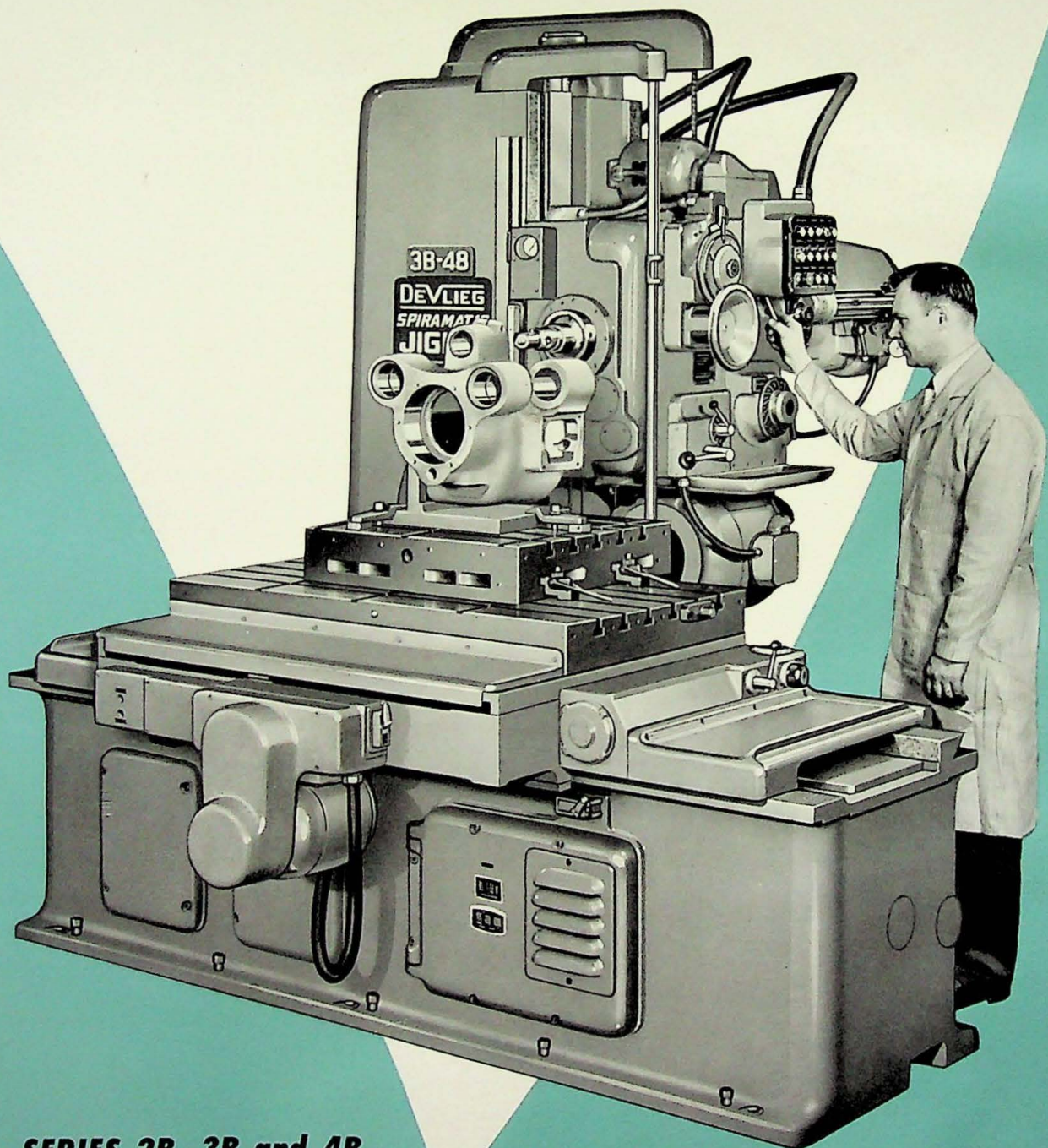


DEVLIEG *spiramatic* JIGMIL®



SERIES 2B, 3B and 4B

PRECISION BORING and MILLING MACHINES

DEV LIEG MACHINE CO. • 450 Fair Avenue, Ferndale • Detroit 20, Michigan

® Trade Mark registered, U.S. Pat. Off.



CATALOG NO. SJ-104

The range of **SPIRAMATIC JIGMIL** Precision Boring and Milling Machines described in this catalog represents the outcome of many years of field analysis and development work carried out by the DeVlieg Machine Company to determine and meet the requirements of the metalworking industry in the field of precision boring and milling.

Design Characteristics

The DeVlieg JIGMIL is a universal Precision Boring and Milling Machine combining extreme accuracy, power, rigidity and facility of operation that has set new standards of economy in the processing of **one-piece jobs** and **production work**. The advanced structural design of the JIGMIL provides a fixed relationship between the horizontal and vertical slides which insures precise accuracy in the full range of the machine. The rugged construction of the machine bed, column and spindle head provides ideal conditions for the efficient application of carbide tools. In addition, the JIGMIL incorporates many important automatic functions that were pioneered by the DeVlieg Machine Company. Reliance on the "human element" to produce close tolerance work is largely eliminated by the use of these automatic machine functions which are integral features of the JIGMIL design.

The Jigmil Technique

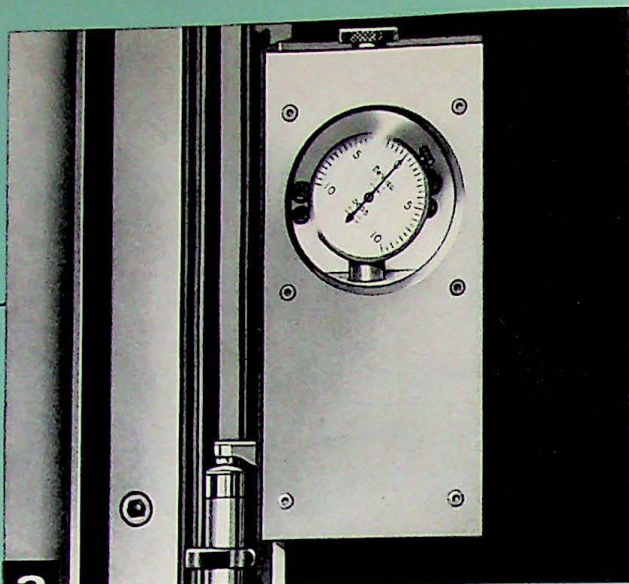
In the process of developing the JIGMIL with its unique design and functions, the DeVlieg Machine Company pioneered a new and simple technique for dealing with precision boring and milling operations. The JIGMIL Technique differs substantially from conventional boring practices and a comprehensive training program covering all phases of the JIGMIL Technique is available without charge to all JIGMIL users. These training programs which are carried out at our plant include the training of operators and an educational program for tool engineers, methods, time study and supervisory personnel. To insure that all JIGMIL users derive maximum benefits from their machines, we recommend that all our customers take advantage of this comprehensive training program prior to installation of their machines.

Customer's Work Analysis

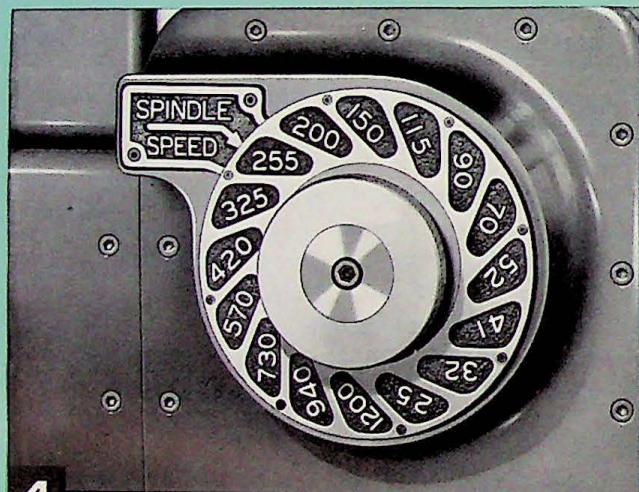
We maintain a special department for making engineering analyses of precision boring and milling work submitted to us by companies who are interested in obtaining a realistic appraisal of the economies that can be obtained by the installation of our machines. This engineering service is furnished without charge and includes the recommended size and type of machine, method of job setup, sequence of operations, tool layouts and time study.

Field Service

A staff of highly trained engineers is maintained to install and service machines in the field and serve customers with technical counsel relating to the operation and application of our machines so that the full potential of the JIGMIL Technique may be attained. Our modern plant is devoted exclusively to the development and manufacture of precision boring and milling machines, and our experience and specialized facilities are at the disposal of the metalworking industry.

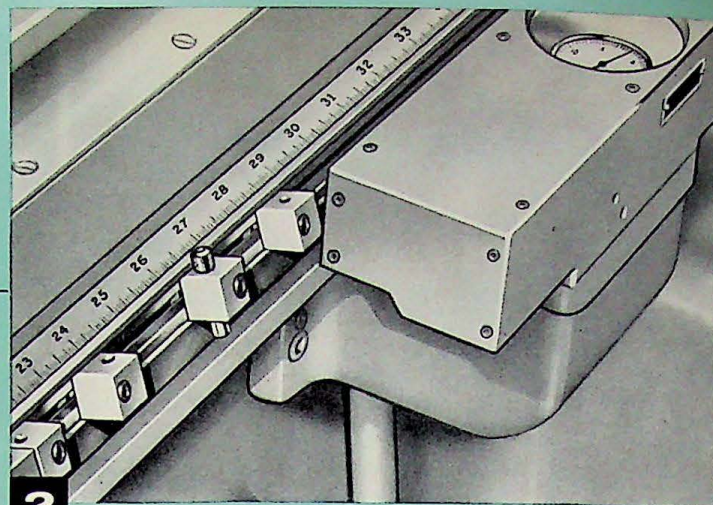
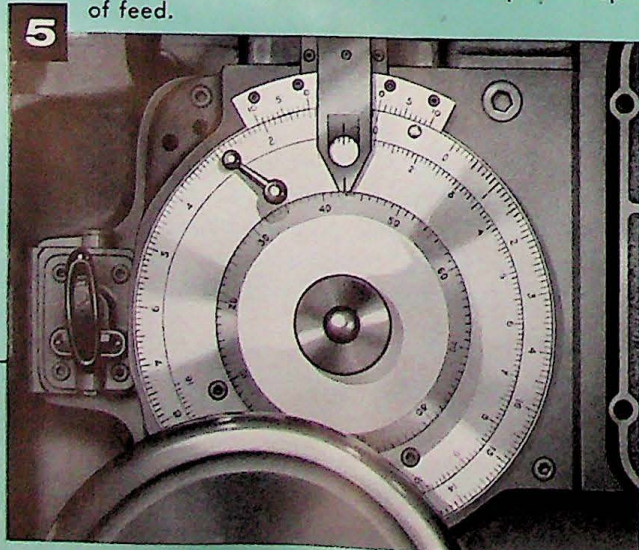


3 **AUTOMATIC POSITIONING OF THE MACHINE TABLE AND SPINDLE HEAD** is performed through a sequenced electrical cycle. Hole spacing in the work piece is controlled to precise limits of accuracy through the operation of a single push button.



4 **PRESELECTIVE AUTOMATIC SPINDLE SPEED CHANGING MECHANISM** for Series 3B and 4B machines is operated through a single push button control.*

AUTOMATIC DEPTH CONTROL—Spindle bar feed is tripped automatically at predetermined points by setting combination dials and vernier scales for required depth of feed.

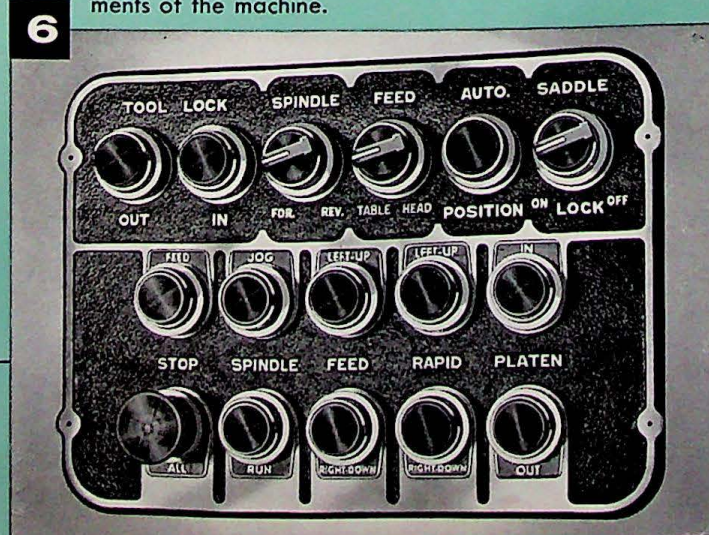


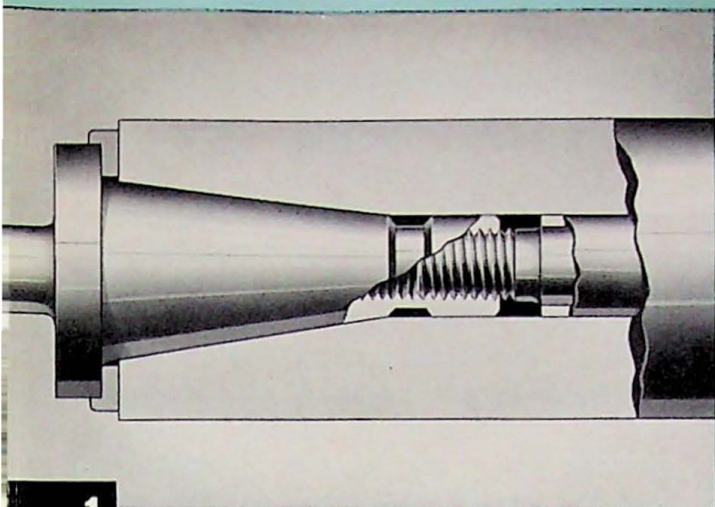
2 **JIGMIL DUPLITROL SYSTEM** in conjunction with the **AUTOMATIC POSITIONING CYCLE** provides a means for "jigless boring" all types of work on a production basis, thereby eliminating expensive boring jigs.

Advanced Constructional * *Features* of *Spiramatic* Jigmils®

*Model 2B-36 Machine is furnished with manually operated Dial Spindle Speed Changing Mechanism.

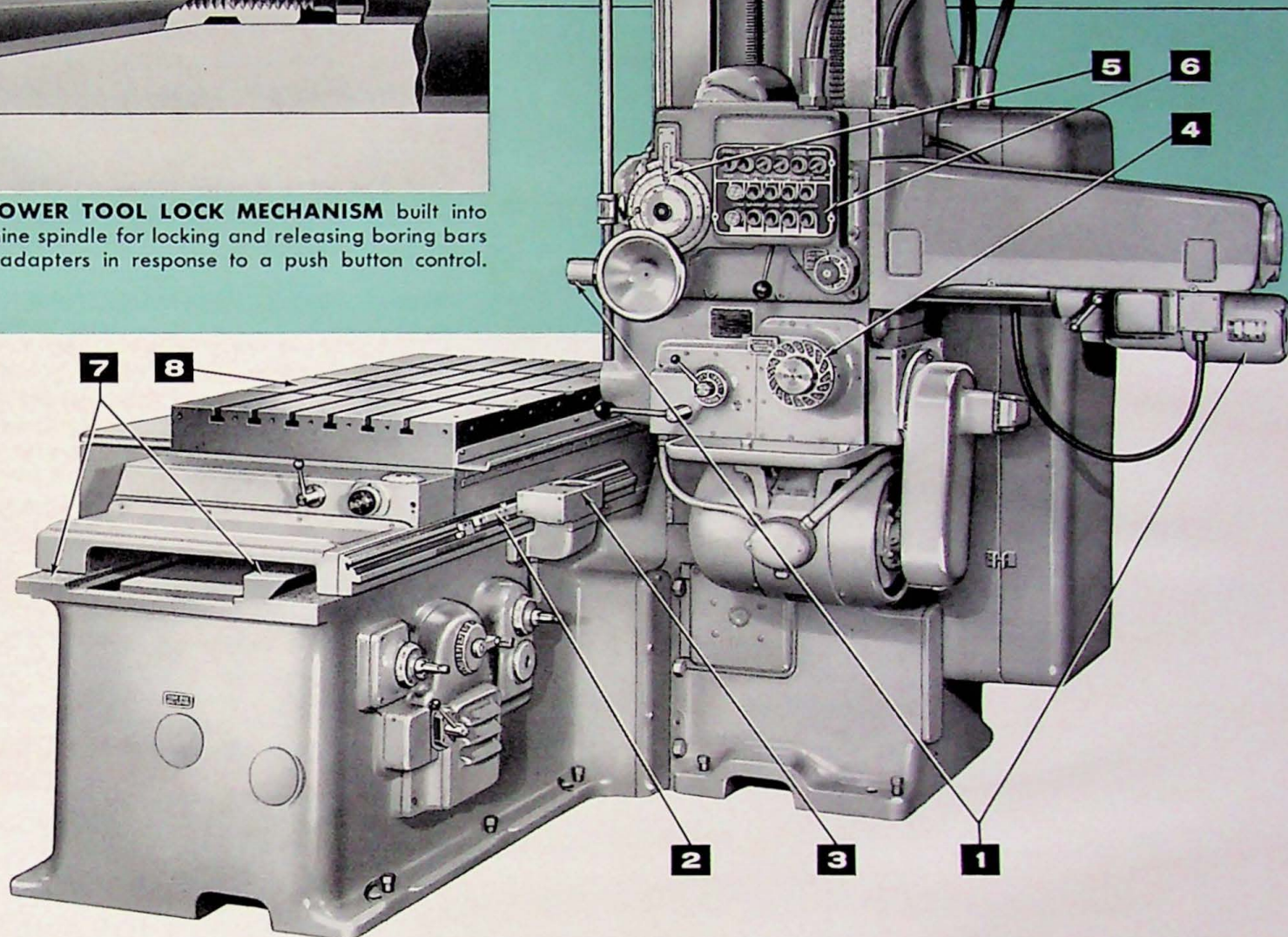
MAIN OPERATING PUSH BUTTON CONTROLS ON SPINDLE HEAD provide convenience of operation for all movements of the machine.



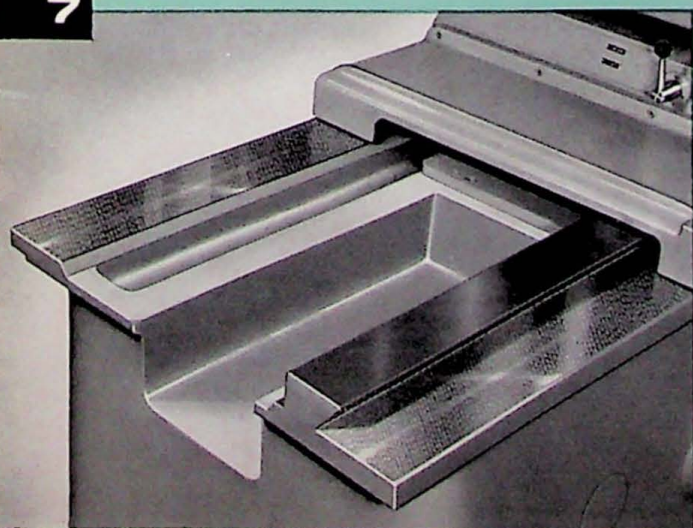


1 **POWER TOOL LOCK MECHANISM** built into machine spindle for locking and releasing boring bars and adapters in response to a push button control.

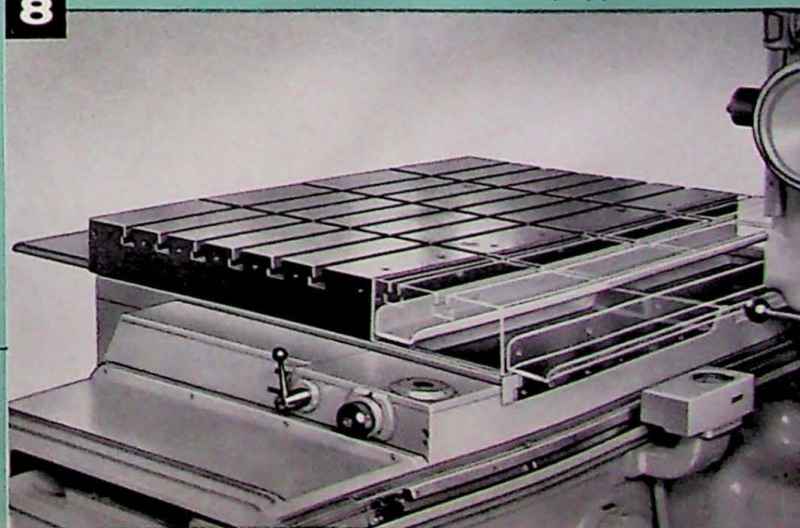
MODEL SHOWN IS
3B-48
DEVLIEG SPIRAMATIC
JIGMIL



MACHINE SLIDES ARE OF GENEROUS DIMENSIONS and accurate alignment is maintained through narrow vee guide. Saddle and table are fully supported on the machine bed at the maximum range of travel.



AUTOMATIC TABLE RETRACTION—To facilitate tool changing and work inspection, machine table is retracted parallel to the spindle axis and repositioned automatically by push button control.



A Comprehensive range of Basic Machines for all

Model 2B-36 SPIRAMATIC JIGMIL

2½" diameter spindle bar
24" vertical travel
36" horizontal travel
36" x 24" table

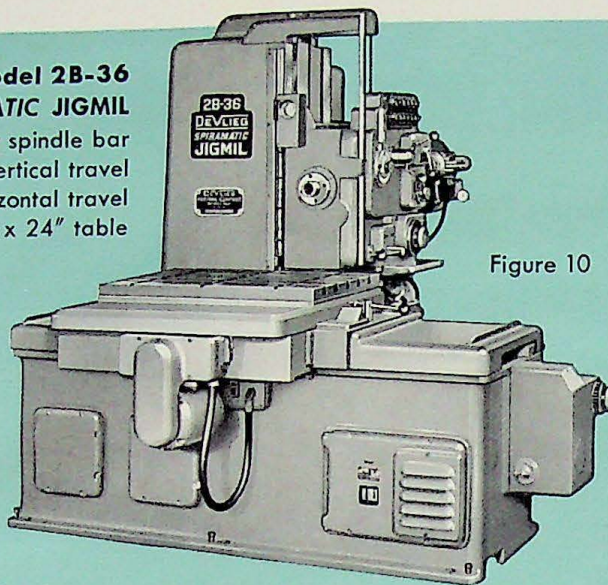


Figure 10

DeVlieg SPIRAMATIC JIGMILS are available in a wide variety of sizes for machining all types and sizes of work pieces, ranging from small instrument parts, jigs and fixtures, etc., to large work pieces such as side frames for printing and paper machinery, aircraft assembly jigs, large gear boxes, etc. Condensed specifications of the full range of standard machines are given below and detailed specifications are listed on Pages 22 and 23.

Model 2B-36 SPIRAMATIC JIGMIL*

This machine is designed for boring and milling small work pieces such as instrument parts, gear cases, jigs, fixtures and experimental parts. The Model 2B-36 machine is available in one size only with 2½" diameter spindle bar, 24" vertical travel and 36" horizontal travel. See pages 22 and 23 for detailed specifications.

Model 3B-48 SPIRAMATIC JIGMIL

3" diameter spindle bar
36" vertical travel
48" horizontal travel
48" x 30" table

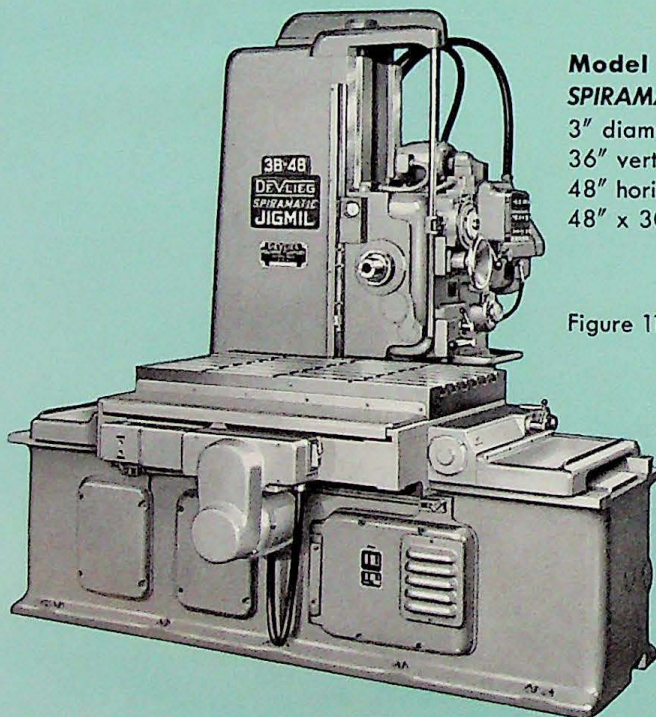


Figure 11

SERIES 3B SPIRAMATIC JIGMILS

Series 3B machines are designed for all types of production work and one-piece jobs in the medium size range. Series 3B machines have 3" diameter spindle bar, 36" vertical travel and 48", 72" or 96" horizontal travel. See pages 22 and 23 for detailed specifications.

Model 3B-72 SPIRAMATIC JIGMIL

3" diameter spindle bar
36" vertical travel
72" horizontal travel
72" x 30" table

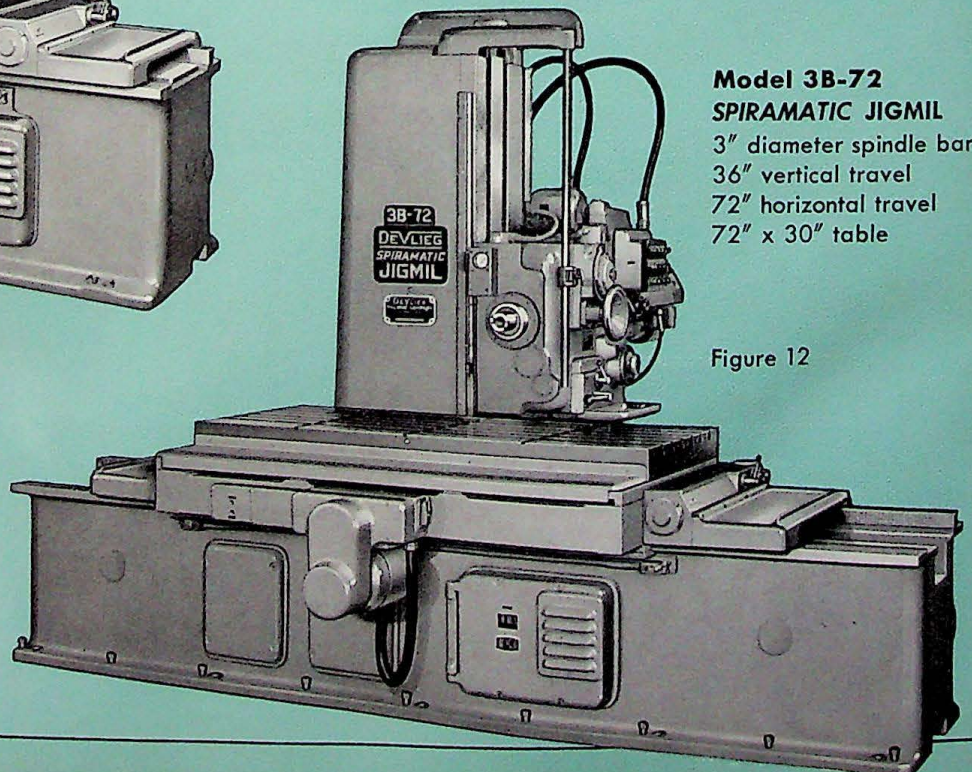


Figure 12

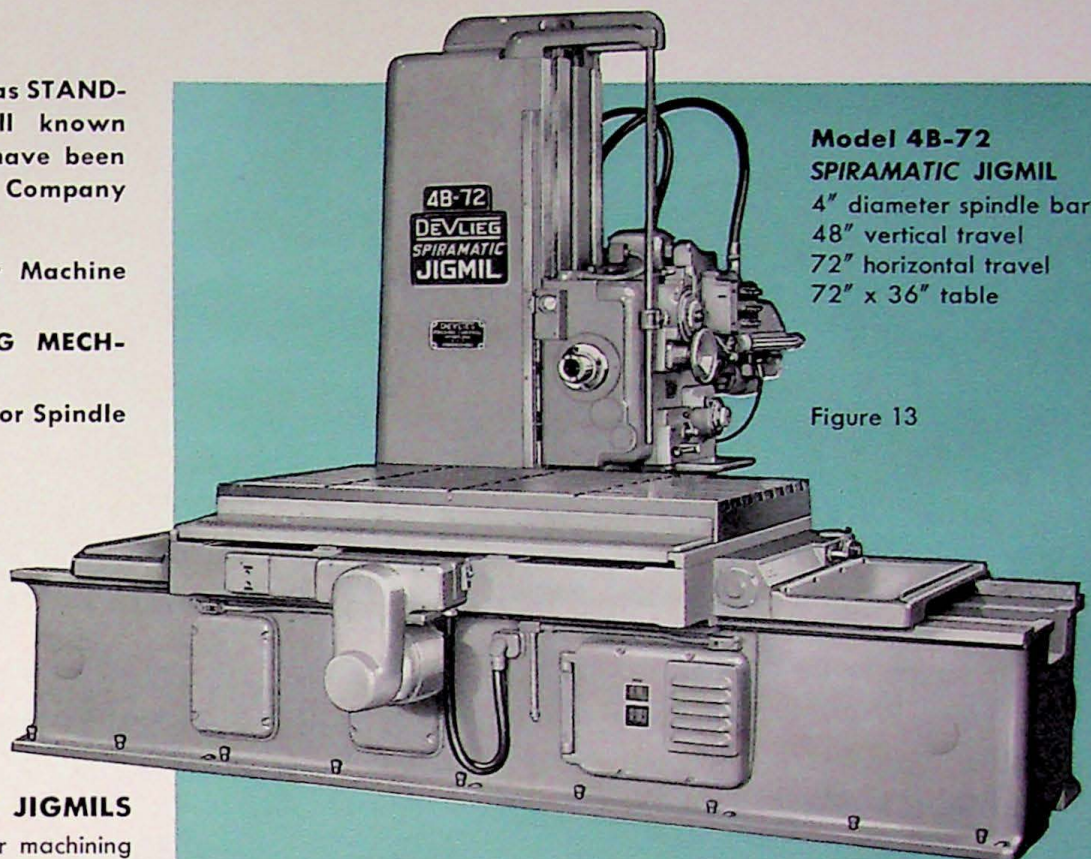
types of Precision Boring and Milling Operations

All SPIRAMATIC JIGMILS incorporate as STANDARD EQUIPMENT the many well known patented automatic functions that have been pioneered by the DeVlieg Machine Company and which include:

- **AUTOMATIC POSITIONING** for Machine Table and Spindle Head.
- **AUTOMATIC SPEED CHANGING MECHANISM** for Machine Spindle.
- **AUTOMATIC TRIP MECHANISM** for Spindle Bar Feed.
- Machine Spindle equipped with **POWER OPERATED TOOL LOCK MECHANISM** for locking and releasing boring bars, milling cutter adapters, etc.
- Machine Table and Column furnished with **DUPLITROL EQUIPMENT** for "Jigless Boring" production work.

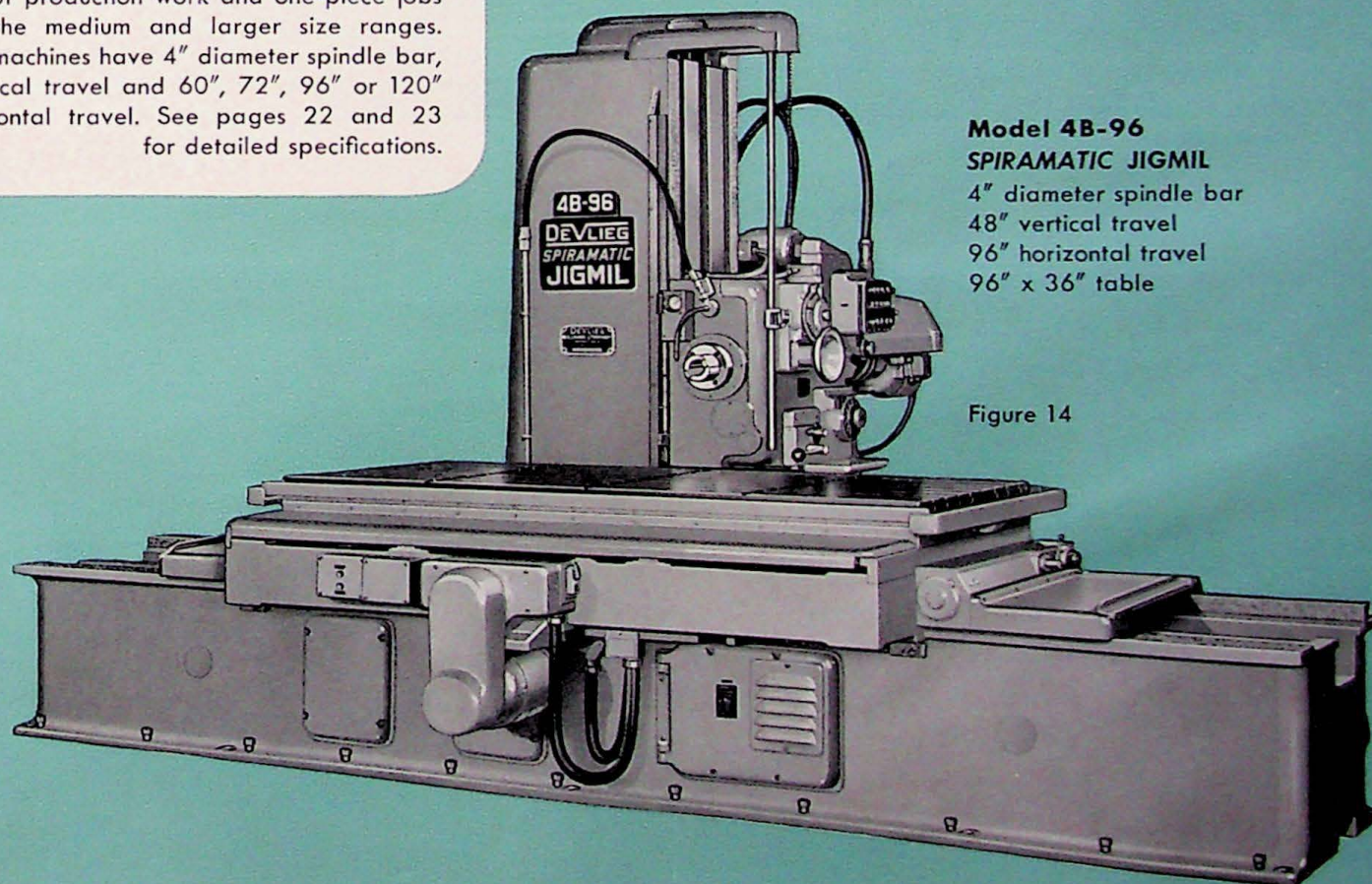
SERIES 4B SPIRAMATIC JIGMILS

Series 4B machines are designed for machining all types of production work and one-piece jobs in the medium and larger size ranges. Series 4B machines have 4" diameter spindle bar, 48" vertical travel and 60", 72", 96" or 120" horizontal travel. See pages 22 and 23 for detailed specifications.



**Model 4B-72
SPIRAMATIC JIGMIL**
4" diameter spindle bar
48" vertical travel
72" horizontal travel
72" x 36" table

Figure 13



**Model 4B-96
SPIRAMATIC JIGMIL**
4" diameter spindle bar
48" vertical travel
96" horizontal travel
96" x 36" table

Figure 14

*Model 2B-36 Machine is furnished with manually operated Dial Spindle Speed Changing Mechanism.

Figure 15

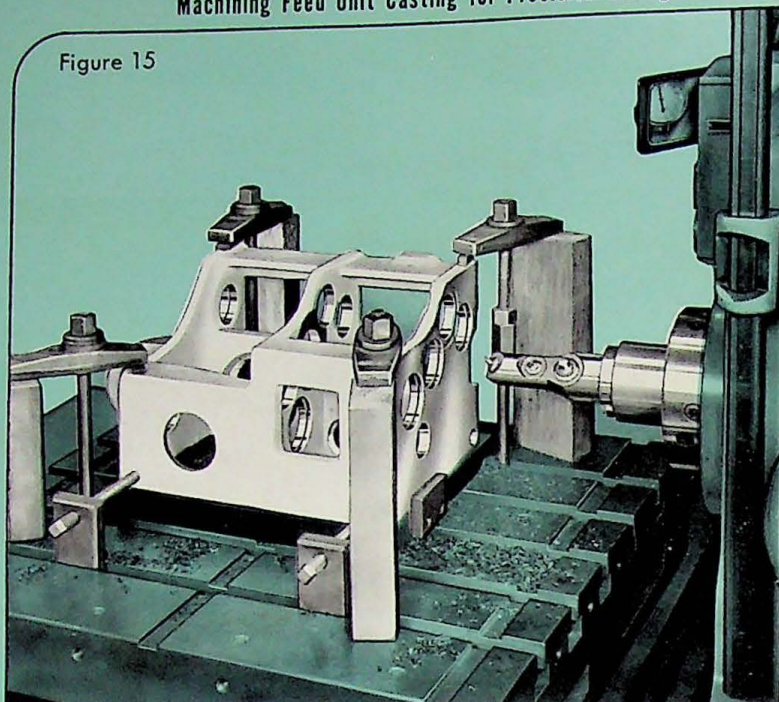
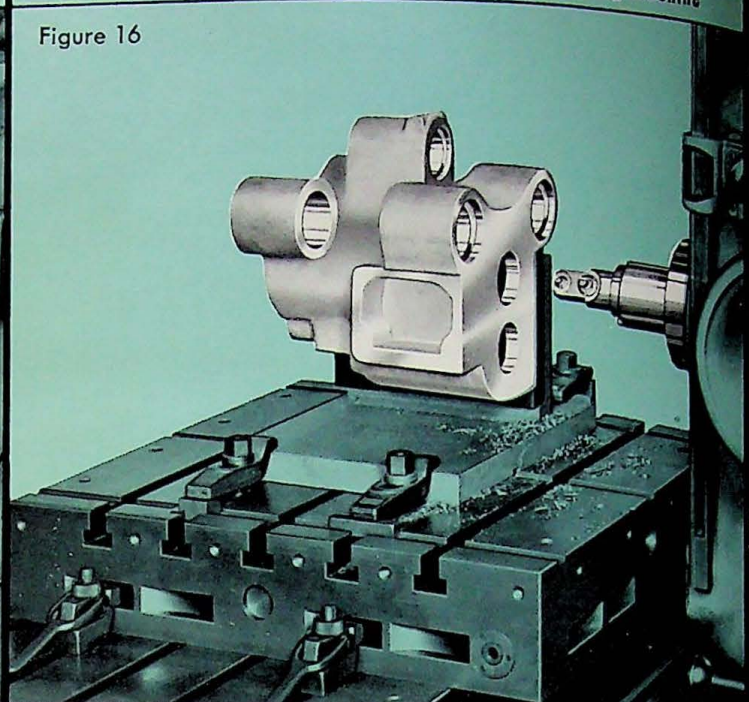


Figure 16



The Jigmil Field of Application

PRODUCTION APPLICATIONS

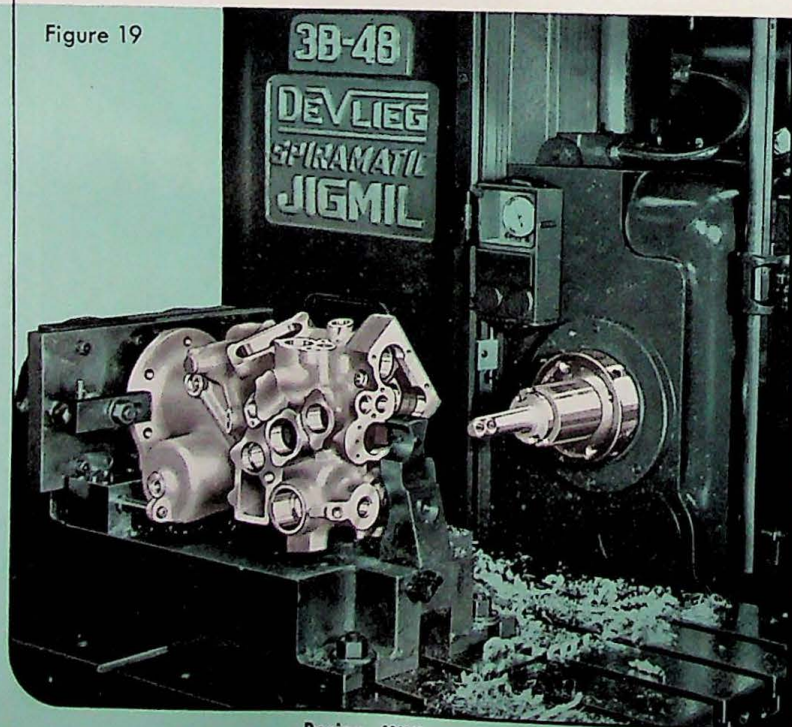
The DeVlieg System of "JIGLESS BORING"

- Eliminates expensive boring jigs.
- Permits complete flexibility of product design.
- Insures interchangeable assembly of parts without hand fitting.

DeVlieg JIGMILS are used extensively for "jigless boring" a wide variety of production parts such as pump housings, gear cases, aeronautical and instrument parts, components for machine tools, printing presses, paper machinery, textile machinery, and all types of machine parts requiring accurate holes and surfaces in accurately spaced relation.

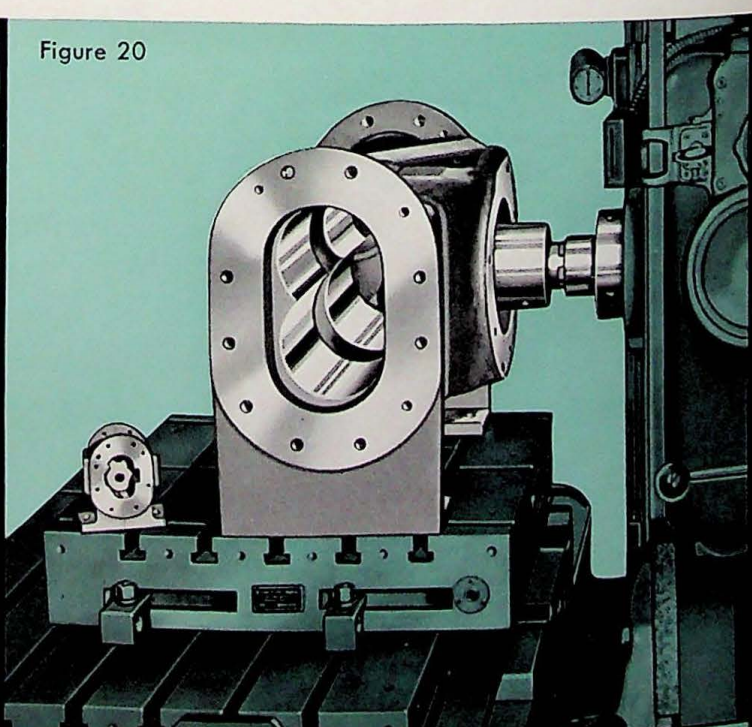
The jobs illustrated are typical examples of the wide variety of work

Figure 19



Boring, Milling and Tapping Fuel Control Body

Figure 20



Boring Screw Pump Bodies

Figure 17

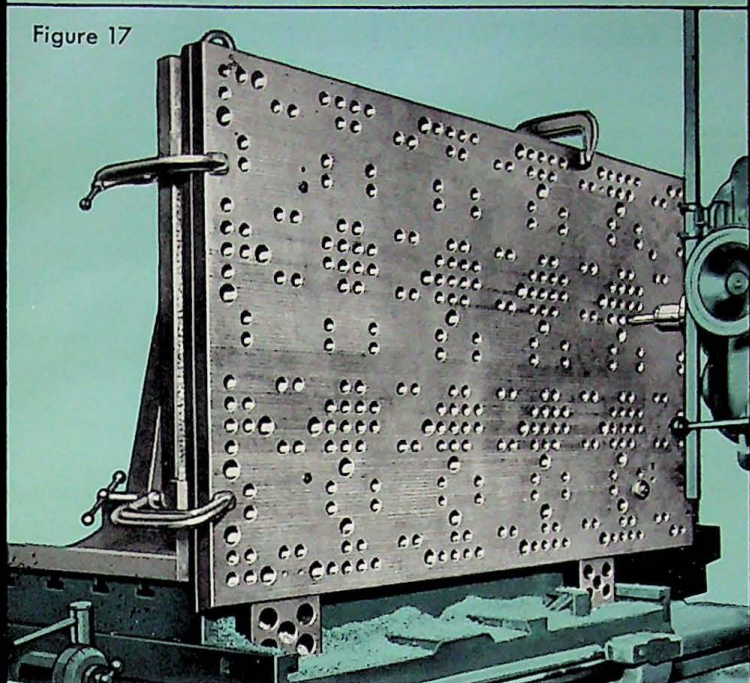
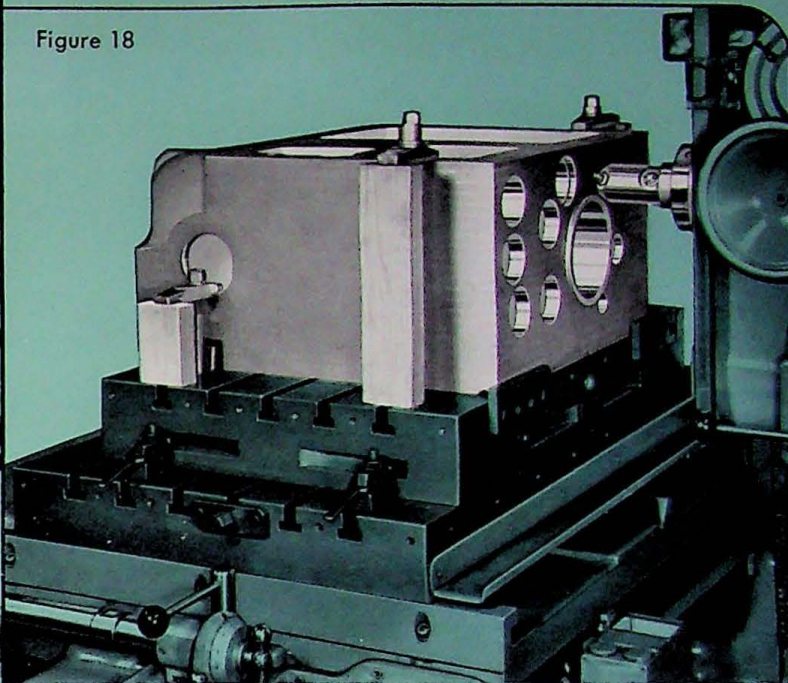


Figure 18



The DeVlieg JIGMIL is an unusually versatile machine which can be used effectively for production work or one-piece jobs.

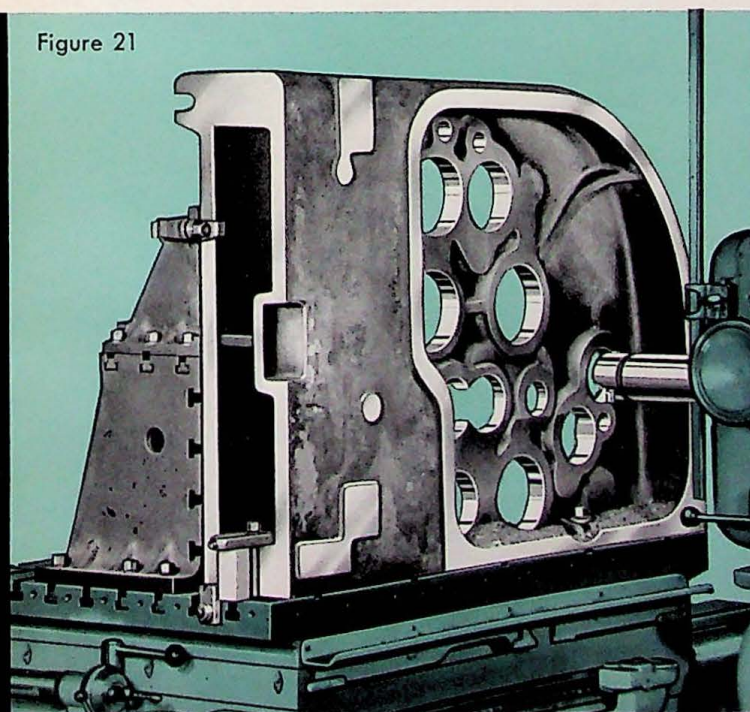
ONE-PIECE JOBS

The versatility of DeVlieg JIGMILS is exemplified by their widespread use in tool rooms, experimental shops and contract job shops. All types of jigs, fixtures and experimental parts can be machined on the JIGMIL to precise limits of accuracy without the special operator skill which is normally required for this type of work. Reliance on the "human element" to produce close

tolerance work is largely eliminated by the use of automatic machine functions which are basic features of the JIGMIL design. The JIGMIL principle of precision boring and milling permits the machining of work pieces from 2, 3 or 4 sides at one setting, and actual machining times are much faster than are possible with conventional machines and methods.

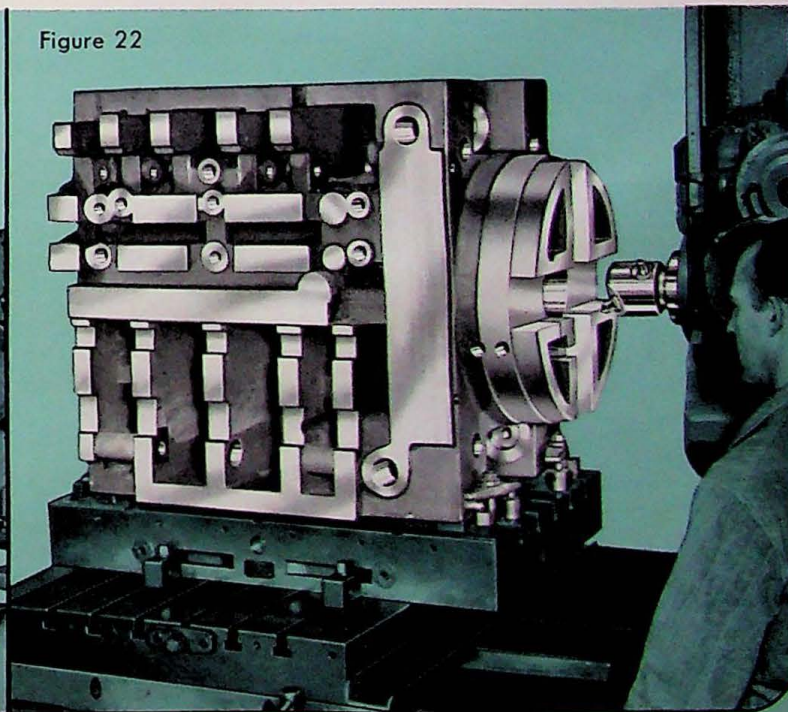
which is being machined accurately and economically on DeVlieg JIGMILS

Figure 21



Boring Side Frame for Paper Machinery

Figure 22



Boring, Milling and Drilling Hydraulic Fixture for special Broaching Machine

Spiramatic Spindle Head

(PATENT NOS. 2,728,242—2,728,248)

SERIES 3B and 4B MACHINES

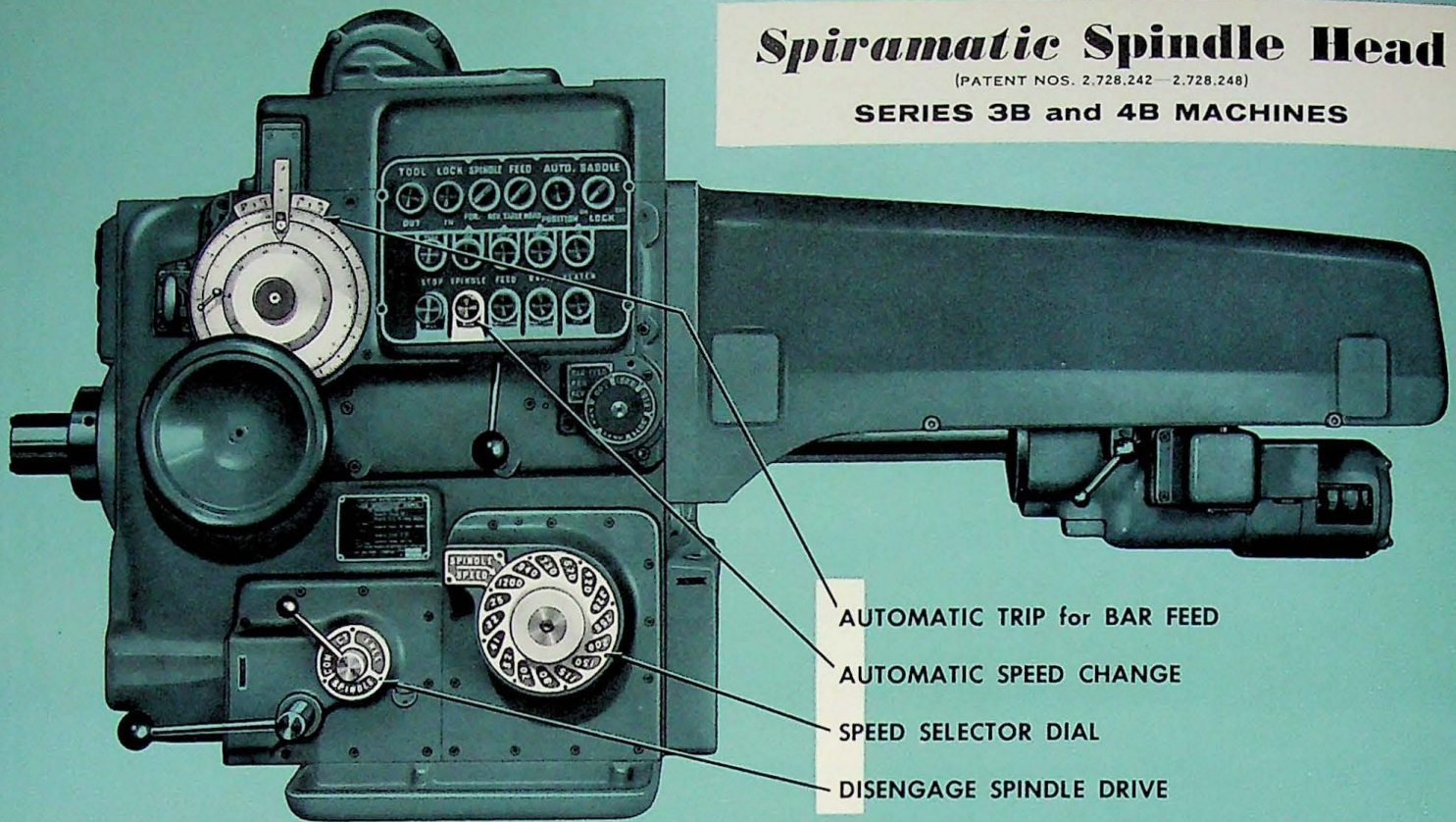


Figure 23

AUTOMATIC SPINDLE HEAD TRANSMISSION

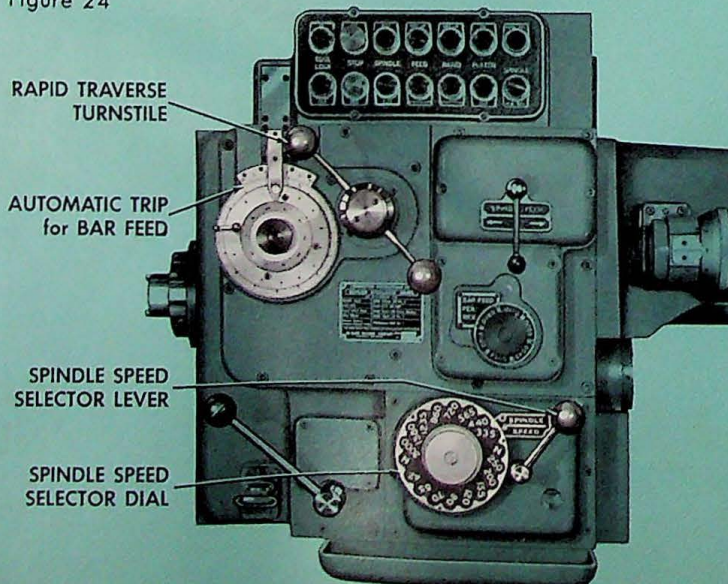
The **SPIRAMATIC** Spindle Head incorporates helical gears operating in constant mesh. All speed changes are effected **automatically** through the operation of a single push button. Spindle speeds are preselected by rotating the **SPEED SELECTOR DIAL** (Fig. 23) to the desired speed, and the actual speed change is made automatically in response to a push button. Speed changes from high to low speeds are made smoothly and without shock to the transmission. The automatic speed changing mechanism can be operated with the machine spindle running in the forward or reverse direction. For setup purposes, the spindle drive can be disengaged by moving a single lever (Fig. 23) and the spindle can then be freely rotated by hand.

AUTOMATIC TRIP MECHANISM for SPINDLE BAR FEED

SERIES 2B, 3B and 4B MACHINES

All **SPIRAMATIC** JIGMILS are furnished with an **AUTOMATIC TRIP MECHANISM** for stopping the spindle bar feed at any predetermined point. This feature provides a means for accurately controlling the depth of bar feed when dealing with counterboring, facing and back-facing operations. The setup for the automatic trip is established by setting the combination Dials and Vernier Scales (Fig. 23) for the required depth of feed, and the power feed is automatically stopped when the tool reaches the desired depth of cut.

Figure 24



Spiramatic Spindle Head

MODEL 2B-36 MACHINE

The Spindle Head for the Model 2B-36 machine (Fig. 24) incorporates helical gears operating in constant mesh. Spindle speeds are selected in the following manner:

1. Speed Selector Lever is operated to neutralize the drive.
2. Selector Dial is turned to desired speed.
3. Speed Selector Lever is operated to re-engage and start the drive.

The spindle bar rapid traverse is operated by a two-speed turnstile. A range of bar feeds is provided with an automatic trip and depth control mechanism.

Jigmil Power Tool Lock Mechanism

(PATENT NOS. 2,667,819—2,667,820)

SERIES 2B, 3B and 4B MACHINES

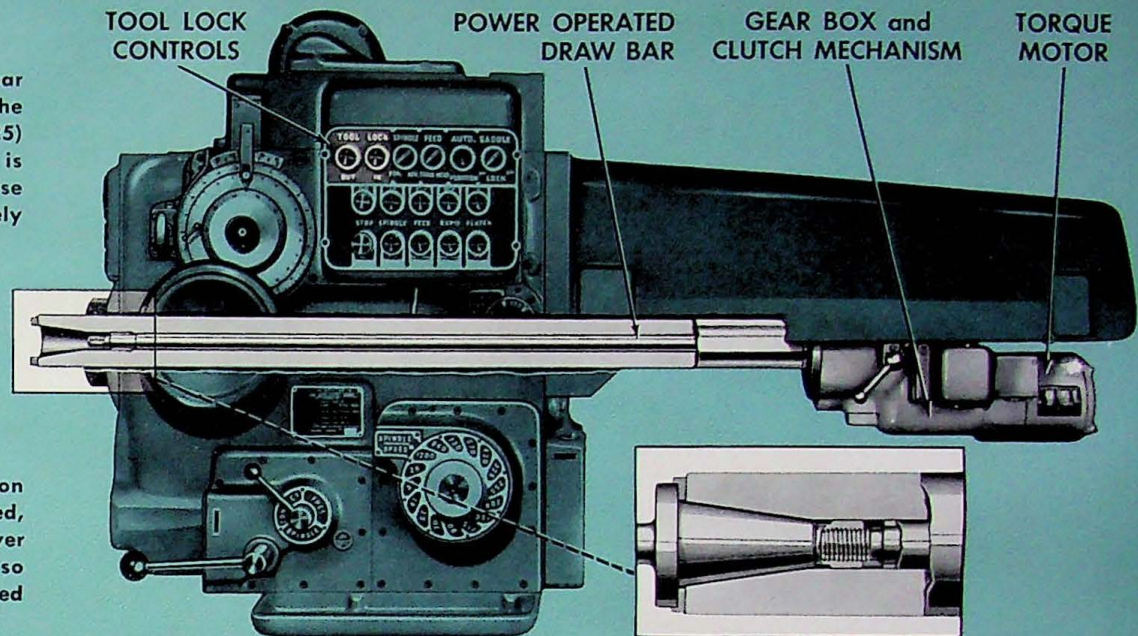
LOCKING OPERATION

The tool is placed in the spindle bar to the full depth of the socket, the push button marked "IN" (Fig. 25) is depressed, and the draw bar is then rotated by power in a clockwise direction, locking the tool securely in position.

Figure 25

UNLOCKING OPERATION

To release the tool, the push button marked "OUT" (Fig. 25) is depressed, and the draw bar is rotated by power in a counter-clockwise direction so that the tool can be freely removed from the spindle bar.



All **SPIRAMATIC** JIGMILS are furnished with a Power Tool Lock Mechanism which provides a means for locking and releasing boring bars and cutter adapters, etc., in response to a push button control. The machine spindle bar is hollow and carries a threaded draw bar (Fig. 25) which is rotated by a fractional H.P. torque motor driving through a simple clutch and gear box mechanism. The machine spindle bar is furnished with standard milling machine taper socket, the Series 2B and 3B machines having No. 40 NMTB taper and the Series 4B machines having No. 50 NMTB taper. The JIGMIL Tool Lock Mechanism provides a uniform

and adequate locking pressure and tools can be locked or released in a matter of seconds. For boring operations, especially in production applications, the uniform locking pressure assures the accurate duplication of any given bore diameters. Tool changes can be made with the spindle bar fully retracted in the spindle sleeve or at any position within its range of travel. The necessity for driving slots and drift slots in the spindle bar is eliminated, and the abuse of spindle and bearings caused by hammering and wedging tools into position, such as is the practice with self-holding tapers, is completely eliminated.

BAR FEED DEPTH CONTROL ATTACHMENT

SERIES 2B, 3B and 4B MACHINES

For production operations, a Bar Feed Depth Control Attachment can be furnished with all **SPIRAMATIC** JIGMILS at extra charge. This attachment consists of a Rotating Turret Bar (Fig. 26) carrying 12 Adjustable Stops which can be set at any desired positions. The Trip Unit carries a projecting contact arm, and when this arm comes into contact with the Adjustable Stops the Bar Feed is tripped automatically. For production work involving multiple counterboring, facing or back-facing operations to close limits, the appropriate number of Adjustable Stops are set to the required positions and the Turret Bar is rotated to its proper station for each individual operation.

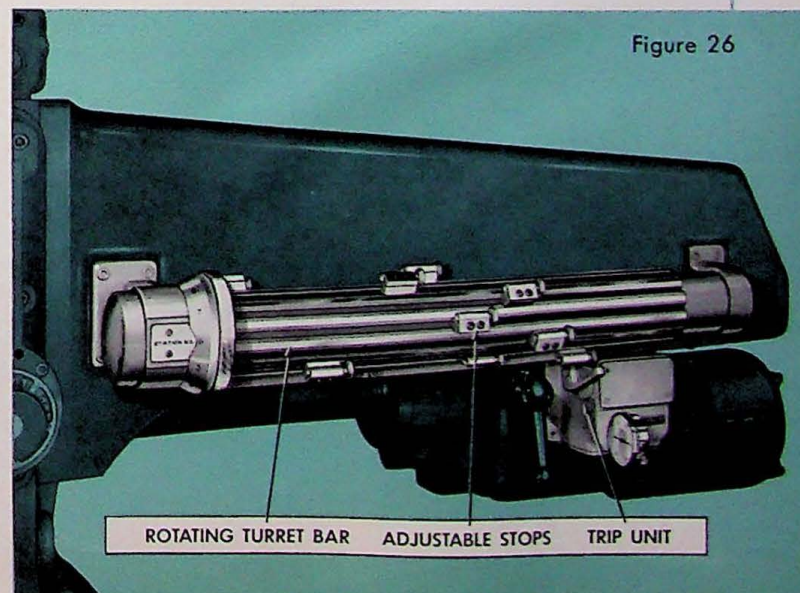


Figure 26

Automatic Positioning of Machine Table and Spindle Head

SERIES 2B, 3B and 4B MACHINES

(PATENT NO. 2,561,346)

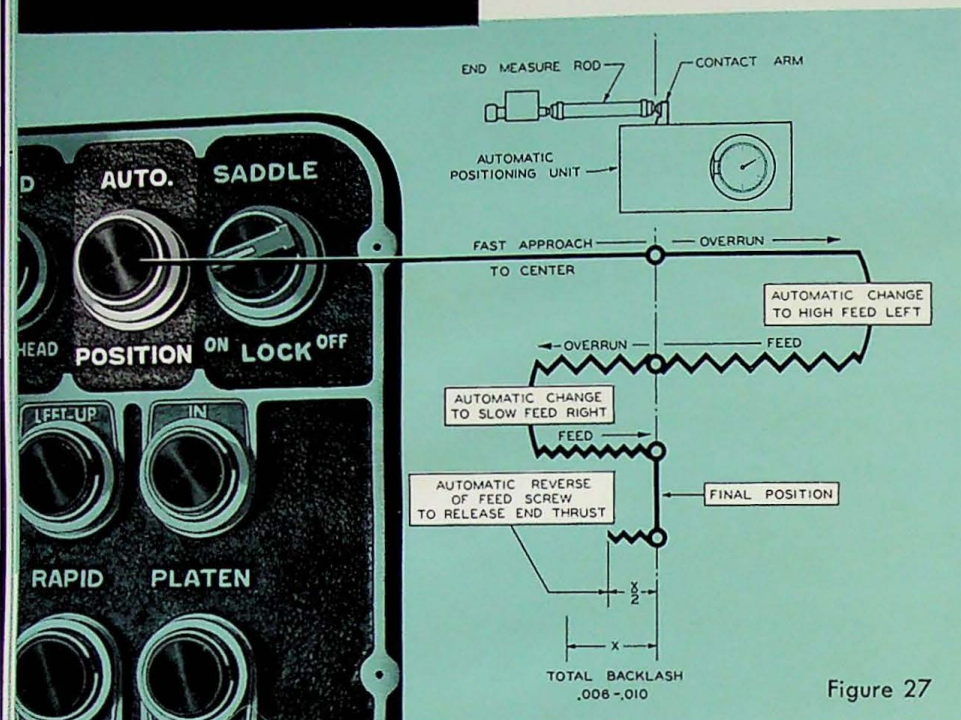


Figure 27

Automatic Positioning for machine table and spindle head is furnished as standard equipment with all **SPIRAMATIC JIGMILS**. The DeVlieg System of positioning the machine table and spindle head in the horizontal and vertical planes is performed automatically through a patented sequenced electrical cycle. This important feature provides a means for controlling hole spacing in the work piece to precise limits of accuracy through the simple operation of a single push button. The diagram (Fig. 27) shows the path of travel of the machine table and spindle head during the automatic positioning cycle. The sequence of operations is as follows:

1. Suitable end measure gages or Duplitrol bars are placed in position in the measuring troughs.
2. The push button (Fig. 27) marked "AUTO POSITION" is then depressed, causing the machine table or spindle head to move by rapid traverse until the measuring element contacts the contact arm projecting from the automatic positioning unit (Fig. 28). The automatic positioning cycle is then completed by oscillating the table and spindle head about the zero line at successively slower feeds, stopping these elements within precise limits of the position determined by the end measure gages or Duplitrol bars. At the position of final location, the machine automatically releases the end thrust of the feed screw so that the table or spindle head can be locked securely without affecting its accurate location.

Illustration (Fig. 28) shows the Automatic Positioning Unit with built-in dial indicator for controlling the location of the machine spindle head in the vertical plane. A similar positioning unit is mounted on the front side of the machine bed for automatically positioning the table in the horizontal plane.

For general purpose work involving one-piece jobs, a combination of end measure gage rods and micrometer heads serves as a dependably accurate means for controlling hole spacing.

A standard set of end measure gage rods is available for each size of machine, and a typical set is illustrated in Fig. 29.

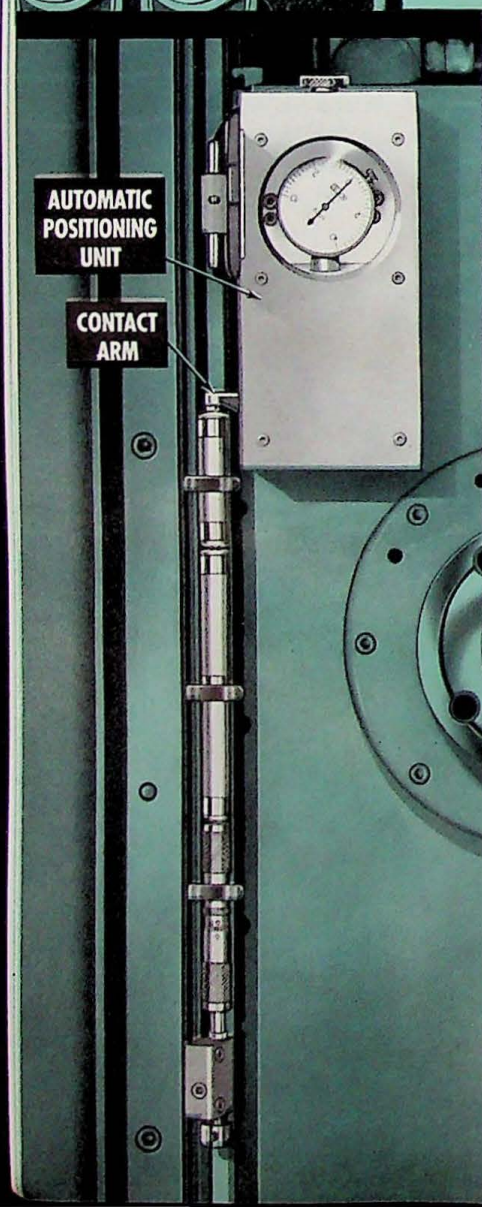


Figure 28

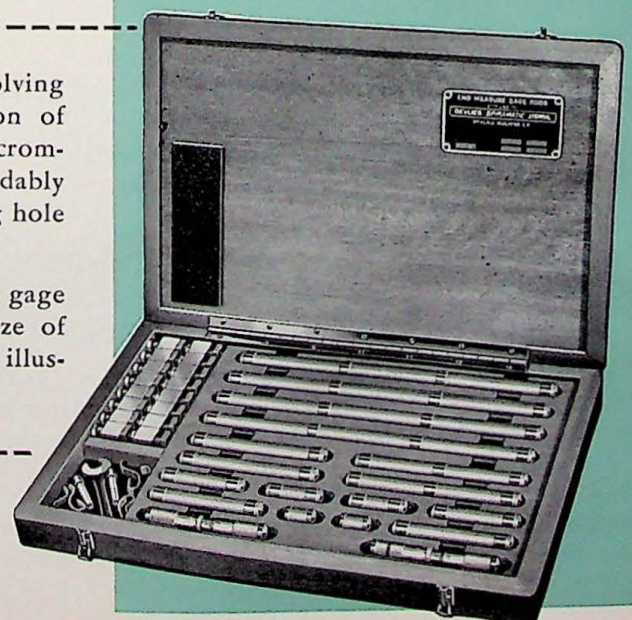


Figure 29

The Jigmil Duplitrol System

(PATENT NO. 2,575,945)

**SERIES 2B, 3B
and 4B MACHINES**

Figure 30

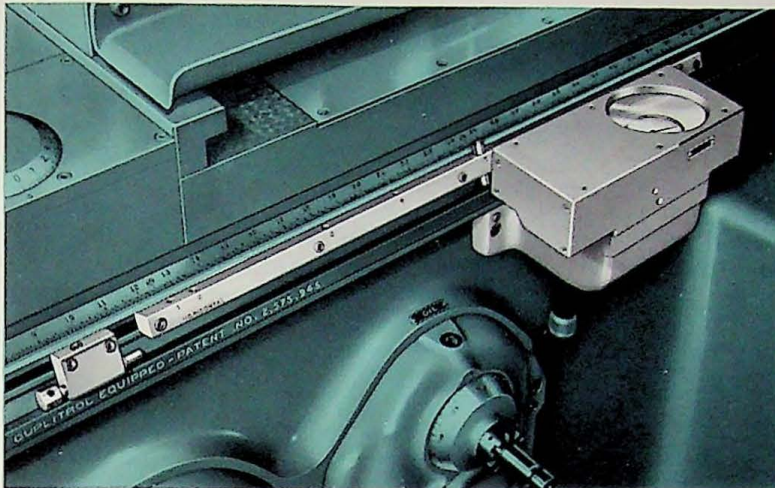


Illustration (Fig. 30) shows a Duplitrol bar mounted in position on the side of the JIGMIL table for controlling the positioning of the machine table in the horizontal plane. Duplitrol bars are made from suitable lengths of $\frac{3}{4}$ " square steel, into which are bored a series of $\frac{1}{4}$ " diameter holes accurately spaced to suit the hole spacing in the work piece. Each Duplitrol bar is furnished with a stop pin $\frac{1}{4}$ " diameter by $1\frac{5}{8}$ " long as illustrated in Fig. 30. With the stop pin in correct location in the Duplitrol bar the automatic positioning cycle is engaged and when the stop pin contacts the contact arm projecting from the positioning unit, the machine table is automatically positioned. As each hole in the work piece is bored, the stop pin is moved progressively into the holes in the Duplitrol bar and the machine table is automatically positioned for each hole location. A similar Duplitrol bar is mounted in the vertical measuring trough on the machine column and this controls the automatic positioning of the spindle head in the vertical plane.

Illustration (Fig. 31) shows a typical layout of a work piece and the necessary Duplitrol bars. The holes in the work piece are laid out in right angle coordinates and the hole locations are identified in the horizontal plane by numerals 1, 2, 3, etc., and in the vertical plane by letters A, B, C, etc. The holes in the Duplitrol bars are identified by similar markings. This layout system provides the JIGMIL operator with a simple key for all hole locations, and by reference to the identifying numerals and letters shown on the layout, the operator simply inserts the stop pins in the appropriate holes in the Duplitrol bars, engages the automatic positioning cycle and the machine is automatically positioned for each hole location.

A special service covering the layout and manufacture of Duplitrol bars is available to all JIGMIL users and prices will be quoted on request. Alternatively, JIGMIL users can bore their own Duplitrol bars on the JIGMIL by providing a suitable layout as shown in Fig. 31.

Illustration (Fig. 32) shows the actual work piece set up for boring on the JIGMIL with the Duplitrol bars in location. The same layout system and Duplitrol control is used when dealing with gear boxes, etc., where it is necessary to bore the work piece from two, three or four sides. This type of work is completely machined at one setting on the JIGMIL Index Table which is described on Pages 14 and 15.

Standard hardened and ground Duplitrol blocks (Fig. 33) are used for production work when conditions do not warrant making special Duplitrol bars. Standard Duplitrol blocks are particularly recommended for a production run when the job is not likely to repeat.

All **SPIRAMATIC** JIGMILS are furnished with patented Duplitrol Attachment as standard equipment. The JIGMIL Duplitrol System in conjunction with the Automatic Positioning of the Machine Table and Spindle Head provides a means for "Jigless Boring" all types of medium and small lot production work to precise limits of accuracy. A set of two simple Duplitrol bars is provided for each job and these bars serve as accurate and permanent masters for duplicating the particular work piece at any time. The Duplitrol System *eliminates expensive boring jigs* and permits complete flexibility in product design. When product design changes occur it is only necessary to provide two inexpensive Duplitrol bars to suit the hole spacing in the redesigned part.

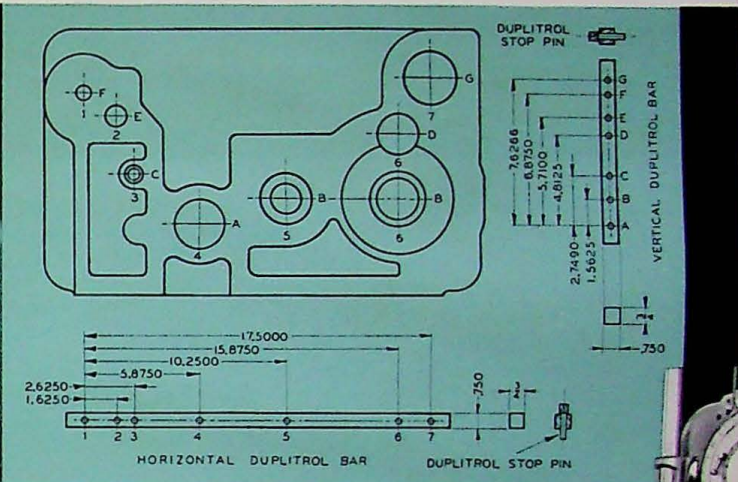


Figure 31

Figure 32

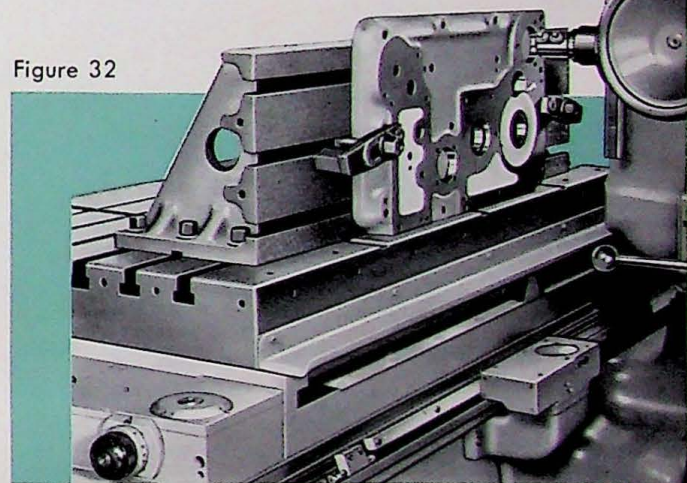


Figure 33

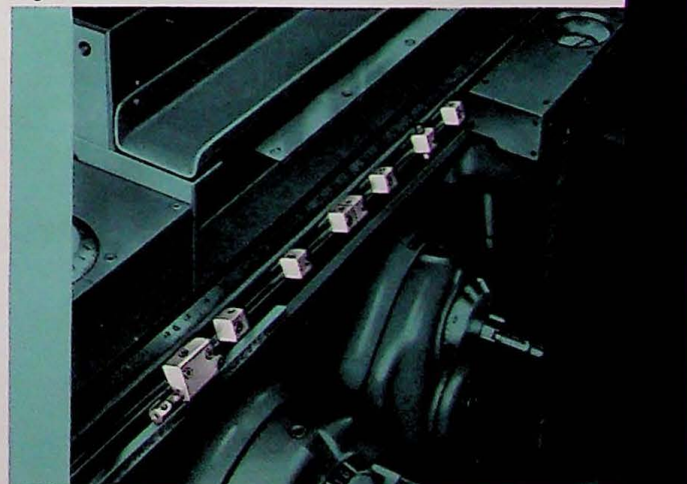
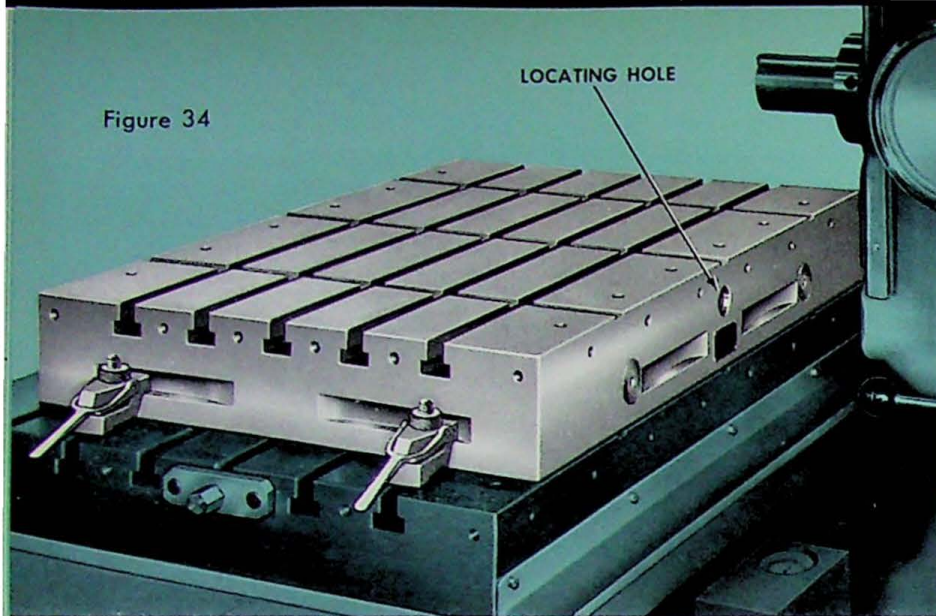


Figure 34



Standard Index Tables

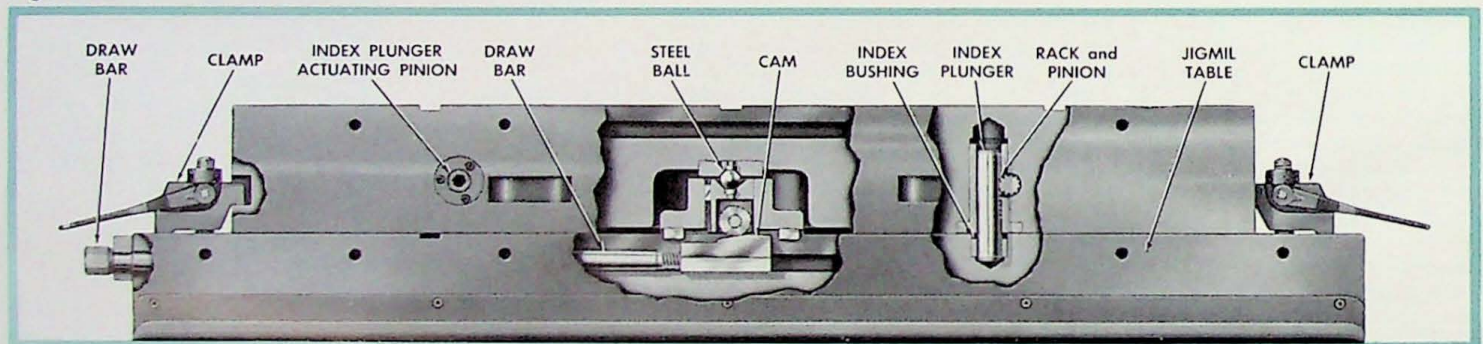
TYPE "E" INDEX TABLES

Standard Type "E" Index Tables (Fig. 34) for use on Series 3B and 4B Machines, provide a simple and accurate means for boring gear cases, box jigs, etc., from two, three or four sides without resetting the work piece. Standard tables provide four 90° indexing positions and the method of indexing used in the JIGMIL Index Table insures precise angular relationship between bores. Long "in-line" bores are held to accurate alignment by machining the work piece from one end, indexing 180° and machining the opposite end. JIGMIL Index Tables are made from heavy box section castings to withstand clamping pressures without distortion.

Illustration (Fig. 35) shows the general construction of Type "E" JIGMIL Index Tables and the principle used for controlling angular movements. Standard Type "E" Index Tables incorporate four accurately spaced index plungers in the form of a square. Each plunger is lowered or elevated individually by rack and pinion. In the main JIGMIL table two accurately spaced holes are provided at the same center distance as the plungers in the Index Table. These holes carry hardened and lapped bushings. The locating of the Index Table for each 90° index

is accomplished by engaging two plungers within the two bushings in the JIGMIL table (Fig. 35). This engagement of two closely fitting parallel plungers into the lapped bushings insures extremely accurate indexing. At the front side of the Index Table a locating hole (Fig. 34) is provided for setup purposes. This hole establishes the accurate center point of the Index Table and relationship between the machine spindle and the center of the Index Table can be picked up quickly from the locating hole.

Figure 35



THE PROCESS OF INDEXING is carried out in the following sequence (See Fig. 35):

- 1 Clamps are released and withdrawn.
- 2 Two plungers are elevated and disengaged from the bushings in the main JIGMIL table.
- 3 Draw bar is rotated causing wedge cam to elevate a steel ball riding in a double cone, thereby raising the Index Table so that it can be freely rotated. Ball and cone assembly allows the Index Table to float a limited amount and permits index plungers to freely and accurately find their locations in the bushings in the JIGMIL table.
- 4 After rotating Index Table to desired position, two index plungers are lowered into the bushings, the draw bar is rotated in a counter-clockwise direction, thereby lowering the Index Table onto the main JIGMIL table. The clamps are then moved into position and locked.

STANDARD TYPE "E" INDEX TABLES WITH FOUR 90° INDEX POSITIONS are available in the following sizes:

SERIES 3B MACHINES

SERIES 4B MACHINES

26" x 26"	26" x 40"	32" x 32"	32" x 48"	32" x 60"
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STANDARD TYPE "E" INDEX TABLES WITH 180° INDEX ONLY*

SERIES 3B MACHINES—12" x 26"	SERIES 4B MACHINES—16" x 32"
------------------------------	------------------------------

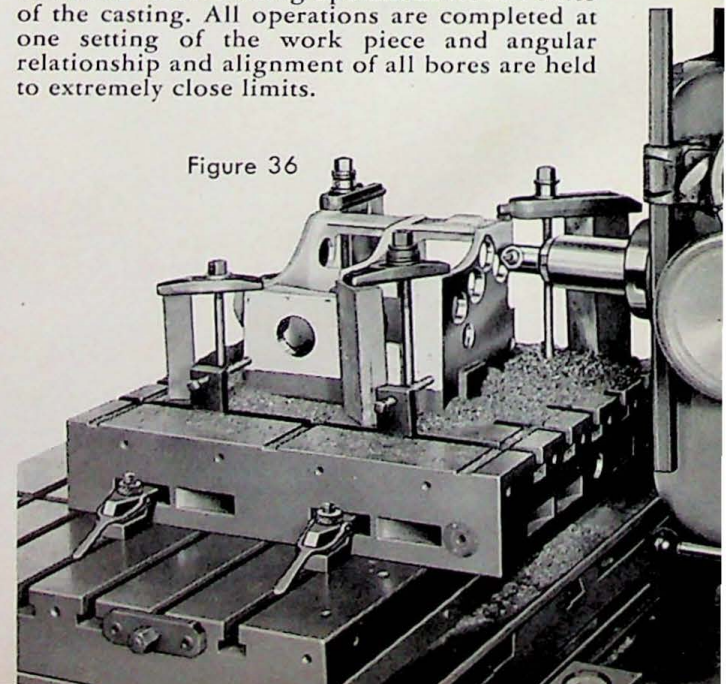
*These tables are designed strictly for small or narrow parts requiring machining from two sides only.

Standard Index Tables for Series 3B and 4B machines are furnished with tee slots and cross slots $\frac{13}{16}$ " wide. Tee slots are spaced at 4" centers.

Special Index Tables for production applications can be quoted on request.

Illustration (Fig. 36) shows typical Index Table setup for machining cast iron gear box on Model 3B-48 SPIRAMATIC JIGMIL. Machining operations include boring and counterboring 14 holes and various facing operations from 4 sides of the casting. All operations are completed at one setting of the work piece and angular relationship and alignment of all bores are held to extremely close limits.

Figure 36



for *Spiramatic* Jigmils

TYPE "M" INDEX TABLES

Standard Type "M" Index Tables (Fig. 37) are designed primarily for use on Model 2B-36 machines but can be used with advantage on all sizes of machines. Type "M" Index Tables are built to provide four 90° index stations to serve the needs for in-line bores and do work from four sides to precise limits with one chucking of the work piece. The unit is self-contained having an upper platen member which rotates on a fixed sub-base. The four positions are located by two precise, hardened and lapped plungers that register in hardened and lapped bushings. Great accuracy results from the index plungers being widely spaced each side of center. Two simple levers operate the index plungers, locking mechanism and the ball lifter. (See Fig. 38.)

The sequence of operation is as follows:

One actuating lever unlocks and raises the table slightly on the pivot ball. The index plunger actuating lever retracts the plungers. The table is then turned free from friction to the desired station, the plungers engaged, and the actuating lever retracts the pivot ball and firmly locks the table in position. A centering test hole is provided in the table for accurate locating of the machine spindle with the center of the table.

STANDARD TYPE "M" INDEX TABLES WITH FOUR 90° INDEX POSITIONS are available in the following sizes:

16" x 16" 20" x 20" 26" x 26"

Standard Type "M" Index Tables are furnished with tee slots and cross slots $1\frac{1}{16}$ " wide. Tee slots are spaced at 4" centers.

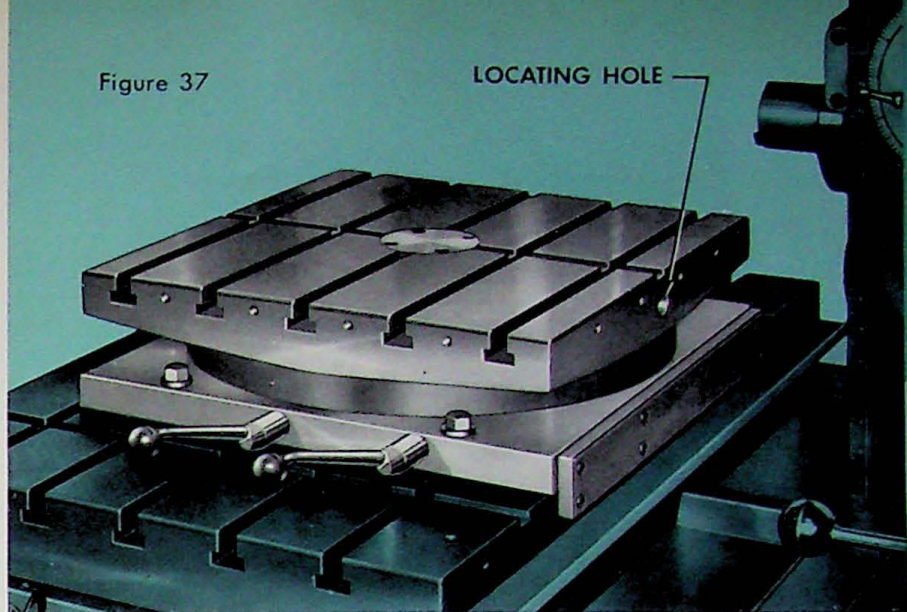


Figure 37

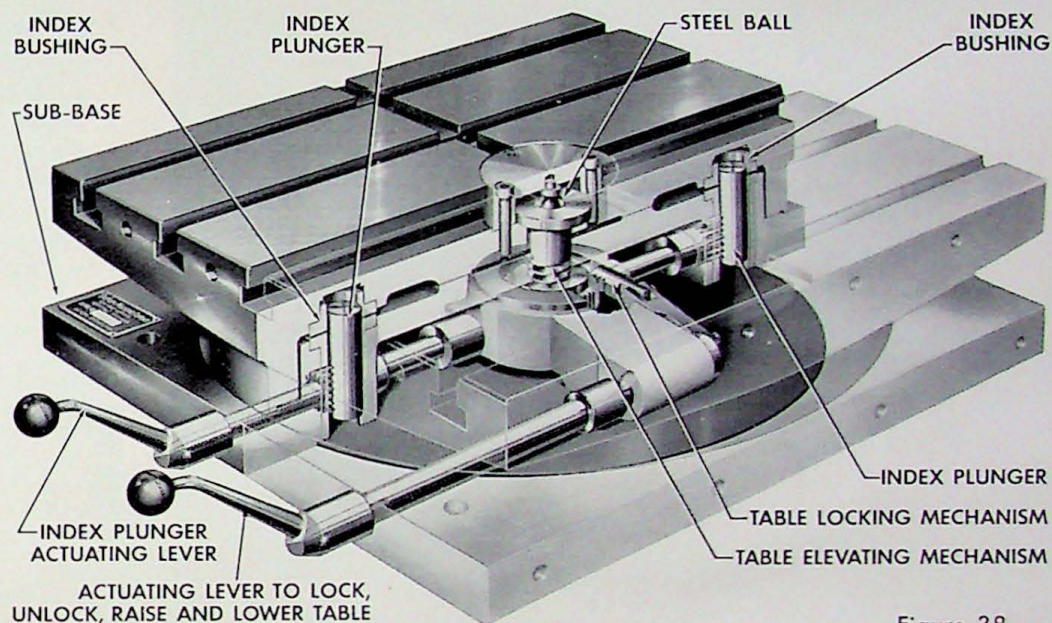


Figure 38

Jigmil Locating and Nesting Blocks

Figure 39

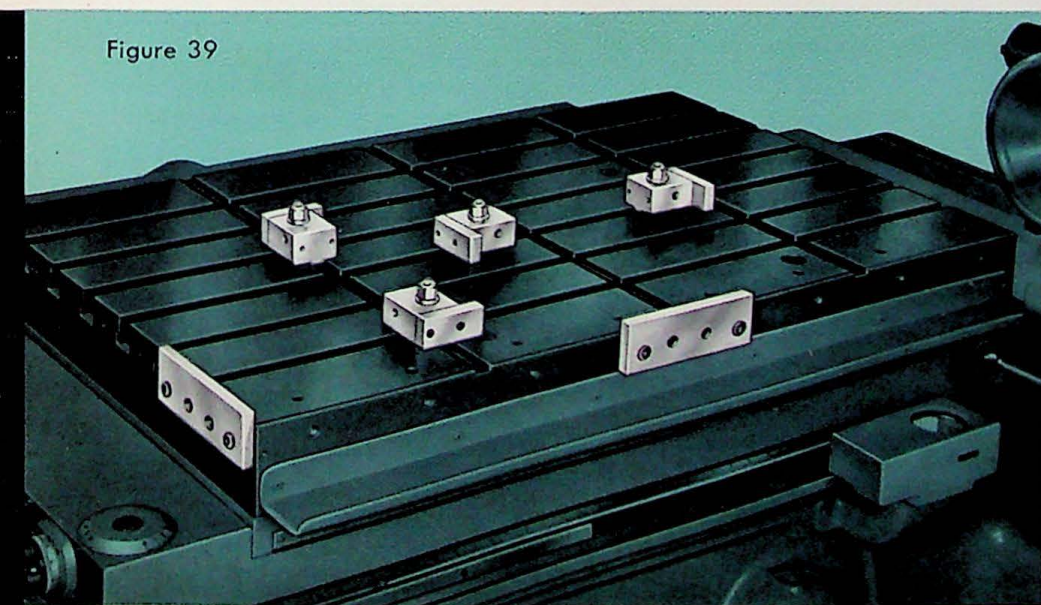


Illustration (Fig. 39) shows a standard matched set of hardened and ground steel Locating and Nesting Blocks which are used for accurately locating work pieces on the JIGMIL table. The arrangement of these blocks indicates how tee slots, cross slots and sides of the machine table are used for mounting standard Locating and Nesting Blocks. Provision is made on the JIGMIL Index Table and Angle Blocks for using the standard Locating and Nesting Blocks in a similar manner. A standard matched set comprises the following pieces arranged in fitted hardwood case:

For Series 3B and 4B machines to fit $1\frac{1}{16}$ " wide tee slots and cross slots:

Set RT-301A, consists of four Locating Blocks with locating tongues and end stops and two table front stops.

For Model 2B-36 machine to fit $1\frac{1}{16}$ " wide tee slots and cross slots:

Set RT-2301, consists of four Locating Blocks with locating tongues and end stops and two table front stops.

Jigmil Precision Matched Angle Blocks

FOR SERIES 3B and 4B MACHINES

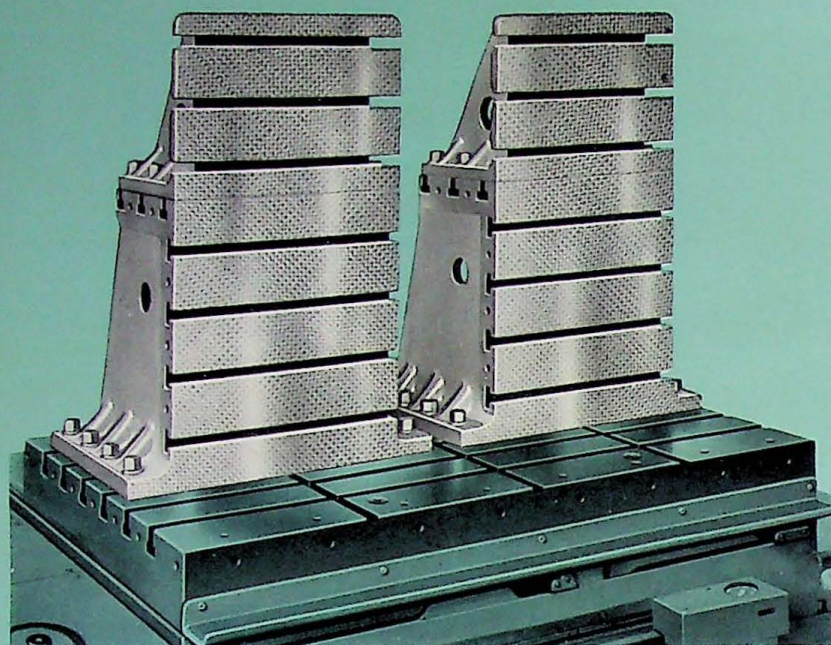


Figure 40

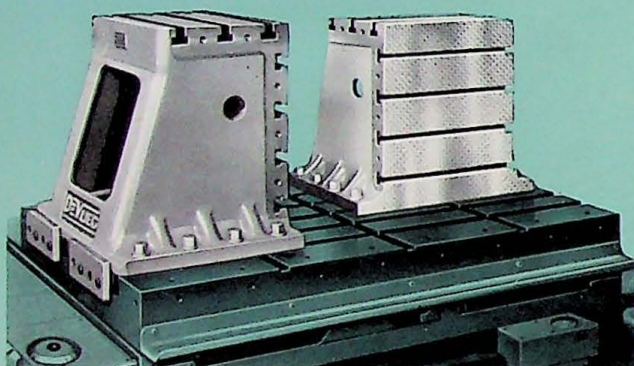


Figure 41

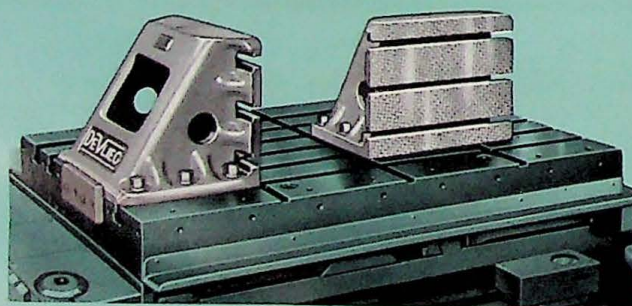


Figure 42

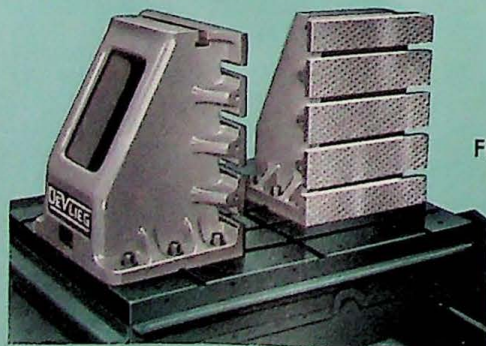


Figure 43

A standard set of four precision matched Angle Blocks provides a convenient means for mounting and clamping work for boring and milling operations. They have a wide range of use and can be applied singly or in a variety of combinations for small and large work. These blocks are machined from heavy box section castings and all flat surfaces are finished by hand scraping. Tee slots are provided to receive the standard Locating and Nesting Blocks so that work pieces can be quickly and accurately located. Standard sets of Angle Blocks for Series 3B and 4B machines include two top members, two bottom members and an assortment of hardened tee slot nuts, studs and screws.

TOP AND BOTTOM BLOCKS ASSEMBLY

Figure 40	Series 3B Machines	Series 4B Machines
	SET RT-303-304	SET RT-308-309
Height	30 1/4"	41"
Length	16 1/2"	20 1/2"
No. Tee Slots* (13/16")	7	10

TWO BASE BLOCKS

Figure 41	Series 3B Machines	Series 4B Machines
	SET RT-303	SET RT-308
<i>Vertical Face Dimensions</i>		
Height	18 1/4"	25"
Length	16 1/2"	20 1/2"
No. Tee Slots* (13/16")	4	6
<i>Top Face Dimensions</i>		
Width	12"	17 1/4"
Length	16 1/2"	20 1/2"
No. Tee Slots* (13/16")	3	4

TWO TOP BLOCKS

Figure 42	Series 3B Machines	Series 4B Machines
	SET RT-304	SET RT-309
Height	12"	16"
Length	16 1/2"	20 1/2"
No. Tee Slots* (13/16")	3	4

FOR MODEL 2B-36 MACHINE

The standard set of Angle Blocks for the Model 2B-36 machine consists of two blocks only, in accordance with the dimensions shown below.

Figure 43	Model 2B-36 Machine SET RT-2301
<i>Vertical Face Dimensions</i>	
Height	18"
Length	15"
No. Tee Slots* (11/16")	4
<i>Top Face Dimensions</i>	
Width	6"
Length	10 3/4"
No. Tee Slots* (11/16")	1

*All tee slots are spaced at 4" centers.

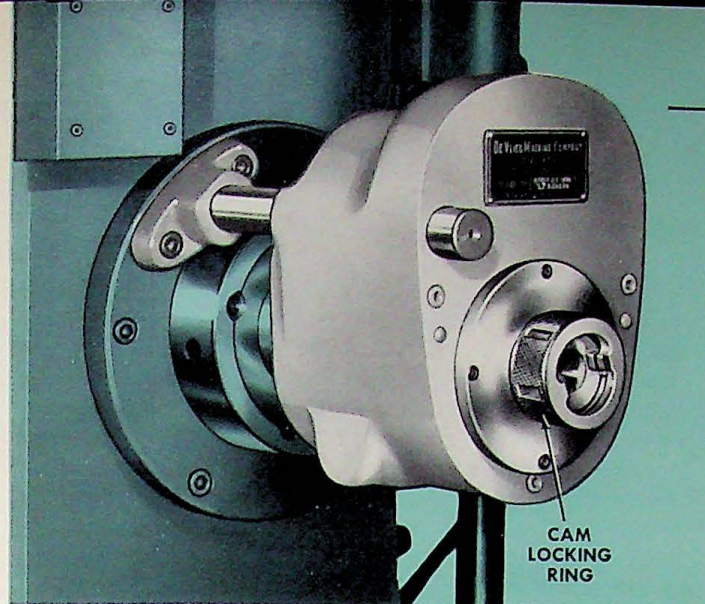


Figure 44

High Speed Boring Attachment and Boring Bar Set

FOR SERIES 3B and 4B MACHINES

The High Speed Boring Attachment (Fig. 44) provides a range of high spindle speeds suitable for boring small diameter holes. The attachment has a driving shank (NMTB taper) which is locked into the JIGMIL spindle bar by means of the Power Tool Lock Mechanism. When using the High Speed Boring Attachment the JIGMIL spindle bar speeds are increased in the ratio of 3.8 to 1. The spindle of the High Speed Boring Attachment has No. 20 NMTB taper bore with cam lock arrangement mounted on the spindle nose. By turning the knurled ring in a clockwise direction, boring tools are locked in the spindle and are released by reversing the locking ring. The spindle of the High Speed Attachment is in accurate alignment with the main JIGMIL spindle, thus eliminating any problem in picking up location when the work piece has once been located in relation to the main spindle.



Figure 45

The No. 20 NMTB Microbore Boring Bar Set (Fig. 45) is designed for use with the High Speed Boring Attachment. This set consists of seven boring bars with No. 20 NMTB taper shanks covering a boring range from $\frac{1}{2}$ " diameter to $1\frac{3}{4}$ " diameter. The set includes necessary Microbore tools for each tool station, two drill chuck adapters, grinding blocks and wrenches, all arranged in a hardwood case.

Jigmil Tapping Equipment

JIGMIL Tapping Equipment includes Tapping Attachments made expressly for use on DeVlieg JIGMILS. The spindle in the tapping head floats endwise and permits the tap to freely follow its own lead and thus eliminate torn threads and lead errors. After the required depth of thread is reached the machine spindle is reversed and the tap spindle is retracted by the lead of the tapped thread. An accurate adjustable torque control is provided which prevents tap breakage when tap becomes dull, loaded or when tap bottoms during blind hold tapping.

A complete set (Fig. 46) includes Tapping Attachments and tap holders providing a range of $\frac{1}{10}$ to 1" diameter, necessary wrenches and fitted hardwood case.

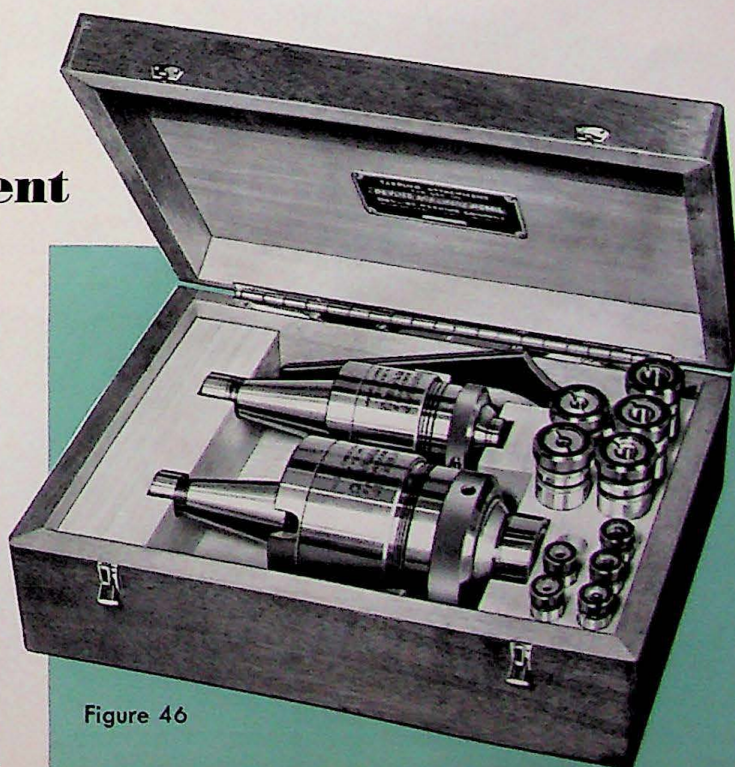


Figure 46

Jigmil Coolant System

FOR SERIES 2B, 3B and 4B MACHINES

A Coolant System is available as optional equipment on all **SPIRAMATIC JIGMILS**. The coolant is carried in a sump cast in the end of the machine bed and the coolant pump (Fig. 47) is mounted on the bed casting. The coolant is pumped from the sump through connecting pipes to the cutting tool and is returned to the sump through a close mesh screen. The Coolant System has a capacity of 7 GPM. Illustration (Fig. 48) shows the trough fitted around the machine table for collecting coolant. The trough is machined and accurately fitted so as to provide water-tight joints. A flexible nozzle with valve is provided for directing a suitable flow of coolant to the cutting tool.

The Coolant System is an integral part of the machine and must be installed at the factory.

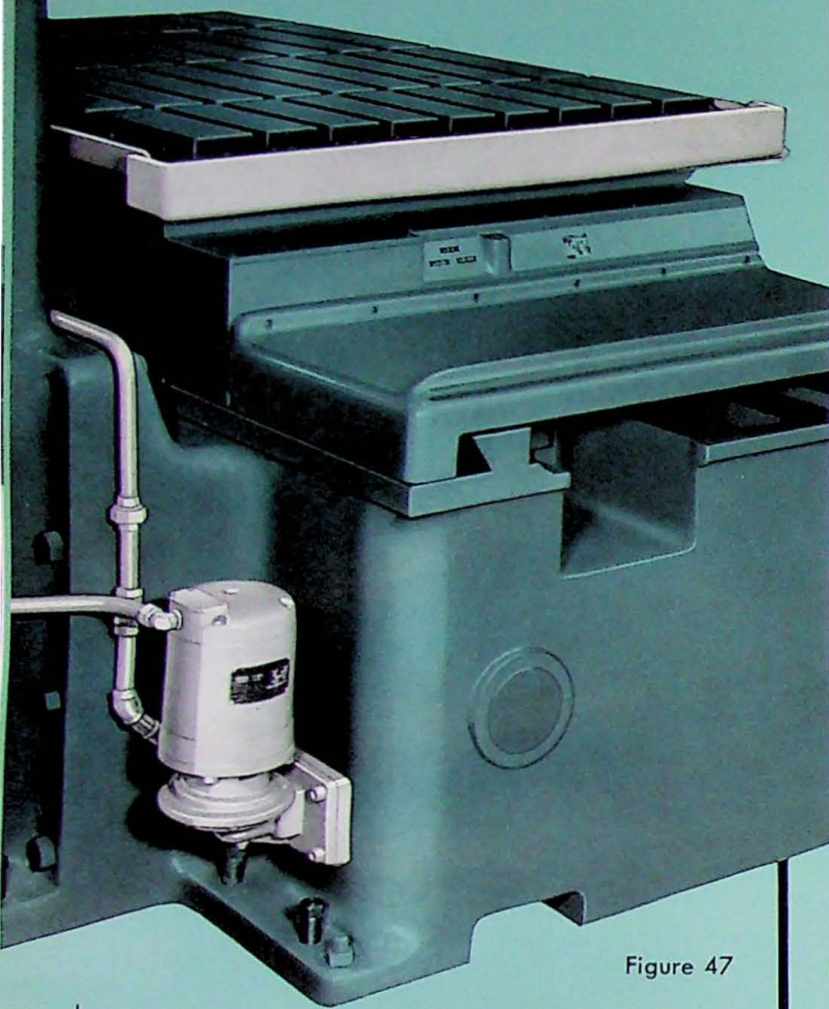


Figure 47

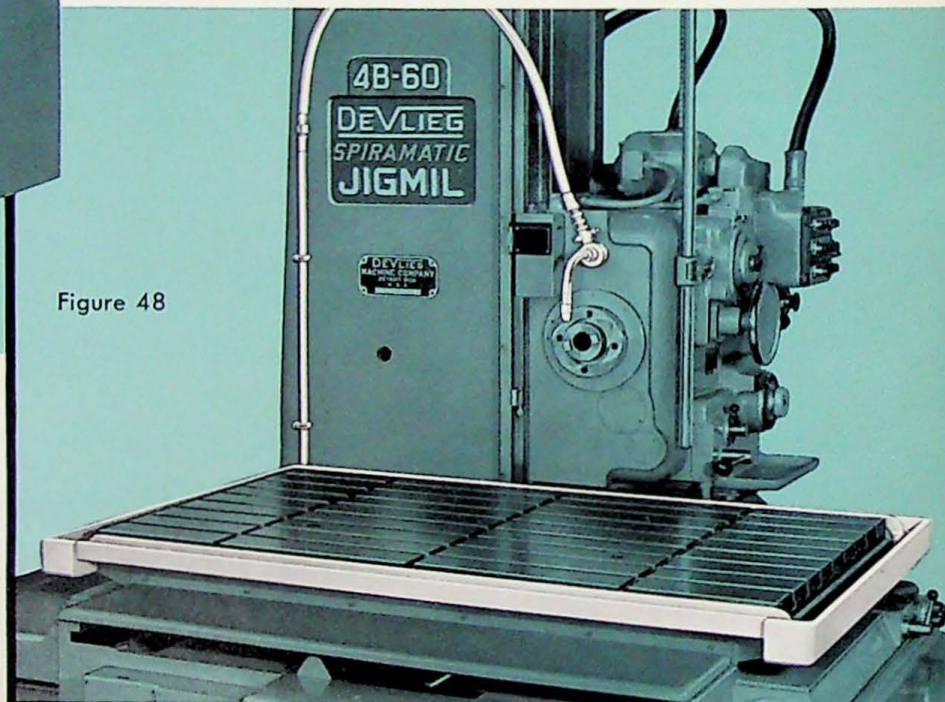


Figure 48



Figure 49

Standard Tee Nuts and Studs

A set of standard assorted tee nuts, studs and washers is recommended for use on **JIGMILS**. These parts are accurately machined and hardened and are designed to provide adequate clamping of work pieces without damage to tee slots in machine tables. The complete set (Fig. 49) consists of the following items in a fitted hardwood case:

For Series 3B and 4B Machines to fit $\frac{1}{16}$ " wide tee slots.

18 each tee nuts, washers and nuts; 6 coupling nuts; 6 each $\frac{5}{8}$ " studs 4" long, 6" long, 8" long, 10" long and 12" long.

For Model 2B-36 Machine to fit $\frac{1}{16}$ " wide tee slots.

Set same as above except studs are furnished in $\frac{1}{2}$ " size.

Standard Milling Cutter Adapters are available for the full range of **SPIRAMATIC JIGMILS** to accommodate Standard Shell End Mills and Face Milling Cutters. Illustration (Fig. 50) shows typical adapters.

For 2B-36 JIGMIL

RT-2101 Flange Mounting Adapter for Standard Cutters with 2" hole.

RT-2102 Flange Mounting Adapter for Standard Cutters with 1½" hole.

RT-151A Adapter with No. 40 NMTB taper shank for Standard Cutters with 1" hole.

RT-152A Adapter with No. 40 NMTB taper shank for Standard Cutters with 1¼" hole.

For Series 3B JIGMILS

RT-101 Flange Mounting Adapter for Standard Cutters with 2" hole.

RT-102 Flange Mounting Adapter for Standard Cutters with 1½" hole.

RT-103 Adapter Ring for Standard Face Cutters with 5⅛" register.

RT-151A Adapter with No. 40 NMTB taper shank for Standard Cutters with 1" hole.

RT-152A Adapter with No. 40 NMTB taper shank for Standard Cutters with 1¼" hole.

For Series 4B JIGMILS

RT-106 Flange Mounting Adapter for Standard Cutters with 2" hole.

RT-107 Adapter Ring for Standard Face Cutters with 5⅛" register.

RT-156A Adapter with No. 50 NMTB taper shank for Standard Cutters with 1" hole.

RT-157A Adapter with No. 50 NMTB taper shank for Standard Cutters with 1¼" hole.

RT-158A Adapter with No. 50 NMTB taper shank for Standard Cutters with 1½" hole.

RT-166 Adapter with No. 50 NMTB taper shank for Standard Cutters with 2" hole.

RT-167 Adapter with No. 50 NMTB taper shank for Standard Face Cutters with 5⅛" register.

Milling Cutter Adapters

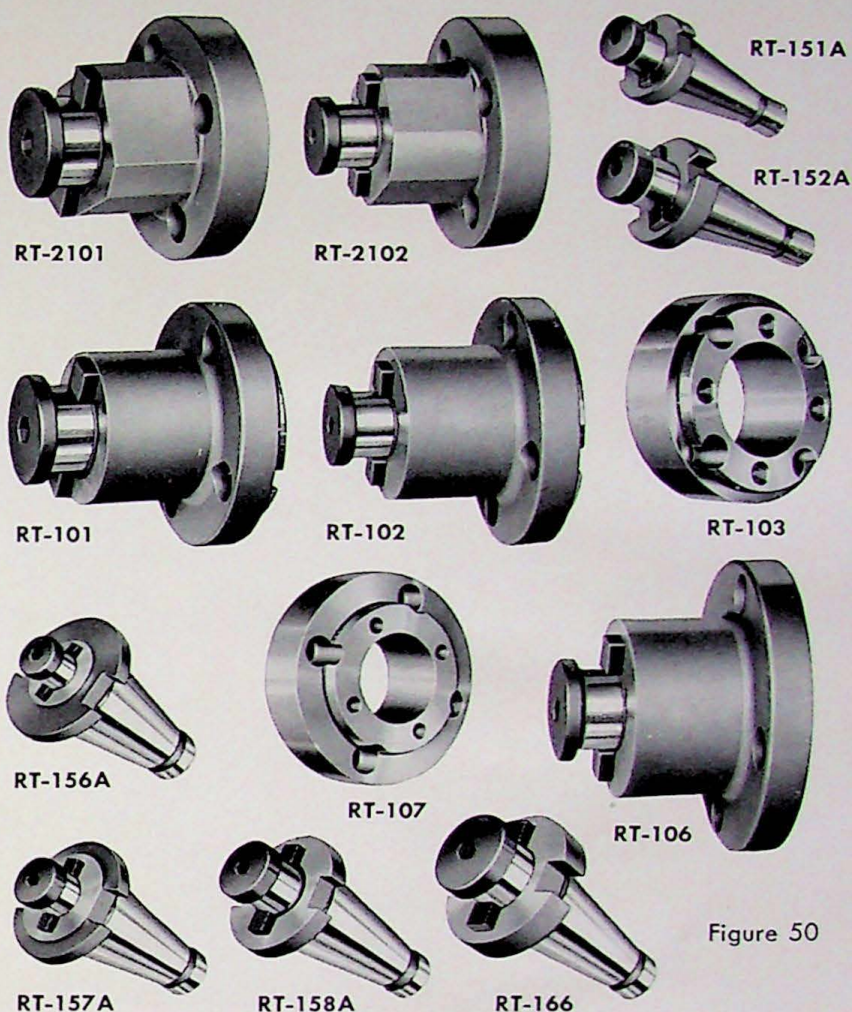


Figure 50

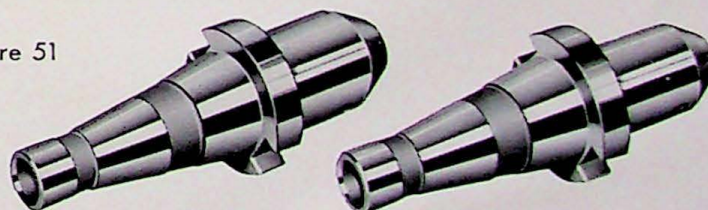
Standard End Mill Adapters are available for the full range of **SPIRAMATIC JIGMILS**. Illustration (Fig. 51) shows typical Adapters.

For Model 2B-36 and Series 3B JIGMILS Standard Adapters are provided with No. 40 NMTB taper shanks to accommodate End Mills with ⅜", ½", ⅝", ¾", ⅞" and 1" diameter shanks.

For Series 4B JIGMILS Standard Adapters are provided with No. 50 NMTB taper shanks to accommodate End Mills with ⅜", ½", ⅝", ¾", ⅞" and 1" diameter shanks.

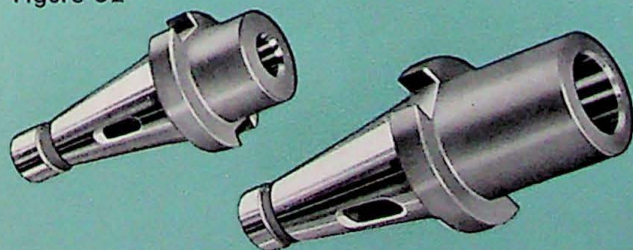
End Mill Adapters

Figure 51



TYPICAL END MILL ADAPTERS

Figure 52



TYPICAL REDUCING SLEEVES

Reducing Sleeves

Standard Reducing Sleeves are available for the full range of **SPIRAMATIC JIGMILS**. Illustration (Fig. 52) shows typical reducing sleeves.

For Model 2B-36 and Series 3B JIGMILS—Standard Sleeves reduce from No. 40 NMTB taper to Nos. 2, 3 and 4 Morse Taper and Nos. 7 and 9 Brown & Sharpe Taper.

For Series 4B JIGMILS—Standard Sleeves reduce from No. 50 NMTB taper to Nos. 3, 4 and 5 Morse Taper and Nos. 7, 9 and 10 Brown & Sharpe Taper.

Microbore®

The Multipurpose Single Point Adjustable Tool

MICROBORE PATENT NOS. 2,330,692—2,537,517—2,652,634—2,654,610—OTHERS PENDING

Microbore Adjustable Precision Tools are recommended as essential equipment for all DeVlieg JIGMILS. Microbore tools are adjusted by proven micrometer vernier principle and tool settings are rapidly established to precise limits, thereby eliminating cut and try methods. Microbore tools can be applied singly or in clusters for all types of boring, facing and turning operations.

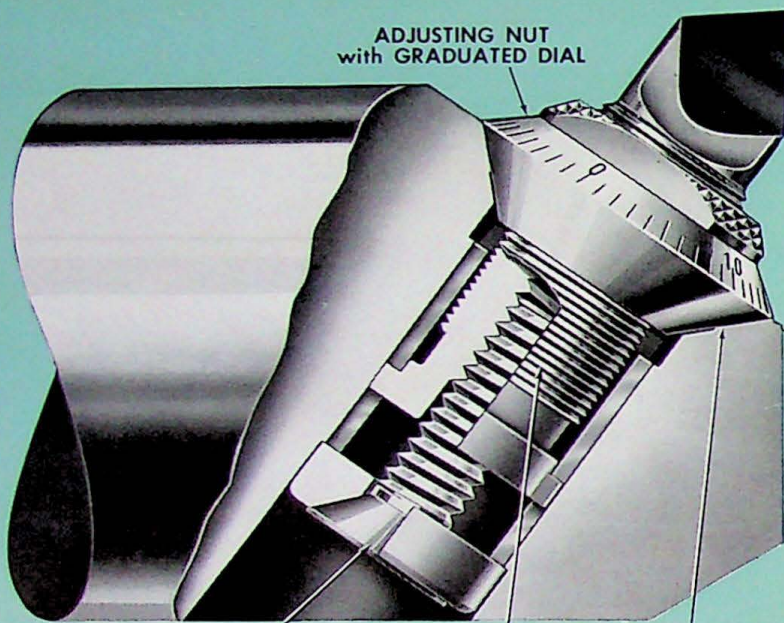


Figure 53

LOCK SCREW
and WASHER THREADED
TOOL BIT CARTRIDGE RIGID CONE
SEAT ASSEMBLY

CONSTRUCTION

The general construction of Microbore Adjustable Tools is illustrated in Fig. 53. The unit consists of a threaded tool bit cartridge assembled in a cone shaped adjusting nut with graduated dial, which is seated and locked firmly in the tool holder by a lock screw and washer assembly. Tool bit cartridges can be furnished with carbide tips, solid carbide, or solid high speed steel.

ADJUSTMENT

To adjust the cutting tool (Fig. 53), loosen the lock screw, adjust the graduated dial to the desired setting and lock by tightening the lock screw. Normal tightening of the lock screw will insure accurate tool setting and ample rigidity to withstand the cutting load.

RIGIDITY OF CUTTING TOOL

The rigid cone seat assembly (Fig. 53) between the graduated adjusting nut and tool holder and the threaded assembly between the cartridge and nut provide maximum support for the efficient operation of carbide tools.

FIELD OF USE

Microbore tooling can be applied efficiently and economically for all types of work involving one-piece jobs as well as production operations. The compactness of Microbore units makes it possible to cluster multiple tools into confined areas, and each tool can be independently adjusted to precise limits. These basic features provide extreme flexibility for the application of Microbore tooling on all types of precision machining operations.



Figure 54

READING THE MICROBORE ADJUSTMENT

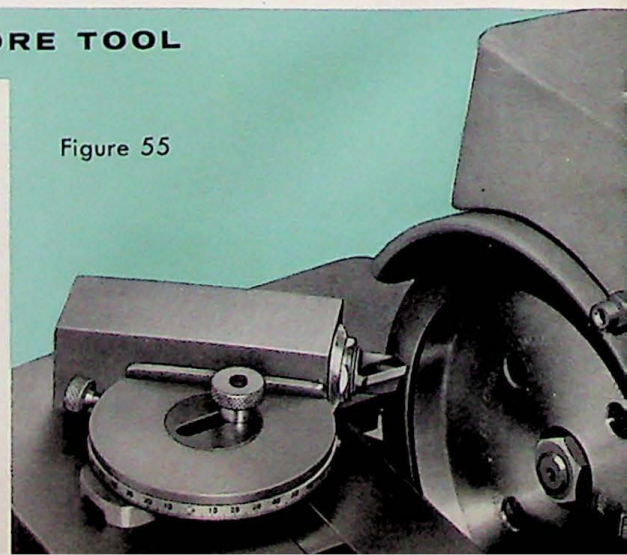
Microbore tools are adjusted by a proven micrometer vernier principle. Illustration (Fig. 54) shows the graduated dial and vernier scale which provide direct readings on diameter.

A dial movement of one graduation represents .001" on diameter. The vernier scale divides one graduation of the dial into ten parts with a resultant change of .0001" on diameter.

GRINDING THE MICROBORE TOOL

A simple and unique system is used for grinding Microbore tools which insures consistently accurate duplication of cutting angles. A grinding block is available for each size of Microbore unit, and the complete unit is located and locked in the grinding block in exactly the same way as when the unit is mounted in the tool holder. The protractor and table of the grinding machine (Fig. 55) are set at the desired angles and the tool can then be ground to the correct cutting angles for any given job. This method of locating the Microbore unit for grinding insures correct clearance angles when the tool is mounted in the tool holder.

Figure 55



Microbore®

STANDARD BORING BAR SETS

Microbore Standard Bar Sets for general purpose work are available for the full range of **SPIRAMATIC JIGMILS**. The No. 40M-3B set (Fig. 56) is designed for use with Series 3B **SPIRAMATIC JIGMILS** and covers a boring range of $\frac{3}{4}$ " to $7\frac{15}{16}$ " diameter. This set consists of nine boring bars with No. 40 NMTB taper shanks, two boring rings with adapter and a Jacobs chuck adapter. The set includes Microbore units for each tool station, necessary grinding blocks and wrenches, all arranged in a hardwood case. Similar Microbore Standard Boring Bar Sets are available for the Model 2B-36 and Series 4B **SPIRAMATIC JIGMILS**.

Figure 56

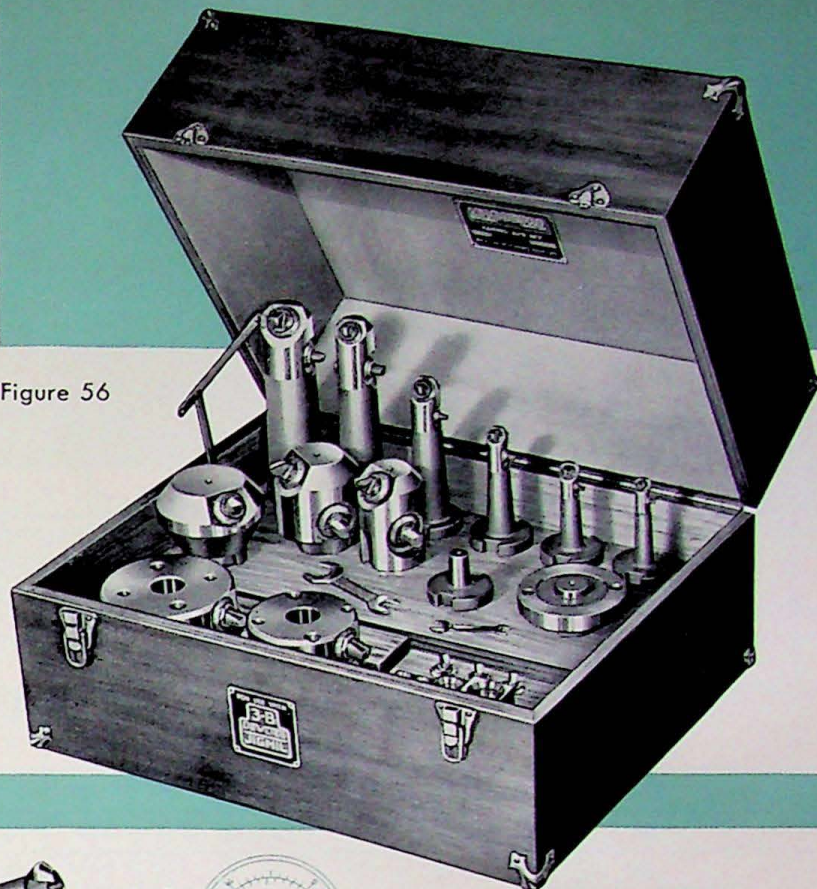
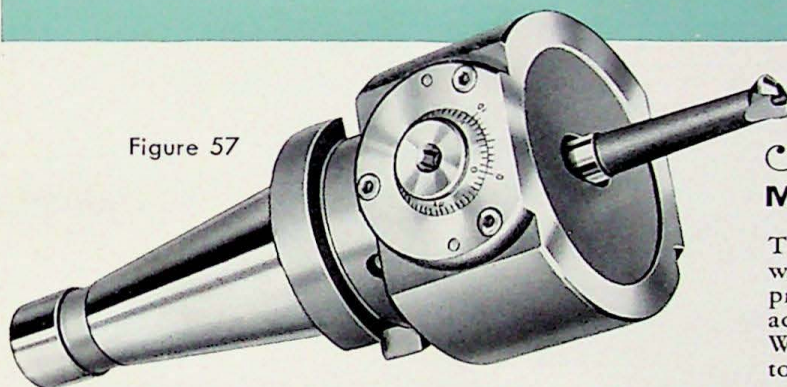


Figure 57



Microbore®

MB-121 ADJUSTABLE BORING HEAD

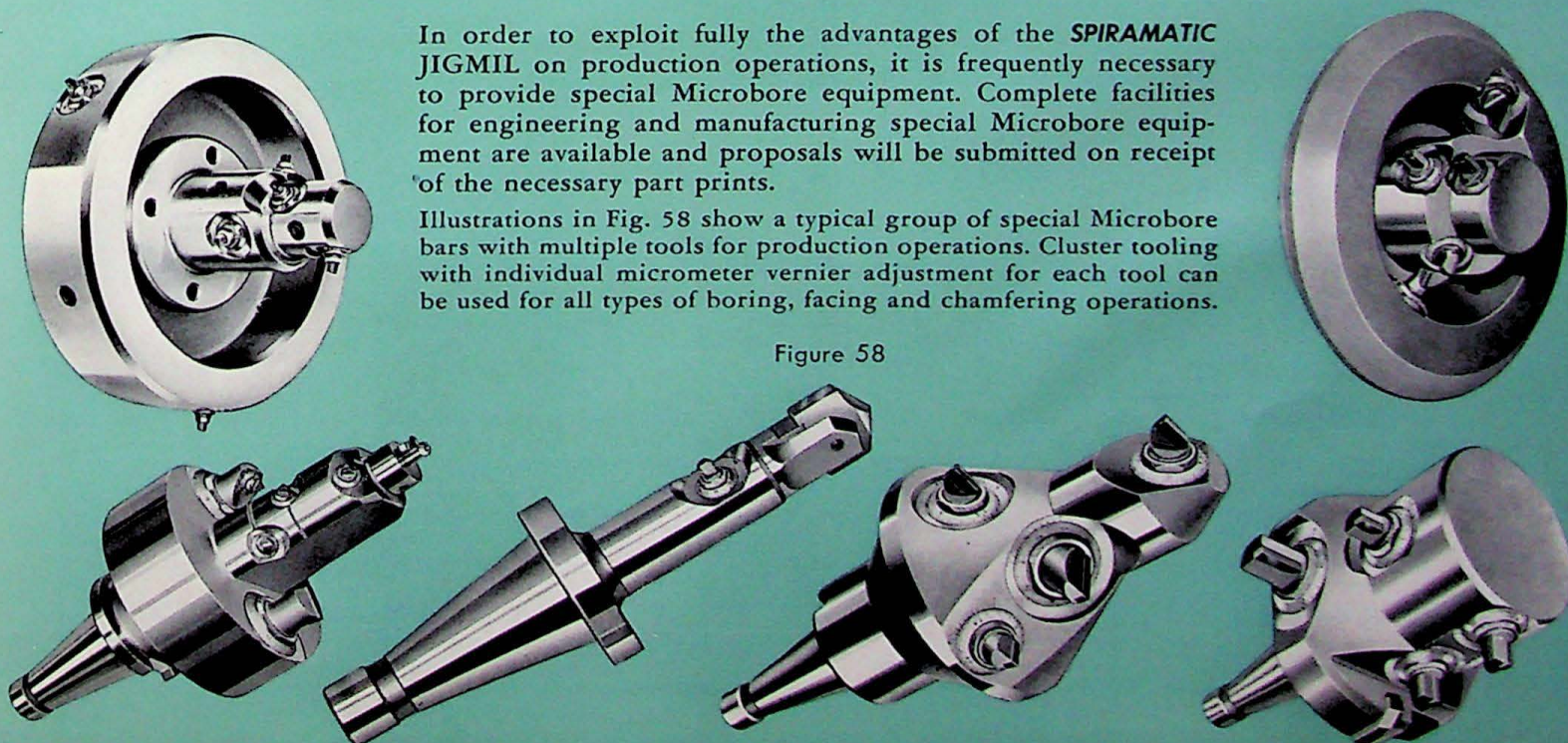
The MB-121 Boring Head (Fig. 57) is a precision tool which can be adjusted rapidly and accurately by means of proven micrometer vernier principle. The tool slide can be adjusted in accurate increments from zero to $\frac{1}{4}$ " off center. With a standard set of boring tools, bores ranging from $\frac{1}{4}$ " to 1" diameter can be machined.

SPECIAL MICROBORE EQUIPMENT FOR PRODUCTION OPERATIONS

In order to exploit fully the advantages of the **SPIRAMATIC JIGMIL** on production operations, it is frequently necessary to provide special Microbore equipment. Complete facilities for engineering and manufacturing special Microbore equipment are available and proposals will be submitted on receipt of the necessary part prints.

Illustrations in Fig. 58 show a typical group of special Microbore bars with multiple tools for production operations. Cluster tooling with individual micrometer vernier adjustment for each tool can be used for all types of boring, facing and chamfering operations.

Figure 58



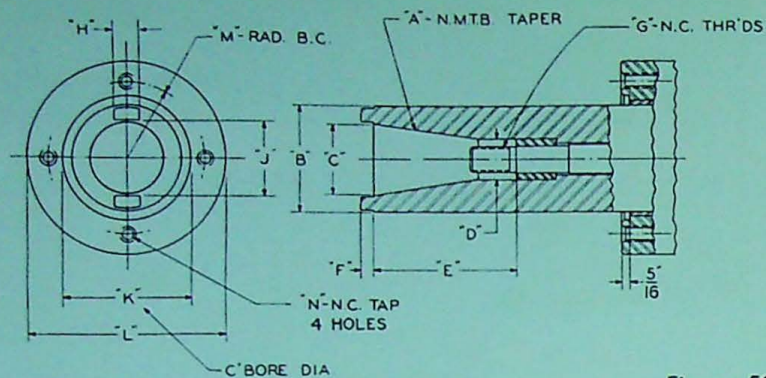


Figure 59

Spindle Bar and Flange Dimensions

SERIES "B" MACHINES

SERIES	A	B	C	D	E	F	G	H	J	K	L	M	N
2B	40	2.500"	1.750"	1.062"	4 1/16"	5 1/16"	5/8"-11	.625"	1.810"	None	5.062"	2"	5/8"-11
3B	40	3.000"	1.750"	1.062"	4 1/16"	5 1/16"	5/8"-11	.625"	1.810"	4.750"	5.750"	2 1/4"	5/8"-11
4B	50	4.000"	2.750"	1.562"	5 1/2"	1/2"	1"-8	1.000"	2.810"	4.750"	7.250"	2 7/8"	3/4"-10

SERIES	P	Q	R	S	T	U	V	W	X	Z
2B	12"	24"	24"	2"	3 1/8"	1 3/4"	12"	5	4"	1/2"
3B	16"	30"	36"	2 3/4"	3 3/4"	2 5/8"	16"	6	5"	1/2"
4B	20"	36"	48"	4"	4 1/8"	2 3/4"	20"	8	4"	1"

Table and Range Dimensions

SERIES "B" MACHINES

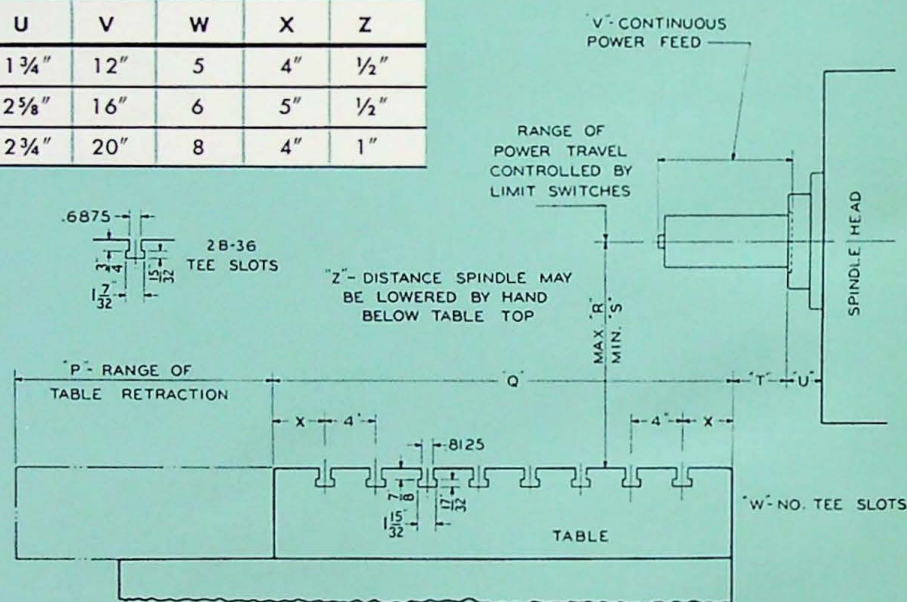


Figure 60

MOTOR SPECIFICATIONS

	MODEL 2B-36	SERIES 3B MACHINES	SERIES 4B MACHINES
SPINDLE DRIVE	5 HP 1800 RPM	7 1/2 HP 1800 RPM	10 HP 1800 RPM
FEED and RAPID TRAVERSE	1 1/2-1/2 HP 1800-600 RPM	3-1 HP 1800-600 RPM	3-1 HP 1800-600 RPM
BAR RAPID TRAVERSE	NONE	1/2 HP 1200 RPM	3/4 HP 1800 RPM
TABLE RETRACTION	3/4-1/4 HP 1800-600 RPM	*1 1/8-3/8 HP 1800-600 RPM	1 1/2-1/2 HP 1800-600 RPM
AUTOMATIC TOOL LOCK	All Models	1/2 HP 1200 RPM Special High Slip Can Type	
FEED UNIT HYDRAULIC PUMP	1/3 HP 1800 RPM Special Motor Pump	1/2 HP 1800 RPM Special Motor Pump Combination	
TABLE STOP ADJUSTMENT	NONE	1/8 HP 1800 RPM Special Can Type	
POWER SADDLE LOCK	NONE	1/20 HP 1600 RPM Single Phase	
POWER LUBRICATION	NONE	Single Phase Gear Reducer Motor, 56 RPM Output, 8.5 Watts	

*Except Model 3B-96 which has 1 1/2-1/2 HP 1800-600 RPM

General Specifications

DeVlieg Spiramatic Jigmils

SERIES "B" MACHINES

All specifications listed below apply to Standard machines only.

		2B-36	3B-48	3B-72	3B-96	4B-60	4B-72	4B-96	4B-120
DIAMETER OF SPINDLE BAR		2.500"	3.000"			4.000"			
SPINDLE NOSE TAPER—N.M.T.B.		No. 40	No. 40			No. 50			
SPINDLE BAR TRAVEL		12"	16"			20"			
HORIZONTAL TRAVEL		36"	48"	72"	96"	60"	72"	96"	120"
VERTICAL TRAVEL		24"	36"	36"	36"	48"	48"	48"	48"
TABLE DIMENSIONS	Length	36"	48"	72"	96"	60"	72"	96"	120"
	Width	24"	30"	30"	30"	36"	36"	36"	36"
TABLE RETRACTION		12"	16"	16"	16"	20"	20"	20"	20"
SPINDLE SPEEDS—16	R.P.M. Standard Speed Range	42-2000	25-1200			21-1000			
	R.P.M. High Speed Range	50-2400	33-1600			26-1220			
NUMBER BAR FEEDS—6	Range—inches per revolution	.0016"-.018"	.002"-.020"			.002"-.024"			
	Rapid Traverse Rate—inches per min.	Manual	90"			100"			
MILLING FEED RATES—16	Range—inches per min.	.4"-32"	.5"-36"			.5"-36"			
	2 Rapid Traverse Rates—inches per min.	50"-150"	50"-150"			50"-150"			
HEIGHT—Floor to Table Top		37½"	40½"	40½"	41½"	40½"		41½"	
HEIGHT—Over-all		6' 9"	8' 4"			9' 6"			
FLOOR SPACE	Length	9' 6"	11' 4"	15' 4"	19' 4"	13' 6"	16'	20'	24'
	Width	9'	10' 10"			12' 4"			
NET WEIGHT—(Lbs.)		13,000	22,500	26,000	30,000	29,000	34,000	39,000	45,000



MAKERS OF FINE MACHINE TOOLS

**DEVLIEG MACHINE COMPANY • 450 Fair Avenue, Ferndale
DETROIT 20, MICHIGAN, U.S.A.**