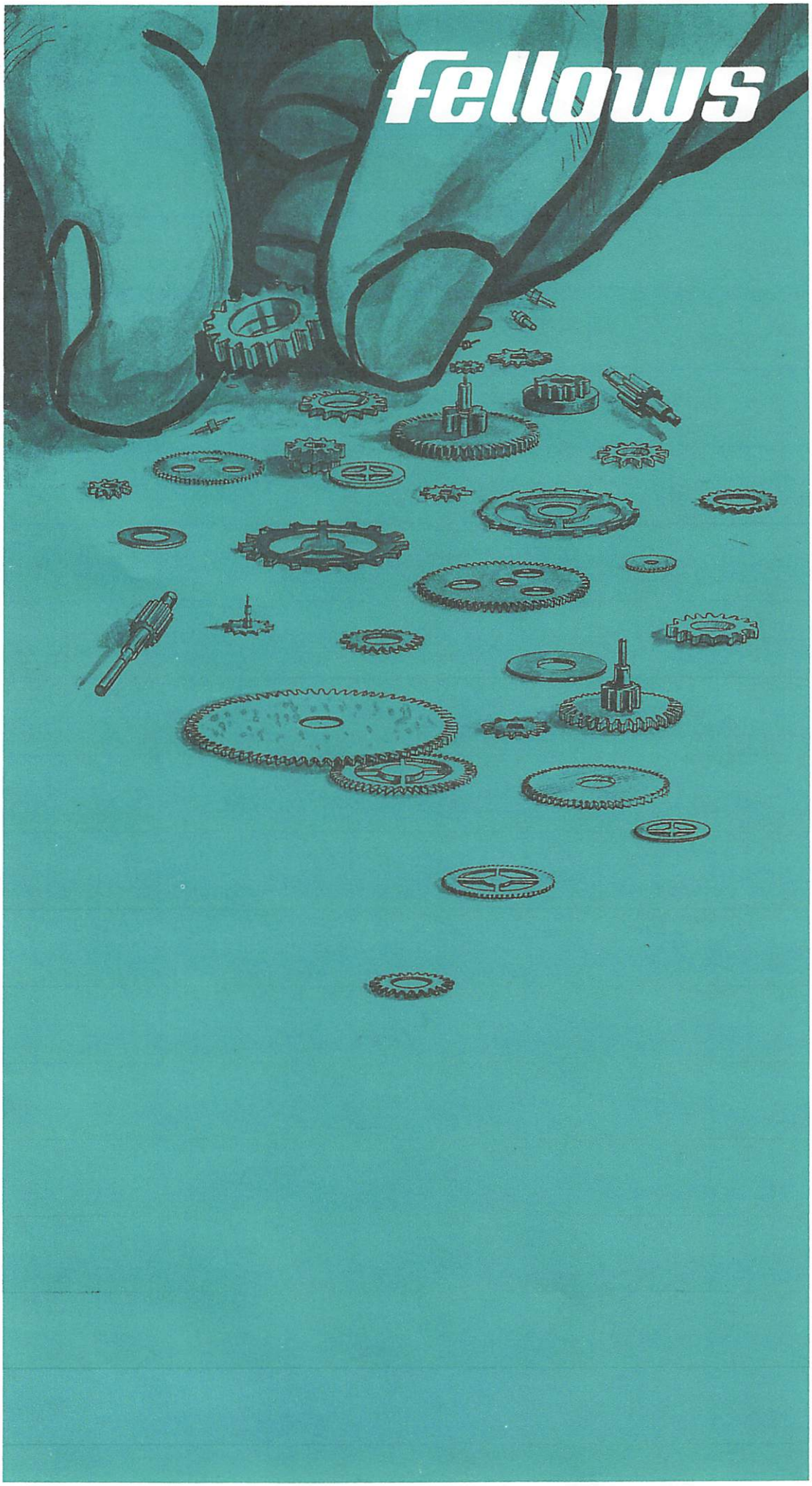
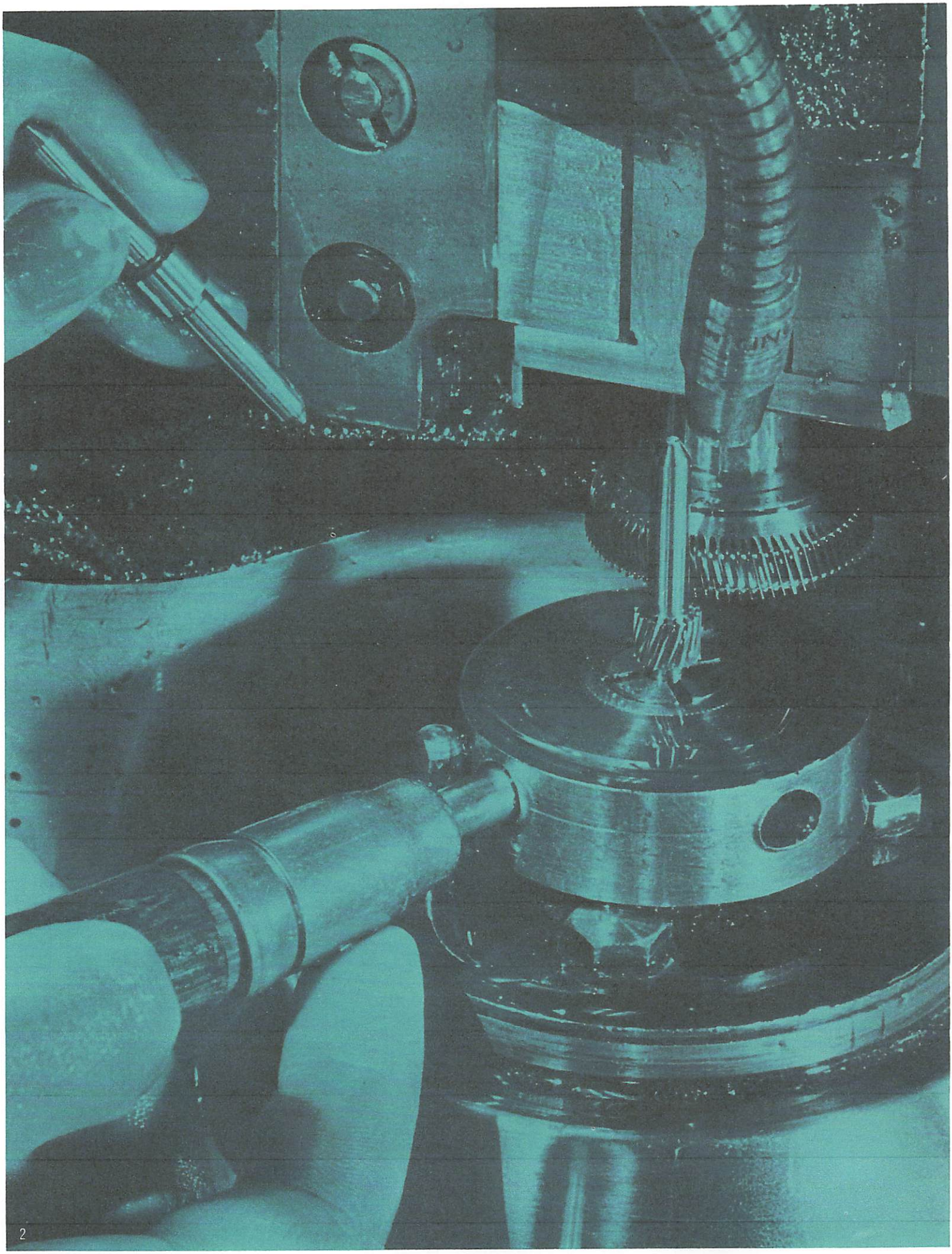


3 inch Fine Pitch Gear Shaper Model 3-2



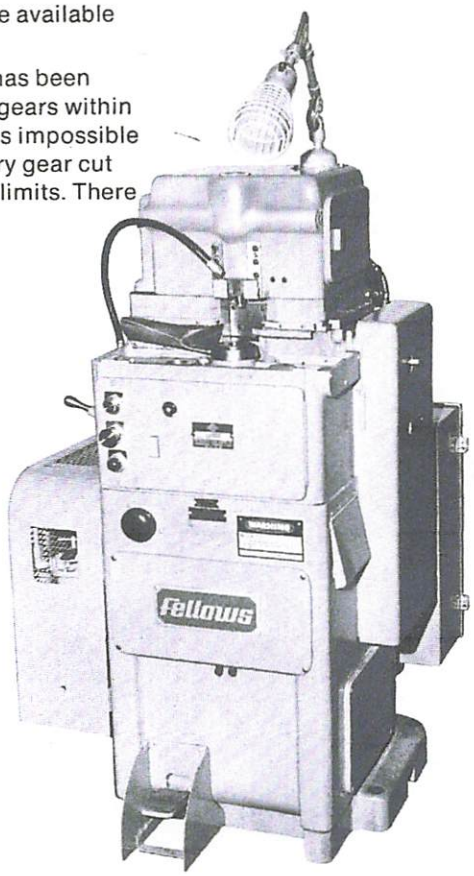
FELLOWS 3-INCH FINE-PITCH GEAR SHAPER: WHEN ABSOLUTE PRECISION IS A MUST

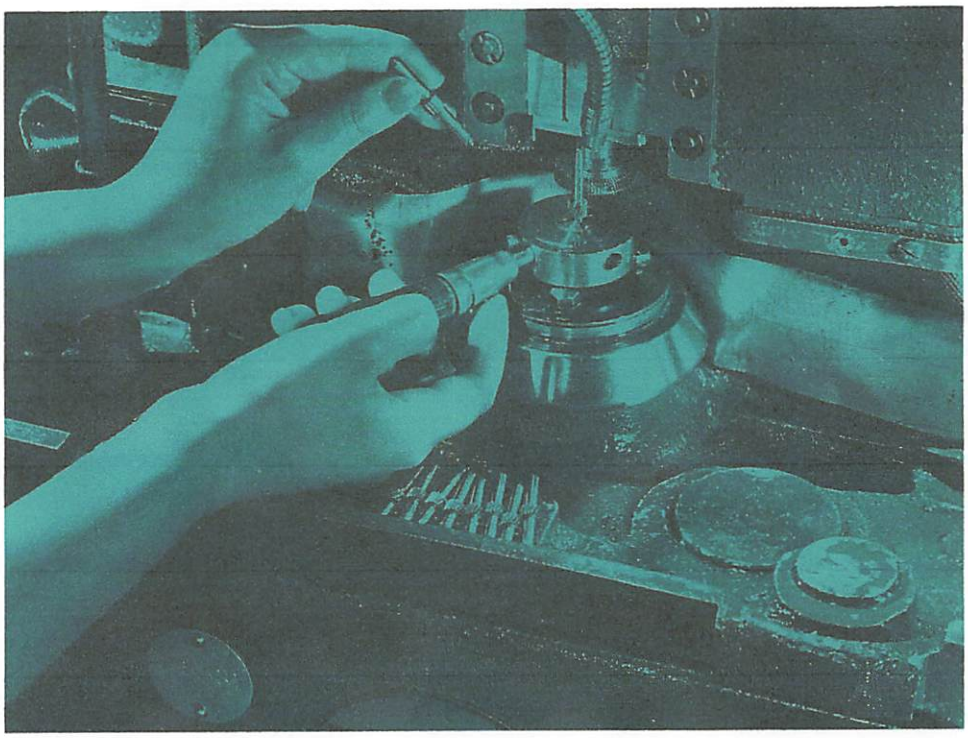
Here is a unit developed specifically to meet the demands of those requiring extreme precision and reliability in the production of fine-pitch gears. This equipment has achieved wide acceptance among the manufacturers of clocks, dial indicators, motion picture cameras, recording instruments and electronic controls used in the aero-space industries.

The machine has been designed to cut gears within the American Gear Manufacturers Association (AGMA) precision class 2 limits, or the more recent designation of Quality No. 12—(0.0005 inch total composite error). Machines to cut within closer limits are available on special order.

Although a machine has been designed to produce gears within certain tolerances, it is impossible to guarantee that every gear cut will conform to these limits. There are so many variables involved over which we as the manufacturer have no control that such a guarantee would be meaningless. Fixtures, cutters, gear blanks, materials, cutting compounds and the accuracy of the checking equipment and master gears have their effect on the precision of the finished product.

It is only with the very closest attention to every detail of production and inspection techniques and equipment that gears of this class can be consistently manufactured. A small bit of dust between the teeth can cause the rejection of a good gear.





The Cutter Spindle Driving Mechanism, is reciprocated by a crank-arm and an operating arm which has a segment gear that meshes with circular rack teeth on the cutter-spindle. A guide, either integral with, or fitted on a tapered bearing on the upper end of the cutter-spindle, "steers" the cutter in its correct path for cutting either spur or helical gears.

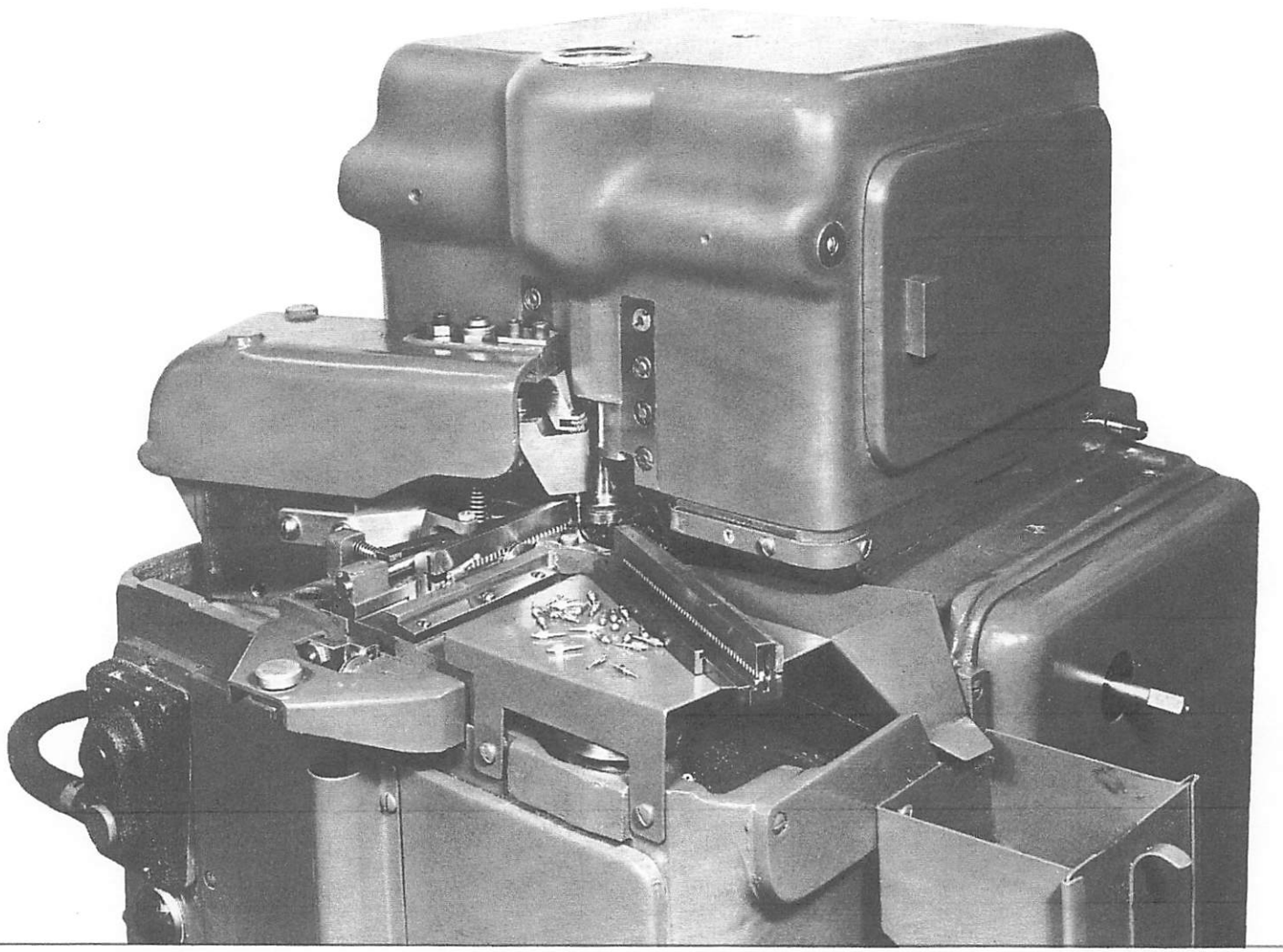
On machines arranged for cutting spur gears only, the integral guide and spindle is furnished. On those machines equipped to cut helical, or both spur and helical gears, the two-piece guide and spindle is required. Two adjustable shoes hold the guide in position, allowing it to reciprocate smoothly without backlash or chatter.

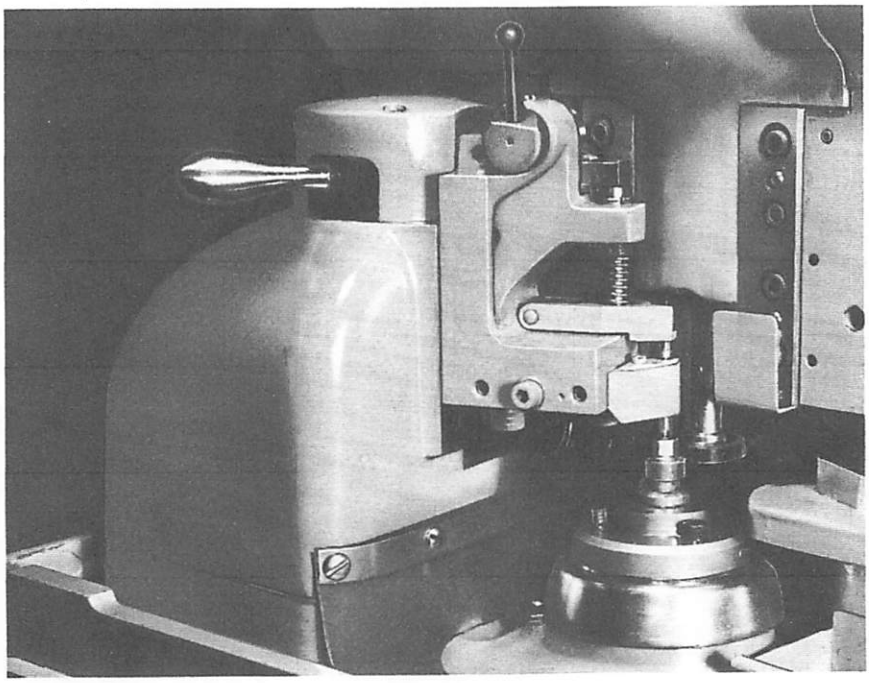
Cutter reciprocating speeds that range from 400 to 2000 strokes per minute are provided through a "V" belt drive. The cutter spindle has been designed in two styles. Either hollow or solid can be furnished as standard according to a customer's individual requirements. The cutting of internal gears with shank-type cutters, of course, requires the hollow spindle. A precision adapter is available for use with the hollow spindle when required to mount disk type cutters.

The work-spindle has a straight hole to accommodate floating type work holding fixtures that can be accurately indicated to eliminate runout and insure maximum precision. For additional rigidity when cutting arbor mounted gears or long thin pinions, the use of a work arbor support is recommended. These are available as extra equipment.

Depth-Feed Mechanism. A new heavier, more accurate lead screw has been utilized in the depth-feed mechanism. When the depth-feed cam has moved the bed and cutter-spindle into the cutting depth, a preloaded tension is set up to hold the bed rigidly in place during the cutting cycle. The large easily read depth-feed dial is graduated in increments of 0.00025 inch for precise size control on the gear being cut.

The Feed Cam Trip Mechanism is designed to control the amount of rotary overtravel of the cutter. This mechanism insures that every tooth on the gear will be cut to the required depth. Turning the dial increases or decreases this overtravel as required.





Indexing Mechanism. The key to reliability and precision in gear cutting equipment is the accuracy of the indexing mechanism. On the 3-Inch Fine-Pitch machine, this is of the continuous revolution type, having two worms and worm wheels. The fine-pitch worms and worm wheels used in this machine are carefully selected to meet the most demanding quality standards. In order to insure lasting precision, adjustments are provided to take up any backlash or looseness due to normal wear. The proper relationship between the work-spindle and the cutter-spindle is maintained through precision finished change gears.

Rotary Feed. The rotary feed is expressed in thousandths of an inch of rotation per stroke of a 1-inch pitch diameter cutter. Feeds of from 0.0004-inch per stroke to 0.0065-inch per stroke are available in twenty steps and are controlled by change gears.

Lubrication. The 3-Inch Fine-Pitch Gear Shaper is equipped with a fully automatic Bijur lubricating system which meters oil to all working members of the machine except as noted on the detailed oiling instructions. Automatic lubrication is a prerequisite to any successful preventative maintenance program designed to keep down time for repairs to an absolute minimum.

Electrical Equipment: This machine requires 1.5 KVA of three phase power. The following noted motors and controls are not included in the price of the machine:

- Stroking motor—½HP, 1800 RPM, foot mounted.
- Feed motor—½HP, 58 RPM, right angle gear motor.
- Coolant motor—¼HP, 3600 RPM, integral with pump.

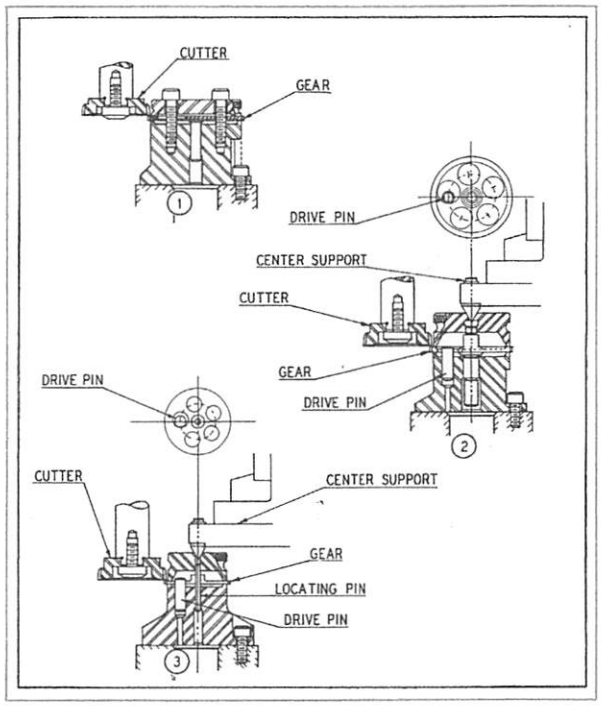
Control complies with EGP 1-1967, (formerly called NMTBA) electrical standards. It includes motor starters, isolating transformer for 115 volt control circuit; fuses and line disconnect. These are all mounted in one oil-tight NEMA 12 enclosure. The disconnect switch is interlocked

with the enclosure door. Push buttons and limit switches are also oiltight or mounted in oil-tight compartments. The machine automatically stops at the end of each cycle.

Available Extras. The simple basic design of the Fine-Pitch Gear Shaper readily lends itself to the adaptation of special fixtures and optional extras and makes it the finest and most flexible machine available within its size and price range.

Varying degrees of automation can be attained by the relatively simple addition of magazine feeding and automatic ejecting systems designed for the rapid handling of high production runs. Production rates of as high as 600 finished pinions per hour have been achieved on these 3-inch Machines.

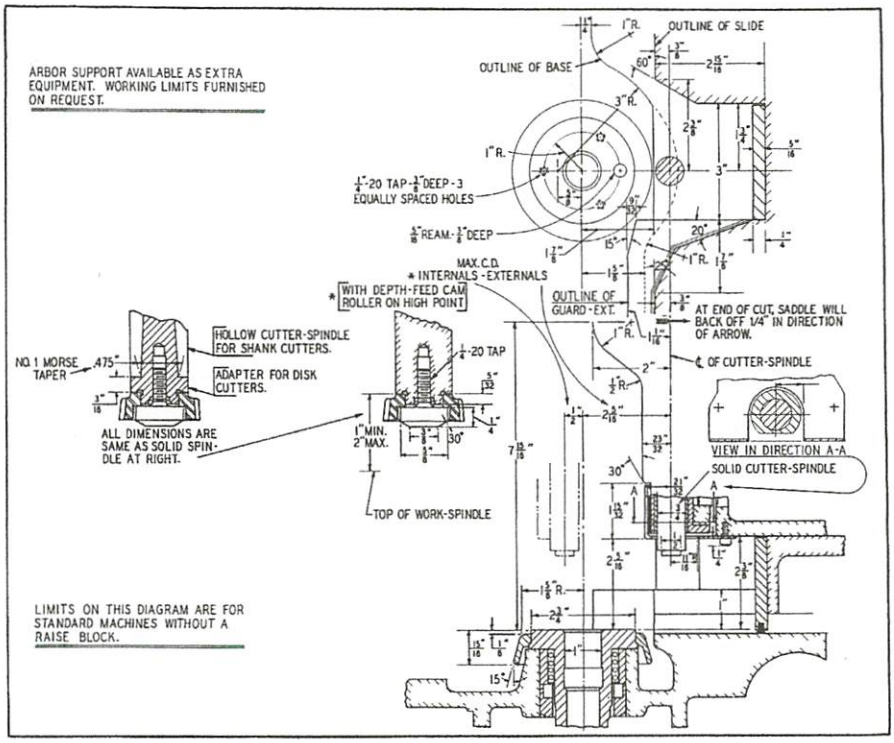
In cases where accuracy requirements are beyond the limits outlined by the AGMA designation of Quality No. 12, the Cutter Truing Attachment is available. This device was developed to check the pitch line runout of a disk type cutter after it has been mounted on the cutter-spindle. The check measures the change in center distance caused by runout errors in the cutter, poor cutter sharpening, faulty mounting of the cutter and runout of the cutter-spindle.



Three typical 3-inch gear shaper fixtures

The attachment is intended primarily for use when cutting gears that require the greatest accuracy possible from the machine and cutter. The device is made to attach to the machine and can easily be removed after the check has been made.

KNOCK-OUT PATTERN



SPECIFICATIONS FOR 3-INCH FINE PITCH GEAR SHAPER

Capacities:

Maximum pitch diameter . . . . . 2" internal, 3" external
Maximum face width . . . . . ¾ inch
Maximum D.P. — 30 for free-cutting brass, 32 for other nonferrous material, and 40 for free-cutting steel.

Weights:

Net weight with motors . . . . . 1400 lbs.
Machine crated for domestic shipment . . . . . 1575 lbs.
Machine boxed for export . . . . . 1900 lbs.

Dimensions:

Depth . . . . . 32" Width . . . . . 30" Height . . . . . 52"
Dimensions of crate or box . . . . . 45" x 47" x 57" high

Standard Equipment

Includes motor bracket; hollow or solid cutter-spindle with integral spur guide depending on type of gear to be cut and/or customer wishes; feed cam trip mechanism; ejector for hand operation; guards; and change and feed gears for one set up on one part. On request, machine can be furnished with a two piece cutter spindle and spur guide at no extra cost. However, for greatest accuracy a one piece spindle and guide is recommended.

Extra Equipment

Includes: work clamping supports (foot treadle required to operate either work clamping support); foot treadle mechanism; cutters; arbors; auxiliary work holders; collets; work centers or adapters; work ejectors and ejector rods; work holding top plate; work magazines; motors; controls; helical guides and additional change and feed gears.

fellows

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