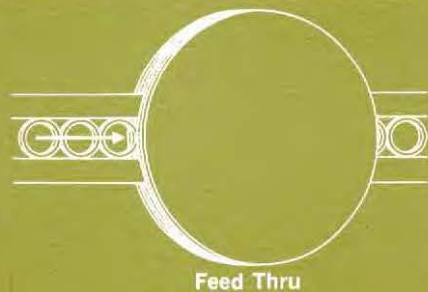
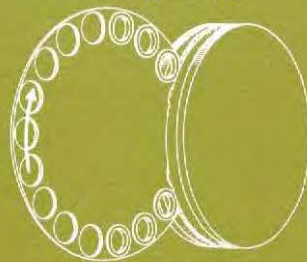


GARDNER®

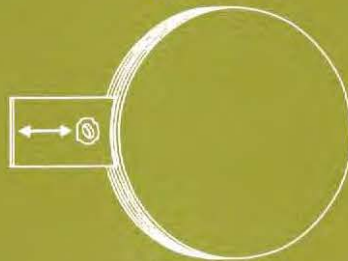
SDG precision double disc grinders



Feed Thru



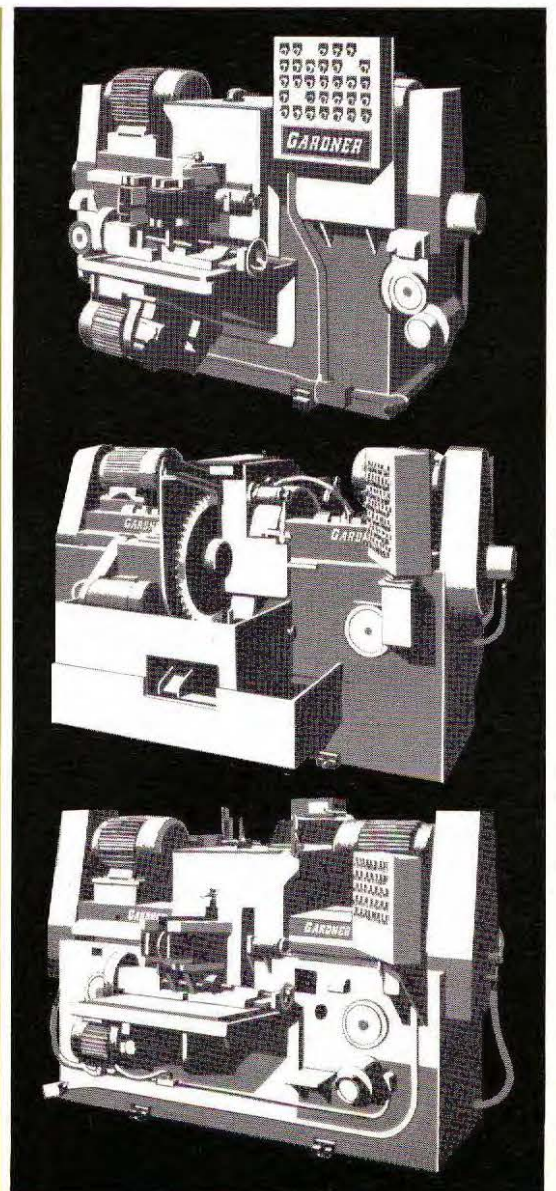
Rotary Carrier



Reciprocating



Special



GARDNER MACHINE
South Beloit, Illinois 61080

GARDNER DOUBLE DISC GRINDING

PROFITABLE PRODUCTION

TWO SIDES AT A TIME — FLAT AND PARALLEL

Gardner double disc grinding is capable of finishing two parallel surfaces simultaneously, at high production rates, to extremely close tolerances, and fine surface finishes.

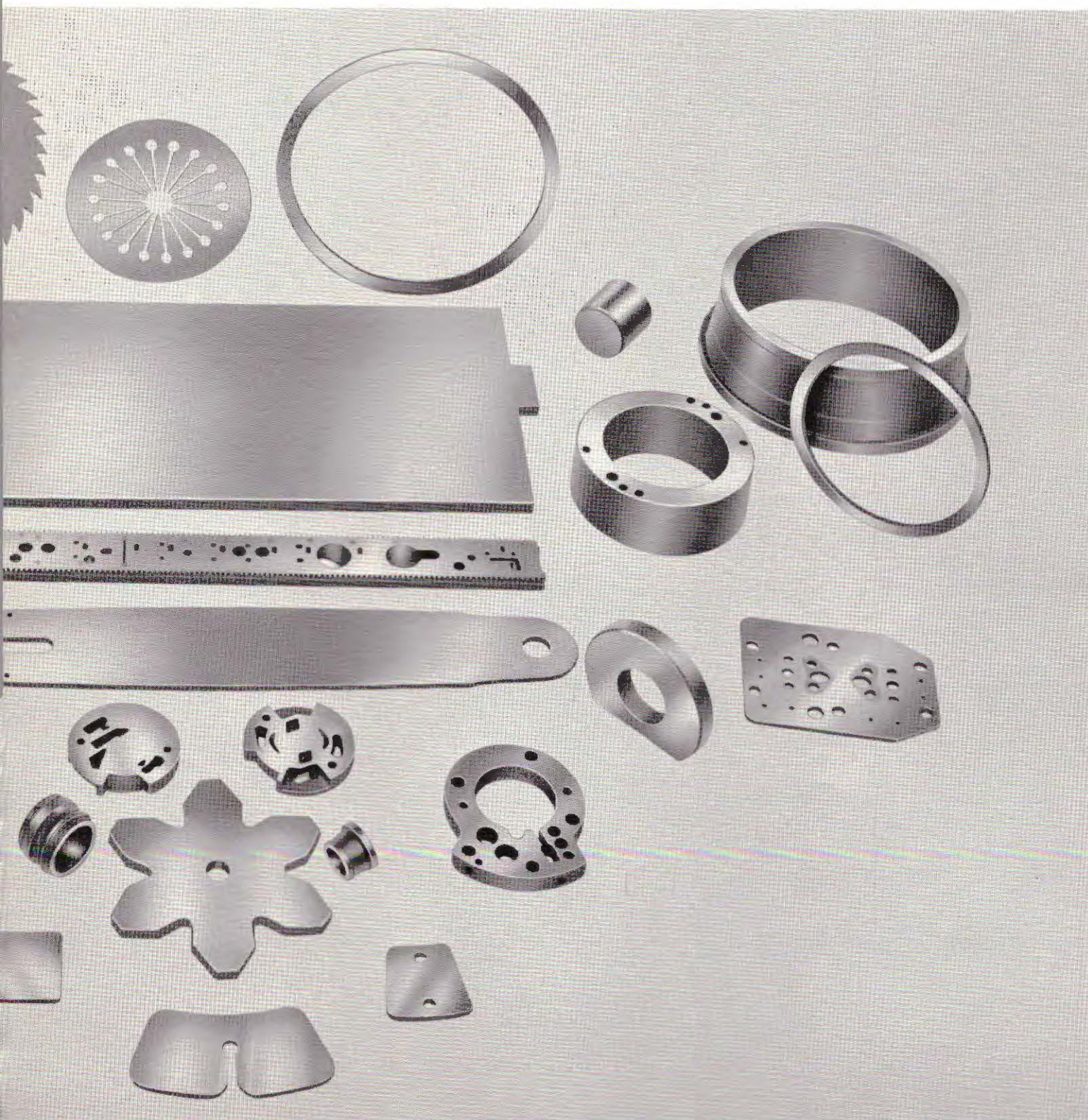
In plants throughout the world, Gardner precision double disc grinders are delivering profitable production in a widely and rapidly increasing range of applications. They are grinding both metallic and non-metallic parts in a broad spectrum of sizes and shapes.

TYPICAL WORKPIECES

The accompanying illustration includes a number of workpieces typical of the type well suited to the double disc grinding method. These workpieces, and many others like them, are now being ground profitably on Gardner precision double disc grinders . . .

- at rates ranging up to many thousands of parts per hour
- with stock removal ranging from a few "thousandths" of an inch (0.05 millimeters, approx.) to more than one-quarter of an inch (6.4 millimeters)
- with tolerances down to "millionths" of an inch (microns)
- in sizes ranging from miniature needle bearings to heavy rings more than 40 inches (1016 millimeters) in diameter.





GARDNER SDG SERIES GRINDERS

Gardner SDG precision double disc grinders are truly versatile machines and represent a completely different concept in disc grinder design. Compared to any disc grinder in use today, SDG grinders will remove stock more rapidly, and produce more precisely ground parts at higher output. They accomplish this while requiring considerably less downtime for set-up, disc change, and maintenance.

While there are many important considerations in the design, manufacture, and application of double disc grinders, experience has proven that there are five major essentials for successful double disc grinding. These five essentials, which dictated the design of Gardner SDG grinders, are (1) wheel support, (2) wheelfeed, (3) work support, (4) head setting, and (5) dressing and truing.

Maximum size holding capability, machine alignment stability, and therefore machine performance are dependent upon the efficiency with which these five essentials function . . . individually and in combination with each other.

THE FIVE ESSENTIALS

1. WHEEL SUPPORT

The abrasive disc wheels and spindles must be adequately and rigidly supported by the wheelhead assembly and machine base to resist the most severe grinding forces. These forces are considerably higher in double disc grinding than in most other types of grinding.

2. WHEELFEED

The wheelfeed system must be capable of precisely advancing the grinding wheelheads, on command, while resisting heavy grinding thrust loads.

3. WORK SUPPORT

The workpieces must be properly and accurately supported and brought into contact with the abrasive disc faces in the most efficient manner. Tooling or fixtures for work support must be compatible with automatic loading and unloading, when required.

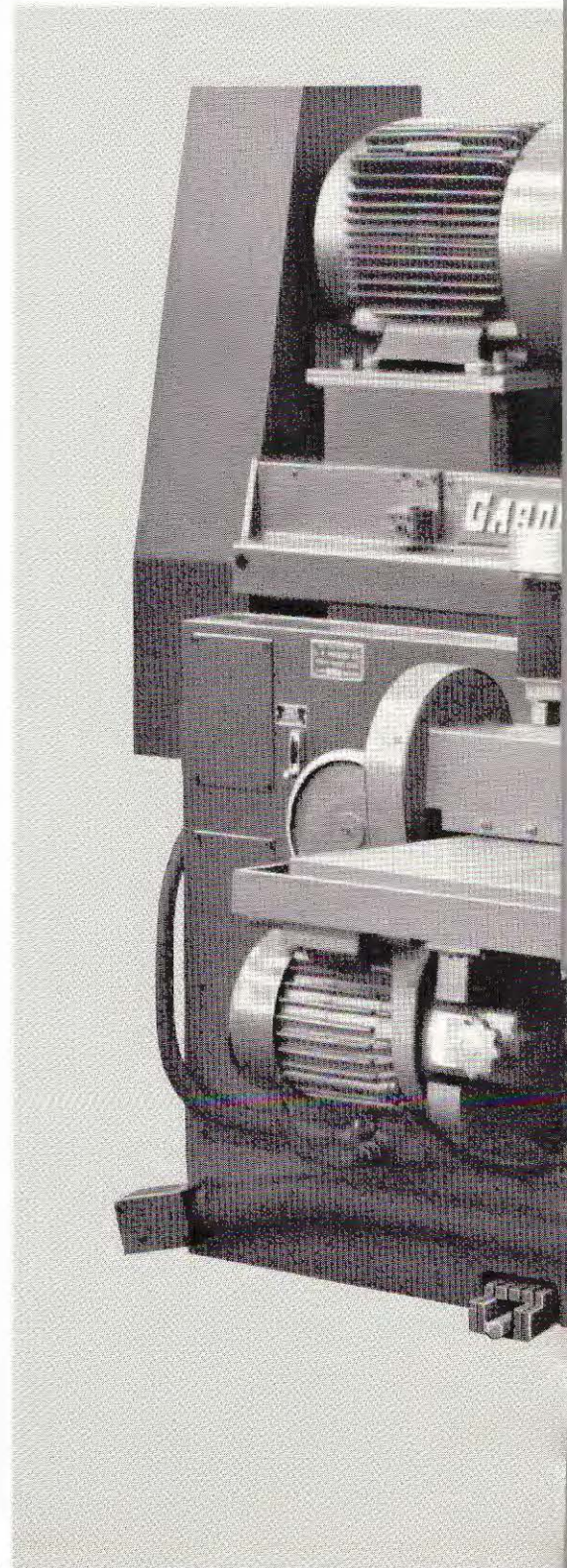
4. HEAD SETTING

The angular relationship of the abrasive discs (head setting) must be easily and quickly adjustable. The precise head setting, once established, must remain fixed without repeated checking and resetting.

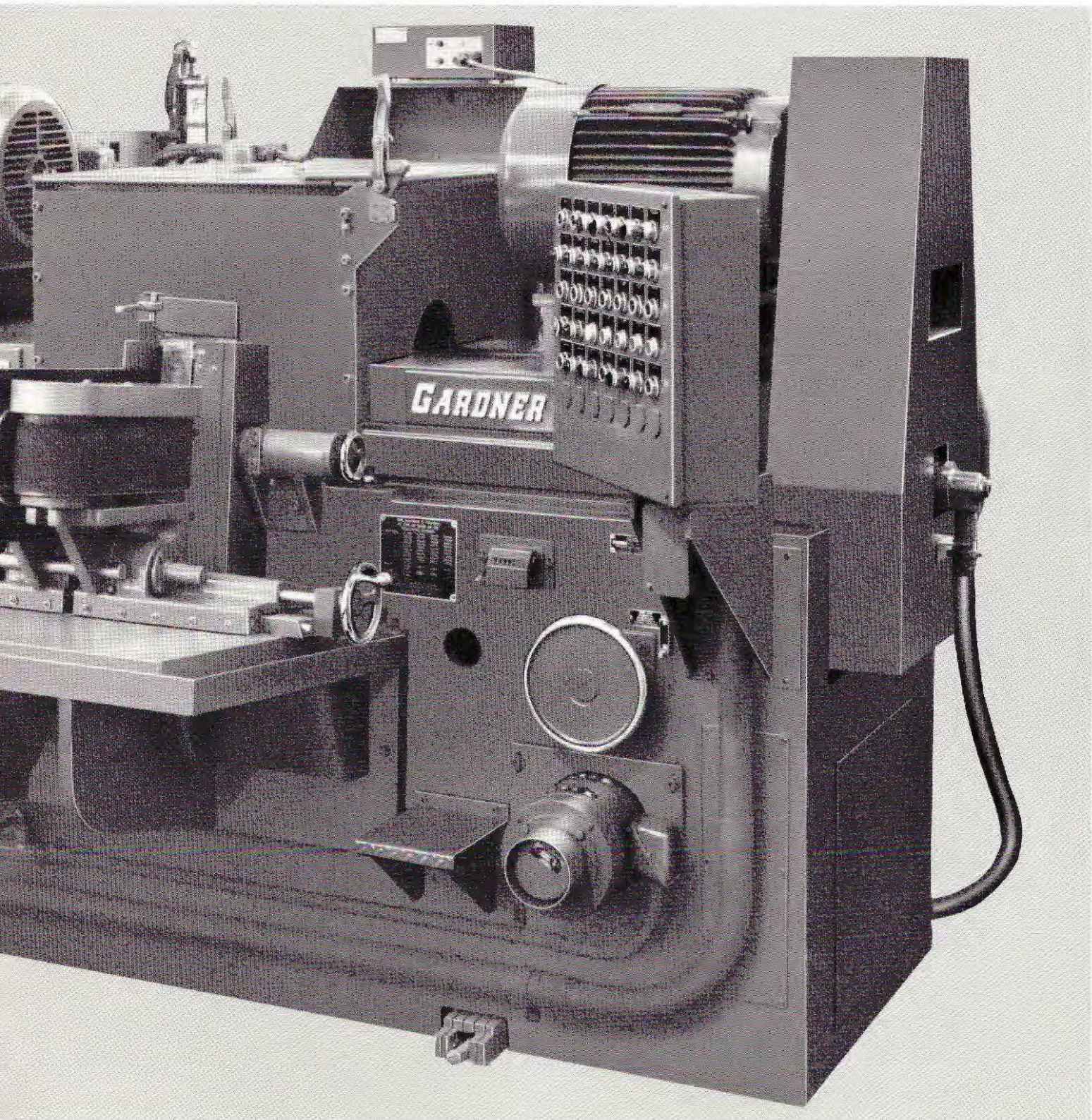
5. DRESSING AND TRUING

The dressing and truing unit must be rigidly mounted to the machine base for precise and permanent alignment relative to the machine base ways. For exact truing of the disc faces, the dresser path must be accurate and uniform.

Gardner SDG grinders are designed and engineered to fulfill the requirements of the five essentials for double disc grinding. Specific SDG grinder design elements . . . relative to each of the five essentials . . . are presented on the following pages.



Gardner SDG6 with feed thru fixturing.



WHEEL SUPPORT—the first essential

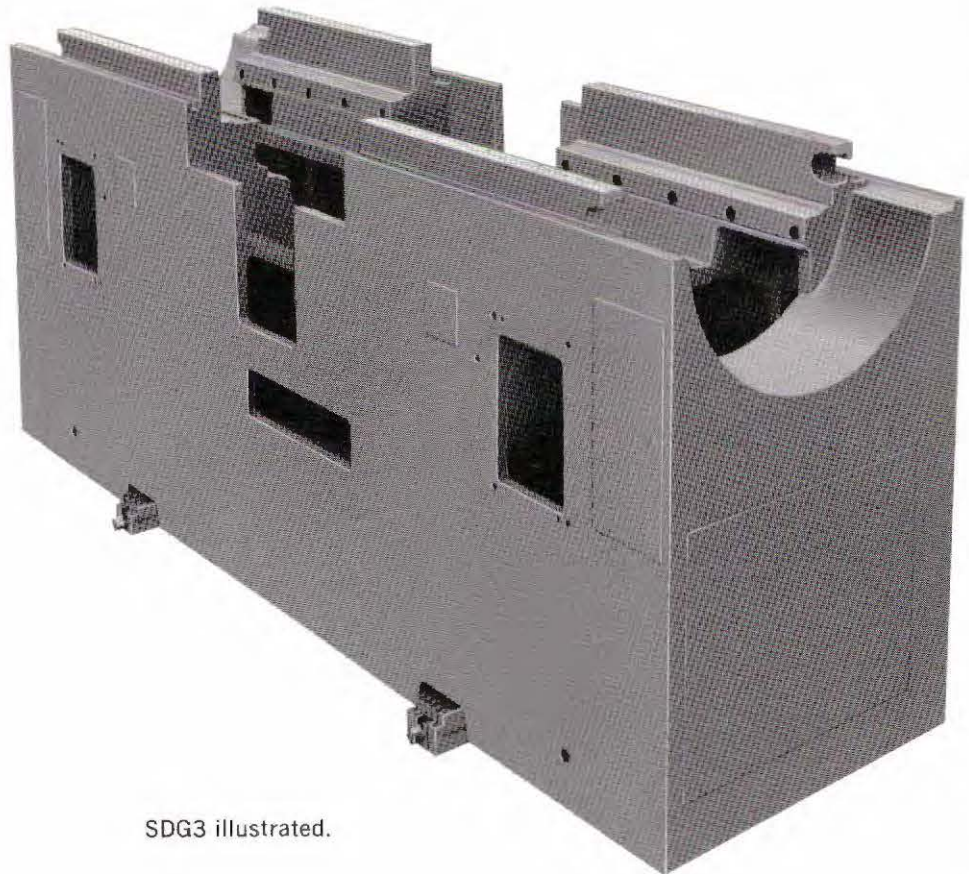
MACHINE BASE

SDG base structures effectively resist abrasive separation or “breathing” under grinding thrust loads, because of maximum beam rigidity.

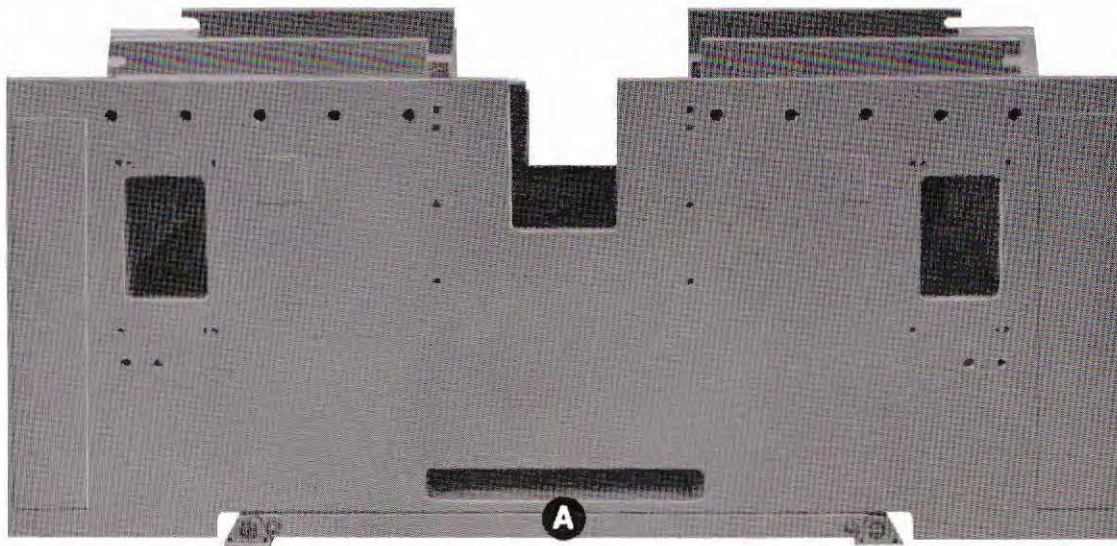
Base distortion is minimized by the high front and rear walls of the base.

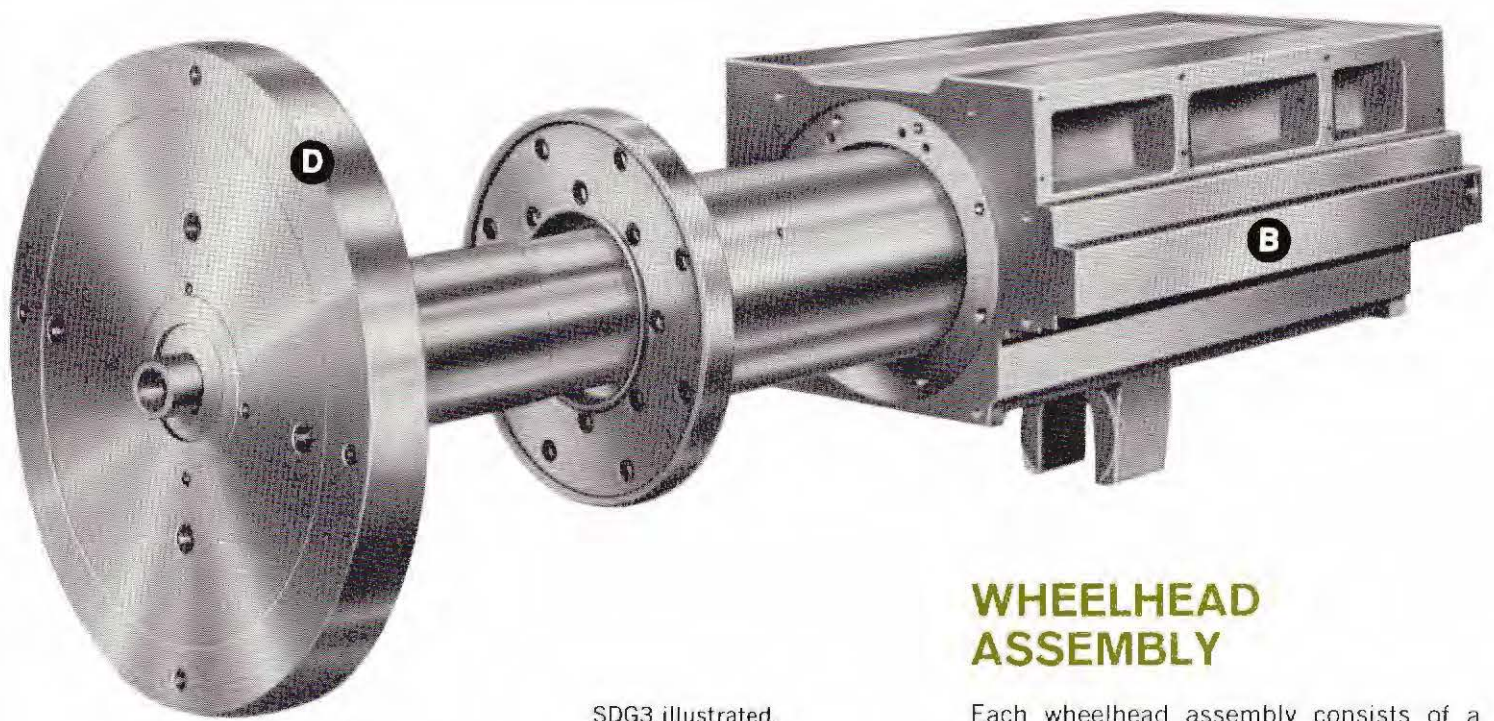
The size holding capability and stability of machine alignment are direct results of dissipation of grinding thrust load through the shortest possible route from disc to disc with a minimum of metal-to-metal surfaces.

Self-adjusting equalizer support (A) under the base nullifies influence of shop floor elevation changes upon accuracy of head alignment. This feature also eliminates the need for specially constructed foundations.



SDG3 illustrated.





SDG3 illustrated.

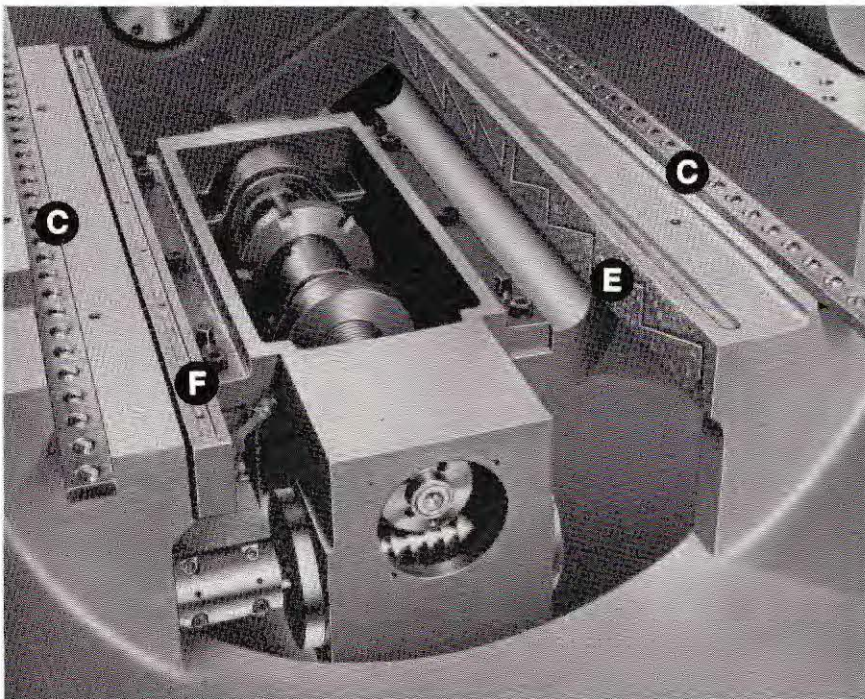
WHEELHEAD ASSEMBLY

Each wheelhead assembly consists of a single sliding member (B), supported by horizontal antifriction ways (C), utilizing hardened and ground replaceable wear strips.

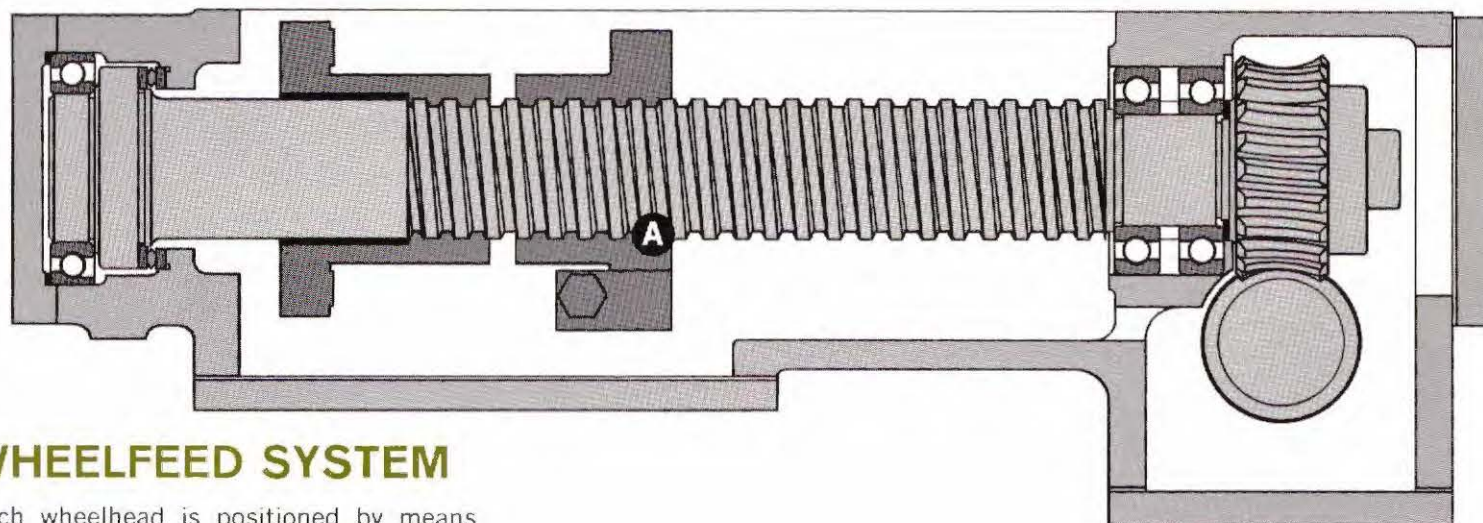
Spindles and wheel mounting flanges (D) are of integral one-piece design, supported in precision bearings, and contained securely within the wheelhead.

Travel for inward and outward movement of each wheelhead is provided by the single slide itself. No subslide is required. An absolute minimum number of components assures the maintaining of true head alignment.

The vertical way (E) and side gib (F) have full length engagement at all times and are pressurized with heavy multiple spring preload to eliminate the need for periodic adjustment.



WHEELFEED—*the second essential*



WHEELFEED SYSTEM

Each wheelhead is positioned by means of a feed screw and flanged feed nut unit (A) mounted in the base of the machine and below the spindle centerline.

This location in the base most effectively absorbs grinding forces and allows the feed screw and nut to be submerged in oil for long life and minimum maintenance.

WHEELFEED TYPES

Lektrifeed™ has 2 in 1 electric stepping motor for rapid positioning and increment infeed. Available as a 0.000050" or 0.0001" (0.0013 mm or 0.0025 mm) increment infeed. Has an electrical counter to select infeeds of 1 to 19 increments.

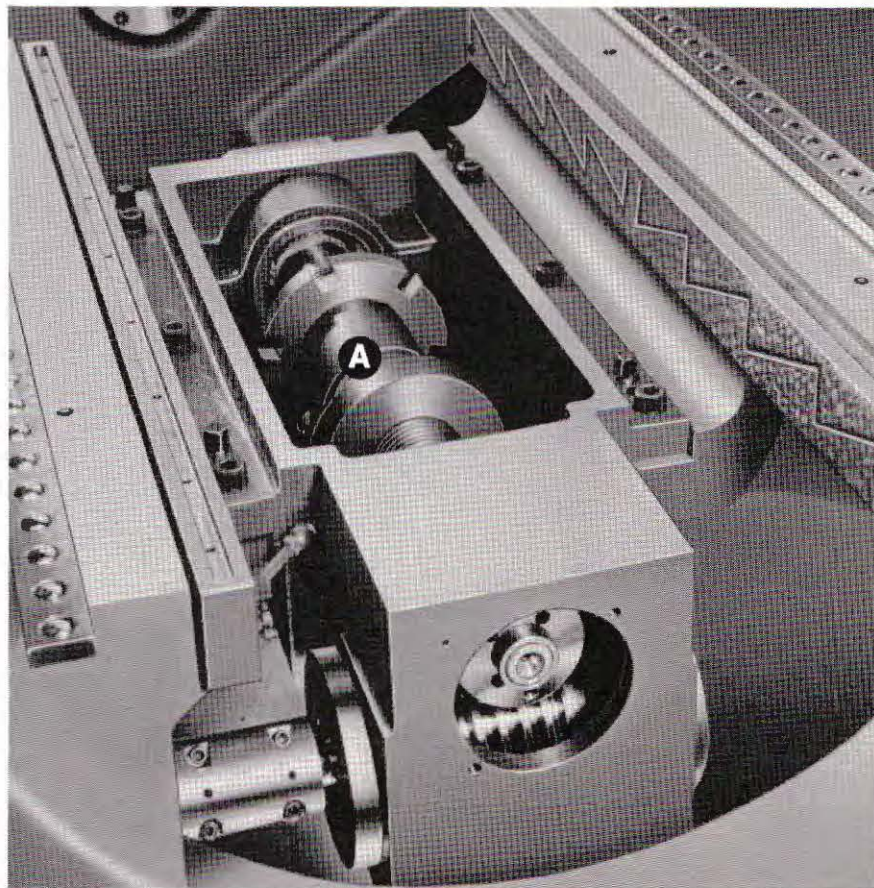
Handwheel Feed is a manual feed system giving precise movement of the wheelheads in either direction.

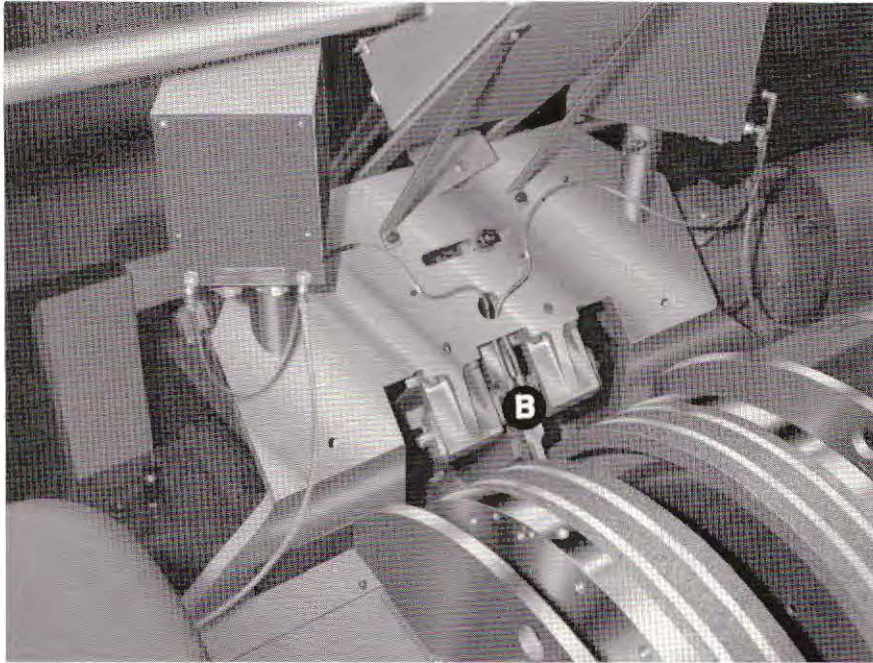
Rapid Wheelhead Positioning speeds dressing, setup, and abrasive disc wheel change. The system is available with air or electric power sources. Wheelhead movement is approximately $\frac{1}{8}$ " (3.2 mm) per second.

Face Cutting is a plunge type controlled feed of one or both wheelheads.

Mechanical Feed features ratchet-type increment feeds available for special applications.

SDG3 illustrated.

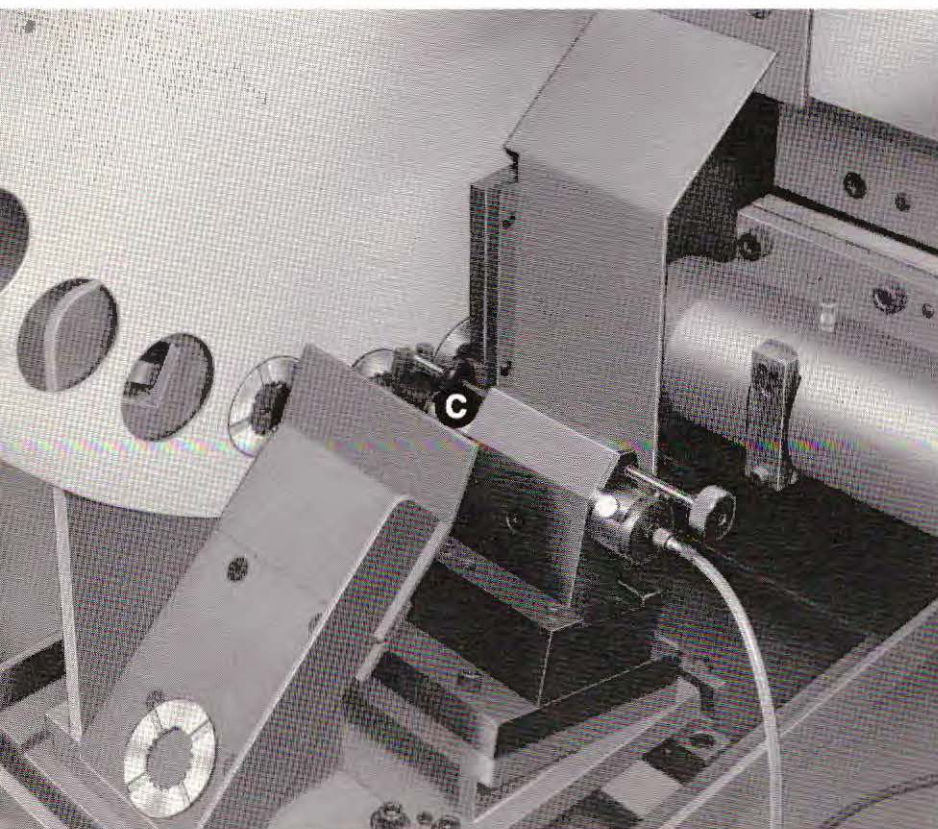




AUTOMATIC GAGING

Automatic gaging maintains uniformity of part size by automatically compensating for disc wear. Various types are available. Selection of the type is generally determined by part configuration and tolerances required.

In-process gaging (B) is usually used in face cut (plunge type) grinding. Gage probes sense the position of the disc faces with respect to part size. Actuated at the end of the face cut cycle, gage signals for increment feed of one or both discs until part size is reached.



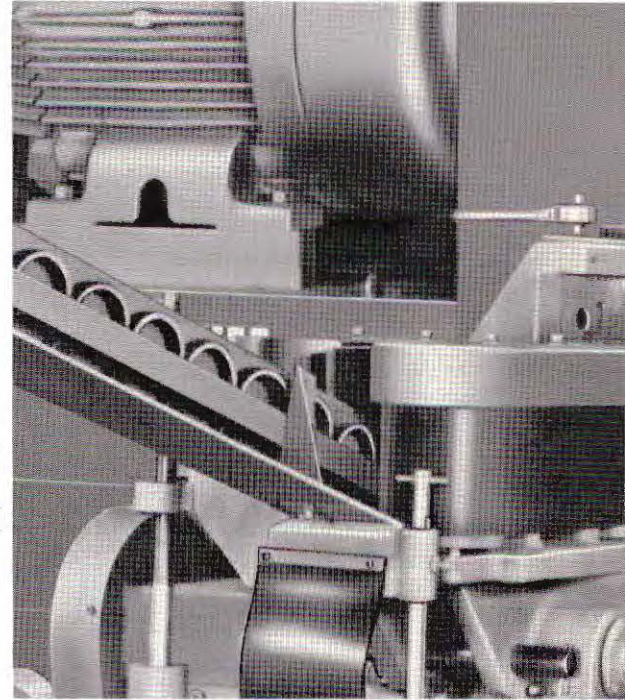
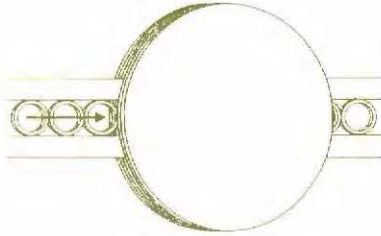
Post-process gaging (C) can be used with most any type of fixturing. Measures part size and advances discs when oversize trend is evident.

WORK SUPPORT—*the third essential*

The type of tooling or fixtures for Gardner SDG grinders depends on the size and shape of the workpiece, the required amount of stock removal, tolerances, rate of production, and the type of material.

FEED THRU

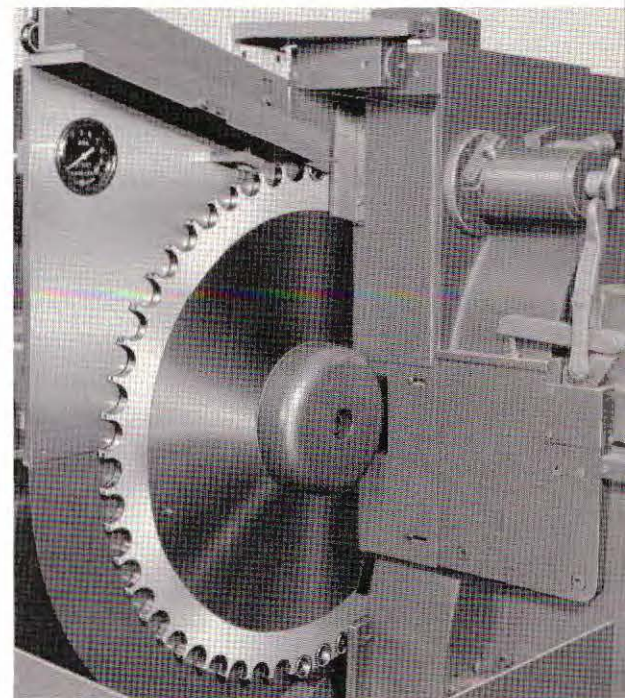
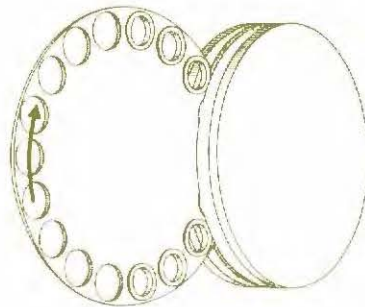
Power driven belts, pickoff chains, rollers, sprockets, magnetic discs, etc., feed parts between opposed discs. Upper and lower guide bars support parts through the grinding area. Feed thru fixturing provides the highest rate of production of all fixturing methods. Correct work path between the opposed discs on feed thru fixtured machines is established by the relationship between the side guides, feed belts, guide bars, and discs. The guide bars are adjustable vertically for part size variation. Parts can be loaded and unloaded manually or automatically.



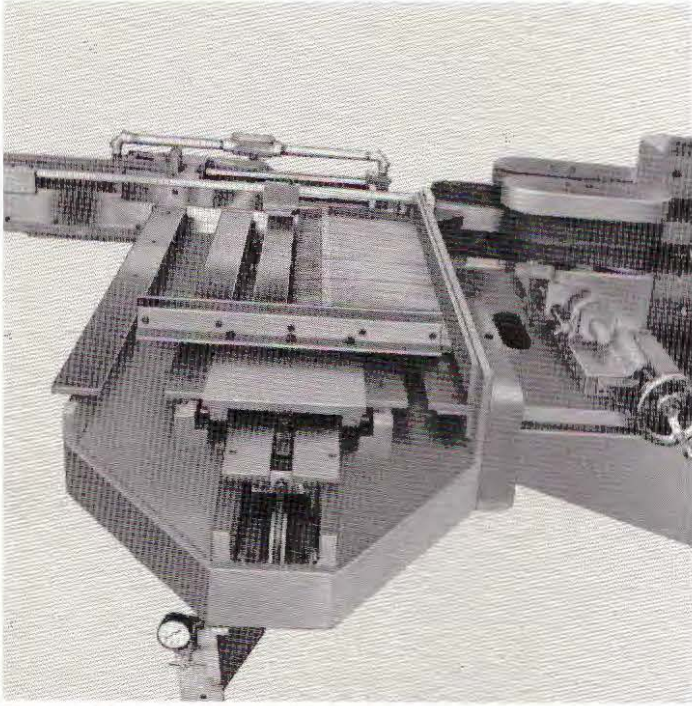
Power driven belt type feed thru fixture, with inclined loading chute, arranged for handling large bearing races.

ROTARY CARRIER

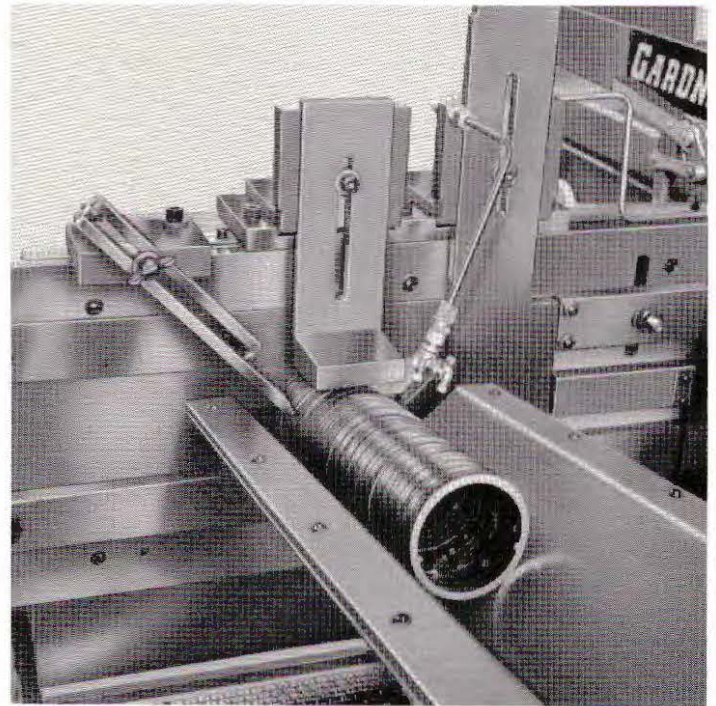
With the rotary carrier, parts are traversed in an arc between the two discs. Parts can be loaded and unloaded manually or automatically. This is the next highest production method.



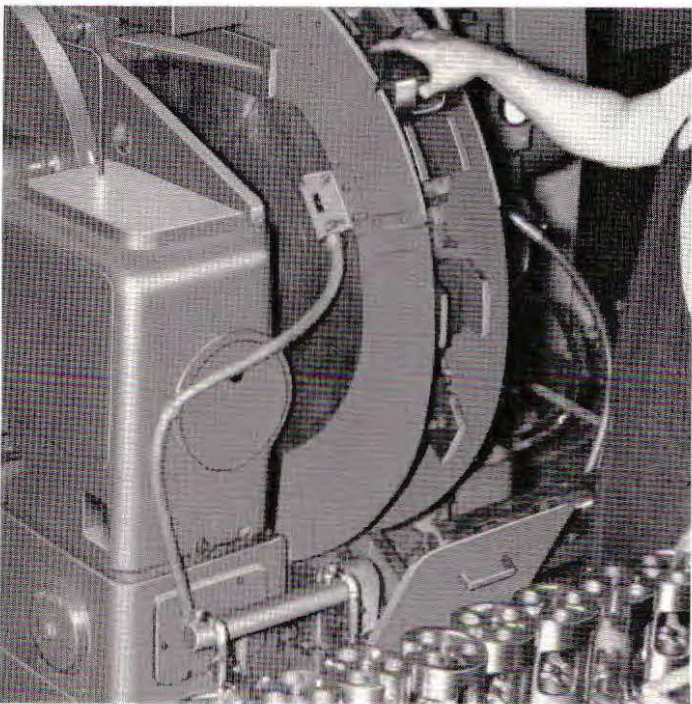
Notched type rotary carrier, with inclined loading chute and peripheral guide through grinding area, arranged for handling small bearing races.



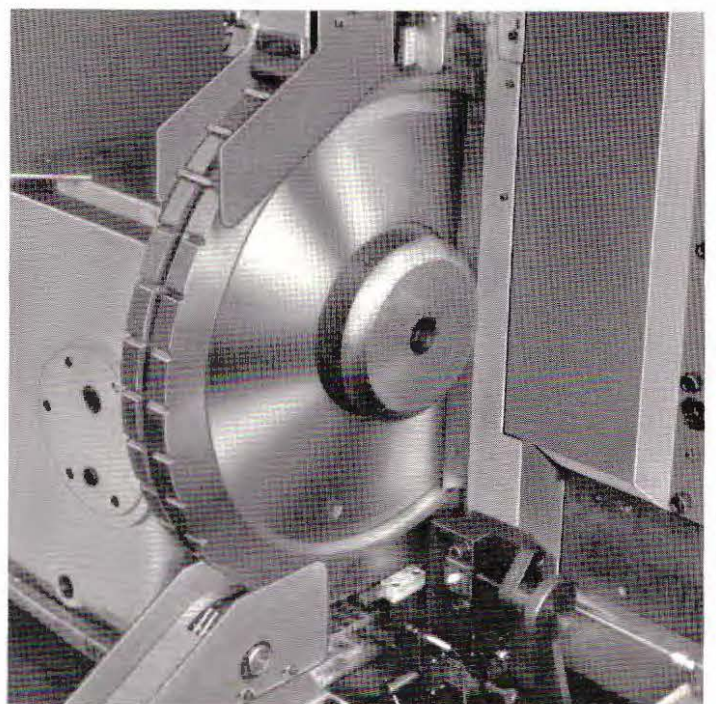
Power driven belt type feed thru fixture, with horizontal loading table and air cylinder pickoff, arranged for handling file blanks.



Chain pickoff type feed thru fixture, with horizontal V-trough loader, arranged for handling piston rings.



Multistation rotary carrier, with chain hold down through grinding area, arranged for handling cylinder cases.

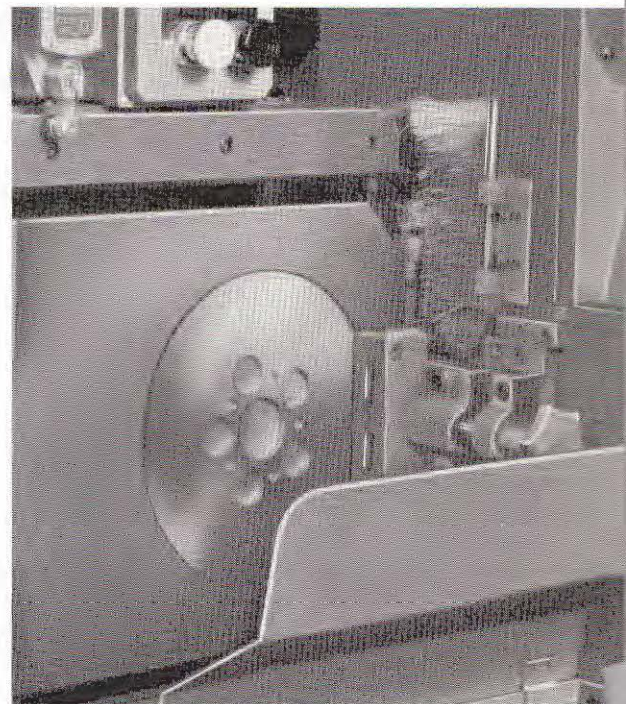
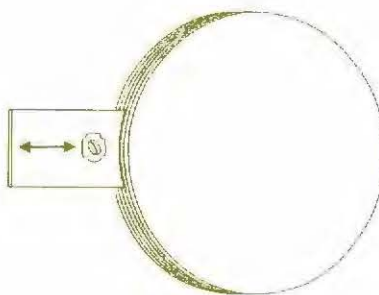


Notched type rotary carrier, with single chain hold down through grinding area, arranged for handling fuel pump push rods.

WORK SUPPORT—*continued*

RECIPROCATING

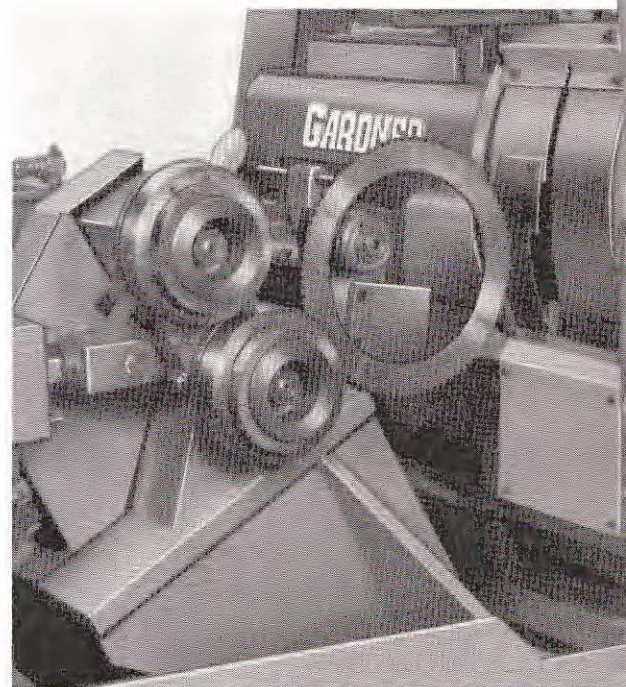
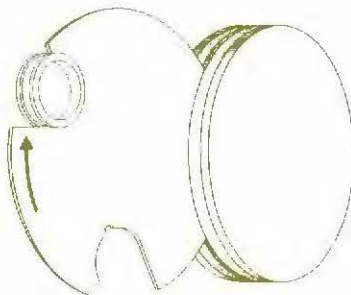
Recommended for refined tolerances, heavy stock removal, or larger parts not suitable for other methods. Parts are contained in the fixture and reciprocated between and across the disc faces. Manual or power operation is available.



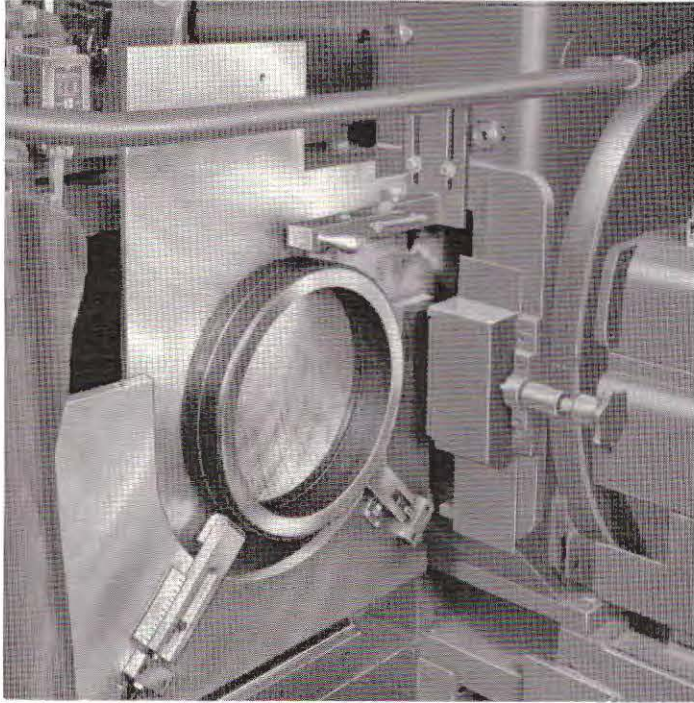
Hydraulically operated reciprocating fixture, arranged for handling brake discs.

SPECIAL

The problem of grinding parts which differ widely in size and shape from average parts and cannot be handled by conventional tooling is solved through use of specially designed fixturing. Gardner engineers can design special work handling fixtures for a wide range of unusual parts.



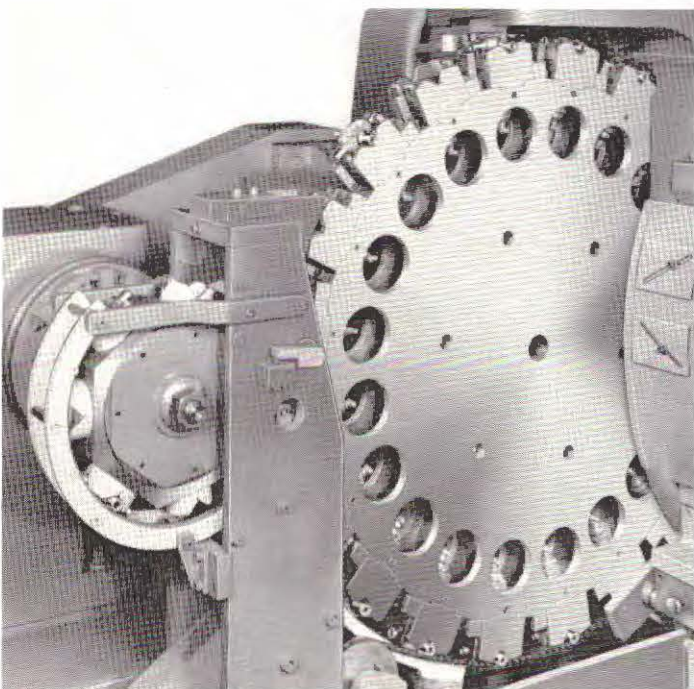
Hydraulically operated swinging arm fixture, with rotating attachment, arranged for handling clutch discs.



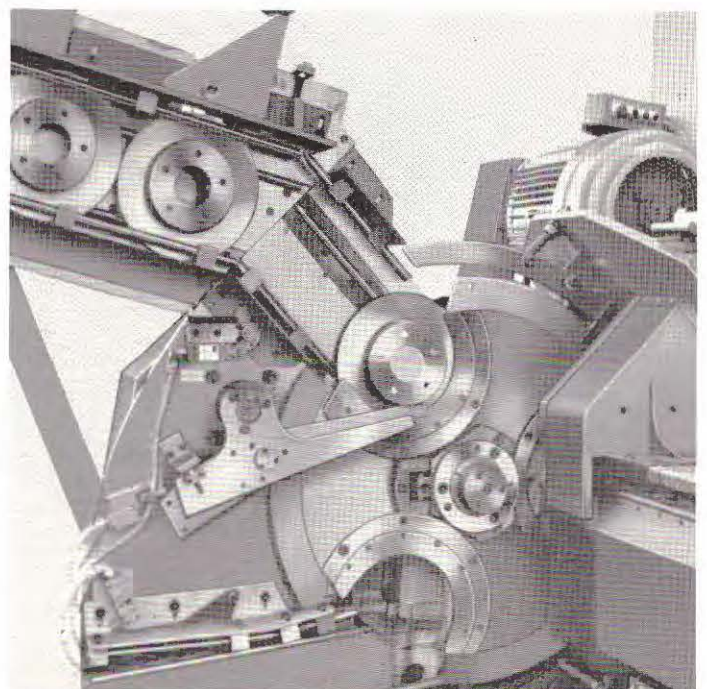
Hydraulically operated reciprocating fixture, with adjustable work holders, arranged for handling various sizes of bearing races.



Hydraulically operated reciprocating fixture, with rotating work holder, arranged for handling disk plates.



Rotary carrier, with double chain peripheral hold down, arranged for handling universal joint spiders.



Indexing rotary carrier, with automatic loader, arranged for handling disc brake rotors.

HEAD SETTING—the fourth essential

NOW FASTER AND MORE ACCURATE WITH GARDNER SWIVELCAP SYSTEM

The new Gardner Swivelcap™ System is an accurate and simple method of quickly setting the angular relationship of the abrasive discs without jacking, tilting, or turning the wheelhead itself. The heart of the system is a patented swivel cap (A).

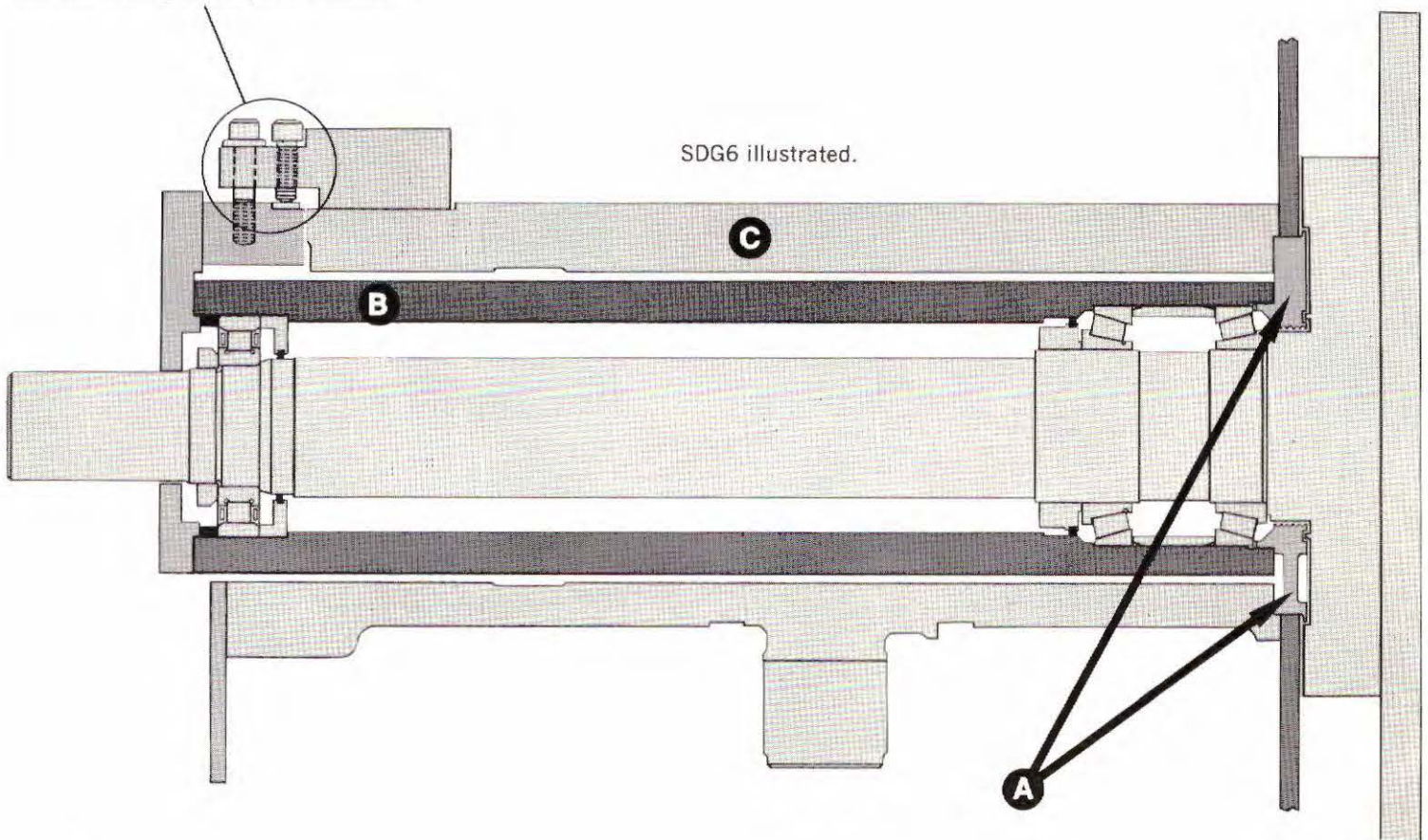
Head setting is accomplished on spindle centerline through adjustment of a tubular spindle housing assembly (B) which is enclosed within the slide casting (C). The

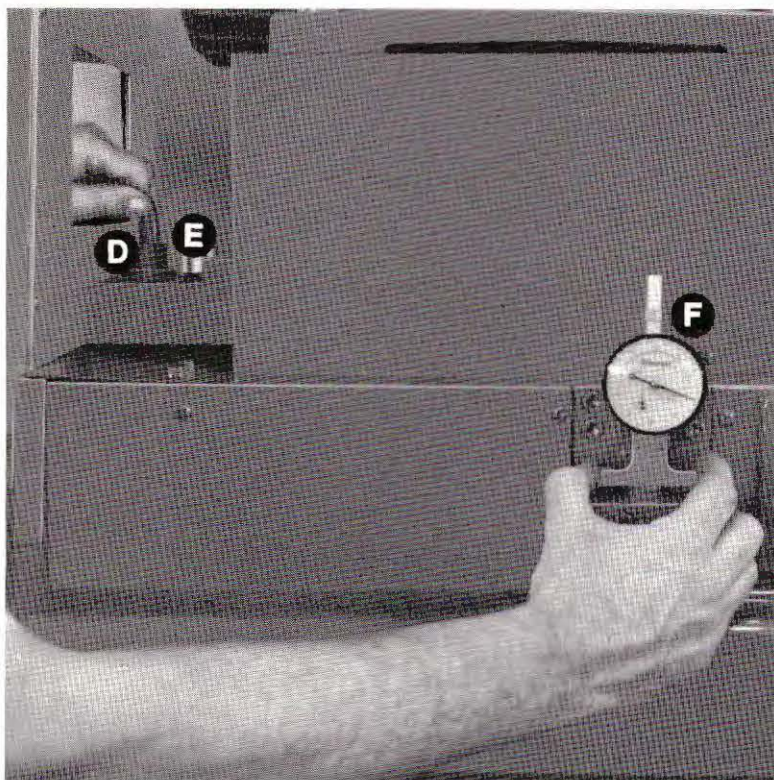
swivel or tilt of the spindle takes place **inside** the wheelhead. With the Swivelcap System, the angular relationship of the abrasive discs remains at the desired setting.

An additional advantage of this new head setting method is the elimination of the subslide, which provides greater rigidity to the wheelhead assembly.

Vertical locking and adjusting screws.

SDG6 illustrated.





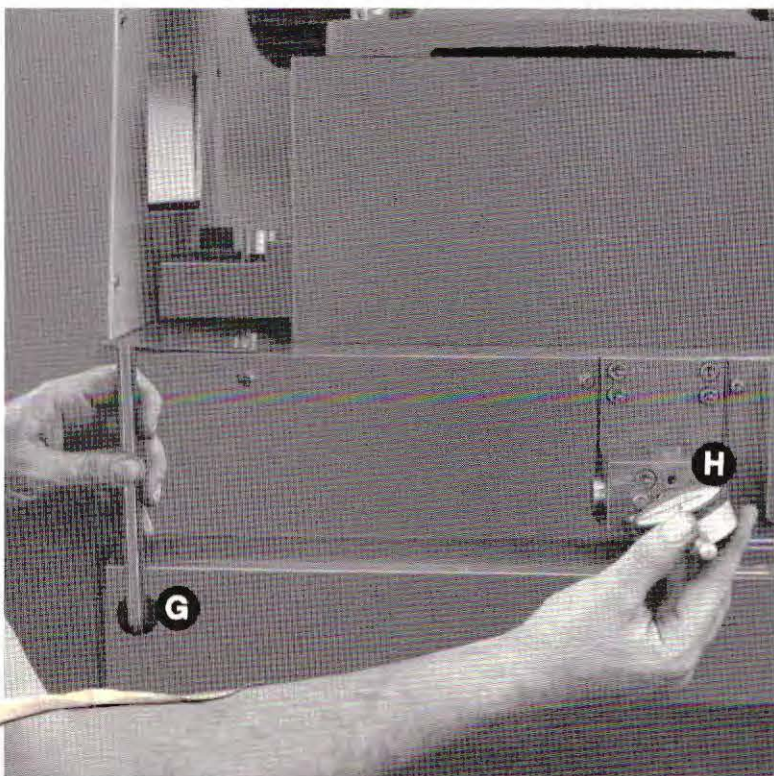
Head Setting Method

A head setting indicator block is mounted at the outer end of each wheelhead. The precise head setting is read directly with a dial indicator inserted in the block.

Vertical Setting

The vertical setting (or tilt) is accomplished through the use of a head locking screw (D) and head adjusting screw (E) located on top and at the outer end of each wheelhead.

With the dial indicator inserted in the block in the vertical position (F), the vertical setting is measured.



Horizontal Setting

The horizontal setting (or swivel) is accomplished through use of two opposed head adjusting screws located on the front (G) and the back of each wheelhead at the outer end.

With the dial indicator inserted in the block in the horizontal position (H), the horizontal setting is measured.

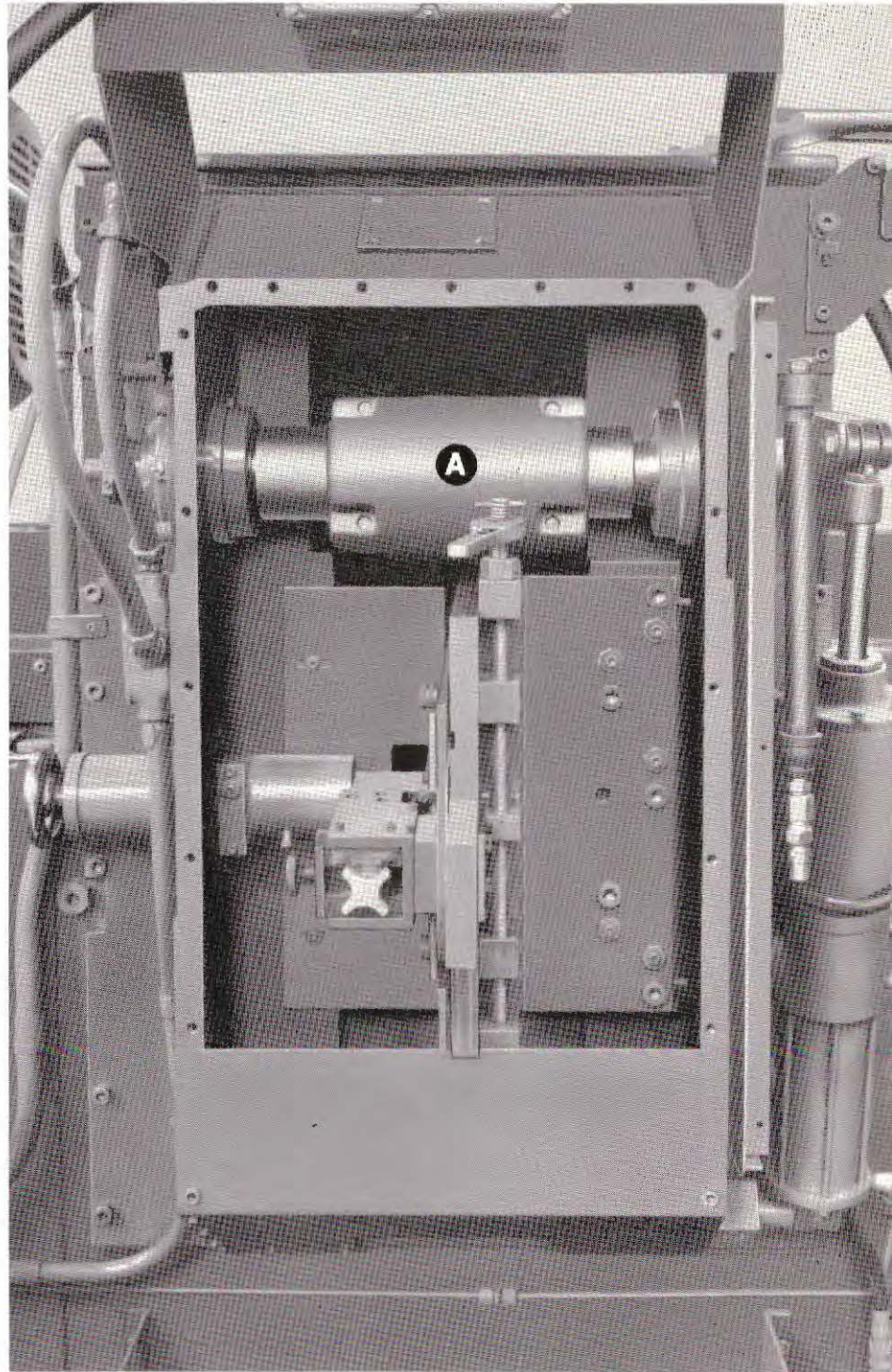
DRESSING AND TRUING — *the fifth*

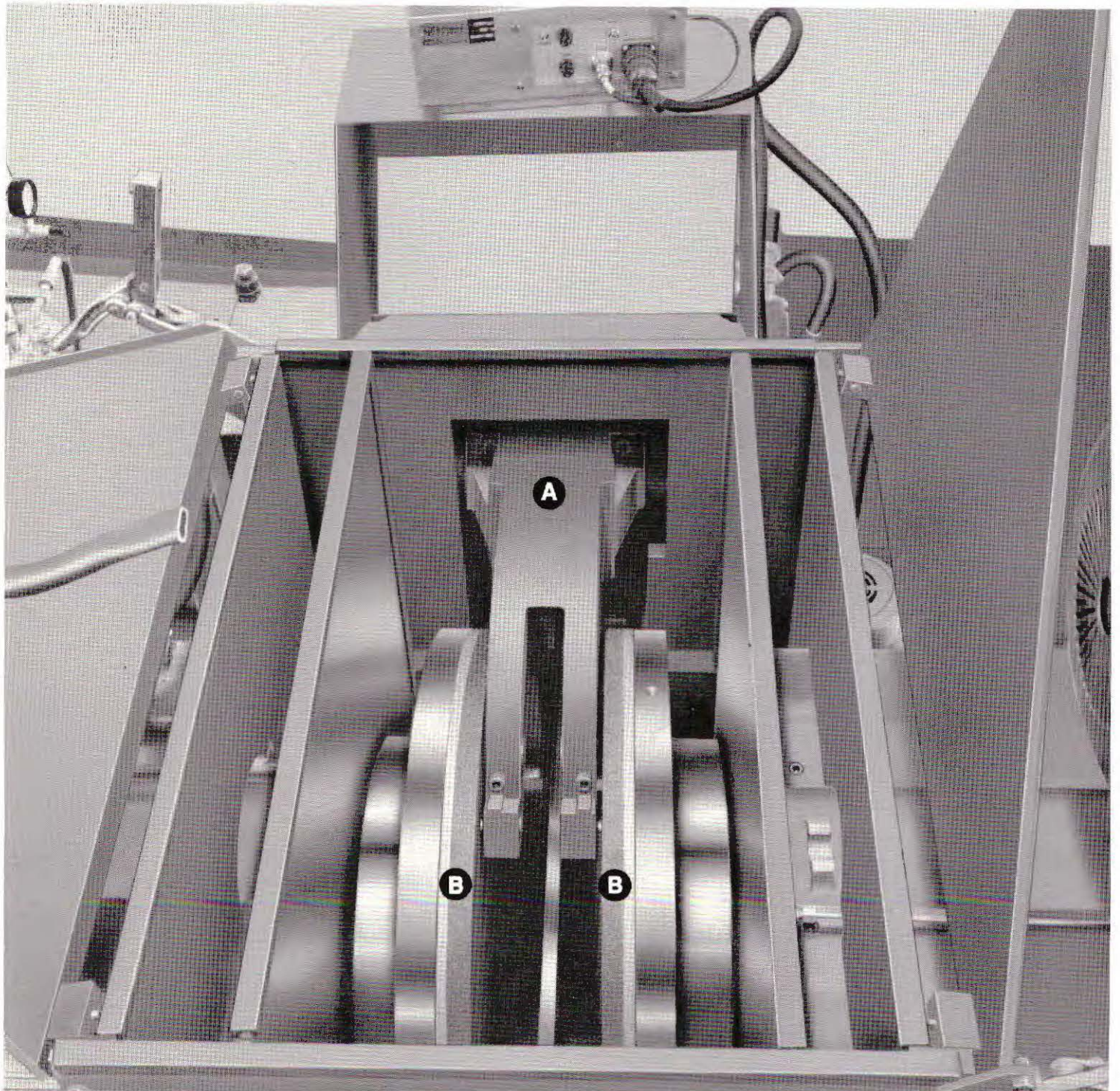
On Gardner SDG grinders a heavy duty power operated dresser (A) is mounted directly on the machine base to maintain the precise factory alignment relative to base ways.

The path of dresser travel is factory aligned with respect to wheel spindle axis and is both accurate and uniform to assure precise truing of the abrasive disc faces. Maintaining this alignment is critical to successful double disc grinding.

The dresser swings upward (or downward) between the discs (B) to dress both discs in one operation. Position of dresser is dependent upon the type of fixturing. This design makes possible the dressing and truing of abrasive discs without having to remove or adjust the tooling. (Subject to limitations of unusual fixturing.)

Both diamond and star cutter dresser heads are available.



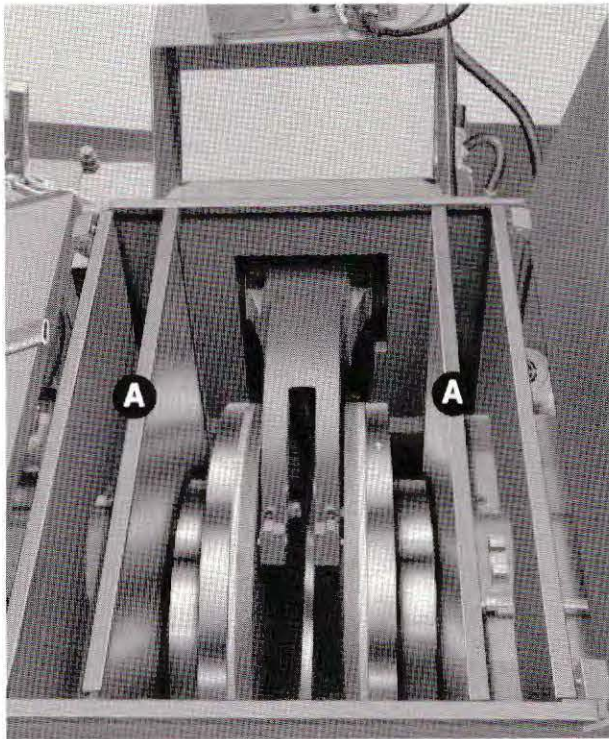


OPERATING AND MAINTENANCE FEATURES

MOVABLE HOOD END SECTIONS

All Gardner SDG grinders have movable hood end sections (A) that travel in and out as the wheelheads advance and retract.

Their function is to contain the coolant within the grinding area and to assure the unrestricted exit of coolant and swarf to the filtration system.



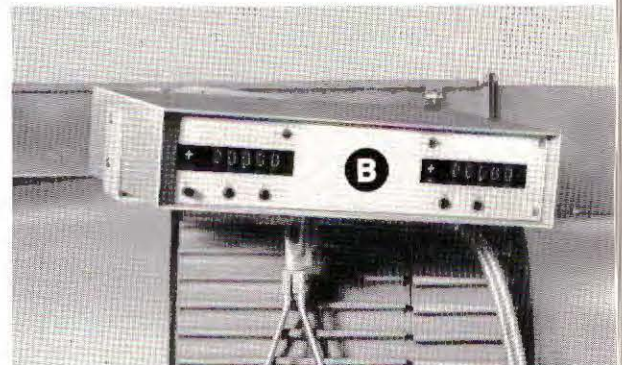
WHEELHEAD POSITIONING INDICATORS

With Gardner bidirectional indicators, the movements of both wheelheads in each direction can be shown.

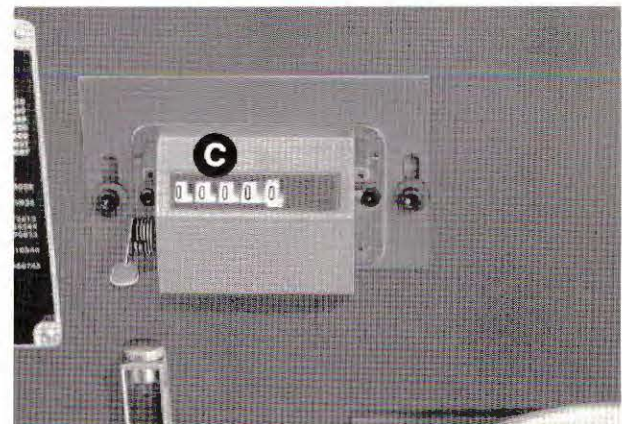
The indicators give a quick easy reading of wheel wear during grinding and indicate the position of the abrasives for setup changes and dressing.

The indicators enable the operator to dress the discs without opening the hood, shutting off the coolant or disturbing the tooling setup (subject to limitations of unusual fixturing). The operator can also rapidly return the wheelheads to grind line.

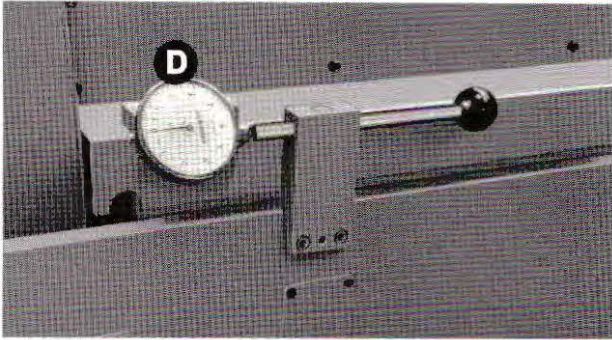
Three types of indicators are available.



1. Electronic digital readout (B) provides a precise, single location readout of the position of **both** wheelheads throughout the full range of slide travel. This system indicates movements of **both** wheelheads in **both** directions and is particularly desirable for face cut (plunge type) grinding.



2. Digital counter (C) provides a reading of the movement of **one** wheelhead in **one** direction throughout the full range of wheelhead slide travel. This is a direct reading mechanical device.



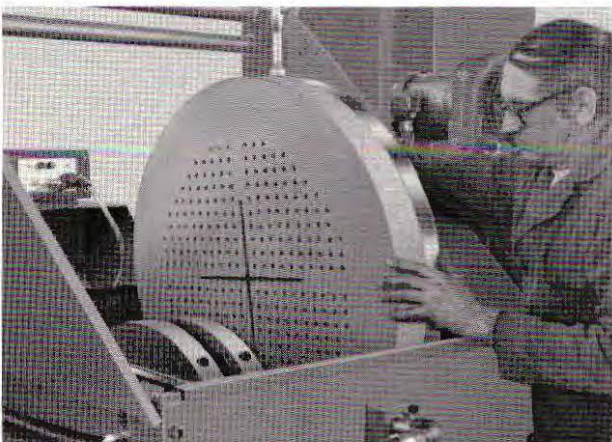
3. Dial indicator (D) provides a direct reading of the movement of **one** wheelhead in **one** direction within the travel range of the indicator dial.

VARIABLE SPEED SPINDLE DRIVE

Variable speed drive of the wheel spindle is often recommended for jobs with unequal areas, bimetals, and other applications where the abrasive action of one disc must vary from the other. Equipment for the system includes appropriate power source for the adjustable speed control.

All Gardner SDG spindle drive motors, whether constant or variable speed, are mounted directly on the wheelheads. Accordingly, the forces involved in driving the spindles are self-contained within the single sliding member. This prevents any possibility of distortion of the disc alignment due to the forces of belt pull from the spindle drive motor.

CHANGING ABRASIVE DISCS



Easy access is provided for abrasive disc change and tooling setup. There is no need to remove any portion of the hood from the machine.

The changing of the discs does not affect tooling, setup, or head alignment. This greatly reduces downtime when abrasive discs are changed.

An adjustable chain pickup for changing the abrasive assembly is available. This device permits precise control by the operator for safely disengaging or engaging the steel wheel hole with the spindle pilot.

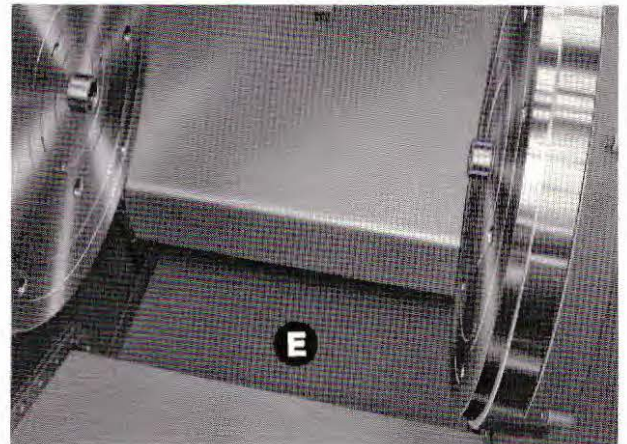
COOLANT SYSTEMS

Of critical importance to successful disc grinding is the amount, distribution, and source of coolant being directed to the grinding area.

All Gardner SDG grinders are compatible with central plant systems or external individual machine systems.

For most applications, Gardner strongly recommends the central plant system.

PREVENTIVE MAINTENANCE

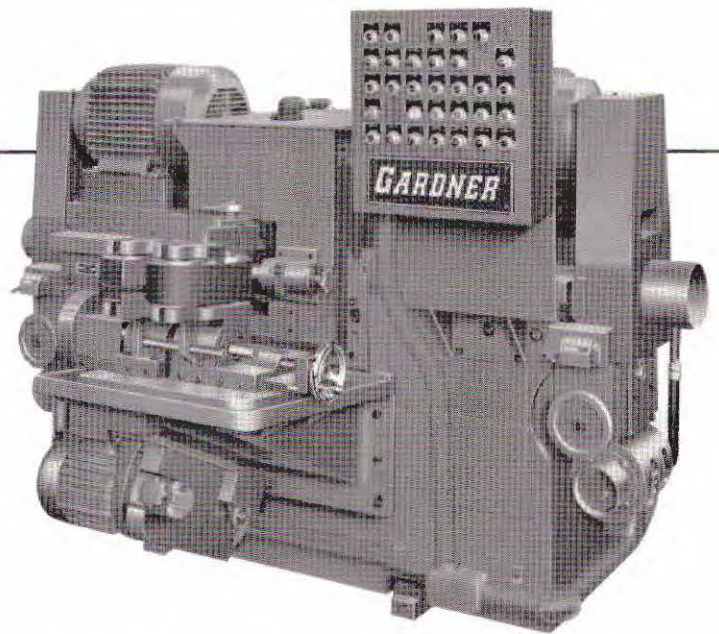


All SDG grinders are designed and engineered for minimum maintenance. The following features reduce maintenance downtime:

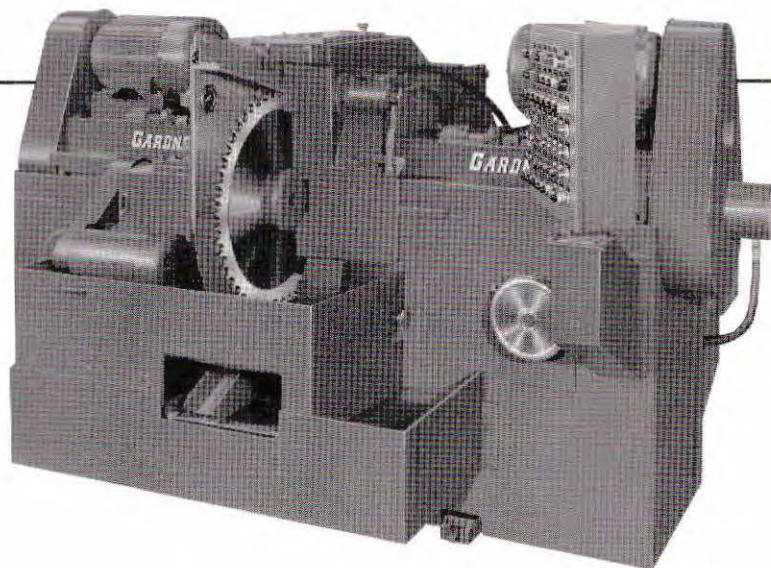
1. Bottom opening in base (E) provides quick escape for grinding swarf and coolant.
2. Horizontal antifriction ways with hardened and ground replaceable wear strips on both machine base and wheelheads.
3. Feed screw is submerged in oil.
4. Side gibs to wheelheads are preloaded and self-adjusting.
5. Rotary joint coolant unions are located outside of belt guards for service accessibility.
6. Automatic lubrication systems are available.

BRIEF SPECIFICATIONS

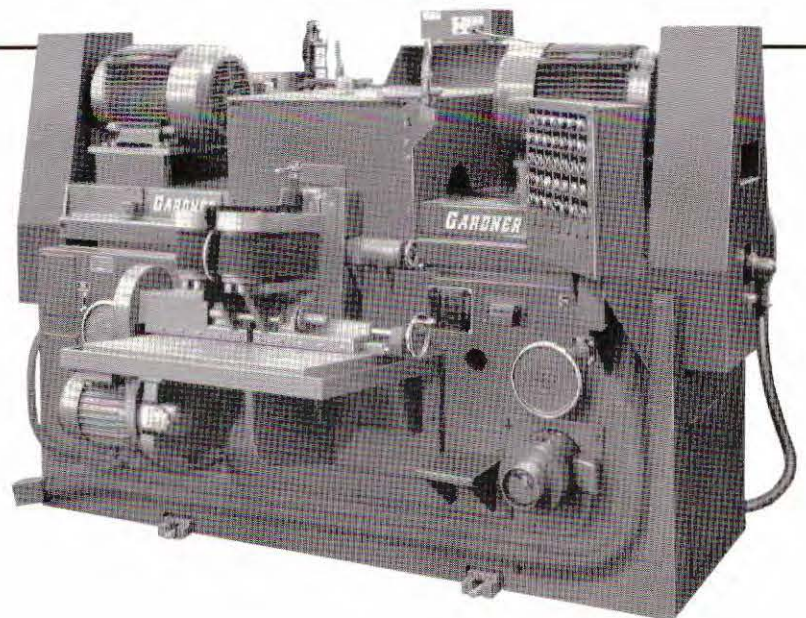
SDG2
precision
double disc
grinders



SDG3
precision
double disc
grinders



SDG6
precision
double disc
grinders



Description**Feed Thru, Rotary or Reciprocating**
English Metric

Abrasive O.D.	Up to 23"	Up to 584 mm
Abrasive thickness (usable)	3"	76 mm
Opening between steel wheels (maximum)	12 1/8"	308.0 mm
Wheel mounting flanges, O.D. x thickness	14 7/8" x 1 3/8"	377.8 mm x 34.9 mm
HP spindle drive, TEFCBB 1750 rpm motors	Up to 30 hp	Up to 22.4 kw

Abrasive O.D.	Up to 30"	Up to 762 mm
Abrasive thickness (usable)	3"	76 mm
Opening between steel wheels (maximum)	15"	381 mm
Wheel mounting flanges, O.D. x thickness	17" x 1 1/2"	432 mm x 38.1 mm
HP spindle drive, TEFCBB 1750 rpm motors	Up to 75 hp	Up to 56.0 kw

Abrasive O.D.	Up to 42"	Up to 1067 mm
Abrasive thickness (usable)	3"	76 mm
Opening between steel wheels (maximum)	15"	381 mm
Wheel mounting flanges, O.D. x thickness	19 1/4" x 2 1/16"	489.0 mm x 74.6 mm
HP spindle drive, TEFCBB 1750 rpm motors	Up to 125 hp	Up to 93.3 kw

Gardner reserves the right to change, without notice, the design and specifications of these grinding machines and their attachments.

NOTE: Some covers, doors, and guards have been removed or shown in the open position to illustrate additional details of the machine. All protective devices must be properly installed and fastened before operating the machine.

ABRASIVES

GARDNER MANUFACTURES BOTH GRINDING MACHINES AND ABRASIVE DISCS

The efficiency of a disc grinder depends to a great extent on the type of abrasive discs used.

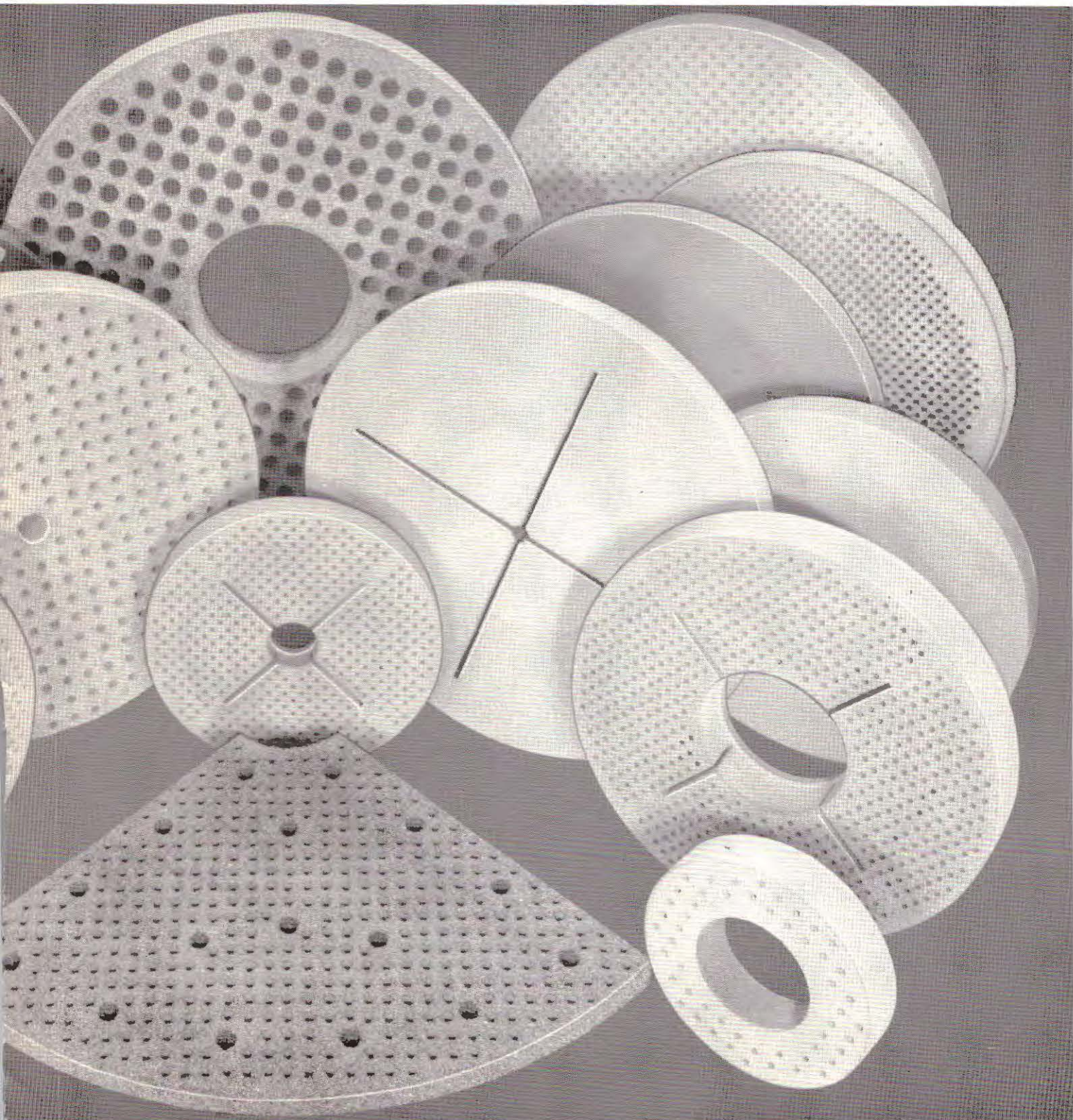
Tailoring the discs to a given job requires a thorough knowledge of the relationship between grain size, bond, grade, grain spacing, and face configuration.

Your Gardner abrasive representative is an abrasive specialist, well qualified to help you make the right abrasive choice for high productivity at the lowest cost per part.

Gardner engineering and research personnel are constantly developing new formulas to meet customers' requirements. Laboratory, manufacturing, and quality control records are maintained so that any given specification or order can be duplicated at any time.

Whether your flat surface grinding is routine or exotic, nobody knows more about matching the abrasive to the job than your Gardner Abrasives Specialist.







GARDNER MACHINE
South Beloit, Illinois 61080