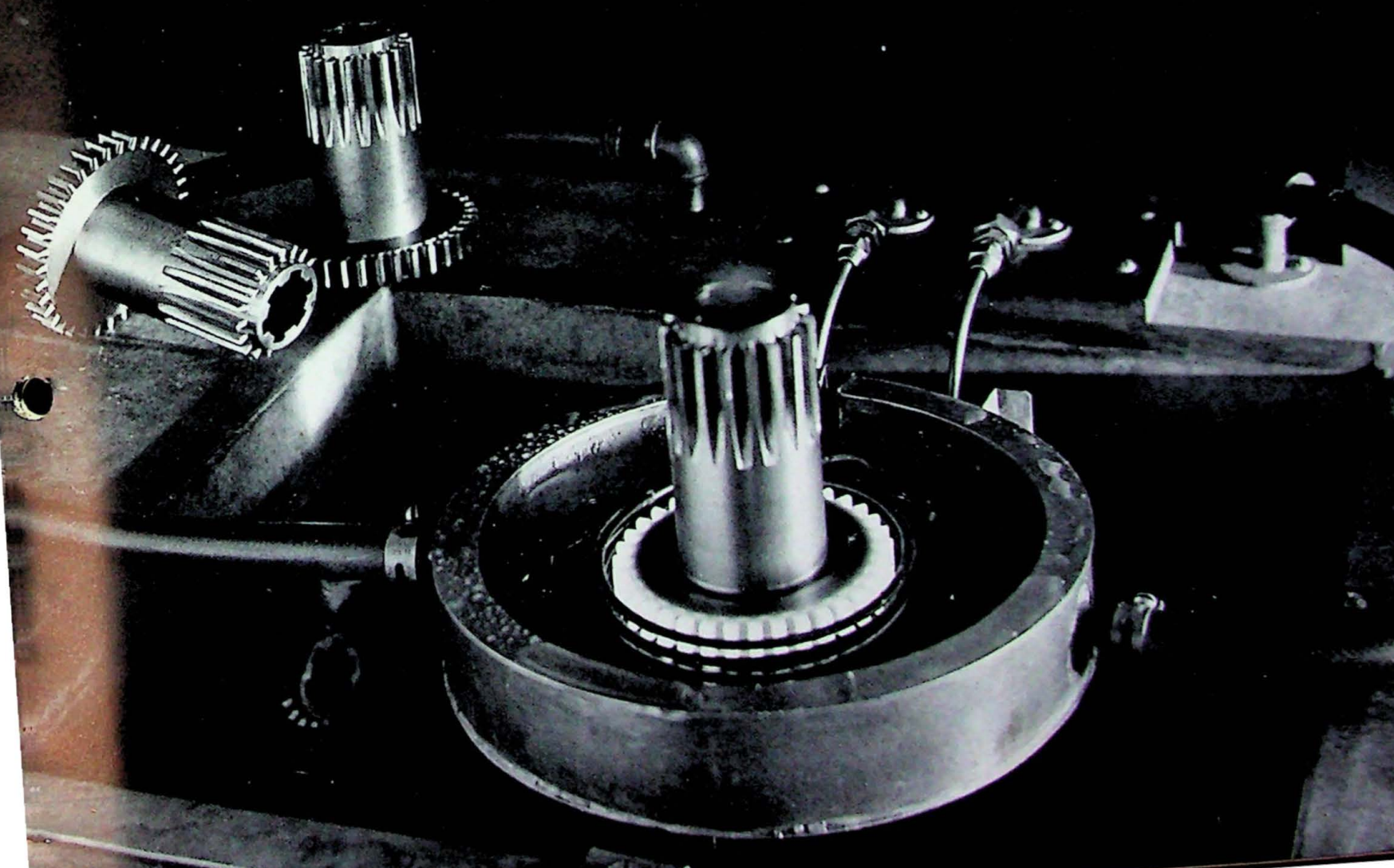
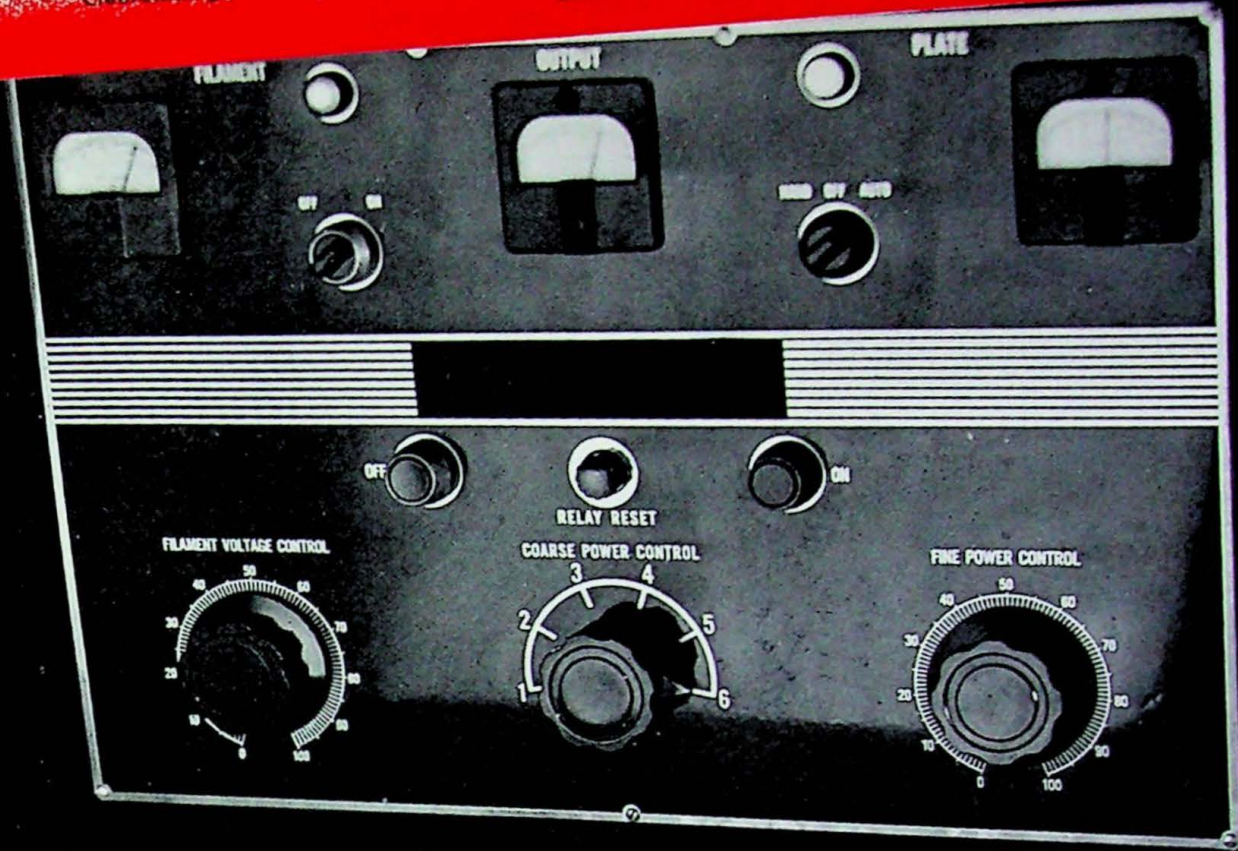


*Cleere-man gears which cannot be
hobbed are generated on modern
gear shapers.*



Cross shaving Clearman gears which must be consistently accurate for tooth thickness, spacing, and concentricity.

Clasprom gears are induction hardened, assuring even surface hardness of teeth, strong case section and minimum distortion.



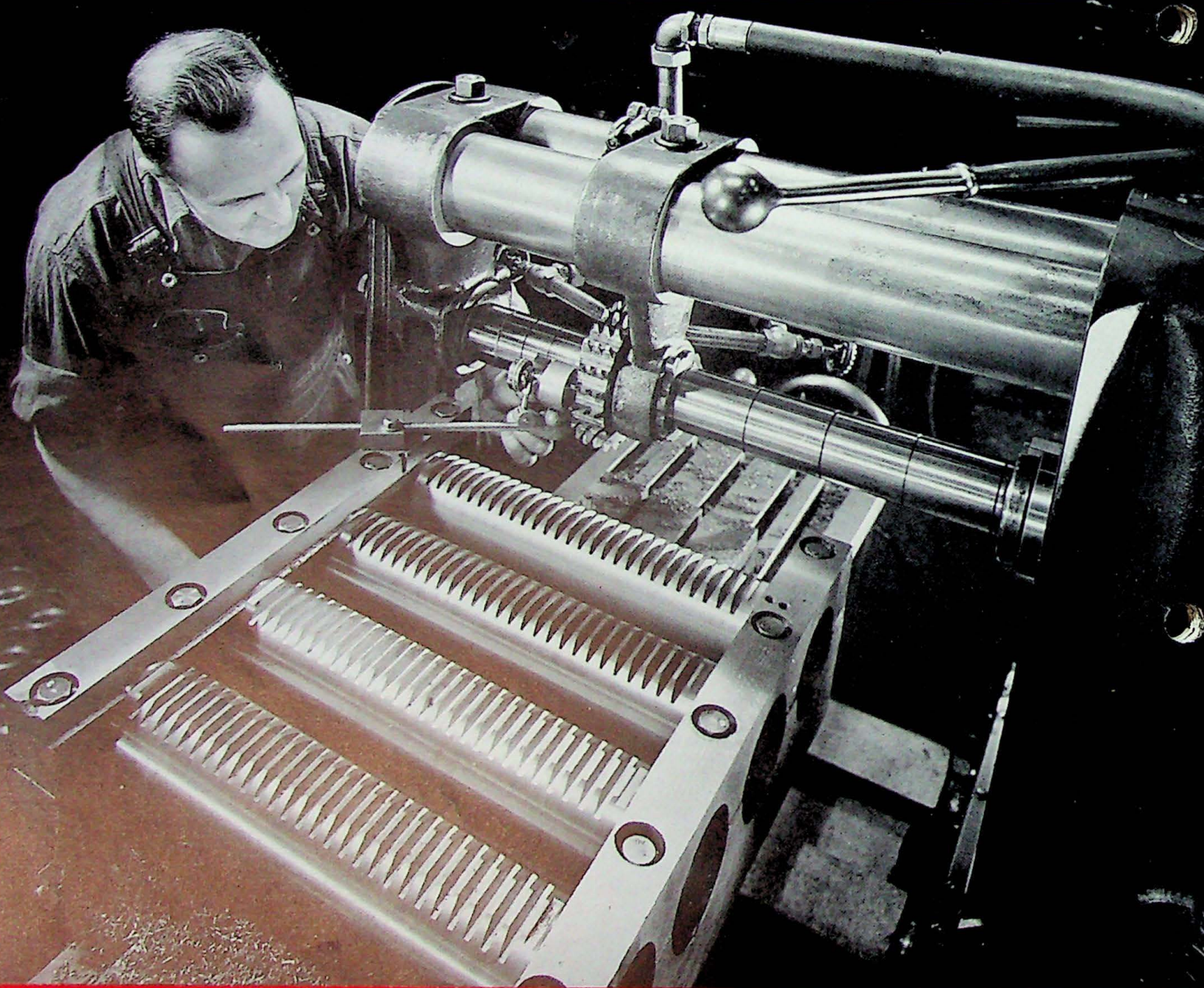
Cleereman Spindle Head,

SPINDLE CONTROL—Mounted on the front of the base of the Cleereman Jig Borer is a single lever which controls direction of rotation of the spindle. This lever operates a built-in electrical switch which controls a reversing type motor. A flip of the lever to the left runs the spindle in the forward direction, and movement to the right reverses the direction of rotation. The middle or neutral position stops the spindle instantly with the brake set. A light pressure inward on the same lever releases the brake for hand rotation of the spindle.

SPINDLE HEAD—Exceptional rigidity is obtained in the Cleereman spindle head because of its double

box section construction, and by the thorough manner in which it is fitted to the dovetail ways of the column. Accurate vertical alignment at any setting of the spindle head is assured by long, narrow guides and broad, flat bearing surfaces.

The spindle head contains the feed worm, worm gear, feed reverse, quill, and the feed depth gage. The feed worm and gear are in constant mesh, are totally enclosed within the spindle head, and operate in a bath of oil. The depth gage, mounted on the left side of the spindle head, carries a scale graduated in sixteenths. This scale is useful as a quick check on depth boring.



Milling teeth in Cleereman quills. Spacing is accurately checked by means of gage block and dial indicator.

Spindle and Quill . . .

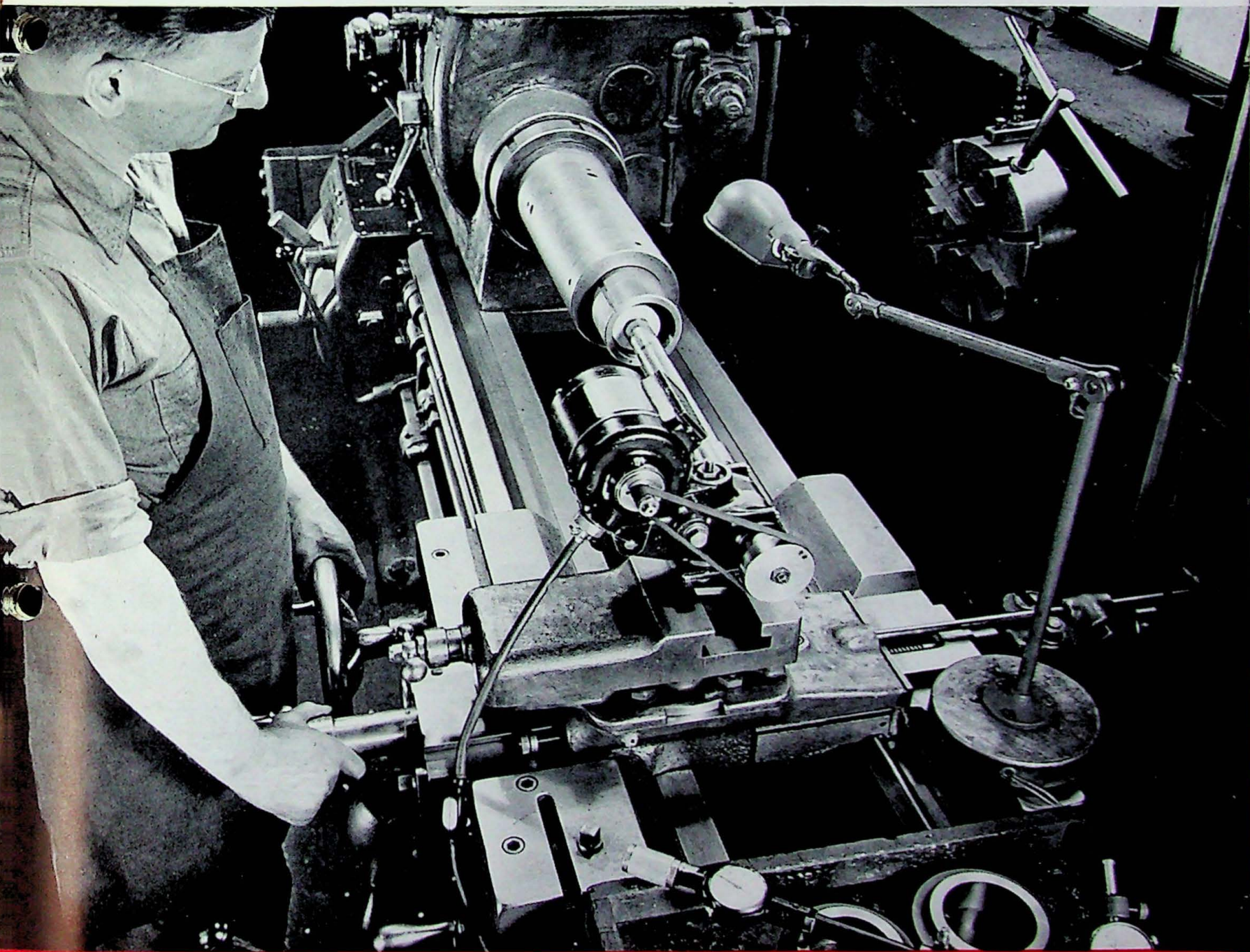
The head is carefully counterbalanced, and is moved vertically on the column by a rack and pinion operated by a handwheel located at the front of the spindle head. A single binder lever clamps the head positively and accurately to the column without disturbing the relationship of the spindle with the work.

A binder clamp tightens the quill in the spindle head for light milling operation. This binder consists of a formed plug which can be locked against the quill in such a manner that it does not affect the precise fit of the quill bearing in the spindle head.

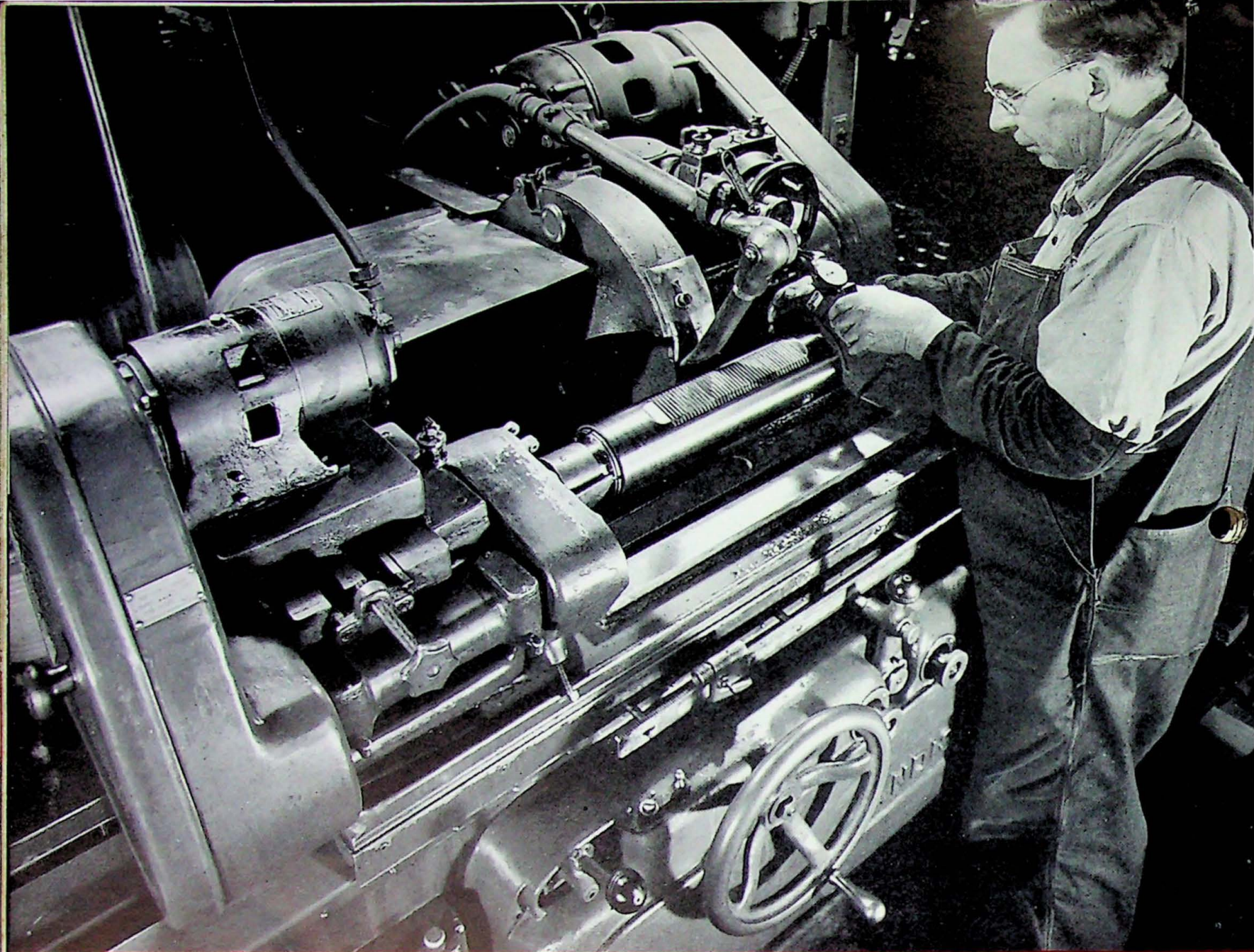
QUILL BEARING—The quill bearing in the sliding head is fitted with a bearing cap to permit adjust-

ment. The flat surfaces of the flanges on the cap are first scraped to a fit on the spindle head. The bearing for the quill is then honed to size, and finally scraped to a full bearing.

SPINDLE and QUILL—Every detail of the spindle and quill on the Cleeregan Jig Borer has received special engineering and construction consideration. The quill is a nitralloy forging which, after heat treating and nitriding, has an extremely hard and long wearing surface. This steel in contact with the Meehanite bearing surface of the spindle head shows no measurable amount of wear after years of service. The scraped spindle head bearing is 12" long. This



The Cleeregan quill is held in a fixture to grind both bearings in one setting. This method assures both bearings being concentric about the same axis. Dial bore gages, reading to 0.0001, are used to make all measurements.



Clearman quills are finish ground on their own bearings, which assures the outside surface being true and parallel with the spindle axis.

bearing is exceptionally long in proportion to the diameter of the quill. The rack teeth are cut integral in the quill and wholly within its circumference. The spindle quill is permanently lubricated and requires no oil or grease throughout its entire life. An oil-slinging bushing is incorporated in the spindle quill upper bearing closure to prevent oil from running down the splined shaft and diluting the grease in the upper spindle bearing.

SPINDLE VIBRATION ELIMINATED—The spindle is an alloy steel forging, carburized, hardened, and ground. It is mounted in the quill in a pair of preloaded, super-precision ball bearings spaced widely apart at the lower end, and in the same type

of bearings mounted back to back at the upper end.

The spindle, extending upward only as far as the top of the quill, is short and rigid. The six-splined driving shaft, mounted in its own precision ball bearing, is connected to the spindle through a special flexible coupling. This coupling completely isolates the spindle from the transmission, eliminating all possible vibration from the spindle drive. It is totally enclosed in the quill and is grease lubricated for long life.

The quill and the spindle nose taper are rough ground before assembly. The assembled spindle and quill are then mounted in a special fixture on an internal grinder, where the spindle nose taper is finish

ground. In this manner, the socket is finished with the spindle running in its own bearings, with concentricity held to less than 0.0001".

The assembled quill and spindle is finally mounted between centers on a cylindrical grinder and the diameter of the quill is finish ground on its own bearings.

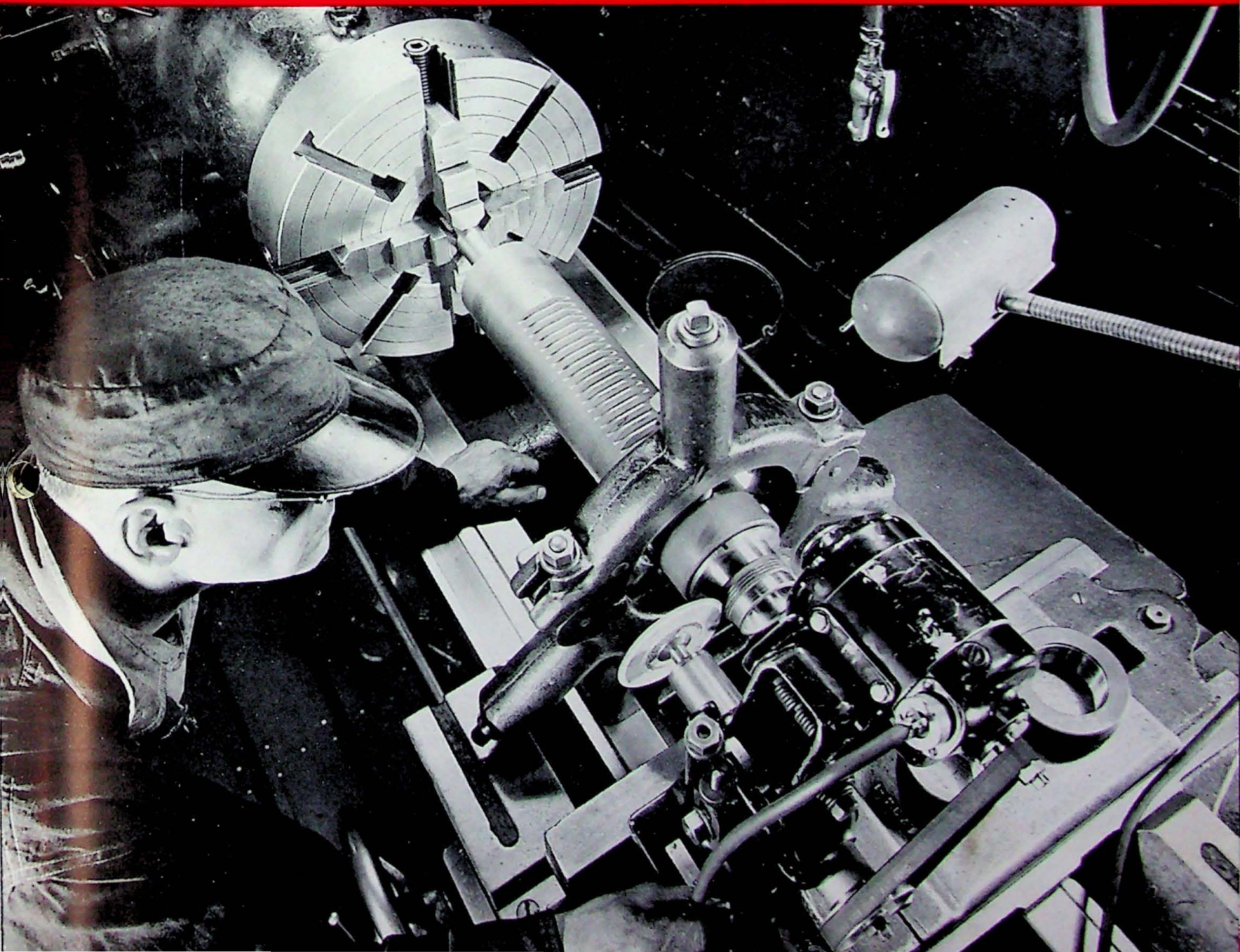
The spindle bearings are entirely sealed against entry of dirt or moisture, and are lubricated for life.

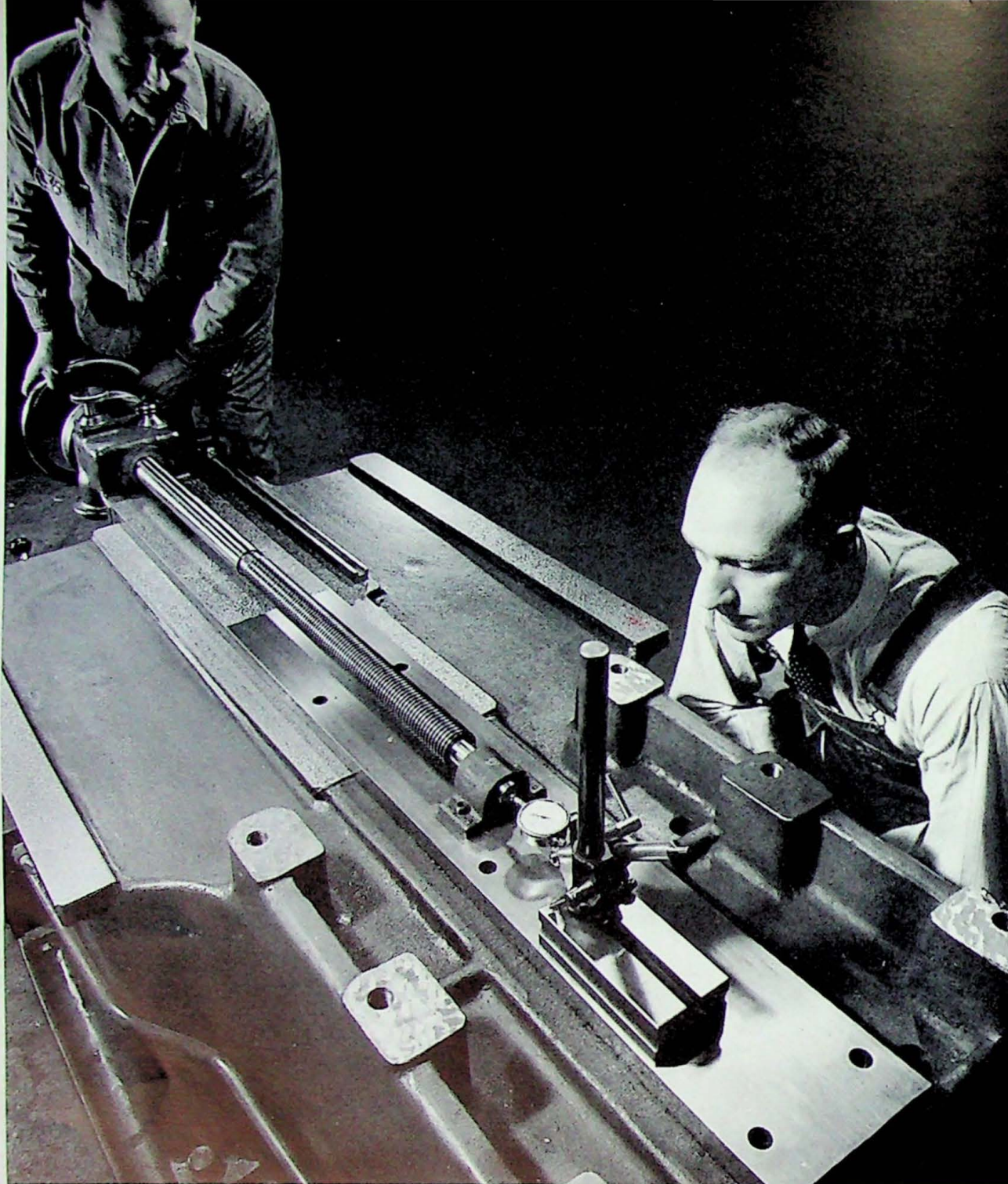
HARDENED LOCKING NUT—The collet is retained and closed in the Cleereman Jig Borer by a hardened locking nut, which has a ground pilot and seat to insure closing the collet the same at each setting. A hardened tool steel tang insert is protection against damage to the spindle and wear of the slot.

LUBRICATION

Insofar as possible, all units of the Cleereman Jig Borer are lubricated from central reservoirs. The transmission head reservoir has an approximate capacity of five quarts. A pump lifts the oil to the top of the head and distributes it by means of tubes throughout the entire gear box, the oil cascading over the gears and bearings. A pressure gage mounted on the front of the head, indicates oil pressure and shows at a glance that the transmission is receiving proper lubrication. The feed worm runs in a bath of oil. A one-shot system fitted to the table saddle assures simultaneous oiling of all ways and bearings on the saddle and base.

The outside of the spindle nose and the thread are finish ground true with the bearings in the quill on which the spindle will run.

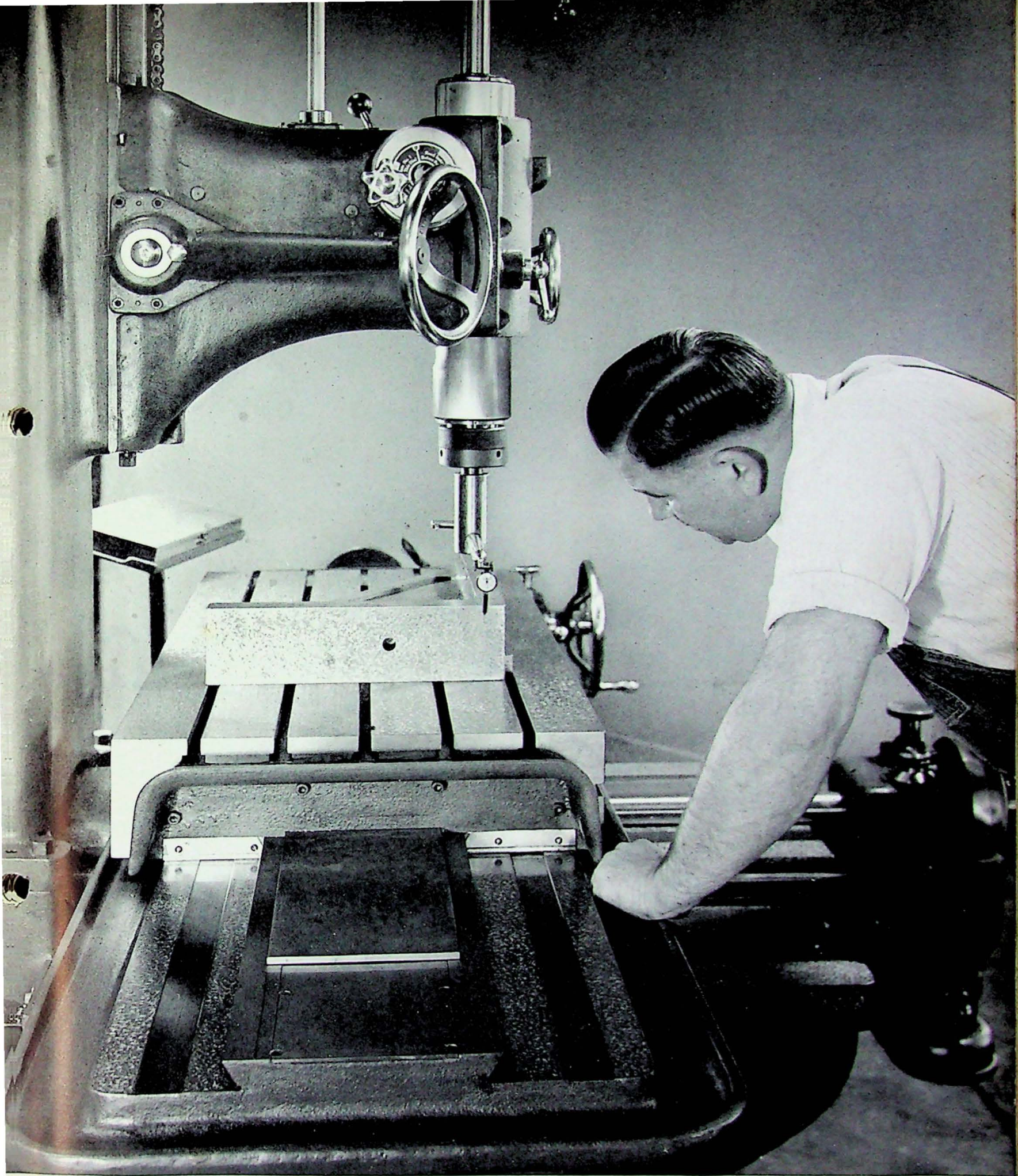




Cleereman Inspection

From the first machining operation on each jig borer part through to the final inspection of a finished machine, Cleereman inspectors make check after check using the finest of precision measuring instruments. Cleereman Jig

Borers are precision machines throughout—machines that are designed and constructed to produce jigs, fixtures, tools, dies, gages, and parts to the highest degree of sustained accuracy.



A Cleereman inspector checking the alignments of a finished jig borer.

Accessories for the Cleereman Jig Borer

1. ADJUSTABLE BORING HEADS

$\frac{3}{8}$ " Capacity— $\frac{1}{4}$ " maximum offset, graduated to 0.001", with No. 2 Morse taper shank. Weight 2 lbs.

$\frac{3}{4}$ " Capacity—1" maximum offset, graduated to 0.001", with threaded adaptor to fit spindle nose. Weight 11 lbs.

1" Capacity—2" offset, graduated to 0.001", with threaded adaptor to fit spindle nose. Weight 18 lbs.

2. PRECISION UNIVERSAL BORING HEAD

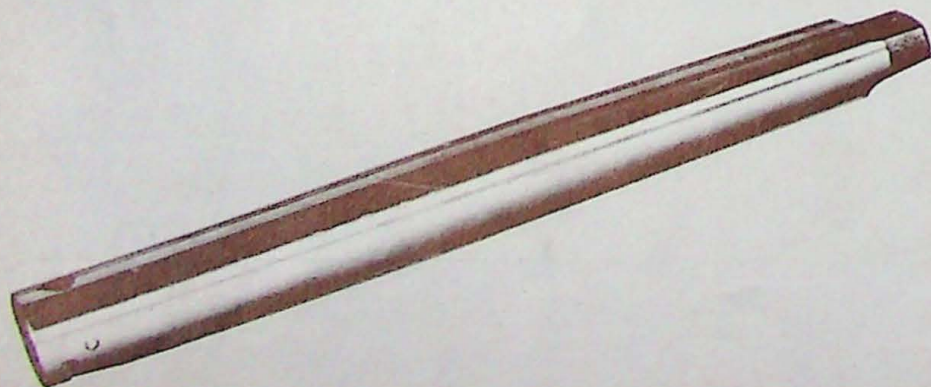
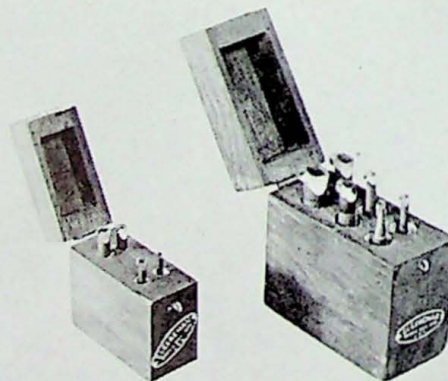
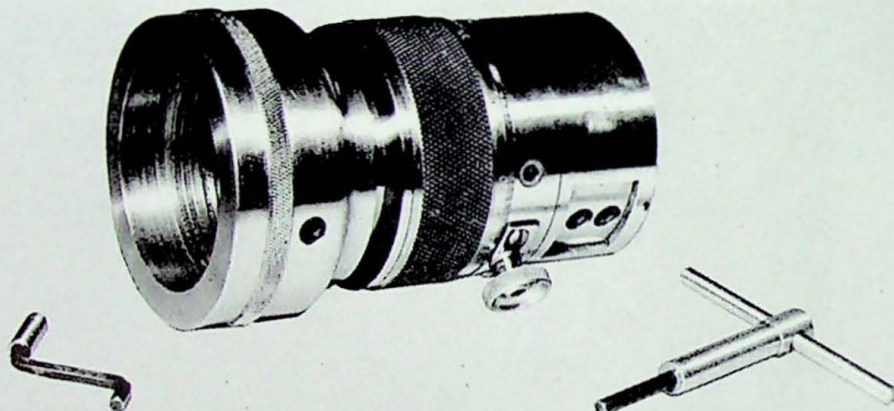
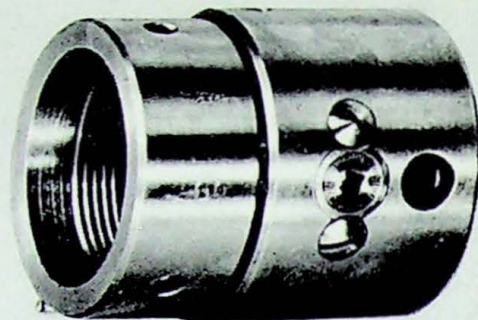
$\frac{3}{4}$ " Capacity— $\frac{3}{4}$ " maximum offset, graduated to 0.001", with threaded adaptor to fit spindle nose, complete with extension tool block and six cutter bars. Weight 13 lbs.

3. BORING TOOLS

$\frac{3}{8}$ " Set—One each $\frac{3}{16}$ ", $\frac{5}{16}$ ", $\frac{7}{16}$ ", and $\frac{9}{16}$ " high speed steel precision boring tools with $\frac{3}{8}$ " diameter shanks for use in $\frac{3}{8}$ " capacity boring head.

$\frac{3}{4}$ " Set—One each $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", and $1\frac{1}{4}$ " high speed steel precision boring tools with $\frac{3}{4}$ " diameter shanks for use in $\frac{3}{4}$ " capacity boring head.

1" Set—One each $1\frac{1}{4}$ ", $1\frac{1}{2}$ ", $1\frac{3}{4}$ ", 2" high speed steel precision boring tools with 1" diameter shank for use in 1" capacity boring head.



4. BORING BARS

Standard boring bars for use direct in the machine spindle collet. Tool bit advanced by means of a micrometer screw graduated to 0.001".

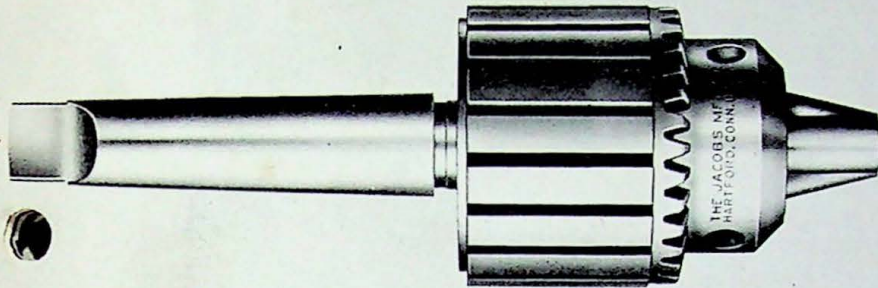
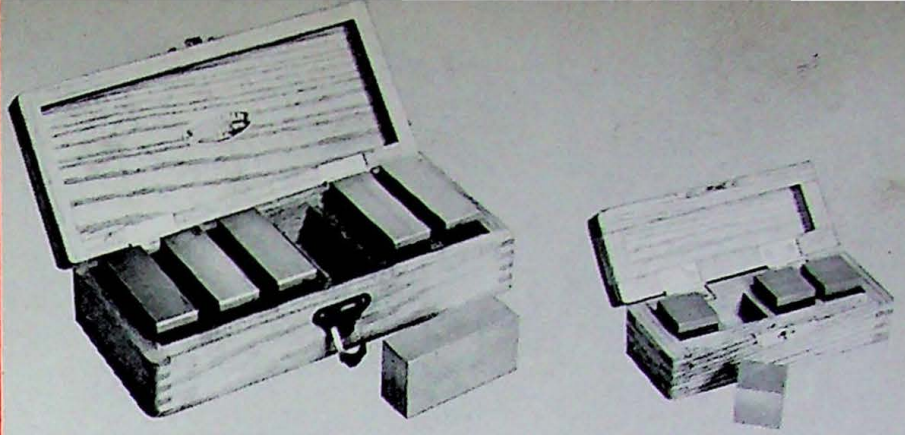
$\frac{7}{8}$ " diameter, 9" long, No. 4 Morse taper shank.

1" Diameter, 9" long, No. 4 Morse taper shank.

$1\frac{1}{4}$ " diameter, 12" long, No. 4 Morse taper shank.

5. PARALLEL BARS

Four hardened and precision ground steel blocks 1" x 1" x 1", in wooden case.
Six hardened and precision ground parallel bars 1" x 1½" x 3", in wooden case.



6. DRILL CHUCKS

0 to 5/16" Capacity with No. 2 Morse taper shank.

0 to 1/2" Capacity with No. 4 Morse taper shank.

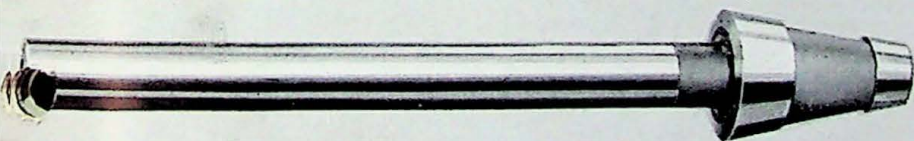
1/16" to 3/4" Capacity with No. 4 Morse taper shank.



7. COLLETS

Full taper collets to fit the machine spindle, with holes as follows: with No. 1, 2, 3, or 4 Morse taper; No. 5, 7, 9, or 10 B. & S. taper; Round—3/8" to 1 1/8" straight round hole, by 1/16ths.

Spindle Hole

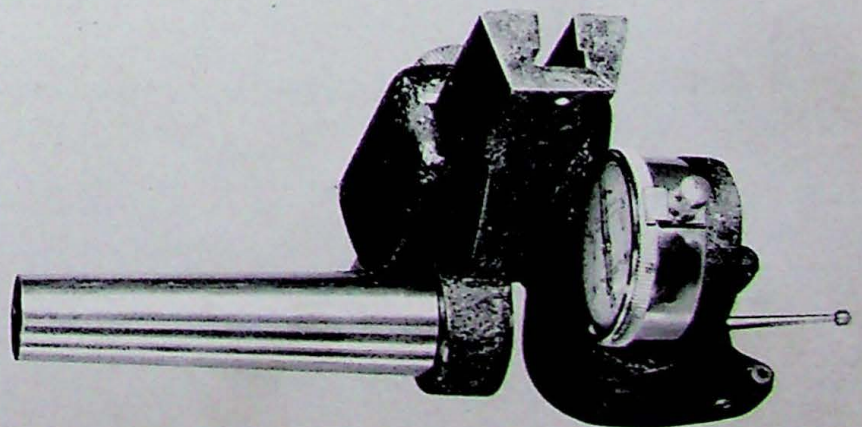


8. SPINDLE PROVING BAR

Fits directly in the machine spindle nose. Hardened and precision ground.

9. WORK LOCATING INDICATOR

For locating work from a finished hole or a finished boss, for checking parallelism, etc. Complete in a wooden case.



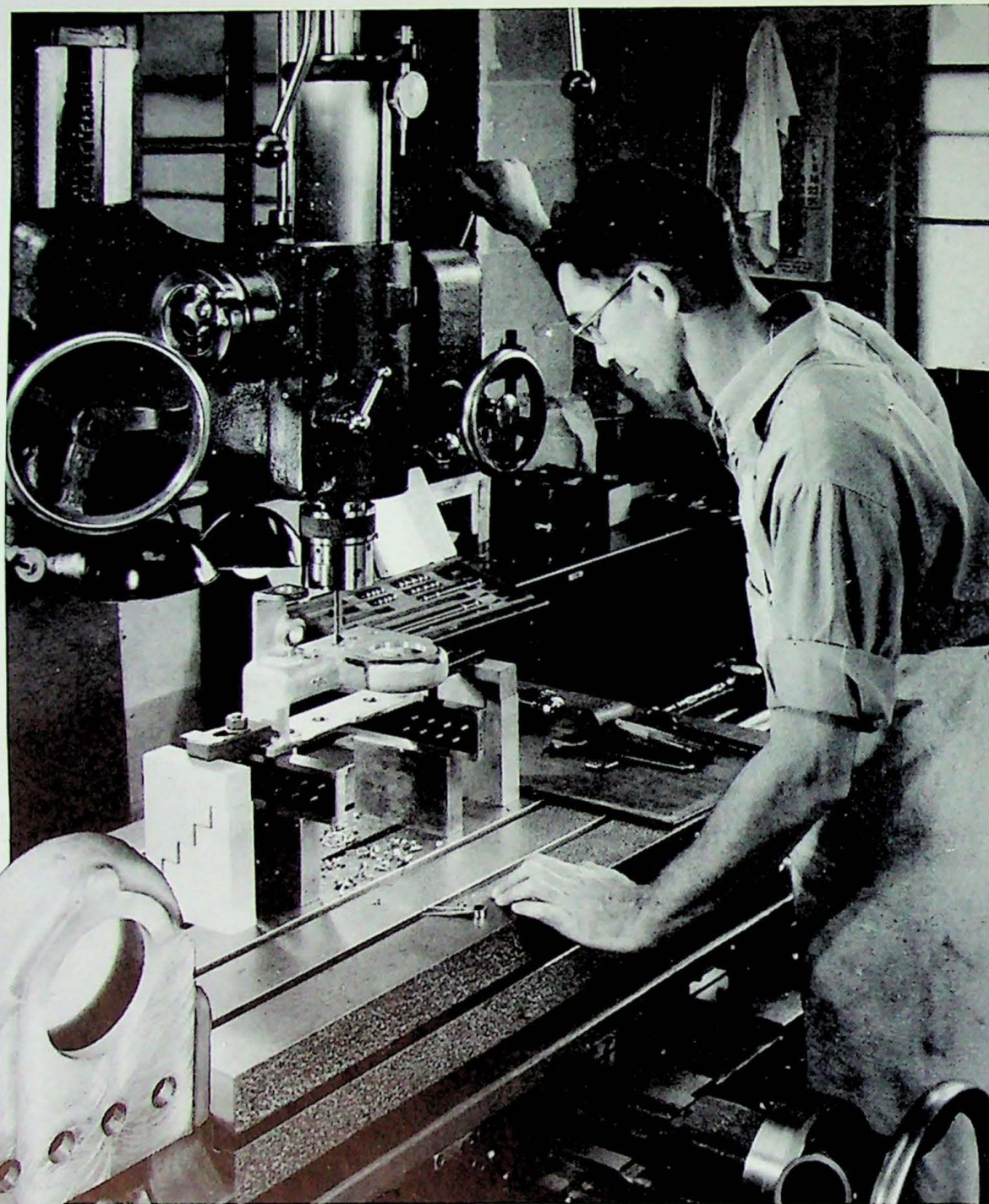
Specifications *for*

DESCRIPTION	1824	1830	Master 1836
TABLE SIZE Table surface and front and back faces are hand scraped to precision flatness. Cleereman tables are extra deep to prevent distortion when work is clamped on them.	16 x 30	16 x 36	22 x 44
NUMBER OF TEE-SLOTS IN TABLE SURFACE The front and back table surfaces and the tee-slots are parallel within extremely close limits. An additional tee-slot is provided on the front face of the table. Tee-slots accept standard 1/2" tee-bolts.	4	4	5
TABLE TRAVEL The Cleereman table is accurately guided on long, narrow ways. It has full bearing in all positions of travel.	18 x 24	18 x 30	18 x 36
SPINDLE TO TABLE—MAX. Repositioning, clamping, or unclamping of the spindle or spindle head does not affect accuracy of work on the Cleereman Jig Borer.	26	27	27 1/2
CENTER OF SPINDLE TO COLUMN WAYS Exceptional rigidity is obtained in the spindle head because of its box section construction and the manner in which it is clamped to the dovetail ways of the column.	14	14	17 1/2
CENTER OF SPINDLE TO COLUMN THROAT Accurate vertical alignment at any setting of the spindle head is assured by long, narrow guides and broad, flat bearing surfaces.	18	18	21 1/2
DISTANCE TOP OF TABLE TO COLUMN WAYS The column is a heavy box section—heavily ribbed—accurately mounted with locating dowels on scraped pads on the rear of the base.	11	11 1/2	11 1/2
VERTICAL TRAVEL OF SPINDLE Cleereman Jig Borers have exceptionally large spindle bearing area in the sliding head. The spindle, extending upward only as far as the top of the quill, is short and rigid.	9	9	9
VERTICAL TRAVEL OF SPINDLE HEAD A special flexible coupling completely isolates the spindle from the transmission, eliminating all possible vibration from the spindle drive.	12	12	12
DIAMETER OF SPINDLE QUILL The quill bearing in the sliding head is fitted with a bearing cap on which the flat surfaces of the flanges are scraped to a fit on the spindle head. The bearing for the quill is then honed to size and finally scraped to a full bearing.	4 1/2	4 1/2	4 1/2
NUMBER OF SPINDLE SPEEDS Twelve speeds in a variety of ratios are available. A total of 24 spindle speeds may be had with a two speed motor.	12 or 24	12 or 24	12 or 24
SPEED RANGE With a two speed motor the speed may be either. or (State choice of speed)	25 to 1000 37 to 1500	25 to 1000 37 to 1500	25 to 1000 37 to 1500
With a single speed motor the speed will be or Cleereman recommends the use of a two speed motor which increases the speed range and usefulness of the jig borer.	50 to 1000 75 to 1500	50 to 1000 75 to 1500	50 to 1000 75 to 1500

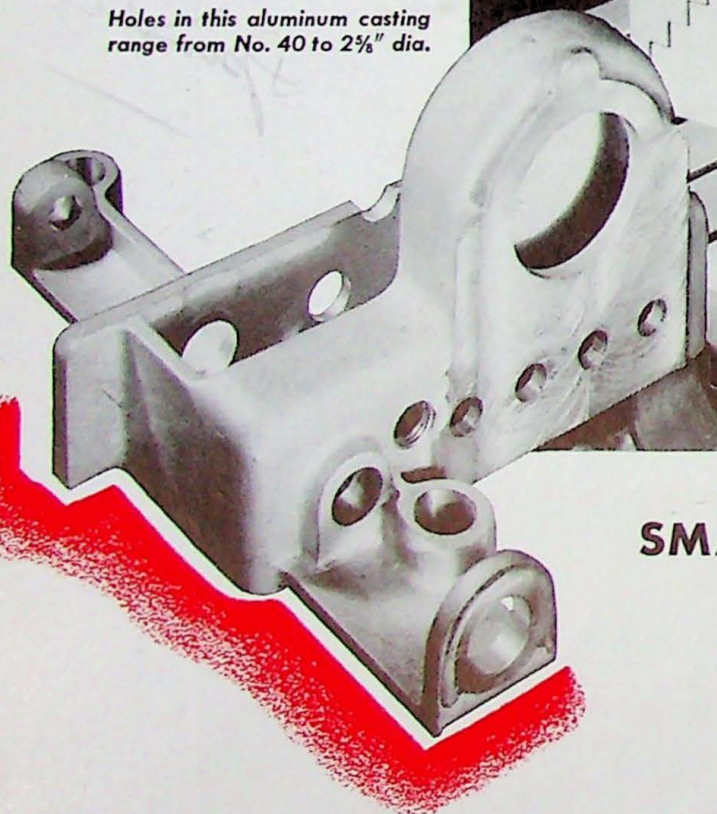
Cleereman Jig Borers

DESCRIPTION	1824	1830	Master 1836
NUMBER OF SPINDLE FEEDS Nine feed changes in a variety of ratios are provided for the full range of jig boring work and manufacturing operations. The single lever feed selector is extremely simple to operate.	9	9	9
STANDARD FEED RANGE—PER REV. The Cleereman spindle can be fed down by hand by either one of the turnstile levers until the tool practically touches the work. Thrusting outward on the levers engages the power feed.	.001-.010	.001-.010	.001-.010
OPTIONAL FEED RANGE—PER REV. The one feed lever is so convenient and simple that the operator need not take his attention from the work when starting a cut.	.0023-.023	.0023-.023	.0023-.023
FLOOR TO TOP OF TABLE These dimensions on the Cleereman Jig Borer were determined for greatest operating efficiency, ease of work placement, and convenient reading of dials.	30	33	33-½
FLOOR SPACE (WxD) No other machine can approach the speed and accuracy of the jig borer for locating and boring holes.	70 x 80	84 x 80	94 x 84
OVER-ALL HEIGHT The extreme accuracy of the jig borer is such that parts of assemblies will match perfectly, and interchangeable replacement units can be made at any time without jigs, fixtures, or previous layout.	105	109	110-½
MOTOR—H.P. Cleereman recommends a magnetic reversing starter which provides instant reversal of the spindle for completing tapping operations at one setting.	2	2	2
NET WEIGHT, LBS. All the important castings on Cleereman Jig Borers are made of Meehanite—castings of extreme stability, great strength, and high resistance to abrasion and wear.	6200	7300	9400
DOMESTIC SHIPPING WEIGHT, LBS. All castings are normalized to relieve strains.	6800	8000	10,100
BOX SIZE—EXPORT Liberal use of metal in all castings assures stability, precision, and long wear.	71 x 84 x 102 High	53 x 87 x 106 High	102 x 92 x 120 High
CUBIC FEET—BOXED FOR EXPORT An outstanding feature of Cleereman Jig Borers is <i>one lever</i> control.	350	328	651
GROSS WEIGHT—BOXED FOR EXPORT Cleereman Jig Borers are massive and rigid. They can remove metal rapidly without impairing accuracy.	8000	9400	10,500

Examples of Work Performed



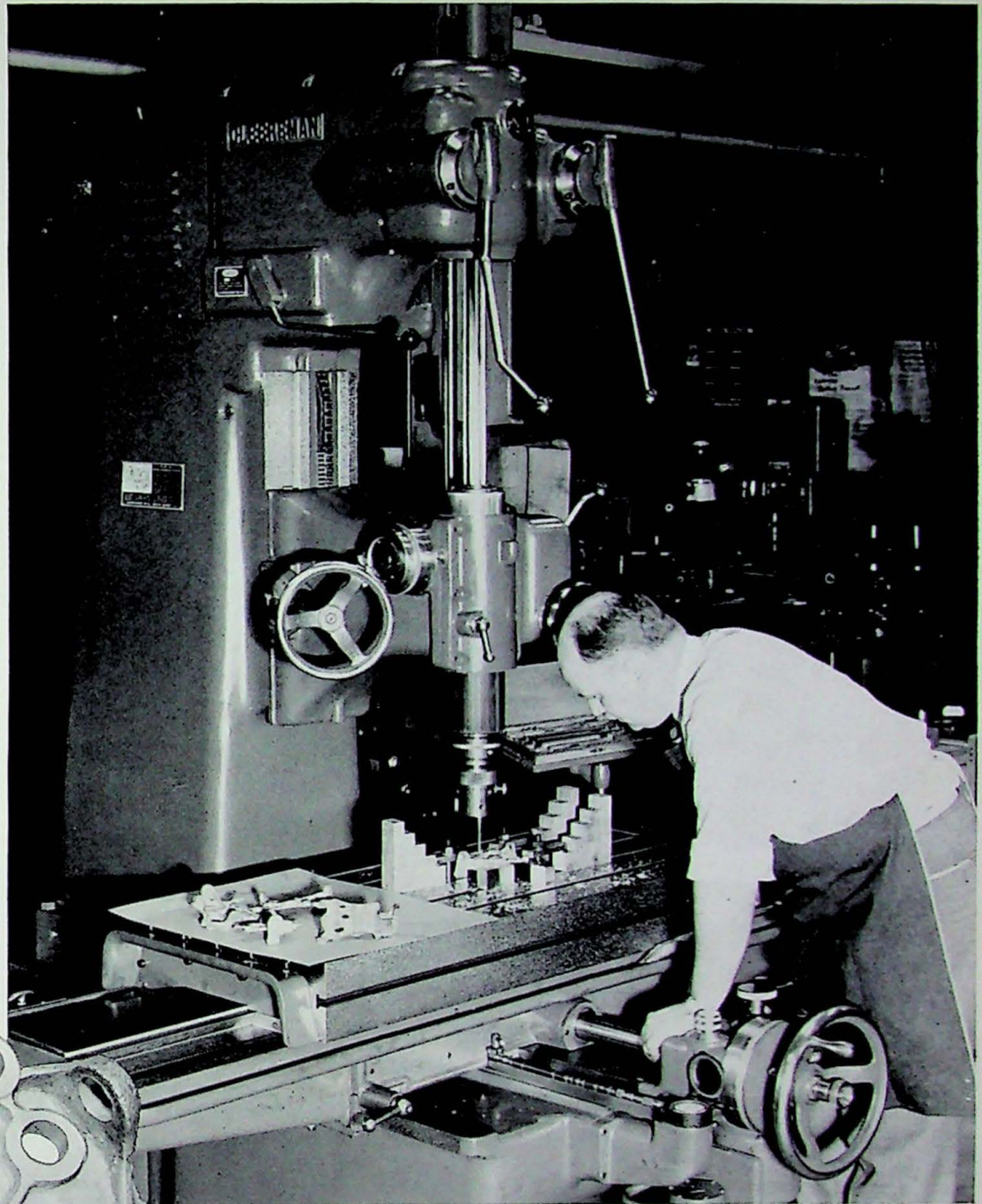
Holes in this aluminum casting range from No. 40 to 2 $\frac{5}{8}$ " dia.



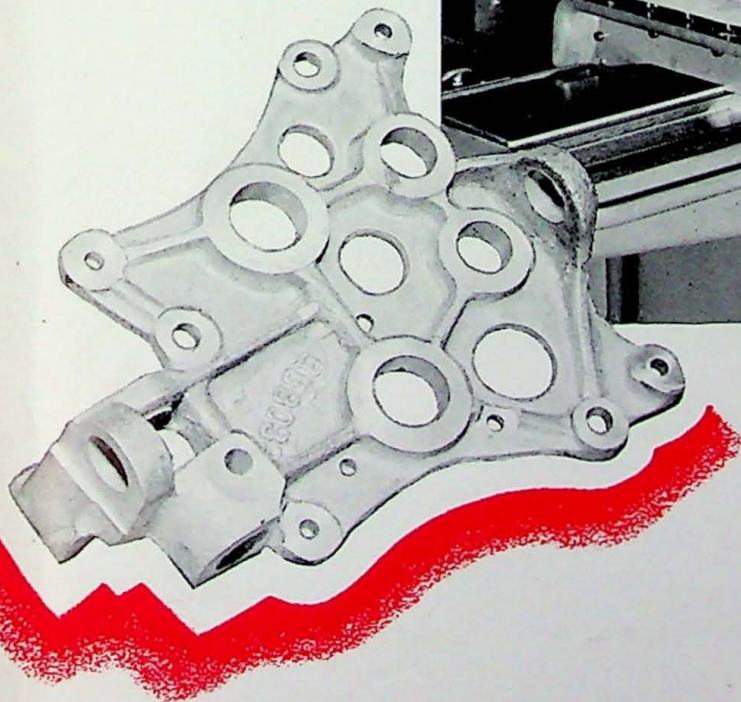
SMALL LOT, LOW COST PRODUCTION

Here is an example of low cost, small lot production on a Cleereman Jig Borer. The part is an aluminum drive casting in which 21 holes are finished, five being counterbored and two threaded. Without jigs or fixtures, tolerances on most of the holes are held to $+0.0003$, -0.0000 .

on Cleereman Jig Borers



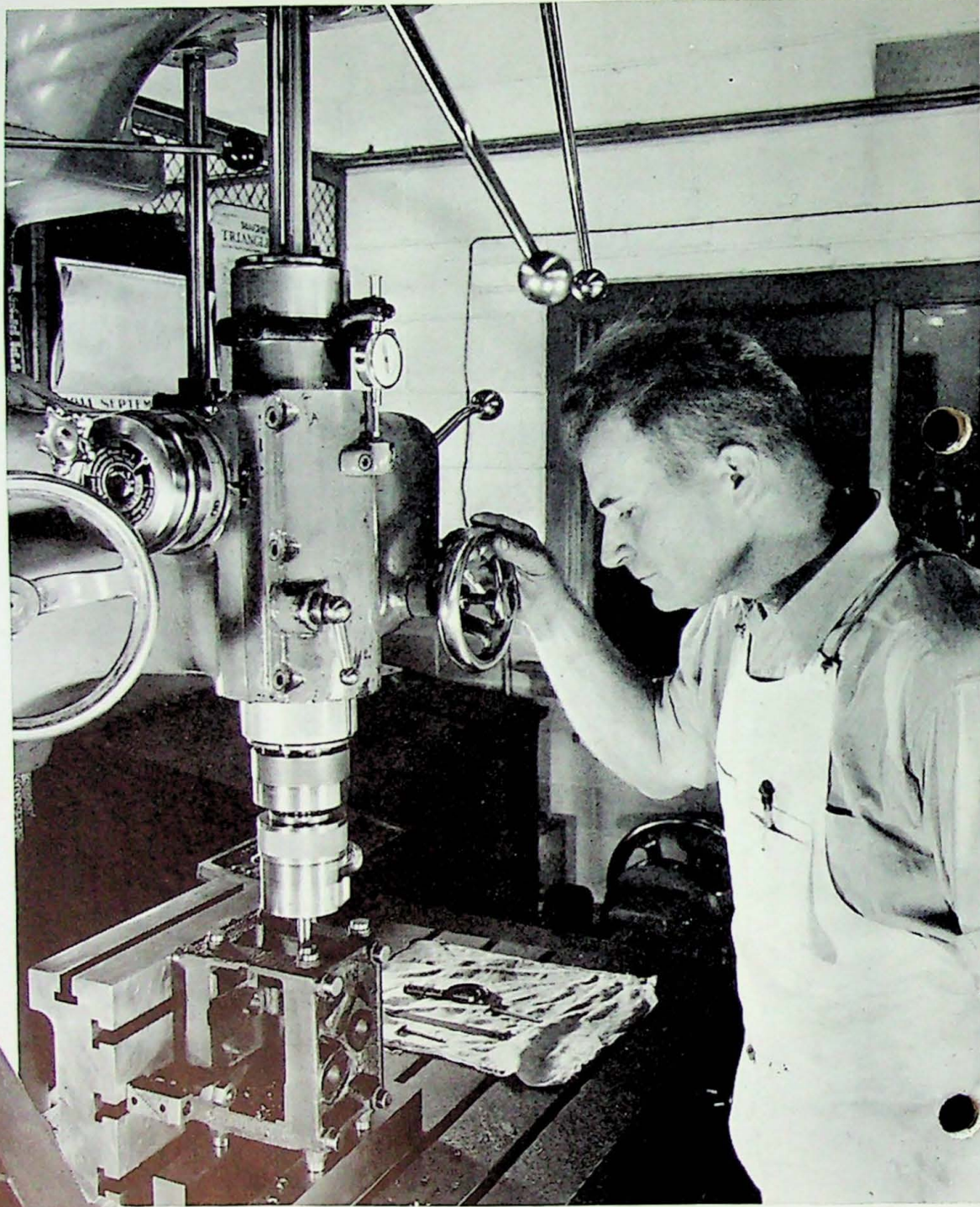
All holes in this magnesium casting are held to $\pm 0.0002''$ for location and diameter.



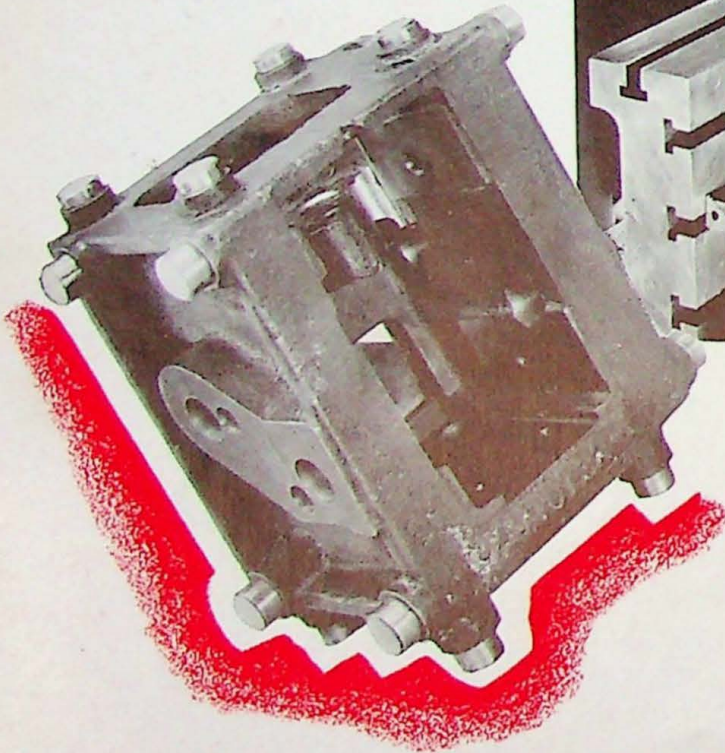
PRECISION PRODUCTION WITHOUT FIXTURES

Magnesium castings are produced economically in small quantities directly on the Cleereman Jig Borer without fixtures. This jig borer is equipped with rapid traverse in both directions, which permits the operator, while boring one hole, to set up dimensions for the next operation.

15 Holes Bored to $+0.0000, -0.0001$ " on a Cleereman Jig Borer



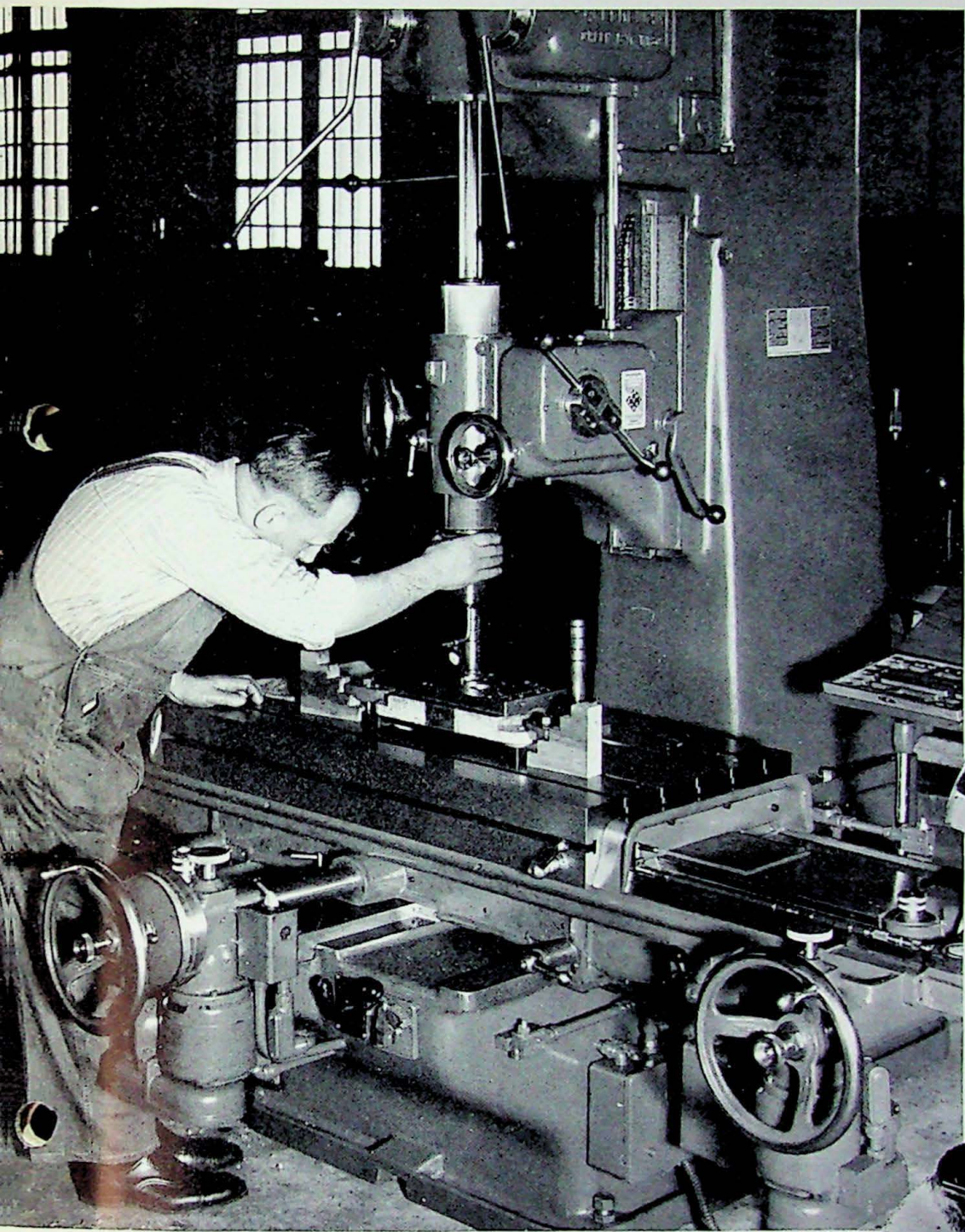
*This fixture was precision made on
a Cleereman Jig Borer.*



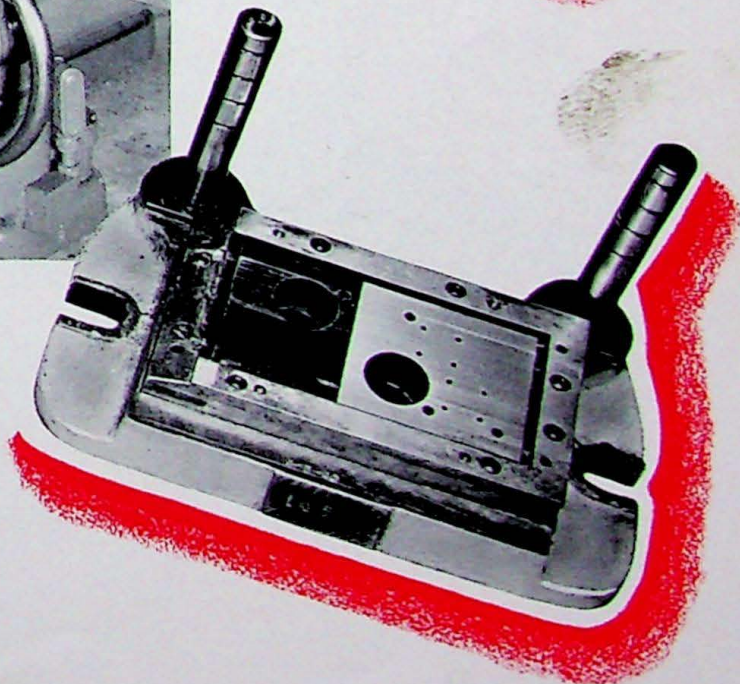
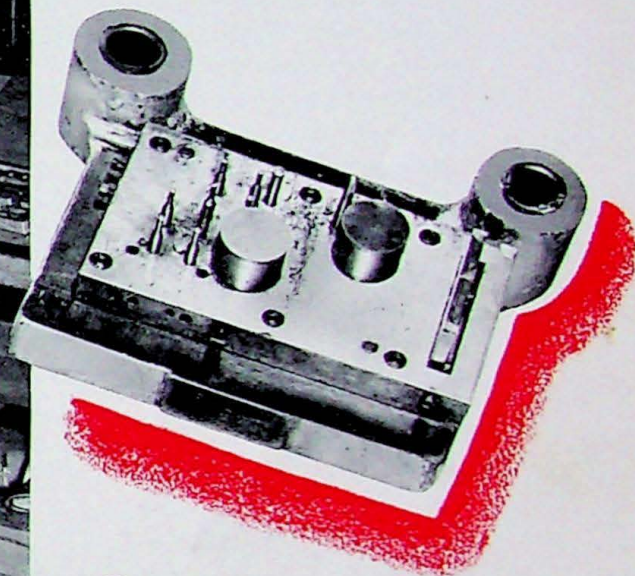
Here is a job that is characteristic of the extreme accuracy of Cleereman Jig Borers. Fifteen holes, ranging in size from $\frac{1}{4}$ in. diameter to $1\frac{1}{4}$ in. diameter, are bored in this fixture. All these holes are bored in proper relation to locating pads on the fixture and in relation to each other to the limit of $+0.0000, -0.0001$ in. Furthermore, all holes are held accurate for angle when the fixture is rotated to four positions.

The Cleereman Jig Borer is unsurpassed for extreme accuracy, range of adaptability, and speed of operation.

The Jig Borer is also a Precision Checking and Inspection Machine



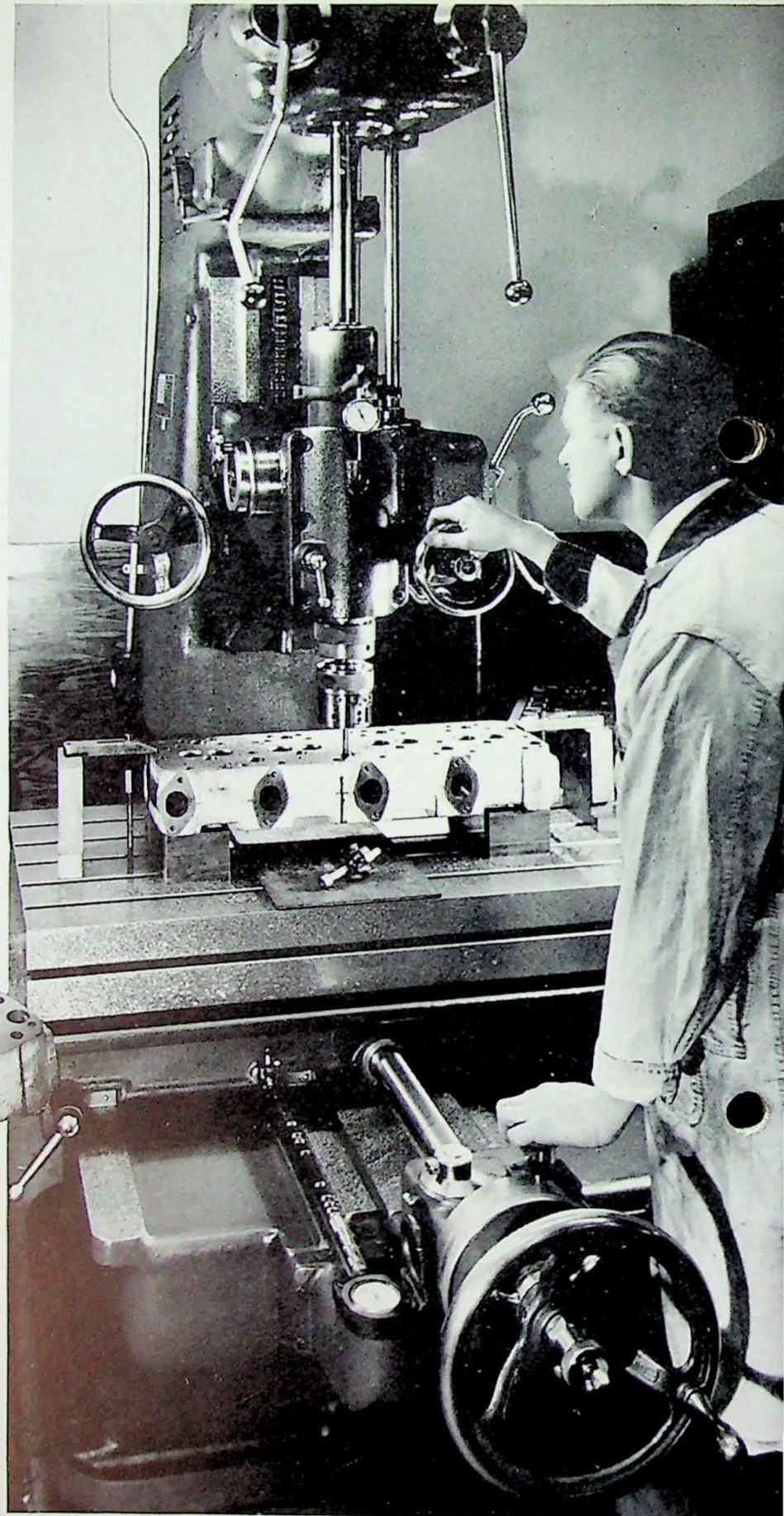
Measuring devices built into Cleereman Jig Borers permit checking precision products to 0.0001".



Another extremely valuable and important use of the Cleereman Jig Borer is precision checking and inspecting. Shown above is a location checking operation on a sectional portion of a die set to assure perfect match with the punch holder, which was bored on a Cleereman Jig Borer.

An Experimental Run – All Decimal Dimensions to $+0.0001''$ and fractional dimensions to $+0.0005''$

This is the top surface of a cast iron engine head. All holes were located from two dowel location holes which were first bored on the jig borer. No tolerance was permitted on the diagonal between these dowel holes. On the opposite surface, four holes were machined at an angle in addition to 17 tapped and 22 bored holes. No tolerance was allowed on any of the hole diameters.

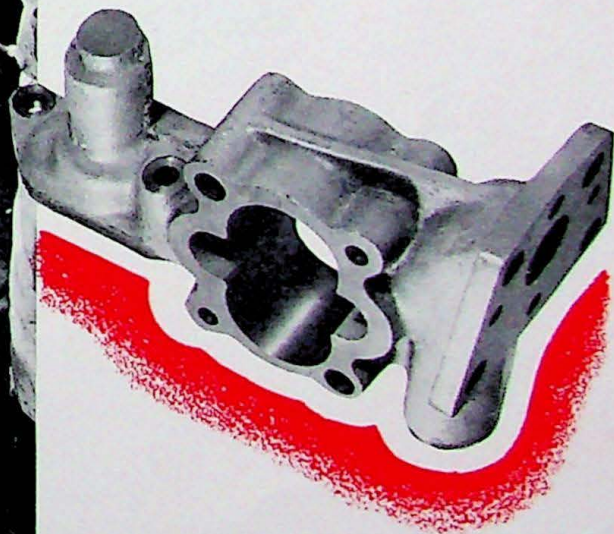


Cast Iron Pump Bodies Bored to Precision Limits on a Cleereman Jig Borer



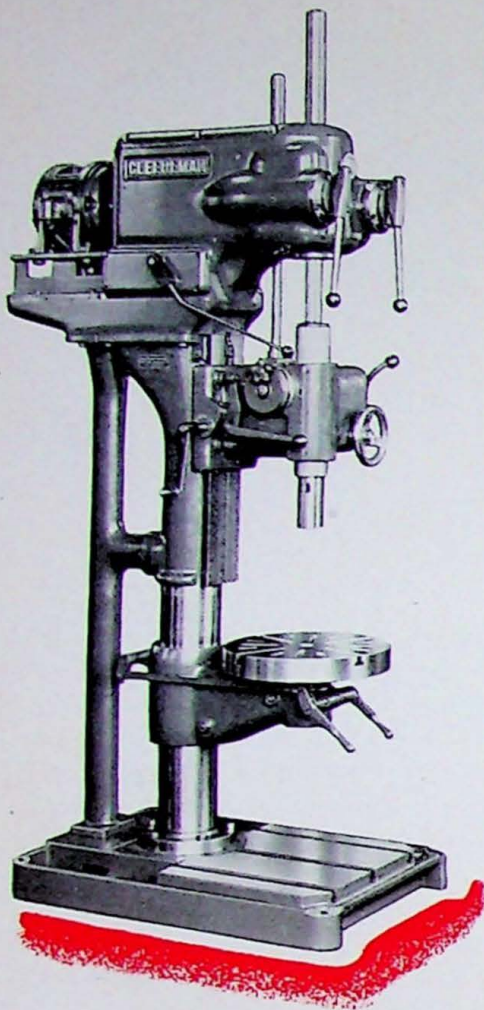
The first operation on these pump bodies is four holes bored to location with total tolerance of 0.0003", and from them are located and bored, to total tolerance of 0.0005", the inner surfaces of the gear rotor chambers. The part is then turned 90 degrees and four concentric holes are bored with total tolerance of 0.0005".

The fixture shown was made for a few holes that are drilled on a drilling machine. This fixture was then conveniently used as a holding device on the jig borer, permitting rapid set-up of short-run parts.

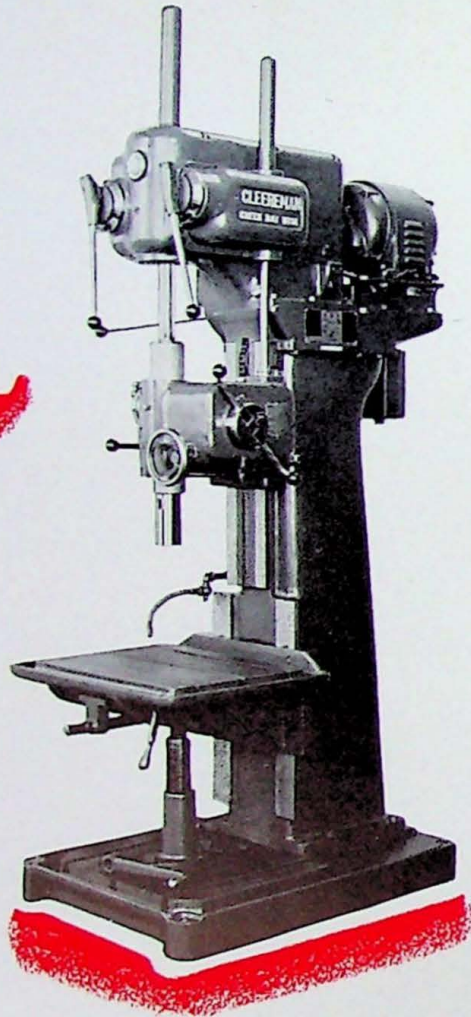


Also - Cleereman Drilling Machines

Write for Cleereman Drilling Machine Catalog No. 400.

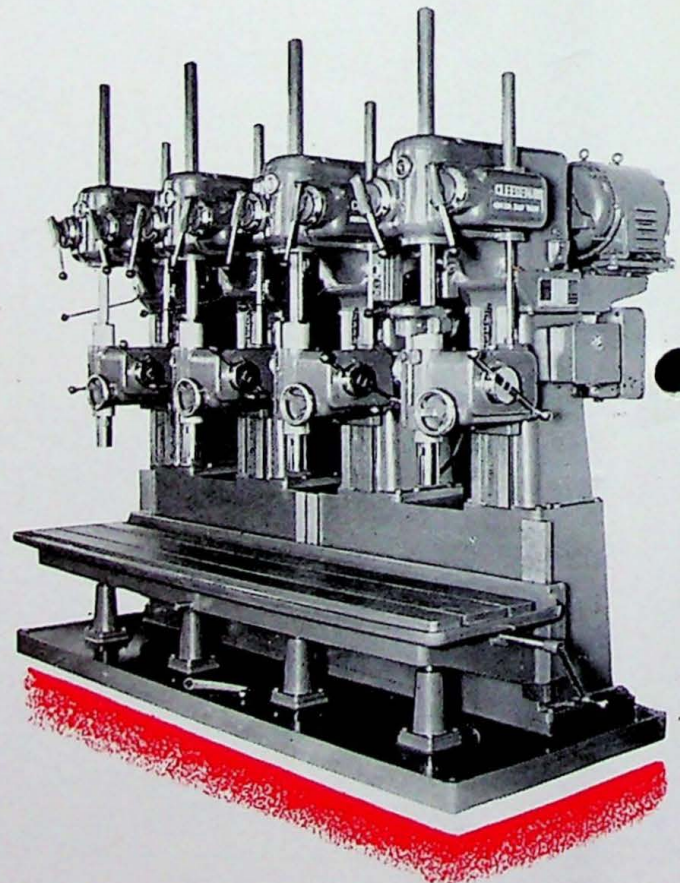


Cleereman Round Column Drilling Machine.

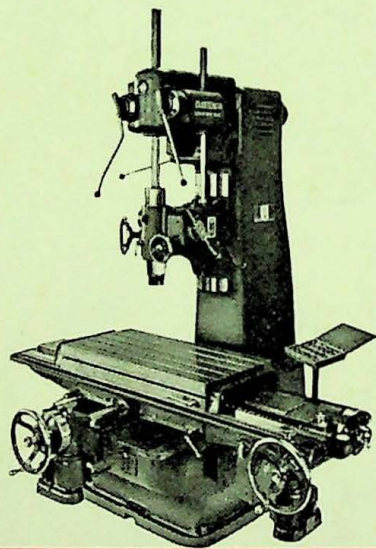


Cleereman Box Column Drilling Machine.

Cleereman 4-Spindle, High Base Gang Drill.



CLEEREMAN



JIG BORERS