Keep in Room 7.

INSTRUCTION MANUAL

BALDWIN

TATE-EMERY

TESTING MACHINE

THE BALDWIN LOCOMOTIVE WORKS

EDDYSTONE DIVISION

PHILADELPHIA • PENNSYLVANIA

No. IS-4904

BALDWIN

instruction sheet

BALDWIN-TATE-EMERY UNIVERSAL TESTING MACHINE

OIL AND LUBRICATION DATA

LOCATION	TEXAS COMPANY	SOCONY MOBIL	GULF OIL COMPANY
Hydraulic System, Oil Reservoir	URSA Oil P-40	DTE-Extra Heavy	Harmony Oil "E"
Weighing System, Capsule	Special.....	See IS-4902.....	.....
Backlash Eliminators, Grease Fittings	Regal Starfak 2	Gargoyle Grease Sovarex L-1	XXX Lubricant #1
Screws, Hand Paint	Pinnacle Cylinder Oil	Gargoyle Cylinder Oil, 600-W	EP Lubricant 115
Crosshead Motor, Reducer Housing	Pinnacle Cylinder Oil	Gargoyle Cylinder Oil, 600-W	EP Lubricant 115
Electric Motors, with Fittings	Regal Starfak 2	Gargoyle Grease Sovarex L-1	XXX Lubricant #1
Load Indicator, Dash Pot	Pinnacle Cylinder Oil	Gargoyle Cylinder Oil, 600-W	EP Lubricant 115

WIEDEMANN

BALDWIN

WIEDEMANN MACHINE COMPANY
GULPH ROAD, KING OF PRUSSIA

Recd 2/19/63

FOREWORD

The Baldwin-Tate-Emery Universal Testing Machine consists of a rugged hydraulic press and a sensitive weighing system. Both units are built to withstand punishment. Neverthless, it has been proven by many years of experience that a thorough understanding of the machine, together with proper attention, will pay big dividends. It is well to bear in mind that while this machine is of heavy, sturdy construction, at the same time it is a precision instrument and for best results deserves the best of care.

This manual has been prepared with the thought that it be kept as a ready reference and should, if read carefully, go a long way towards eliminating many of the difficulties usually experienced by a new operator in the use of your testing machine.

Due to varying sizes and capacities of our Baldwin-Tate-Emery Universal Testing Machine, this manual must of necessity be prepared in a general way, and does not in every particular apply to the individual machine. It is, therefore, important when ordering spare parts, accessories, or service to always specify the serial number stamped on the nameplate of your machine.

THIS MANUAL IS DIVIDED INTO FOUR PARTS:

PART No. 1—General Instructions for Handling, Erection, etc.

PART No. 2—Construction, Operation and Maintenance.

PART No. 3—Parts Lists, including identifying Cuts and Diagrams.

PART No. 4—Essential Accessories.

PART NO. 1

GENERAL INSTRUCTIONS FOR HANDLING AND ERECTING

BALDWIN-TATE-EMERY UNIVERSAL TESTING MACHINES

FOUNDATION

Where specific foundation is required, see that foundation is ready and in accordance with certified blueprint sent you in advance of machine.

Although lighter machines (120,000# capacity and less) do not usually require a special base, it is advisable that bolts or some other means of assuring stability be provided.

It is important that machine and cabinet be properly spaced because oil line is cut to a set length.

ERECTION

Problem of erecting the machine is determined by the facilities available and is therefore a matter on which specific instructions cannot be given. The problem should be placed in the hands of a competent rigger who should read this part of the instruction book and then decide the best means for upending the machine. Two possible methods are outlined below:

WHEN OVERHEAD LIFTING EQUIPMENT IS AVAILABLE

(a) Remove boxing and blocks securing machine to skids.

(b) Make certain that block and bolt between heads F and D are secure.

(c) Attach slings around head D.

(d) Raise machine until it is suspended over the foundation or anchor bolts, then lower vertically. When raising machine it is a good idea to follow up closely with cribbing unless high capacity crane and strong cable are used.

WHERE OVERHEAD LIFTING EQUIPMENT IS NOT AVAILABLE

Machine can be lifted by block and tackle or by jacks or by both methods together.

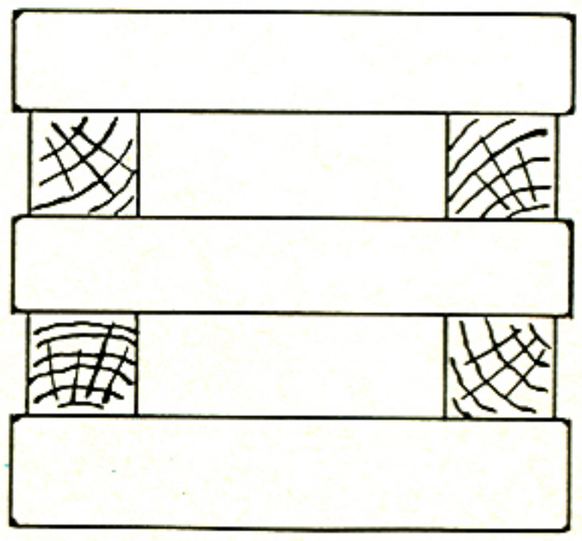
Whether or not to remove the skids before upending the machine is a matter for specific determination in each case. As a rule they are left on if a pit is not required and removed if machine is to be sunk below the floor level. If left on, be sure that the projecting ends are sawed off well above the plane of the base.

In either case the general procedure should be as follows:

(a) Move the machine to a position such that when upended it will occupy the position desired.

(b) Place jack either (a) under each longitudinal skid, a little above the plane of the ram table, or (b) under crosshead D. After machine has been raised somewhat, it is easier to jack along edge of table.

(c) Jack up equally and insert timbers to conserve your gain. Release the jacks and repeat building a wide based crib as you proceed. Merely piling one timber on another for a crib is not sufficient, because at an angle of 45 degrees timbers will roll out and drop the machine. Adjacent sketch shows correct type crib. Do not jack against skid cross pieces as these are merely nailed and may pull loose.



(d) Continue the upending and snub the machine from overturning when the center of gravity passes the vertical plane through the front supporting edge. The snub rope may be attached around crosshead D and then snubbed by one or two turns around some solid post.

(e) Where a pit is required, it is usually necessary to crib up in the pit with timber to floor level or a little below and upend the machine on this cribbing using care in its arrangement so that the projecting parts (below the plane of the machine base) enter openings in the cribbing.

(f) When machine is in a vertical position, insert timber (heavy enough to support machine) under head F and raise machine by means of jacks under ends of this timber. Then lower onto floor or foundation threading anchor bolts through holes in the base.

(g) Level machine using ram table or a leveling plane and apply grouting if so desired.

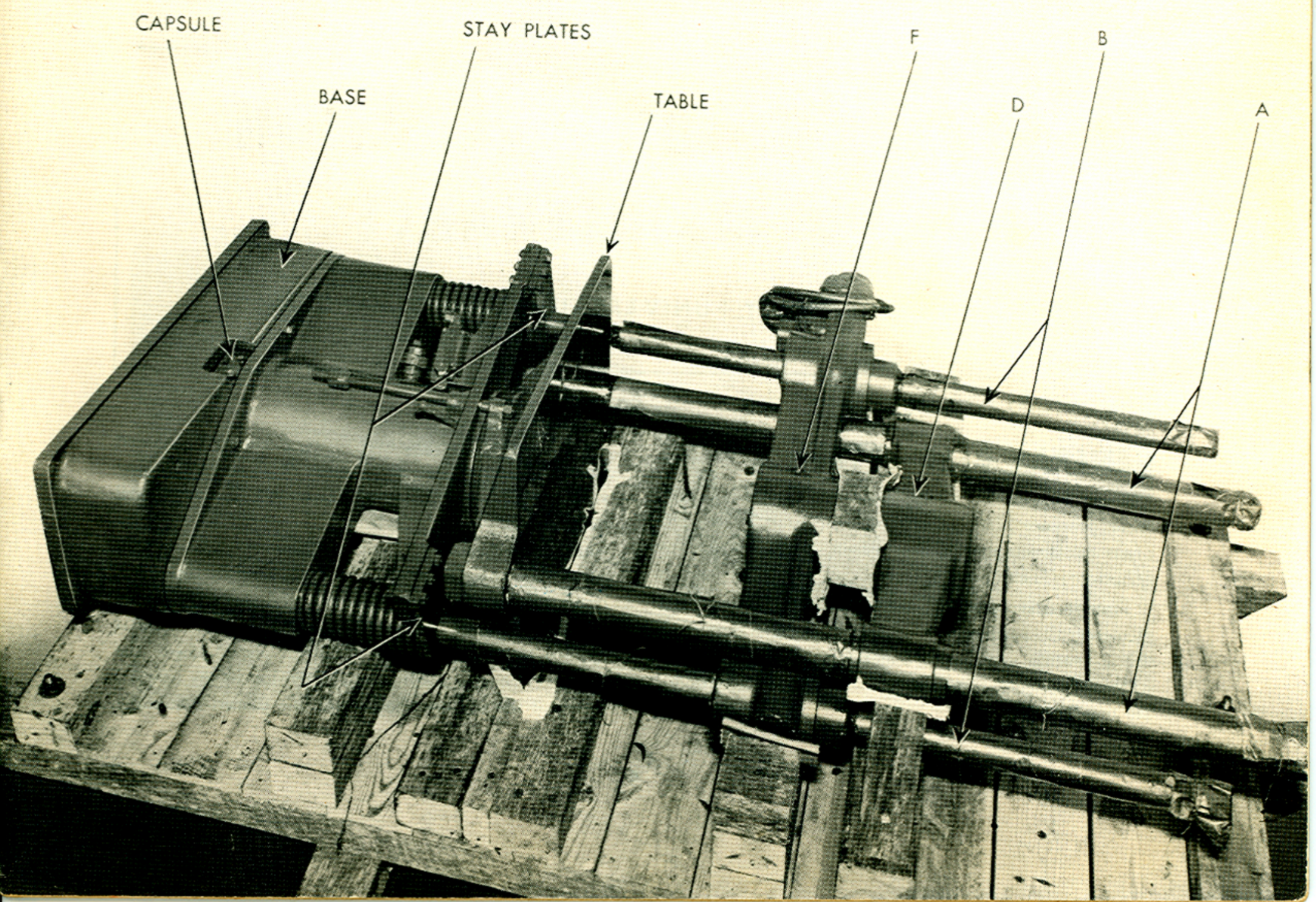
IMPORTANT:— (a) Never impose a load on stayplates.

(b) Never lift without following closely with cribbing.

(c) When applying jacks, cables, etc. always make certain that machine is protected by pads or blocks.

CABINET AND PIPING

The upper section of the cabinet contains the indicating system; the lower half holds the pumping unit and electrical control boxes. After machine has been erected, locate cabinet as shown on erecting drawing.



Distance between the two units can be checked by attaching pipe from cylinder to pumping unit.

Capsule line (¼″ copper tube) and overflow line (5/16″ copper tube) will be installed by our Field Engineer. A ¼″ copper tube is furnished for carrying air into the indicating system. One end is attached to the filter on the inside of the cabinet. The other end is attached to the air compressor or lead from air line.

The AIR should be reasonably clean and dry. If it is not, an extra filter should be installed.

Air pressure should be between 35 and 125 lbs.

If you so desire, the cabinet may be attached to the floor by bolts at the rear. It is important that cabinet be made secure since appreciable shifting may cause an erratic zero.

WIRING

(1) Connect conduit from limit switch on loading cylinder to starter box on pumping unit, making connections as indicated on wiring diagram.

(2) Connect crosshead and cabinet push button stations. Be certain that color of wires and color of terminals agree.

(3) Insulate free ends of remaining wires, if any, from each other and from ground.

(4) Check pump motor and sensitive platen motor for current requirements. Then connect power lines to proper terminals in pump motor starter box as indicated by wiring diagram on inside of box cover.

(5) Check rotation of motors (with right hand valve closed) and reverse wiring if necessary.

(6) Fluorescent light requires a 110 volt current. so do recorder, pacing disc drive, and air compressor. A lead should be provided if any of this equipment is to be installed. In the event that a transformer is used this is not necessary except in the case of an air compressor. A separate 110 volt supply is always required for an air compressor.

NOTE: Fluorescent lights are not furnished as standard equipment on Models 20-35, 60-35.

PART NO. 2

CONSTRUCTION OPERATION AND MAINTENANCE

BALDWIN-TATE-EMERY UNIVERSAL TESTING MACHINES

GENERAL DESCRIPTION

Efficient operation of the Baldwin-Tate-Emery machine demands that the operator have some knowledge of its construction. For this reason, the following description is included.

Functionally speaking, the machine contains three elements: the loading system, the weighing system, and the indicating system. To understand the construction of these elements, it is best to consider how they operate together.

Assume that the machine is in operating order and that the pump motor is running. With the unloading valve closed and the loading valve open, the pump will discharge oil into the cylinder and drive the ram upwards. Attached to the ram is the work table which carries the two compression columns and the top crosshead. Between the top crosshead and the table is the sensitive crosshead. Thus when a hydraulic pressure is applied to the cylinder, a specimen placed above the sensitive crosshead will be put in tension by the upward travel of the top crosshead, and one placed below the

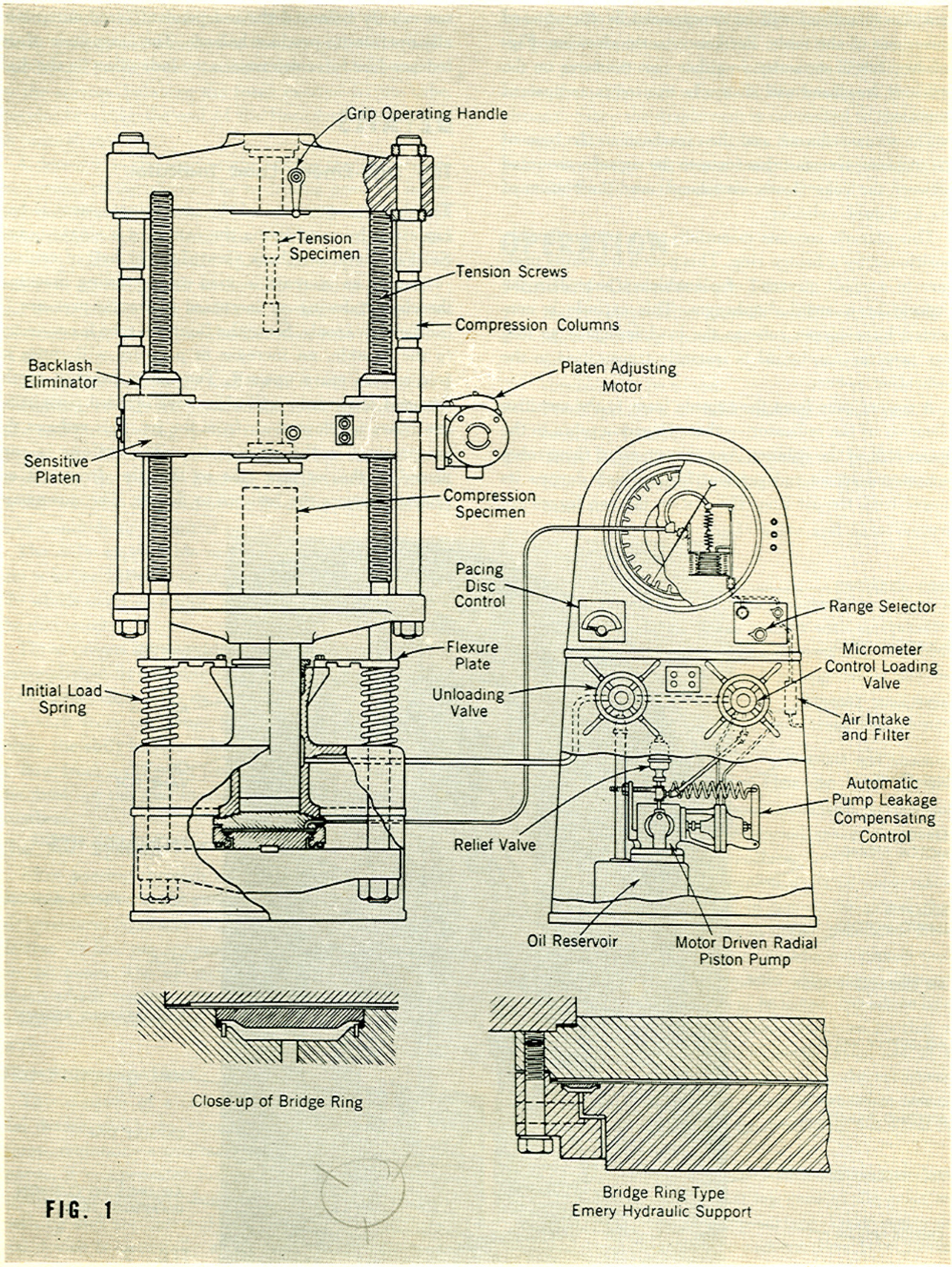

Grip Operating Handle
Tension Specimen
Tension Screws
Compression Columns
Backlash Eliminator
Platen Adjusting Motor
Sensitive Platen
Compression Specimen
Pacing Disc Control
Range Selector
Flexure Plate
Micrometer Control Loading Valve
Initial Load Spring
Unloading Valve
Air Intake and Filter
Automatic Pump Leakage Compensating Control
Relief Valve
Oil Reservoir
Motor Driven Radial Piston Pump
Close-up of Bridge Ring
Bridge Ring Type
Emery Hydraulic Support

FIG. 1

sensitive crosshead will be compressed by the upward movement of the table. Reference to the drawing. Figure No. 1, will show that in either case the force on the sensitive crosshead will always be exerted in an upward direction.

The screw columns and the crosshead in the base of the machine transmit this force to the capsule, mounted between the yoke (lower crosshead) and the bottom of the hydraulic cylinder.

This capsule consists essentially of a piston flexibly positioned by a bridge ring. This piston transmits pressure to a small quantity of oil which is sealed in the capsule by a metal diaphragm. This capsule is connected by a copper tube to the load indicator so that any pressure on the oil is instantly transmitted to the indicating system.

A copper tube from the capsule leads to the sensitive elements of the indicator — three Bourdon tubes in the upper half of the cabinet. Any movement of these tubes is opposed by an independent force which derives its power from the air line. The instant the two forces are not exactly balanced the independent force automatically operates to produce balance. The magnitude of the independent force determines the indication on the dial.

DETAILS

The Tate-Emery Load Indicator

The detailed operation of the indicating system is best explained by considering the action of a single range. See Fig. 2 showing back view of upper half of cabinet.

Assume an increase in load on the testing machine, thereby producing an increased hydraulic pressure in the Emery capsule. Since the Bourdon tube is connected to the capsule, an increase in pressure will cause its free end to move upward. The baffle attached to the free end of the tube will also move upward permitting less restricted flow of air from the jet. This reduces the air pressure in the jet pipe line. The bellows is connected to the jet pipe line so that the decreased air pressure causes the bellows to deflate. The downward

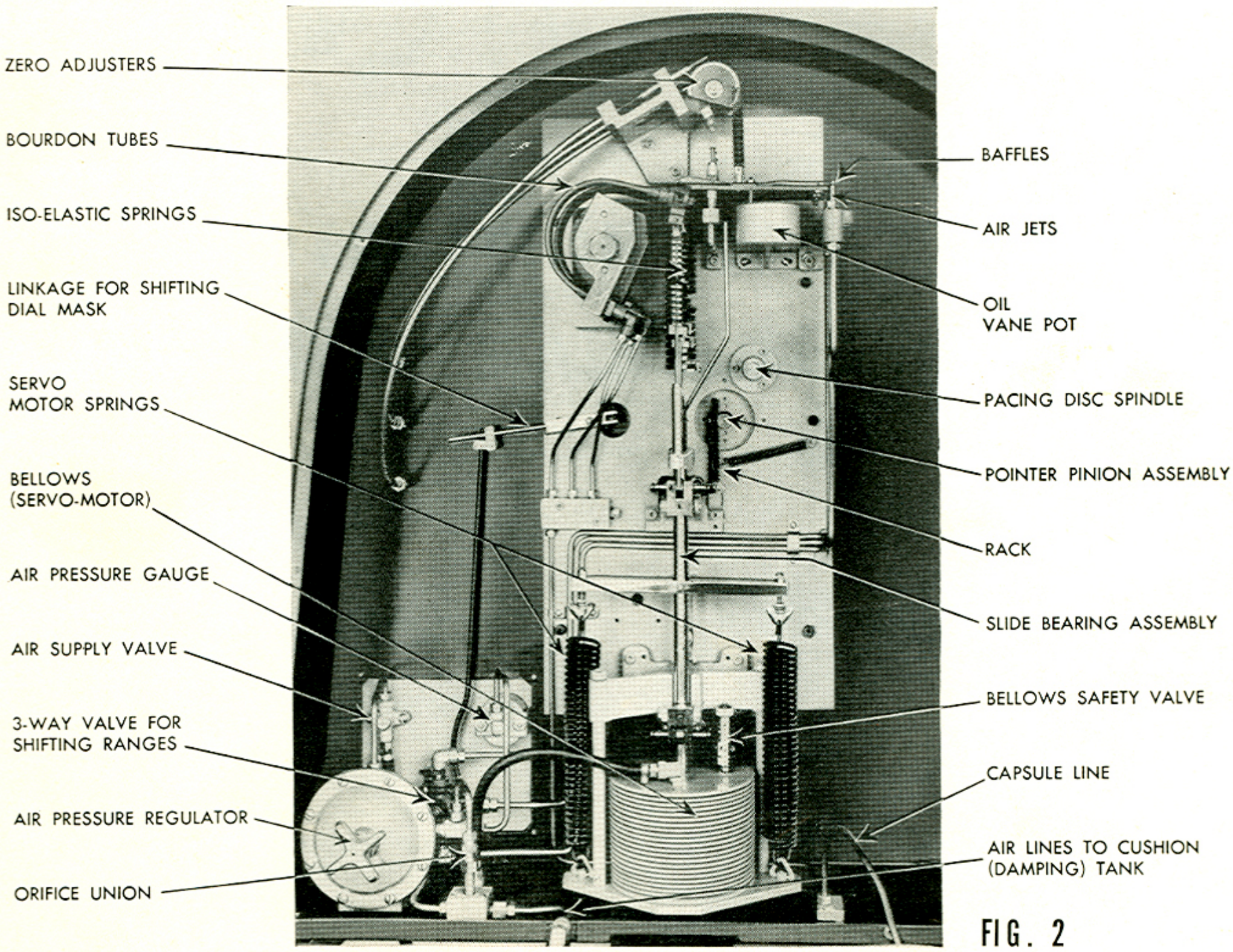


FIG. 2

motion of the bellows increases the tension on the iso-elastic springs also attached to the free end of the Bourdon tube. This process continues until the load exerted by the springs balances the force exerted by the tube, thereby bringing the end of the Bourdon tube back to its orginal position.

A decrease in the load on the testing machine causes the reverse of the above. The hydraulic pressure in the Bourdon tube being less, its free end will fall. This will make the flow of air from the jet more restricted and the air pressure will build up. As a result, the bellows will rise, carrying with it the slide bearing assembly; and the tension of the iso-elastic springs will decrease. Consequently, the end of the Bourdon tube will rise to its original position.

The device follows the load up or down, maintaining a condition of balance between the force exerted by the tube and the opposing spring force. In other words, the greater the load the greater the spring tension, and conversely, the less the load the less the spring tension. In this way, the free end of the Bourdon tube is always held minutely to its initial position.

The only appreciable motion in the indicating system is in the bellows, springs, and slide bearing assembly which move as a unit. This motion is used to drive the dial pointer.

Three ranges are provided in each indicator. This is accomplished by utilizing three Bourdon tubes, one for each range, each with its own load spring and air jet. The shift from one range to another is effected by rotating the shift knob on the panel, thereby causing air to flow from a different jet. The shift knob also causes the mask on the dial to uncover a different set of dial numbers.

The Air System

After passing through the filter, air enters through the supply valve at the panel. It then passes through an air pressure regulator which should be regulated to deliver 25 lbs. per square inch as indicated by gauge on the panel. The air next passes through an orifice union which regulates the flow to the jets. From there it leads to the three jets, the bellows, and the capacity tank.

The Pumping Unit

This consists of a radial piston pump and differential device which, by varying the displacement of the pump, maintains a constant speed of the ram. In other words, it compensates for any variation in resistance against the ram, any leakage past the main cylinder packing and any internal pump leakage. The differential device is essentially a two chamber unit separated by a flexible diaphragm. One chamber is connected to the pump oil pressure, and the other side to the cylinder oil pressure. Any change in pressure in the cylinder or in the pump will result in movement of the diaphragm. Since the diaphragm is connected to the pump plunger, this movement will vary the eccentricity of the pump and hence its displacement, thereby tending to equalize the forces against the diaphragm.

OPERATION

Standard Compression Test

1 — Insert compression plate in sensitive crosshead.
2 — Move sensitive crosshead so as to provide a compression space about ½ inch greater than the specimen to be tested.
3 — Place specimen on table making certain that it is centrally located.
4 — Move maximum hand on gauge to position well below anticipated breakload and adjust indicator hand to zero.
5 — Open release (left hand) valve and close control (right hand) valve.
6 — Start pump.
7 — Close release valve and open control valve. Just as soon as specimen makes contact with compression plate, close coarse control and open fine (micrometer) control so that load is applied at the desired rate.
8 — When breakage has occurred, close fine control and open coarse release valve.

Standard Tension Test — Flat or Vee Grips

1 — If necessary, move upper crosshead to position which will give desired tension space. Be sure to replace split rings and collars.
2 — Insert grip operating pinion shaft in upper cross head. Screw L — stops in top of the grips; then lower the grips into slot in upper crosshead. Level the grips by pushing in or pulling out pinion shaft and tighten set-screw to hold adjustment. Depending on size of specimen to be tested, introduce liner plates in pairs of the same thickness so that at start of test lower ends of wedge grips are ¼ to ½ inch above the lower surface of the crosshead. Apply small plate and screw in top of crosshead to prevent upper grips from jumping out when the specimen breaks.
3 — Arrange grips and liners in the sensitive crosshead in the same way so that top ends of the grips are ¼ to ½ inch below top surface. Liner plates are inserted from above to prevent them from falling

out when the specimen breaks. Apply small plate and screw in bottom surface of crosshead to prevent grips from falling through.

4 — Insert specimen in upper crosshead, using care that a full bite on the specimen is obtained.

5 — Raise sensitive crosshead until its grips are in a position to bite the greatest possible area of the specimen.

6 — Set grips tight with handles on pinion shafts and start test as described in paragraph A. As soon as load starts to increase, remove handles. At breakage close control valve and open release valve.

Standard Tension Test — Shoulder End or Thread End Specimen Holders

Tension tests of specimens having thread or shoulder ends do not require the use of the pinion shafts. The plate to stop the wedge block from jumping out of the upper head should be used. To support the lower holder and wedge block in the sensitive crosshead a coiled compression spring assembly is provided. After specimen has been properly inserted in holders, test is conducted as described in previous paragraph.

CAUTION — DO NOT

1 — Shut off motor with load on the machine. This puts an undue strain on the diaphragm of the pump control.

2 — Lower sensitive crosshead close to table without first raising table slightly and holding it there. In this way, any jamming can be overcome by merely dropping the table.

3 — Pull tension tests without a full bite on specimen. This is a very common mistake and is responsible for most of the damage done to flat and vee grips and thread and specimen holders.

MAINTENANCE

Weighing System

(Does not apply to 20-35 or 60-35 Model Machines)

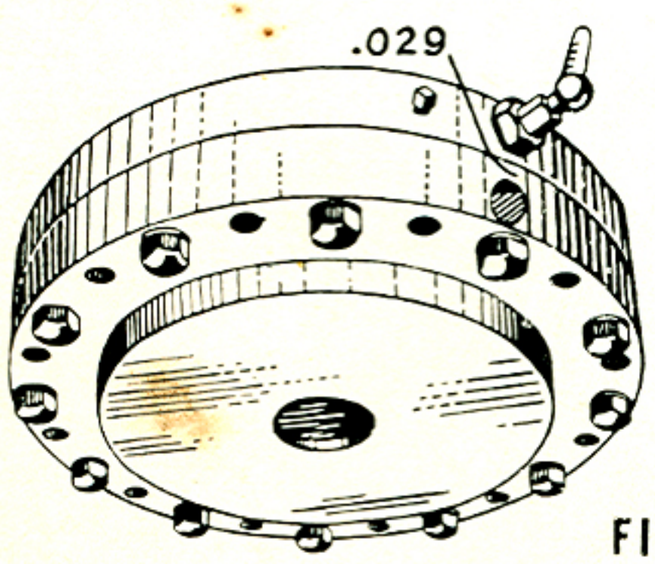


FIG. 3

Capsule

The hydraulic load indicating system includes the Emery hydraulic weighing support normally called the "Capsule" together with the load indicating mechanism and the connecting tubing. This is a sealed system which, for proper operation, must contain the correct amount of oil.

Detached from the testing machine, the Capsule would appear as shown in the illustration, Fig. 3. This capsule is located in the base of the testing machine and is provided with an oil gun fitting, generally from the back of the testing machine.

Three equally spaced openings around the capsule are provided through which thickness gauges can be inserted to determine the spacing of the flat surfaces at the bottom of these holes. The correct amount of oil is indicated when the average gauging at these holes is within .003" of the number stamped on the capsule near the filling connection, for instance .029" (illustration Fig. 3). Should the gauging indicate more than the permitted amount of spacing, oil should be added.

.027" for our machine.

Capsule Filling

Capsule Filling is done at zero machine load. Fill the oil gun (furnished with the machine—Fig. 4) level

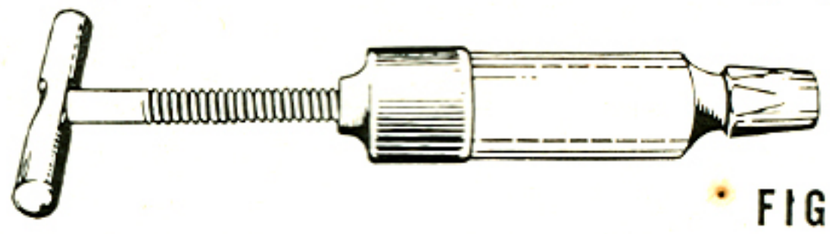


FIG. 4

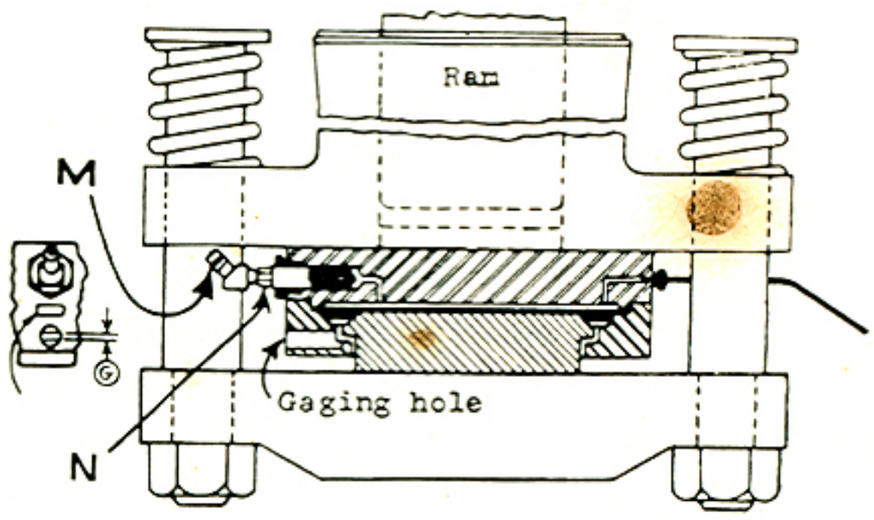


FIG. 5

full, using special mineral oil supplied, making certain that it is free from air bubbles. Attach gun to threaded nipple, "M"—Fig. 5, having gun pointed downward at all times during attachment and while it is attached to the filling connection, so that any air trapped in the gun will not be forced into the system. Open valve, "N", Fig. 5, with wrench and pump in oil until the desired gauging is obtained. Note that adding oil reduces the gauging. Close valve firmly with wrench after filling. A special 19/32 inch hex wrench is furnished for the purpose.

Leakage

Loss of oil is evidenced by an increase in gaugings, slight increase over a period of time is normal. However, if connections are tight and it still becomes necessary to refill more often than every three months, and no leak can be found, report to manufacturer, giving full details. In particular, note whether gauging holes are wet.

Gauging

Check gauging daily the first week of service, weekly for a month thereafter, and then every month.

Capsule Oil

The oil for the weighing system, supplied with the machine has been carefully selected for its properties. While almost any good grade oil of light viscosity would probably be satisfactory, it is recommended that only this special type of oil be used. Additional quantities can be obtained from The Baldwin Locomotive Works, Eddystone Division, Eddystone, Pa.

Air in Weighing System

Accuracy of indication is affected if any appreciable amount of air gets into the weighing system. Since the system is always under pressure (as a result of the initial load springs), the only way it can get in is by careless operation of the filling gun. Therefore, every precaution to prevent entry of air into the capsule should be taken when inserting additional oil. The gun should point downward when oil is being pumped in.

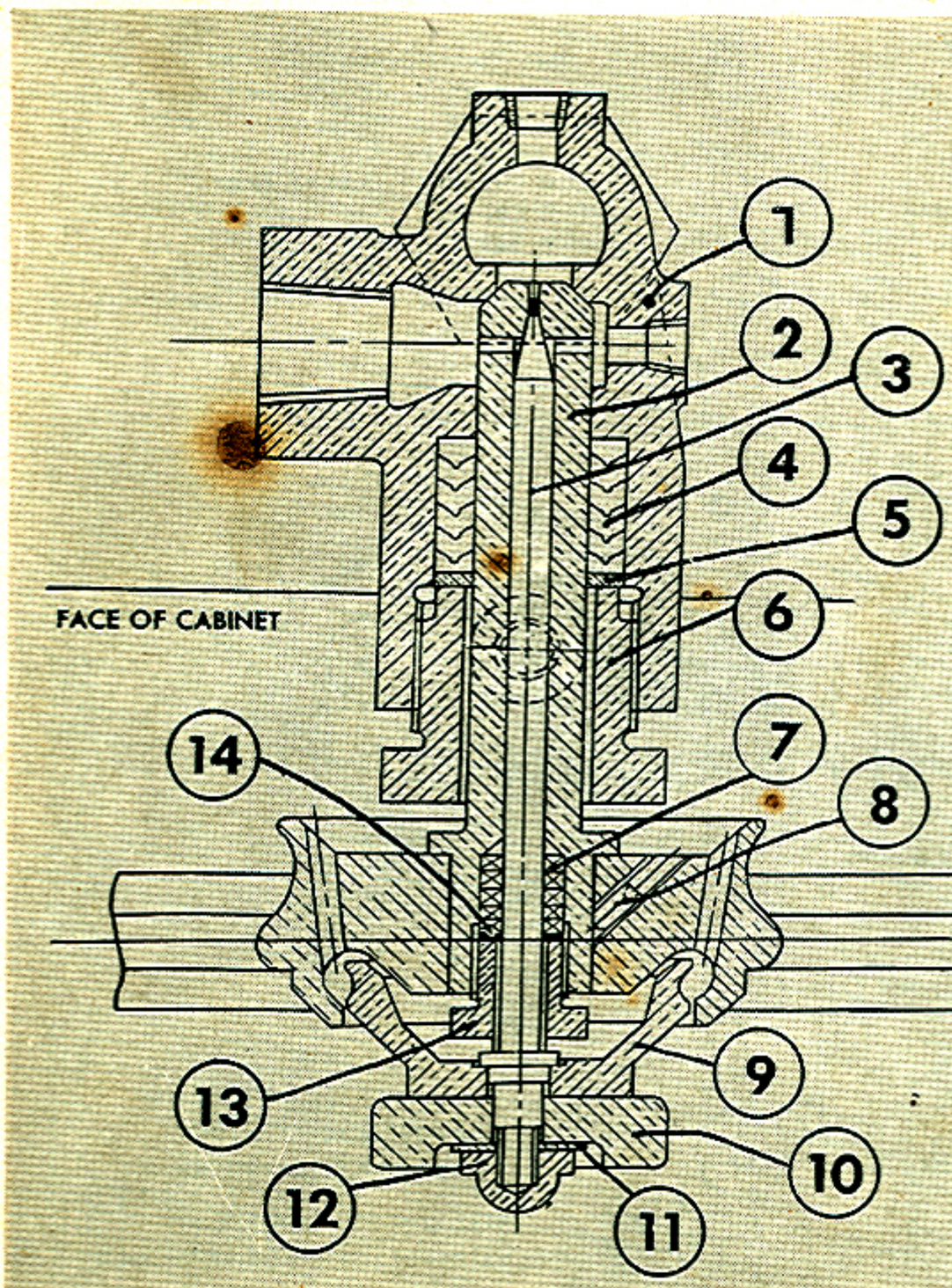
Tension Screws

(a) If the crosshead motor shows signs of laboring, it may be that the grease on the screws has become too sticky. In this event wipe it off and apply fresh grease. A semi-fluid grease such as "Vaseline" is recommended. The temperature under which the machine operates will to some extent determine the viscosity.

(b) Keep tension screws free from chips. If this is difficult with screws exposed, protect them as well as possible.

Stay-Plates

Do not permit fragments to collect on stay-plates. Such fragments may be trapped between the ram table and stay plates, bending the latter and entailing a troublesome repair job.



Item	Piece No.	Description
1	27106-A	Valve Body
2	27106-H	Spindle
3	27106-M	Needle Spindle
4	27106-S*	¾" I.D. x 1 9/32" O.D. x 1" Lg. Chevron Packing
5	27106-J	Brass Washer
6	27106-G	Spindle Gland
7	27106-T*	9"-⅛" Turxo Twist Packing
8	27106-D	¼" x ⅜" Allen Set Screw
9	27106-E	Dial
10	27106-F	Handle
11	27106-N	¼" Standard Washer
12	27106-P	¼" Acorn Nut
13	27106-L	Gland
14	27106-K	Brass Washer

* When inserting fresh packing be careful that washers—piece nos. 27106-J and 27106-K—are next to gland.

NOTE:—Unloading (Release) Valve is the same as loading (Speed Control) Valve except for Valve Body-Piece No. 27106-A.

SPEED CONTROL VALVE
BALDWIN SOUTHWARK DIV.
BALDWIN LOCOMOTIVE WORKS

FIG. 6

Crossheads Caps

These should be kept full of grease. It is, therefore, a good idea to occasionally press the "Alemite" gun against the special fittings and pump in grease until leakage appears around the top of the caps.

LOADING SYSTEM

Cylinder Gland

If leakage of oil from the main cylinder is excessive, tighten gland nuts evenly. If they will tighten no more, raise ram hydraulically, block it up (never block up on stay-plates), raise gland and add to or renew packing. In replacing gland, do not tighten nuts too firmly or ram will not return quickly by gravity.

Ram Table

Unless the ram table is protected it will be damaged by objects which are bound to be dropped on it, broken specimens in particular. It is, therefore, standard practice to cover the entire surface with some material such as linoleum, fibre, copper, Masonite, laminated wood, or steel plate.

Control Valves

(a) If operation of the valves becomes too easy, they can be stiffened by merely tightening the glands, after the set screws have been loosened. If glands will tighten no more, add to or replace packing. See Fig. 6, showing cross-section of speed control valve.

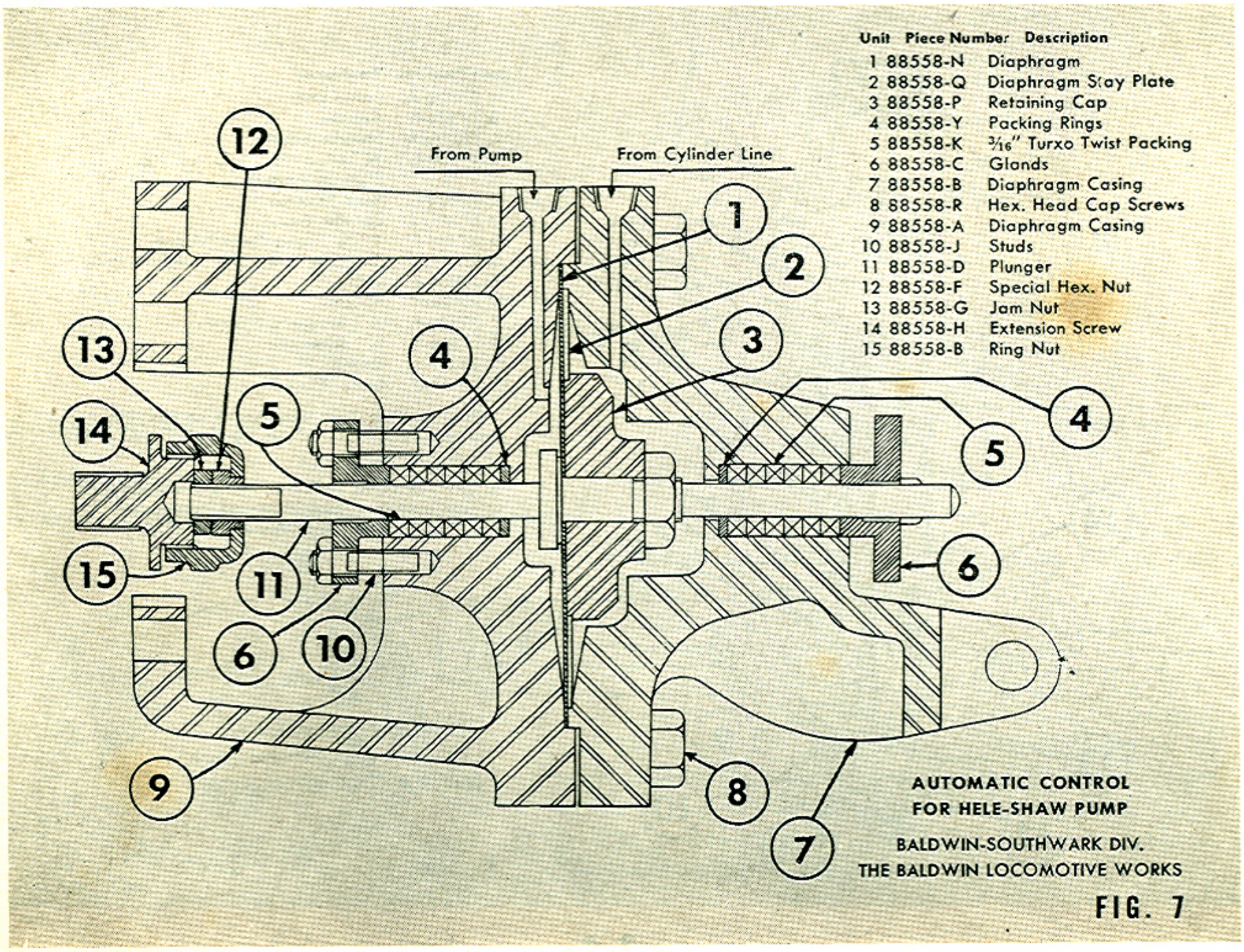
(b) Oil leakage past the main spindles should fall on the leakage collectors and be returned to the reservoir. If instead oil spills down the front of the cabinet, remove top half of collector and seal bottom half with a few drops of paint.

Pump Control

If much oil collects under pump control, tighten gland nuts on each side of unit. If they will tighten no more, add to or replace old packing. See Fig. 7. Instructions for adjustment of the pump control are given in drawing Fig. 8.

Oil Supply

Machine is shipped with oil reservoir filled. If there has been much leakage, remove plug and examine gauge. If level has fallen below lower notch, add oil having 600 S.S.U. at 100° F. (such as Socony Vacuum DTE, extra heavy).

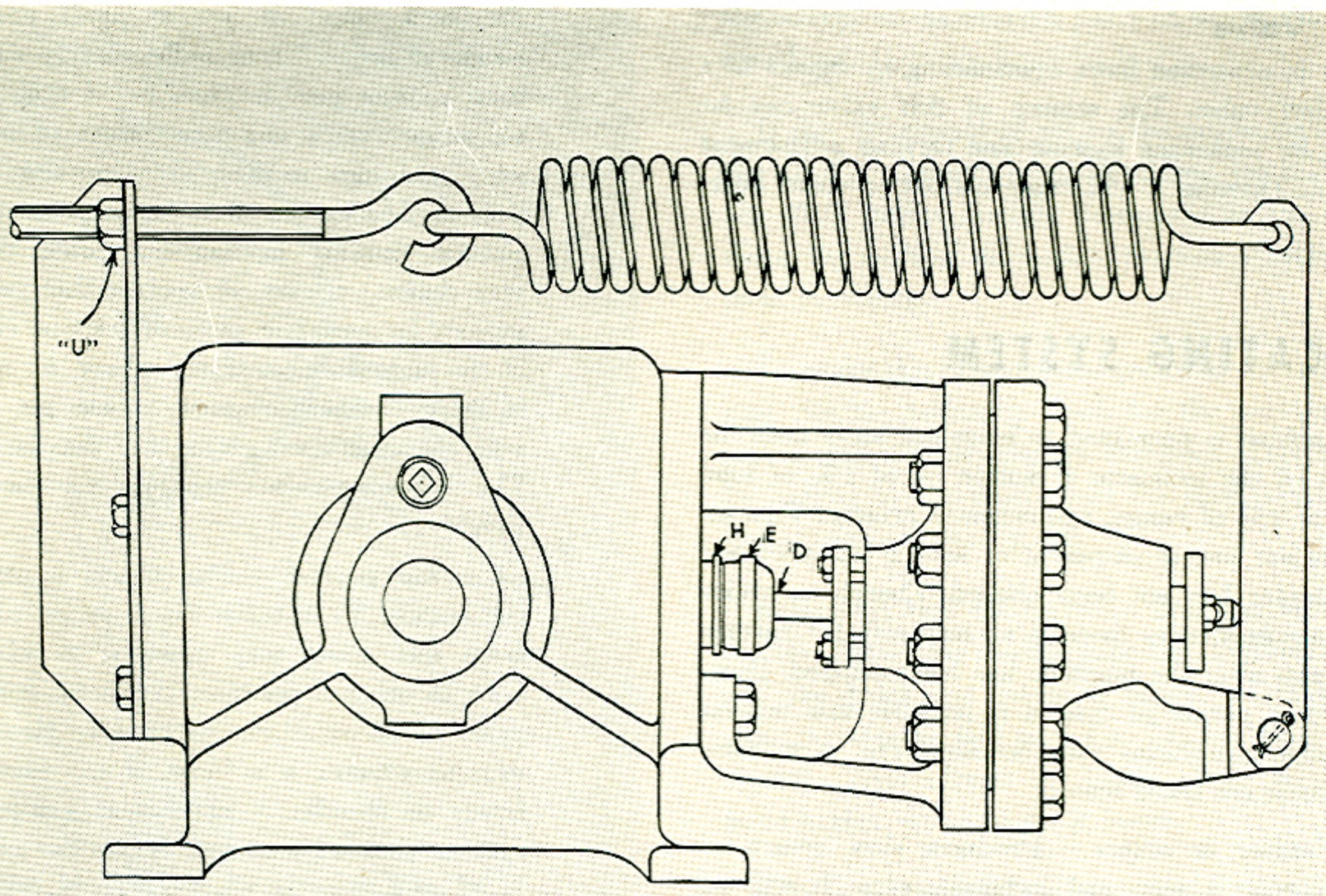


Unit	Piece Number	Description
1	88558-N	Diaphragm
2	88558-Q	Diaphragm Stay Plate
3	88558-P	Retaining Cap
4	88558-Y	Packing Rings
5	88558-K	3/16" Turxo Twist Packing
6	88558-C	Glands
7	88558-B	Diaphragm Casing
8	88558-R	Hex. Head Cap Screws
9	88558-A	Diaphragm Casing
10	88558-J	Studs
11	88558-D	Plunger
12	88558-F	Special Hex. Nut
13	88558-G	Jam Nut
14	88558-H	Extension Screw
15	88558-B	Ring Nut

AUTOMATIC CONTROL
FOR HELE-SHAW PUMP

BALDWIN-SOUTHWARK DIV.
THE BALDWIN LOCOMOTIVE WORKS

FIG. 7



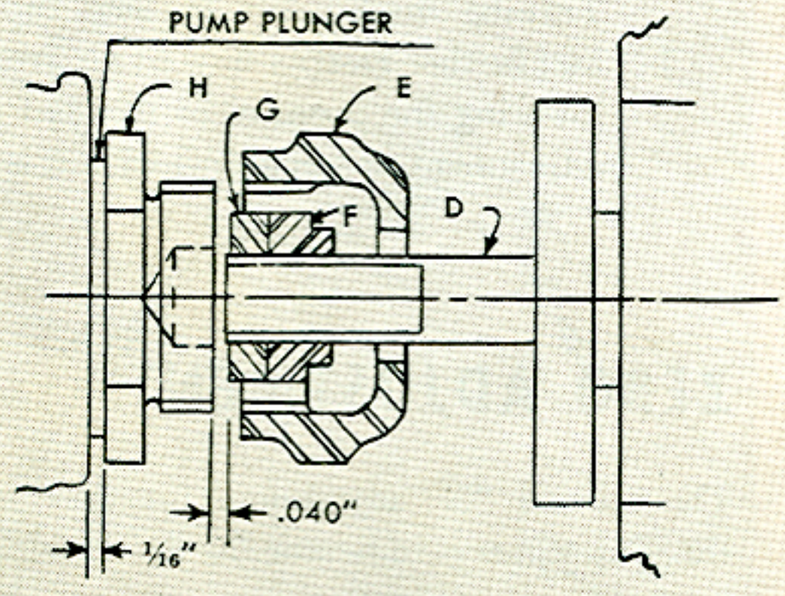
INSTRUCTIONS FOR ADJUSTING CONSTANT SPEED ATTACHMENT

1.—Attach to Pump as shown.

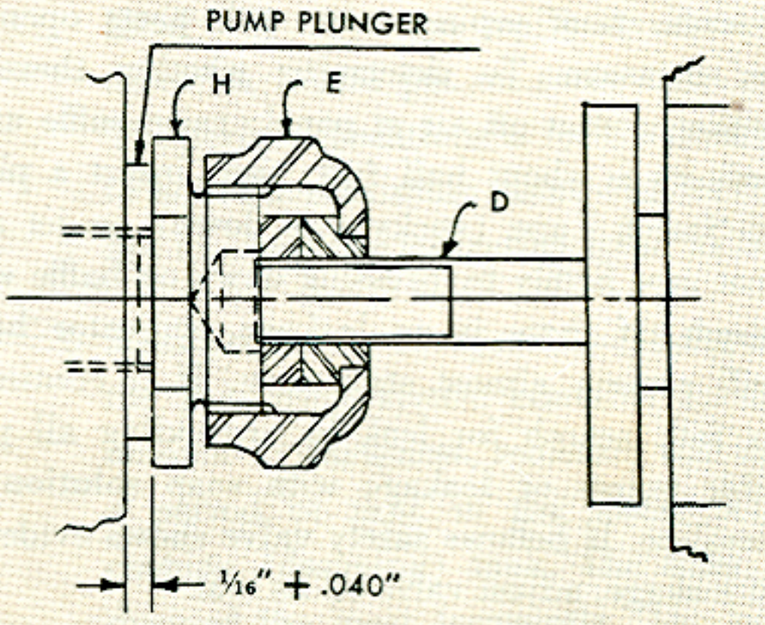
2.—Tighten Nut "U" until Spring has been stretched 3/8", being careful that Nut "G" does not touch Extension Screw "H".

3.—Adjust Nut "G" so that there is a clearance of .040" between it and end of Screw "H" when Pump Plunger extends 1/16" from face of Pump. Tighten Nut "F", locking Nut "G" to Stem "D".

4.—Slide Nut "E" into place over Nuts "G" & "F" and pull it up tight on Extension Screw "H".



OPERATION #3 COMPLETED



OPERATION #4 COMPLETED
AFTER PULLING UP "E"

FIG. 8

Safety Valve

Pump is protected from overloading by means of a fluid relief valve. The setting of this valve can be changed by loosening locknut and turning adjustment in or out. Turning it will cause cut-out to occur later.

INDICATING SYSTEM

No machine is permitted to leave our shop until the accuracy of the indicator is within ½ of 1% of load or 0.10 of 1% of range, whichever is greater. This accuracy is not lost in shipment or setting up, provided that indicator has not been abused. Therefore, under normal circumstances there is no necessity for further adjustments after the machine has been shipped. However, over a period of time it is possible that certain unfavorable conditions may develop. The most common of these are listed below:

1 *Fouling at orifice* — Produces slow return of pointer to zero and indefinite zero. It will be evident on all ranges of indicator. To cure: open orifice union, remove orifice, clean and replace firmly.

2 *Fouling at jet* — Slow pointer return and indefinite zero on one range can be caused by dirt particles around jet. To clean: draw a piece of paper between jet and baffle while pressing down gently on baffle.

3 *Leakage in system open to jet pressure* — Slow return of pointer and failure to reach zero on all ranges can be caused by leakage of air in the bellows, bellows relief valve, jet piping, cushion tank piping — ie — all parts open to jet pressure. To determine whether there is leakage: shut off air at panel; raise baffle until bellows is about half full; then insert a piece of Scotch Tape (sticky side down) on jet and seat tape firmly by pressing down on baffle with finger. If there is no leakage, indicator hand will remain almost stationary. If it continues to fall, search for leak by sprinkling all possible points of leakage with soap solution or gasoline. If bellows safety valve shows evidence of leakage, adjust valve on its seat.

NOTE:

Indicating system is operating satisfactorily if pointer will return to zero in 12 seconds or less. To check: shut off air at panel and hasten escape of air by lifting baffle slightly with finger until pointer goes to capacity of dial. Turn on air supply valve and time return of pointer to zero. Although unlikely, it is possible for friction to develop in slide bearing assembly or pointer spindle mechanism. Since this is a very delicate device, we request that you do not attempt to overcome possible friction condition. If the suggestions outlined above do not result in improved performance, please get in touch with manufacturer, giving full details.

The following minor troubles may be encountered:

1 *Loose dial pointer* — The pointer is attached to the spindle by a taper fit. A series of sudden stops and starts may cause it to work loose from its original position. If pointer does not return to zero on all ranges, remove glass and determine whether it is loose. If so, reset and tap firmly on spindle. A hand jack is supplied for making such adjustments. When the air supply is off and there is no pressure in the bellows (bellows at bottom of stroke) the pointer should be pointing vertically downward so that it bisects the dead space at the bottom of the dial.

2 *Stiff range selector knob* — this condition can usually be overcome by merely pulling out on the knob.

3 *Insufficient zero adjustment* — It may happen that the zero adjusters do not bring the hand to zero. In this case, additional adjustment can be obtained on all ranges by means of the screws on the end of the Bourdon tube arms. Turning them out will cause the baffle to fall and further restrict flow of air from jet, thereby lowering the position of the dial pointer. After adjustment, see that the lock nut is tight.

ZERO ADJUSTMENT

The normal "0" adjustment for the three ranges of the Tate-Emery indicator is by means of the three knobs shown in Fig. 9.

When the "0" of the lapped ram type machine (Models 20-35 or 60-35) Fig. 10, is adjusted it is necessary that the ram be lifted or slowly rising so that

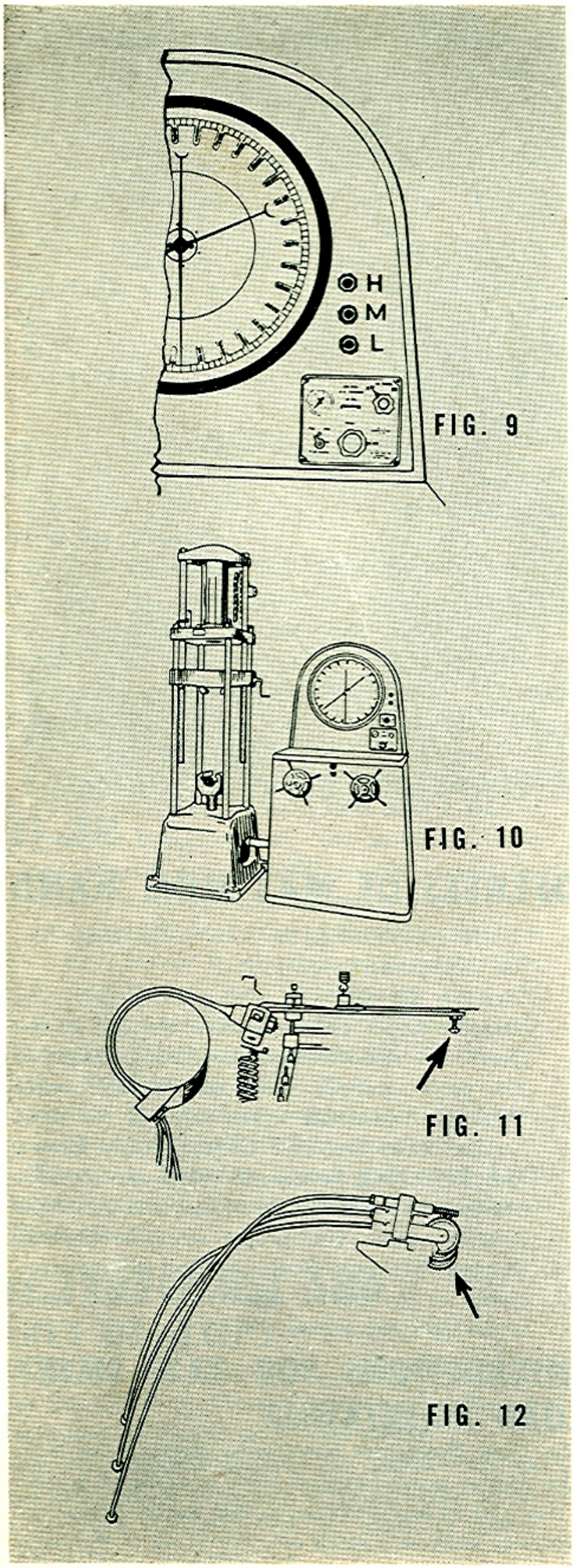


FIG. 9

FIG. 10

FIG. 11

FIG. 12

the weight of the moving parts of the machine is balanced out.

If the "0" cannot be set by the adjusting knobs and the hand is correctly set as described (so that with the air off it points directly downward in the space between the ends of the scale), there is a course adjustment provided.

To make this, remove the panel at the back of the dial. Set the adjusting knob for the scale to be corrected midway between its extremes. This can easily be judged by the position of the gear segment at the top of the cabinet, Fig. 12.

Remember that the rearmost Bourdon tube controls the low range, the middle tube the intermediate range and the front one the high range. To make adjustment, loosen the lock nut, Fig. 11, and turn the screw slightly. This adjusts the baffle, *up* to set indicating hand higher, *down* to set it lower.

This is a coarse adjustment. Final adjustment must be made in the normal manner by using the knobs at the front of the dial.

4 *Maximum hand either too loose or too tight* — There are two provisions for adjustment of this pointer. One is the knurled ring next to the glass. If this is tightened, more force is required to move the pointer by hand. The other provision is the small hex nut revealed when the locknut extension is removed. If this nut is tightened, the maximum hand will offer more resistance to the indicating hand. Should the hand still move too easily on its spindle, disassemble it and put on some light cup grease. The perfect conditions is for the maximum hand to hold the maximum point without drifting but not to cause the indicating hand to lag.

5 *Moisture in the air system* — If the air used in the indicating system contains an appreciable amount of dampness, moisture will collect over a period of time in the filter, bellows, and cushion (damping) tank. The filter should be drained the most frequently. The bellows and cushion tank need only be drained every 6-12 months except where moisture content of air is unusually high.

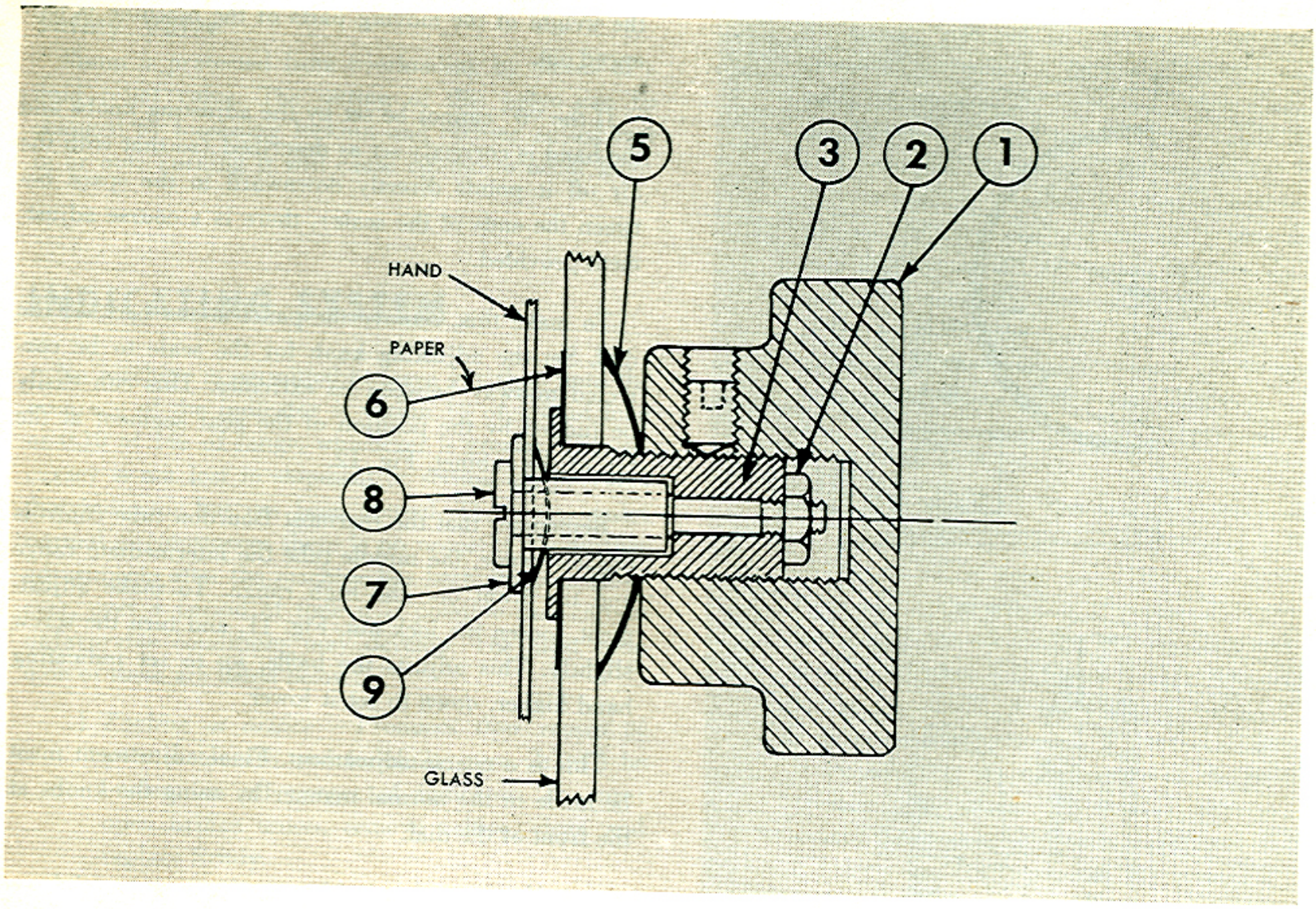


FIG. 13

• INSTRUCTIONS: TO CORRECT LOOSENESS OF MAXIMUM HAND

There are two types of "Looseness";

A. General looseness of the "Max" Hand Axis

There is a phosphor bronze cupped washer No. 5 between the Bakelite knob No. 1, and the gears. Its purpose is to hold the axis of the "Max" hand steady and to contribute a small amount of friction to the Bakelite knob (not to the "Max" hand). To increase the force exerted by this washer, loosen the set screw in the Bakelite knob and screw the knob in. Retighten set screw. (It may be found necessary to remove the dial ring and glass so that a screw driver may be used to prevent rotation of the threaded part No. 3 which carries the Bakelite knob.)

B. "Max" hand moves too freely

A small amount of friction is desirable to dampen the "Max" hand, so that it will not coast after being struck or moved suddenly. This is provided by a small bent washer No. 9, between the hub of the "Max" hand and the sleeve No. 3, which goes through the hole in the glass (not the washer mentioned in A).

Remove the dial ring and glass. Remove the Bakelite knob. This will allow the rest of the parts to be removed from the glass. Disassemble the parts carefully. Bend the friction washer slightly. Reassemble completely. If the bent washer makes too much friction, gently force a thin knife blade between the hand and the bent washer so as to take some of the bend out of the friction washer, until proper action is obtained. Replace dial ring. Should the hand still move too easily on its spindle, disassemble it and apply some light cup grease.

INSTRUCTIONS FOR TATE-EMERY LOAD MAINTAINER

The Load Maintainer operates by limiting the load. The regular manual control valve is adjusted to give a slow rate of load increase, so that the oil pump continuously delivers a small quantity of oil to the load-

ing cylinder. The Load Maintainer is an air operated valve, actuated from the Load Indicator, which bleeds oil from the loading cylinder to the oil sump when the load tries to exceed the "control point." The operating panel contains an oil shut-off valve in series with the air operated valve, an air supply valve, and a knob for adjusting the control point.

Comment

The Load Maintainer is highly sensitive, as it must be to control at a definite point. Therefore, least swing or variation is produced at the control point when the rate of feed is set as slow as possible. If this is done the "band" of control is very narrow and good results are obtained.

Load Maintainer Operation Instructions

Example — To Control at say 10,000 pounds.

1. Start testing machine and Tate-Emery Load Indicator in usual manner.

2. At Load Maintainer Panel. Turn on air supply. "Open" oil valve. Turn control knob clockwise until pointer is in max direction. This puts the control point at the top of dial range.

3. Close regular Manual Release Valve on testing machine and by operating regular manual load Valve raise load to 9000 pounds. Then close Load Valve.

4. Decrease (counter-clockwise) Load Maintainer knob (which lowers the control point) until it hits the 9,000 pounds indicated load. The automatic bleed will open when it hits the 9000 pounds, so that the load will drop to, say 8500 pounds, and stay there.

5. Adjust regular load valve so that load on indicator rises *Very Slowly*. It will rise until it hits the 9,000 pounds, control point. Here the automatic bleed will open slightly, preventing the load from rising above 9,000 pounds. The Load Maintainer will then be controlling at 9,000 pounds point.

6. Increase Load Maintainer knob (clockwise) very slowly to the desired 10,000 pounds point.

7. When it is desired to operate without the Load Maintainer close Air Supply and Oil Valve at Load Maintainer Panel.

THE PROPER USE AND CARES OF GRIPS

Here are a few suggestions that will enable you to extend the life of grips and eliminate one of the primary sources of trouble in physical testing.

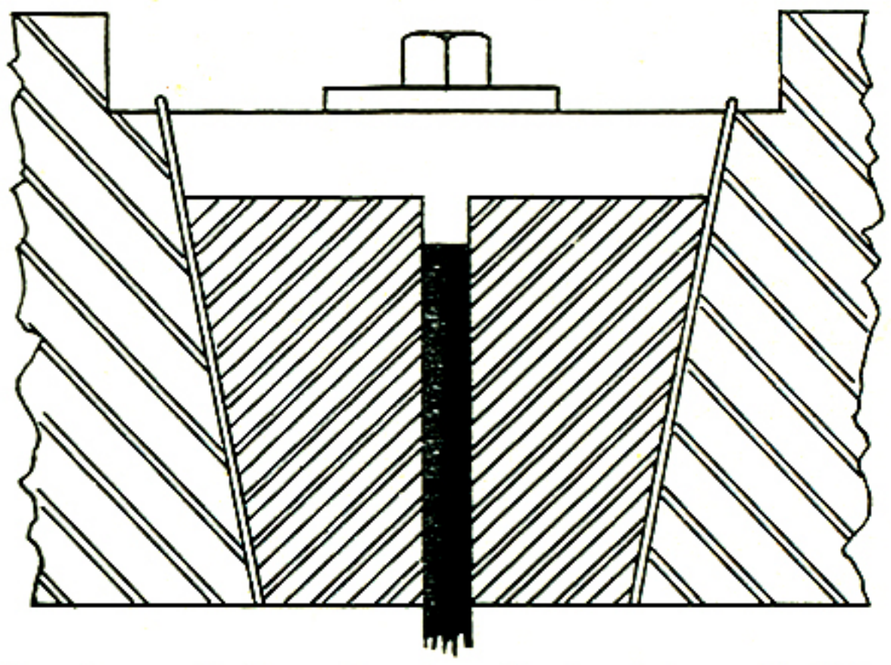
Grips are especially designed for handling various shapes and types of specimens. *Always use the proper grips for each specimen.* Use "V" grips for rounds and flat grips for flat specimens.

In selecting proper grips, the material to be tested must be considered. For example, round bars of soft steel or brass up to about ½ inch diameter can be safely tested with flat wedge grips, whereas, spring temper or hard drawn wire only ⅛ inch diameter would damage flat-face grips. For materials such as music wire, special grips with renewable file faces are recommended.

Remember that in the interest of strength and toughness, the ordinary wedge grip either flat or "V" — cannot be made as hard as a file. Occasionally it may be necessary to make tests on materials harder than the grips. In this case an old set of grips should be used or set of file face insert grips. See page 25 for details.

Before a specimen is pulled, the double pinion gears used for moving the grips in the slots should be centered and anchored in place with the set bolts. Otherwise the specimen will not be centered and may not be pulled straight.

Sufficient liners should be used, of the same thickness on both sides of each grip, so that the grips are well within the crosshead of the machine. If one or



both grips pull through when the load is applied they may break or they will upset the corners of the crosshead casting and are likely to damage the double pinions.

Test specimens should extend at least ¾ of the length of the grips.

When grips do not move smoothly in the heads, as revealed by a clicking noise and a jump on the load indicator, *a lubricant should be used on the back of the grips.* Any grease used to lubricate lathe centers is satisfactory. White lead in oil is frequently used. Use only a small amount — and only on the backs — or it will collect scale and dirt.

Always use grips retainer furnished for bolting to cross head castings, otherwise recoil may throw the grips out of the machine.

PART NO. 3

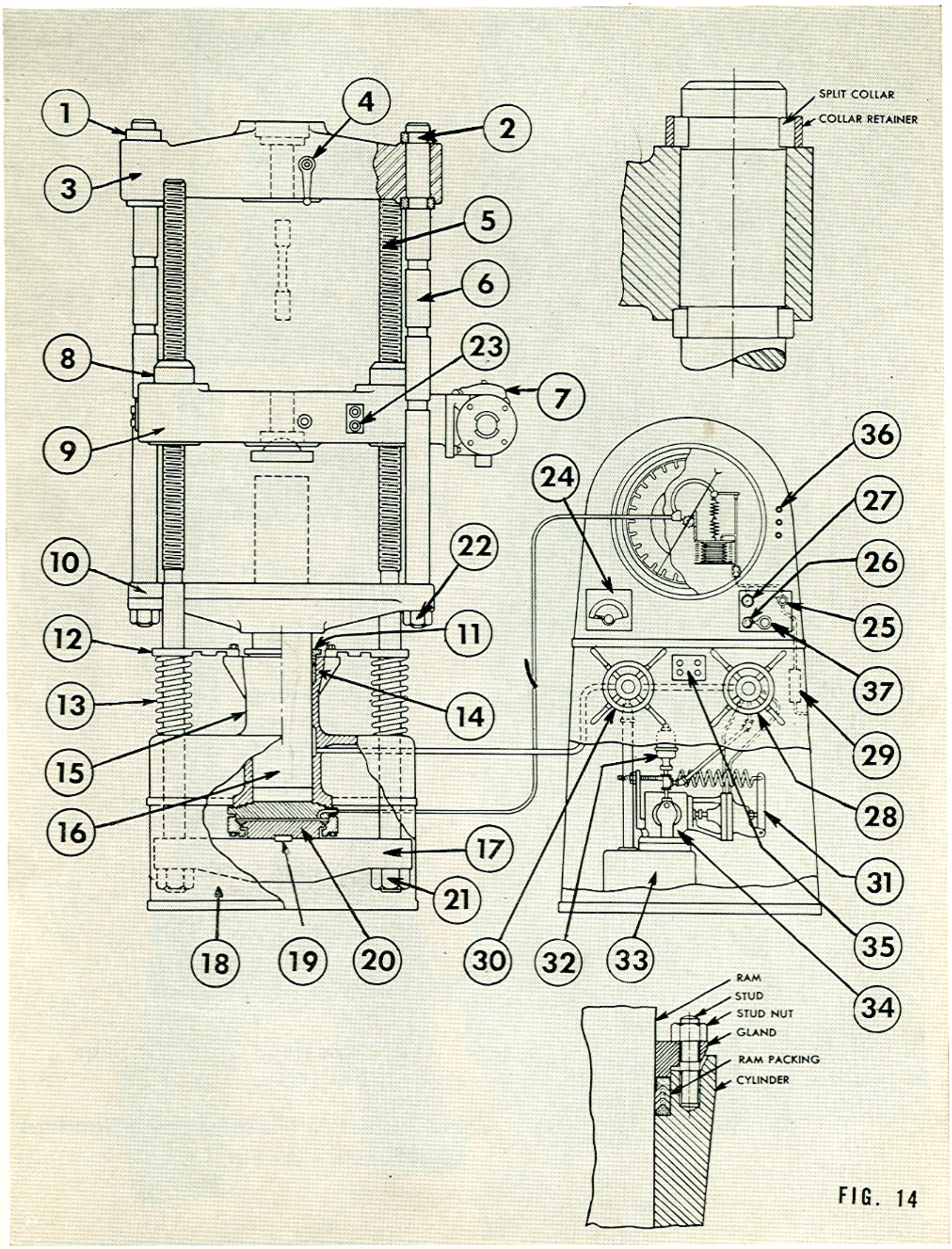
PARTS LISTS...INCLUDING IDENTIFYING CUTS & DIAGRAMS

BALDWIN-TATE-EMERY UNIVERSAL TESTING MACHINES

1. Collar Retainer
2. Split Collar
3. Top Platen
4. Operating Grip Handle
5. Tension Screws
6. Compression Columns
7. Platen Adjusting Motor
8. Backlash Eliminator
9. Sensitive Platen
10. Table
11. Packing Gland (for Cylinder)
12. Flexure Plate
13. Initial Load Spring
14. Hydraulic Packing
15. Cylinder
16. Ram
17. Bottom Platen
18. Base
19. Centering Plug
20. Capsule
21. Nut (Bottom of Screws)
22. Nut (Bottom Compression Columns)
23. Push Button Control Platen Adjusting Motor
24. Pacing Disc Control
25. Air Shut-off Valve
26. Low Range Shut-off Valve
27. Air Gauge
28. Micrometer Control Loading Valve
29. Air Intake and Filter Valve
30. Unloading Valve
31. Automatic Pump Leakage Compensating Control
32. Relief Valve
33. Oil Reservoir
34. Motor driven Radial Piston Pump
35. Starting and Stopping Switch
36. Zero Indicator Adjustment Knob
37. Range Selector

Detailed parts — Upper cabinet on Pages 20-21; Speed Control Valve on Page 22; Automatic Pump Leakage Compensating Control on Page 23.

IMPORTANT: When ordering spare parts, or accessories, always specify serial number which is stamped on nameplate of your machine.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SPLIT COLLAR
COLLAR RETAINER
RAM
STUD
STUD NUT
GLAND
RAM PACKING
CYLINDER

FIG. 14

MODEL 60-35 TESTING MACHINE PARTS LIST

1. Screw Nut
2. Crosshead
3. Ram
4. Cylinder
5. Oil Balance Chain
6. Top Platen
7. Column Nut
8. Screw Columns
9. Adjustable Crosshead
10. Crank Handle
11. Clamp Ring
12. Column
13. Adjusting Screw Head
14. Adjusting Screw
15. Adusting Screw Nut
16. Base
17. Cross Head Guide Bearings

Cabinet details same as on Standard Machine — see Fig. 14.

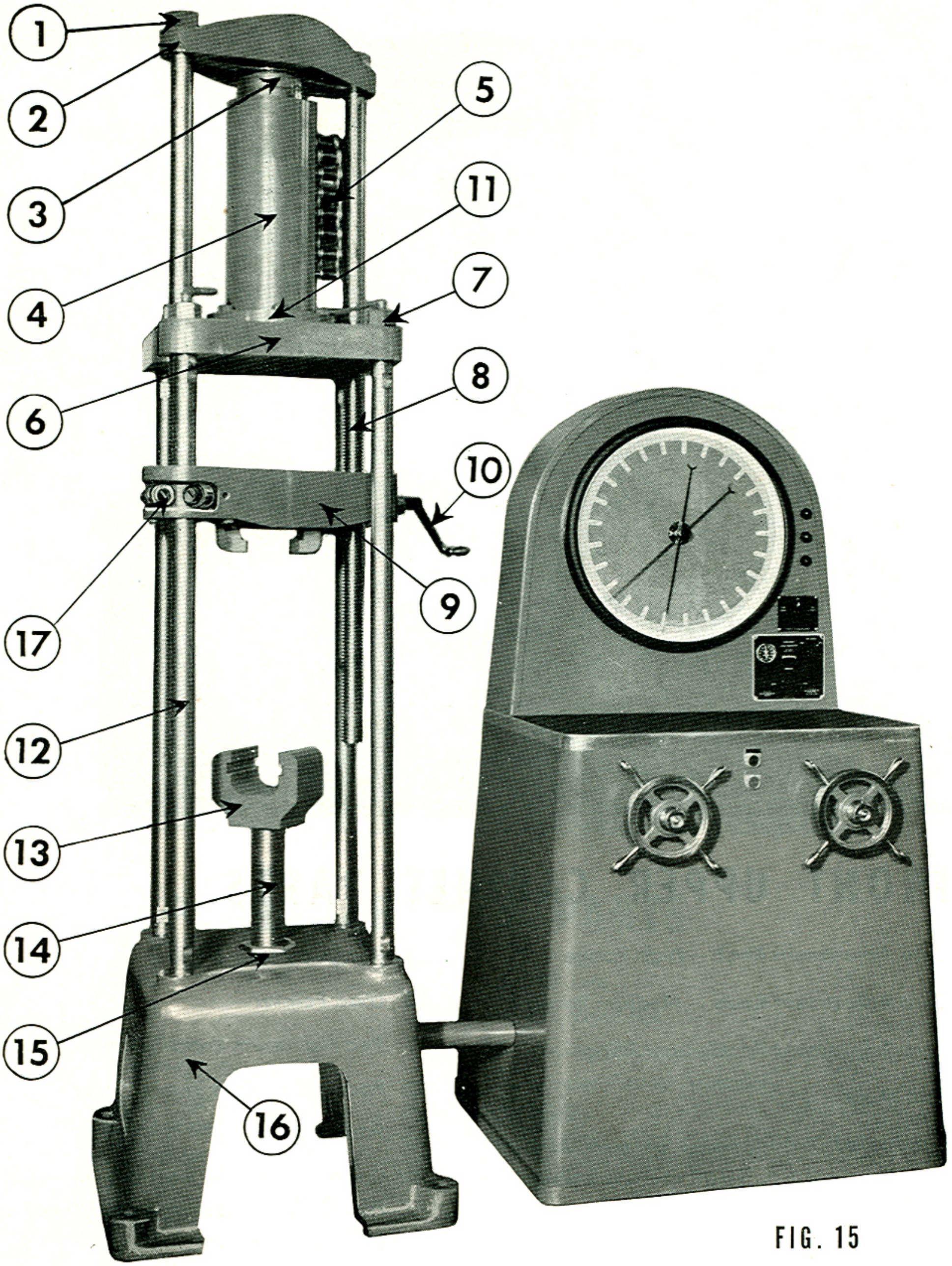
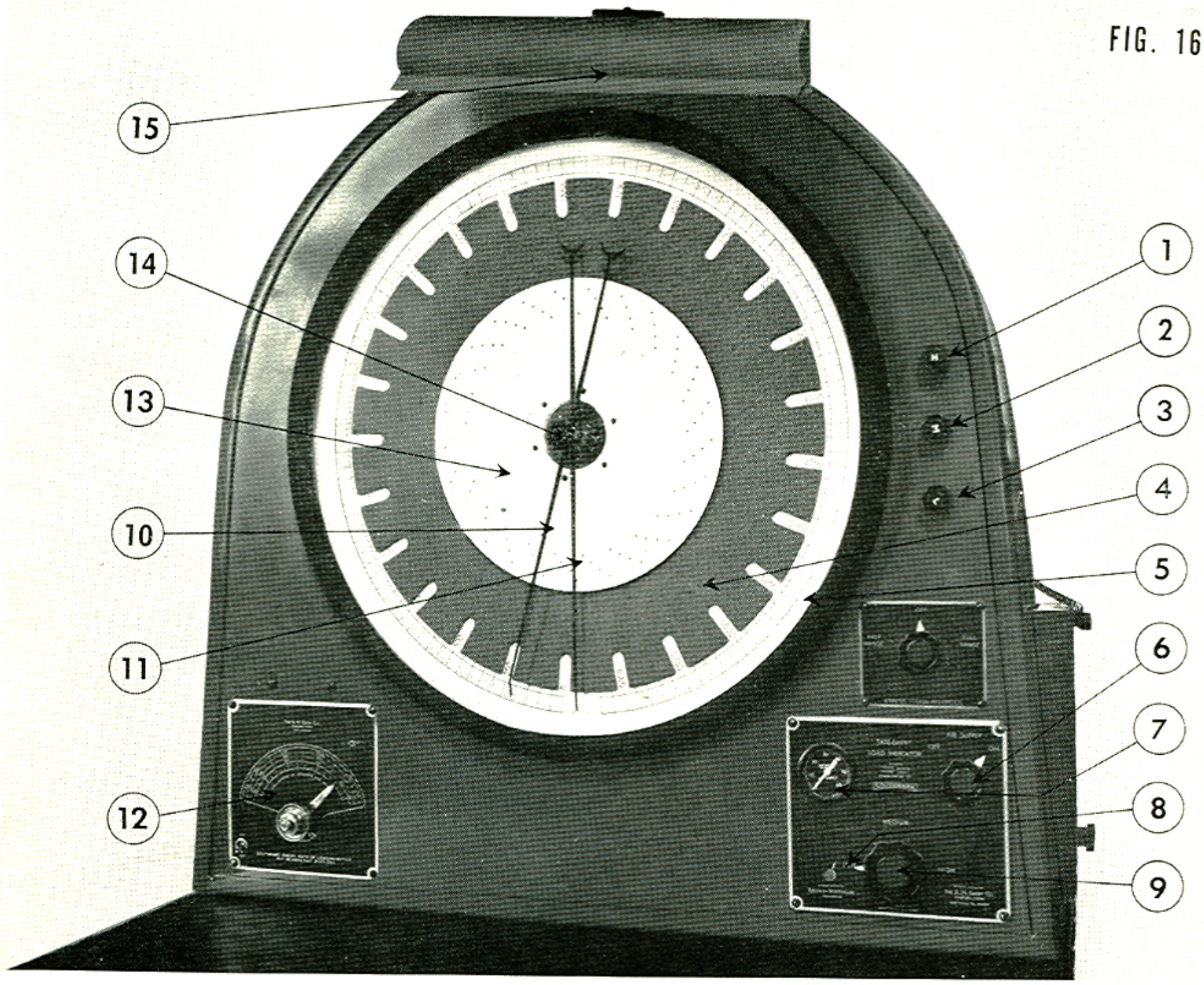


FIG. 15

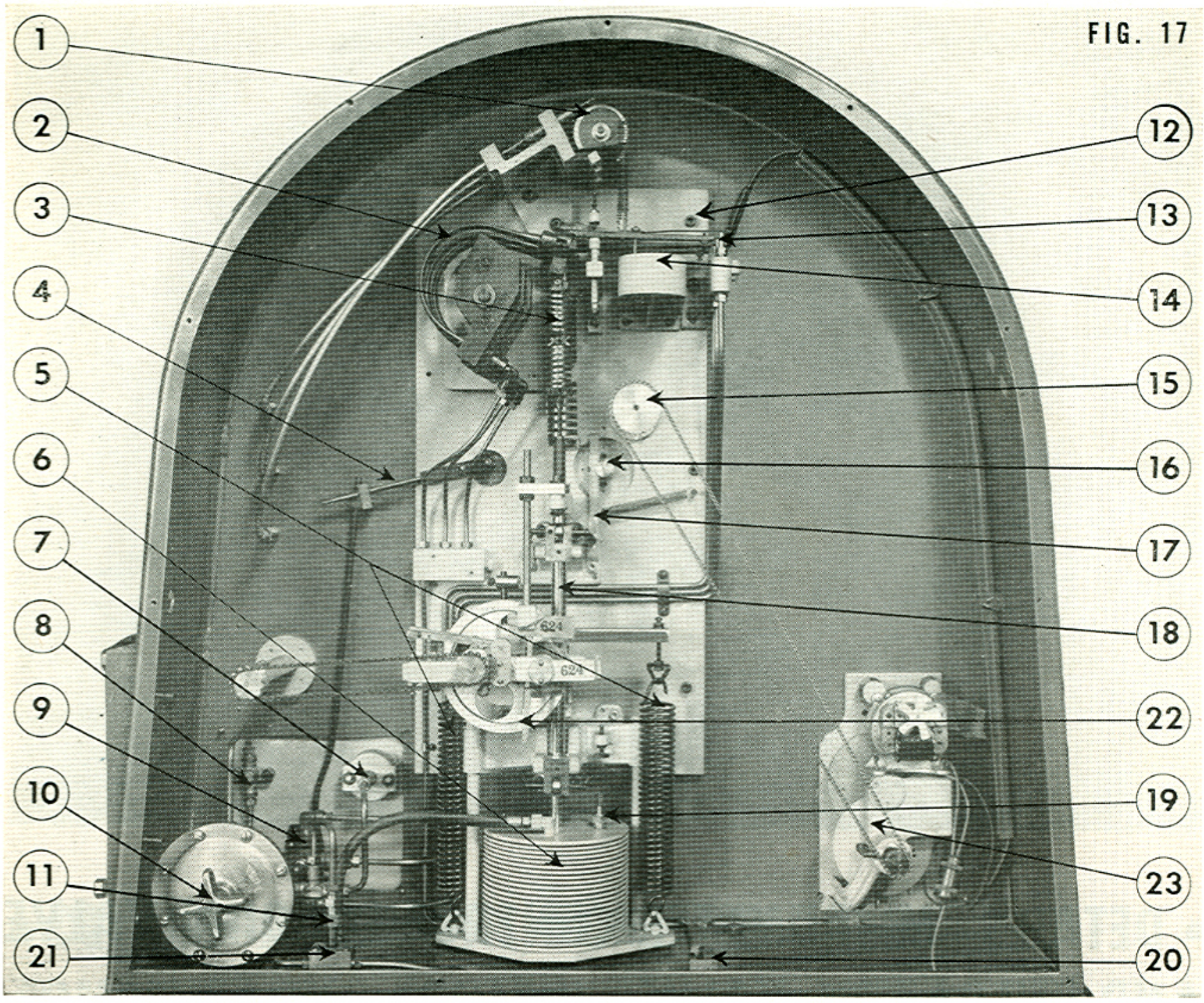
FIG. 16



• FRONT UPPER CABINET PARTS

1. Zero Adjustment Knob — High Range
2. Zero Adjustment Knob — Medium Range
3. Zero Adjustment Knob — Low Range
4. Dial Mask
5. Graduated Dial
6. Air Supply Valve
7. Air Pressure Indicator
8. Low Range Shut-off Valve
9. Range Selector Knob
10. Load Pointer
11. Red Maximum Load Pointer
12. Pacing Disc Control and Drive
13. Pacing Disc
14. Control Knob for Red Maximum Load Pointer (for adjustment detail see Page 14)
15. Fluorescent Light

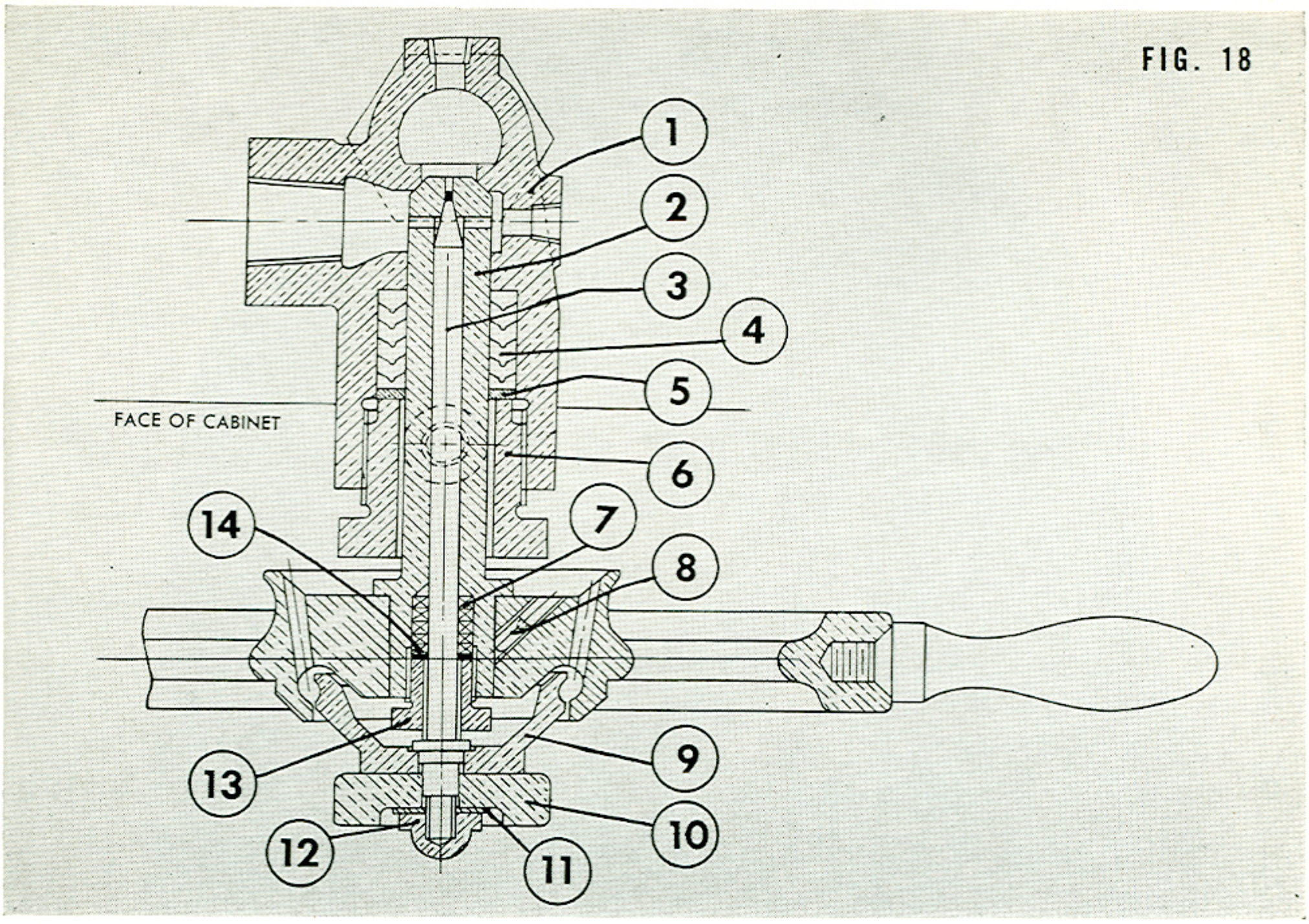
FIG. 17



• BACK UPPER CABINETS PARTS

1. Zero Adjusters
2. Bourdon Tubes
3. Iso-Elastic Springs
4. Linkage for Shifting Dial Mask
5. Servo-Motor Springs
6. Bellows (Servo-Motor)
7. Air Pressure Gauge
8. Air Supply Valve
9. 3-way Valve for Shifting Ranges
10. Air Pressure Regulator
11. Orifice Union
12. Baffles
13. Air Jets
14. Oil Vane Pot
15. Pacing Disc Spindle
16. Pointer Pinion Assembly
17. Rack
18. Slide Bearing Assembly
19. Bellows Safety Valve
20. Capsule Line
21. Air Lines to Cushion (Damping) Tank
22. Drive Wheel for Recorder
23. Pacing Disc Drive Assembly

FIG. 18



• DETAILS—MICROMETER CONTROL LOADING VALVE AND UNLOADING VALVE*

ITEM No.	PIECE No.	DESCRIPTION	ITEM No.	PIECE No.	DESCRIPTION
1	27106-A	Valve Body	7	27106-T	9"-⅛" Turo Twist Packing
2	27106-H	Spindle	8	27106-D	¼" x ⅜" Allen Set Screw
3	27106-M	Needle Spindle	9	27106-E	Dial
4	27106-S	¾" I.D.x1-9/32" O.D.x1" Long Chevron Packing	10	27106-F	Handle
			11	27106-N	¼" Standard Washer
5	27106-J	Brass Washer	12	27106-P	¼" Acorn Nut
			13	27106-L	Gland
6	27106-G	Spindle Gland	14	27106-K	Brass Washer

*NOTE — Unloading valve, item 30 — Page 17, is the same as Control Loading Valve, item 28 — Page 17, except for valve body.

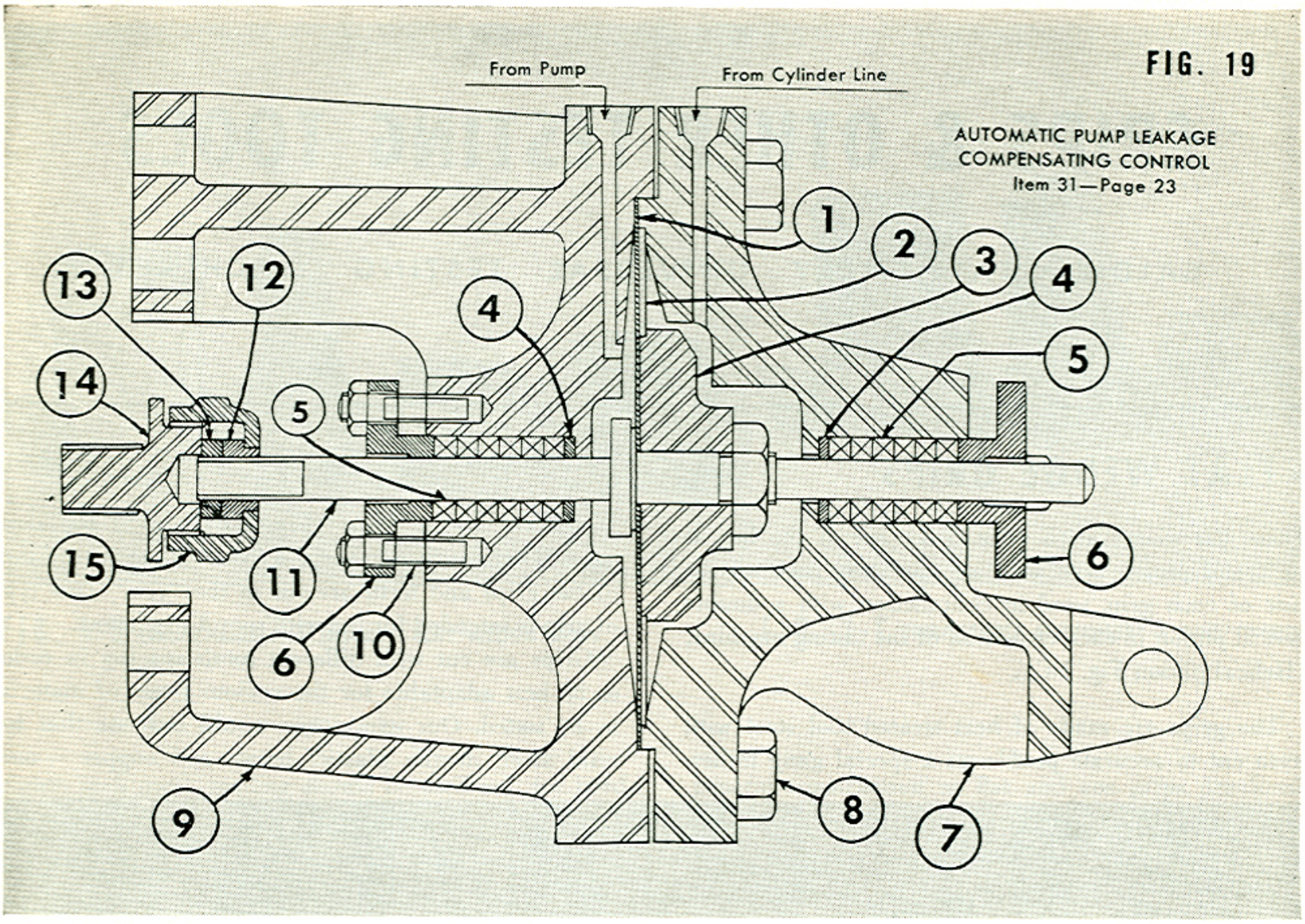


FIG. 19

AUTOMATIC PUMP LEAKAGE COMPENSATING CONTROL
Item 31—Page 23

• DETAILS AUTOMATIC PUMP LEAKAGE COMPENSATING CONTROL (Item 31—Page 17)

ITEM No.	PIECE No.	DESCRIPTION	ITEM No.	PIECE No.	DESCRIPTION
1	88558-N	Diaphragm	8	88558-R	Hex. Head Cap Screws
2	88558-Q	Diaphragm Stayplate	9	88558-A	Diaphragm Casing
3	88558-P	Retaining Cap	10	88558-J	Studs
4	88558-Y	Packing Rings	11	88558-D	Plunger
5	88558-K	3/16" Turo Twist Packing	12	88558-F	Special Hex. Nut
6	88558-C	Glands	13	88558-G	Jam Nut
7	88558-B	Diaphragm Casing	14	88558-H	Extension Screw
			15	88558-B	Ring Nut

PART NO. 4

GRIPS & OTHER TESTING TOOLS

BALDWIN-TATE-EMERY UNIVERSAL TESTING MACHINES

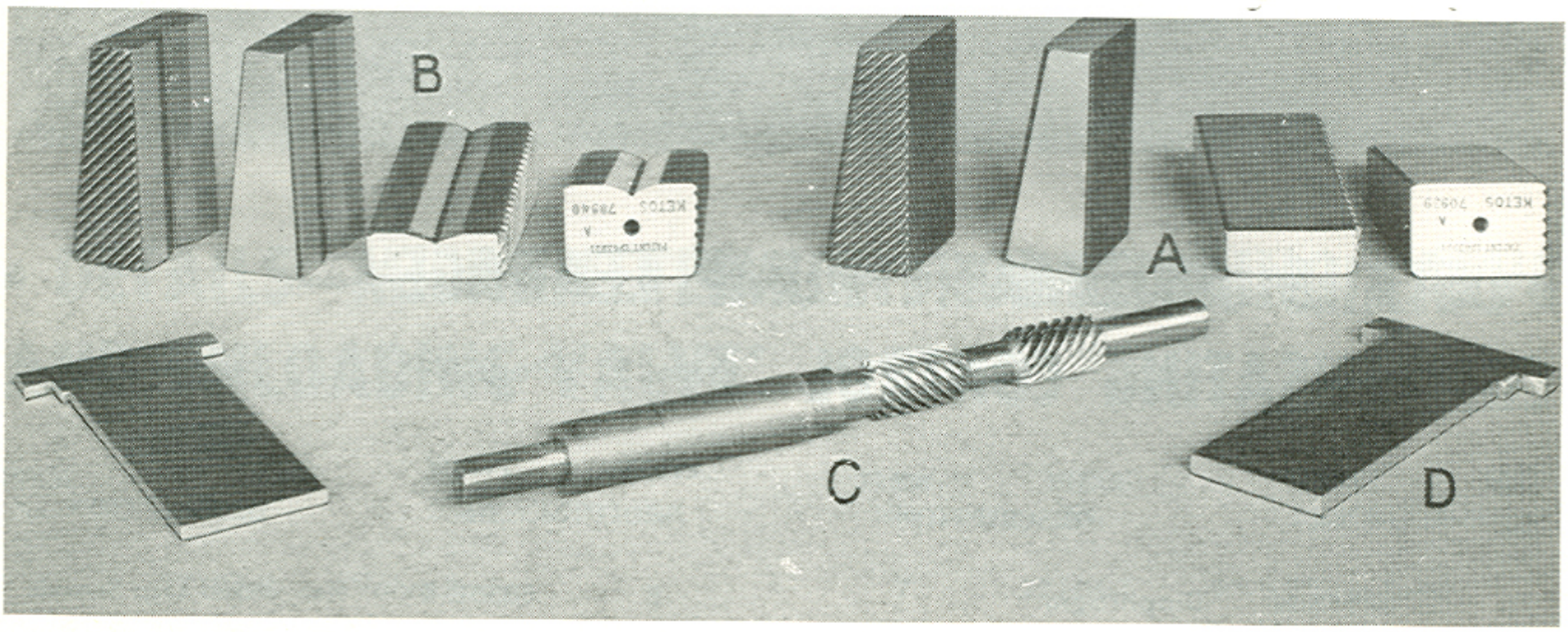
• FLAT WEDGE GRIPS

These flat wedge grips (Fig. 1-A) are of the helical rack and pinion type with an operating rack on the side of each grip, used in conjunction with a double helical pinion in each crosshead of the testing machine. (Helical pinion Fig. 1-C).

The grips are made of heat treated tool steel with teeth cut to accurate profile on a special gang miller. They have an average hardness of 55 to 60 Rockwell "C."

The vee wedge grips (Fig. 1-B) are of the same general construction, except a "vee" is cut in the face of the grips and teeth are cut in the "vee." This type of grip is intended for use with round specimens.

Grips are cut with different tooth spacing in order to be best adaptable for the various types of material to be tested. Our experience would indicate that for mild steel, ductile plastic, brass, and copper — one-



• STANDARD FLAT AND VEE GRIPS FIG. 1

MACHINE CAPACITY (Pounds)	SPECIMEN SIZES		PART NUMBER FOR DIFFERENT TOOTH SPACING					
	Maximum — Flats Width and Thickness	Vees Diameter Range	8 to Inch		16 to Inch		25 to Inch	
			Flats	Vees	Flats	Vees	Flats	Vees
20,000 Model 20-35 60,000	1⅜″ x ¾″	½″ to 1 ″			*71316	*71314	72584	72585
Model 60-35	2 ″ x 1¼″	½″ to 1½″	72948	72950	*71035	*71067	71130	71620
60,000	2½″ x 1½″	½″ to 1½″	*72091	*71487	*70937	*70938	70720	71371
120,000	2¾″ x 2¾″	½″ to 2 ″	73114	71559	*70939	*70940	71371	
200,000	3¼″ x 1¾″	½″ to 2½″	68896	70217	*71031	*71029		
300,000	3¾″ x 2¾″	½″ to 2½″	69521	70218	*71030	*71077		
400,000	4½″ x 3¼″	½″ to 2½″	71107	72566	70764	70765		

*Stock items — All others are made on order.

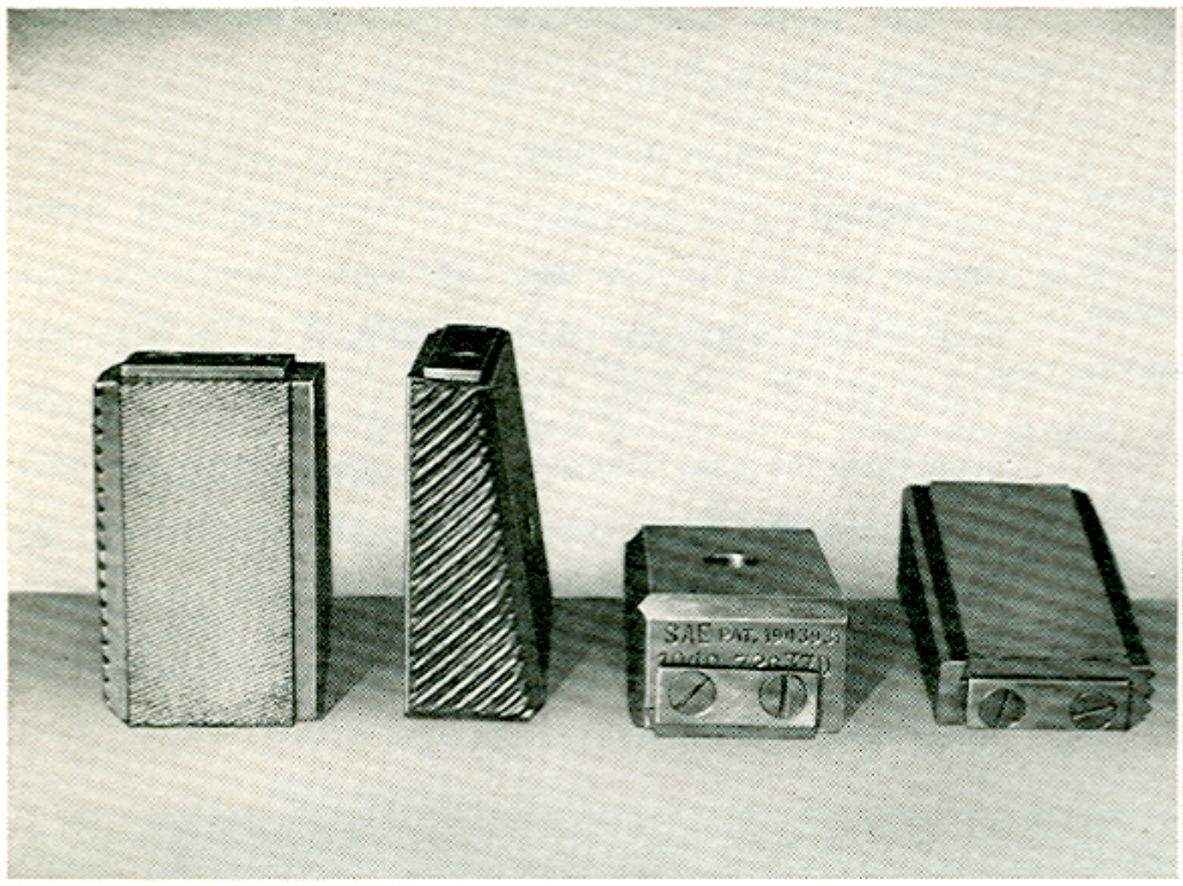


FIG. 1-E REPLACEABLE FILE INSERT — FLAT WEDGE GRIPS

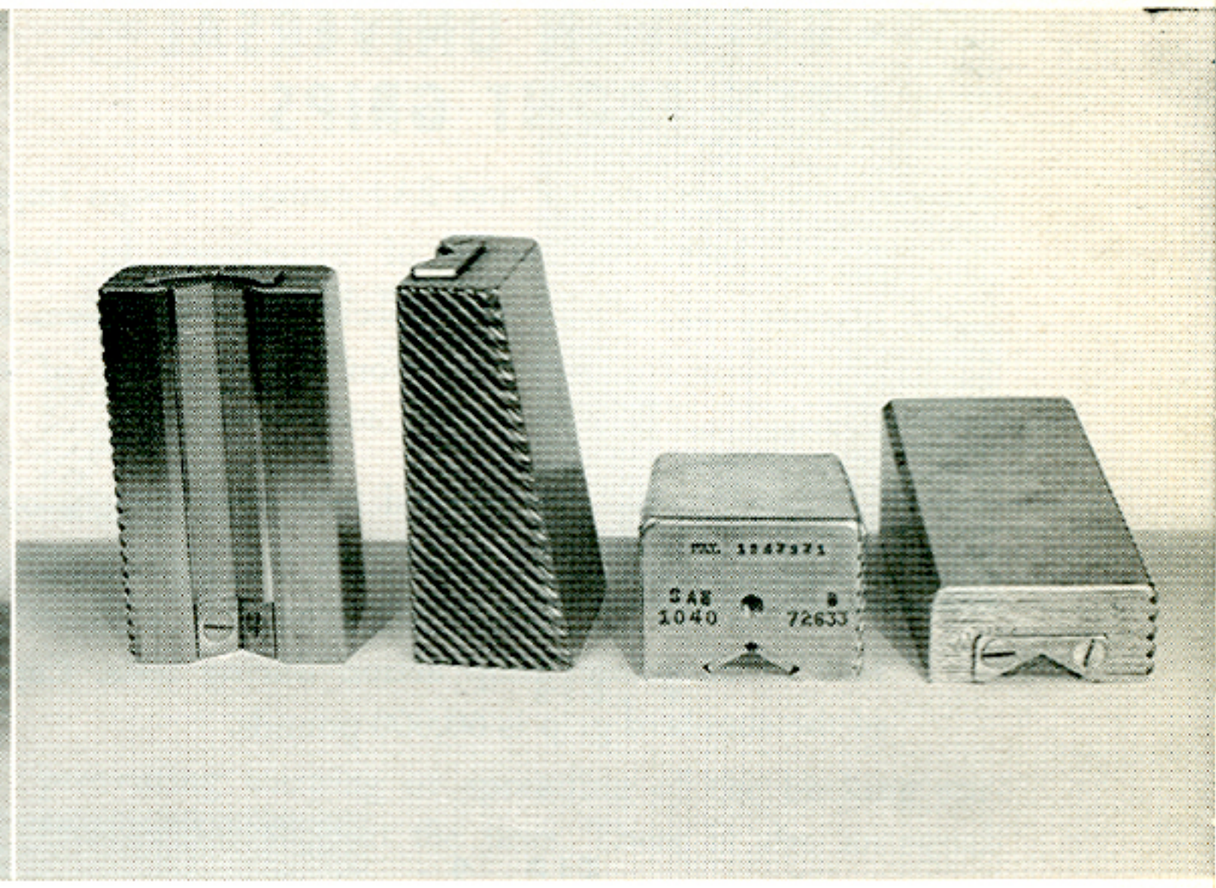


FIG. 1-F REPLACEABLE FILE INSERT — "VEE" WEDGE GRIPS

eighth inch tooth spacing should be used and for hard steel, hard plastic, chrome molybdenum tube, aluminum and magnesium the one-sixteenth tooth spacing is best.

The table on Page 24 will serve as a guide when ordering grips.

The Replaceable File Faced Insert Wedge Grips both Flat and Vee Type, (Figs. 1E & 1F) are of the same general construction as flat and vee grips previously described, except that the face of the grip has been slotted to permit the insertion of a removable file face. This feature permits having an extra stock of file faces of different tooth spacing, adaptable for various types of material being tested. It also permits the use of the same wedge grips and the replacement of worn or broken teeth by the insertion of a new file face.

• REPLACEABLE FILE FACE GRIPS

MACHINE CAPACITY (Pounds)	SPECIMEN SIZES		PART NUMBER	
	Maximum Flats Width and Thickness	Vees — Diameter Range	Flats	VEES
60,000 (Model 60-35)	7/8" x 1 3/4"	3/4" to 1 1/4"	73523	73531
60,000	13/16" x 2 "	3/4" to 1 1/4"	73530	73532
120,000	2" x 2 1/4"	3/4" to 1 1/2"	73525	73524
200,000	2 1/4" x 2 1/2"	3/4" to 1 1/2"	73527	73526
300,000	2 1/2" x 2 3/4"	3/4" to 1 1/2"	73529	73528

NOTE: — The inserts are made in two different tooth spacings. 10 to the inch and 16 to the inch. They come in sets of six for flat grips and twelve for vee grips, thus allowing a half set of spare inserts per set. When ordering extra files please specify part no. and tooth spacing desired.

• BALDWIN UNIVERSAL OPEN FRONT GRIPS

These grips (Fig. 2 and 2A) embody design improvements based on years of experience in building gripping apparatus, and special care has been taken to provide for easy insertion and removal of specimens.

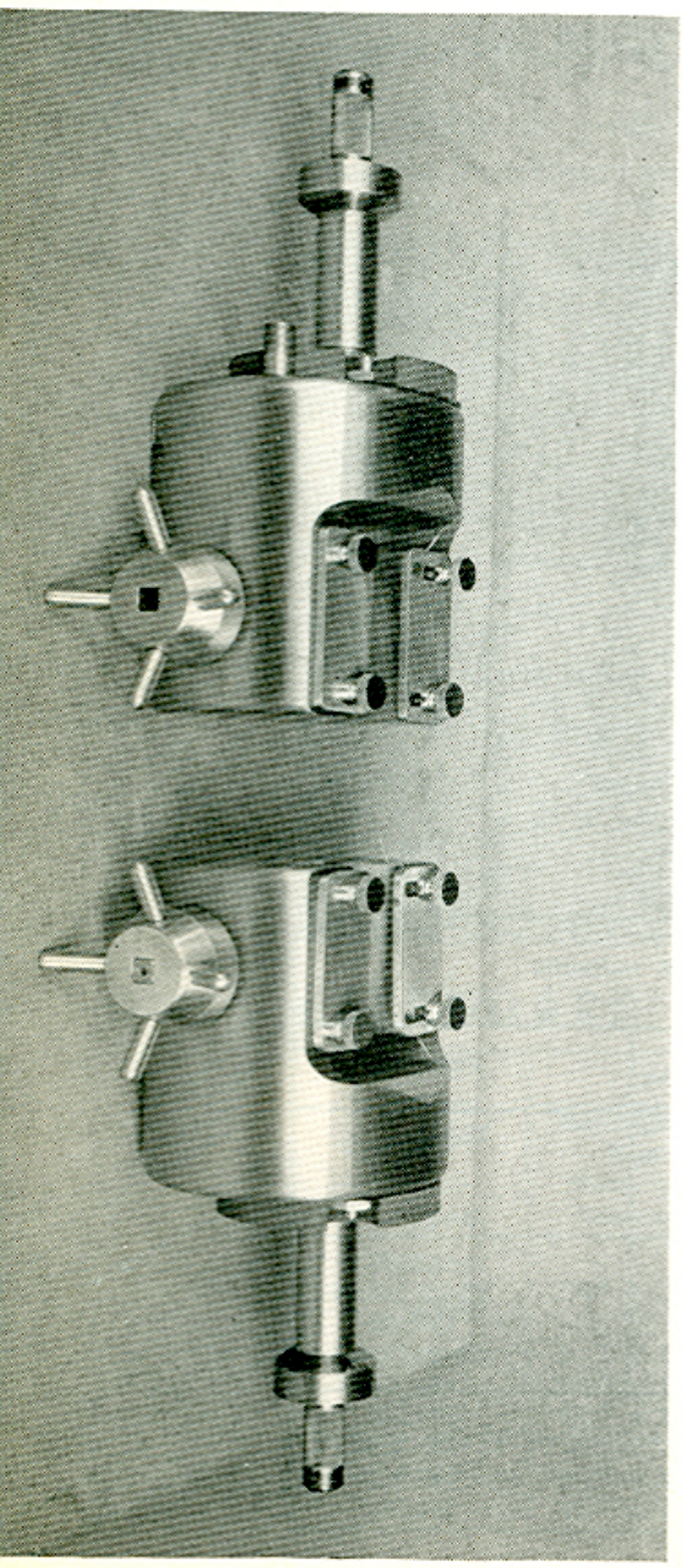
They employ heat treated tool steel wedges operating on the patented helical rack and pinion principle. The backs of the wedges are ground to a smooth surface to eliminate jump action during tests. Capacity of the standard grip is 60,000 pounds.

The grips are provided with spherically seated holder rods and individual wedge blocks for mounting in each size machine.

Standard flat wedges will accommodate flat specimens up to 2 inches wide by 1¼ inches thick, and vee wedges will take round specimens ½ inch to 1½ inch diameter. Wedges for the ¾ inch plain shank specimen of cast magnesium or cast aluminum bars are available. These wedges grip the bar around its entire circumference with 1/32 inch tooth spacing.

Wedges with a coarser spacing are available for plastic materials.

FIG. 2



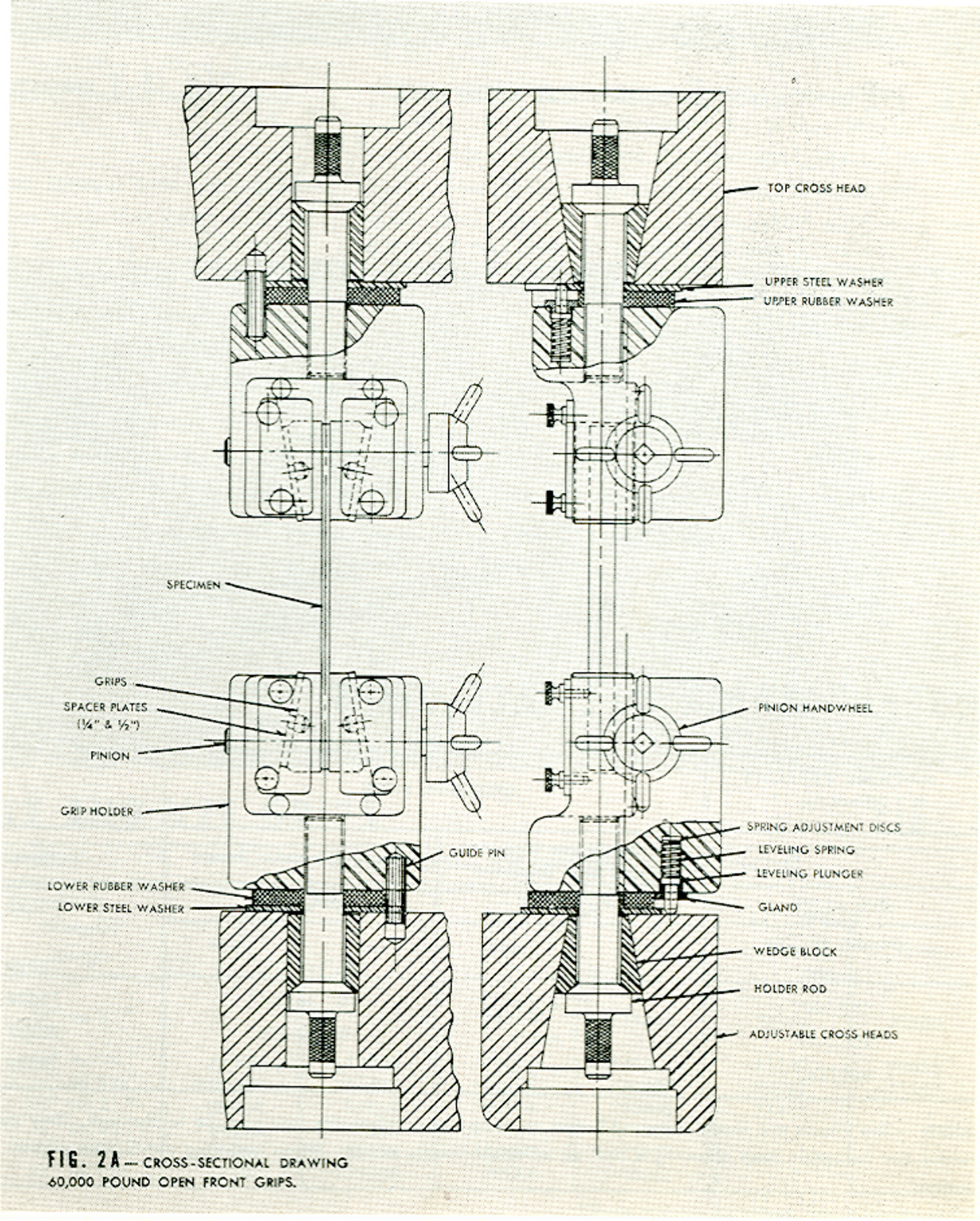


FIG. 2A — CROSS-SECTIONAL DRAWING 60,000 POUND OPEN FRONT GRIPS.

• TEMPLIN GRIPS

These widely known grips (Fig. 3) built under license from R. L. Templin of the Aluminum Company of America, are recommended for sheet and wire testing. The lateral self-adjustment feature of these grips make them very desirable especially in the case of very thin sheet metal specimens which would be likely to tear with ordinary gripping. They are furnished complete with flat wedge jaws and wedge block adaptors in the following capacities:

8000 pound capacity for sheet specimens up to ¾ inches wide and ½″ thick

10000 pound capacity for sheet specimens up to 1 inch wide and ½″ thick

20000 pound capacity for sheet specimens up to 2 inches wide and ½″ thick

Vee type wedges are available for testing round specimens from 0.06″ to 0.24″ diameter which fit either the ¾ inch or 1 inch grip holders. Vee type grip jaws are also available in all capacities for round specimens ¼ inch to ½ inch or ½ inch to ¾ inch or ¾ inch to 1 inch diameters.

The jaw holders are of heat treated tool steel, and the jaws themselves of an especially tough abrasion-resistant high carbon chrome steel. The sharpness of the teeth is retained during heat treatment by packing the metal in a neutral material to prevent scaling or decarburization, and the edges of the teeth emerge from the quench and draw of the same quality as the main body. Parallelism between gripping faces is attained by employing the mortised front and back plates for preventing warping or spreading of the backing surfaces which support the jaws. There is also an equalizer surface in the jaw to compensate for unequal specimen thickness. This distributes the lateral gripping force evenly over the surface of the specimen shank.

The jaws are self-closing under spring pressure, and are readily removable from the holder by displacing a spring stop which allows them to drop out of the holder.

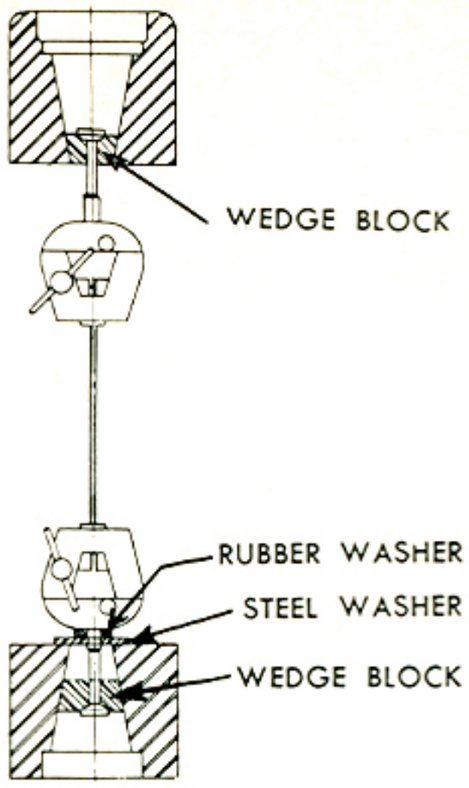


FIG. 3A

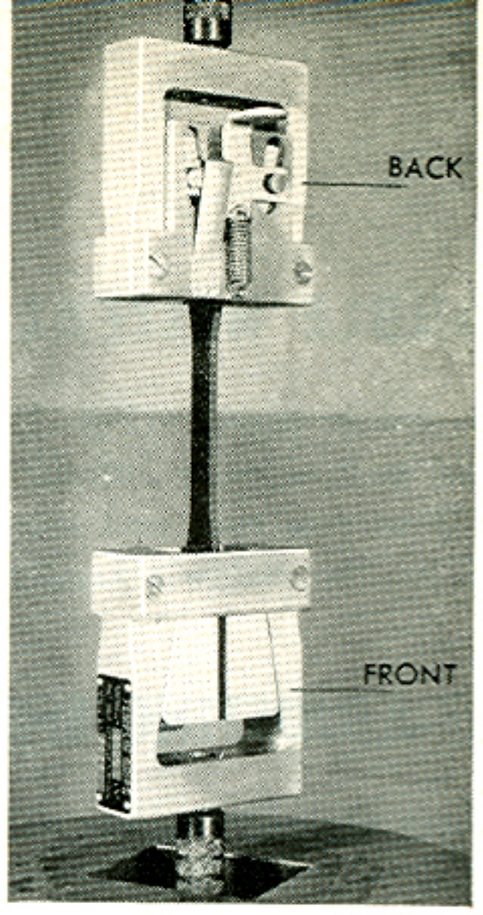
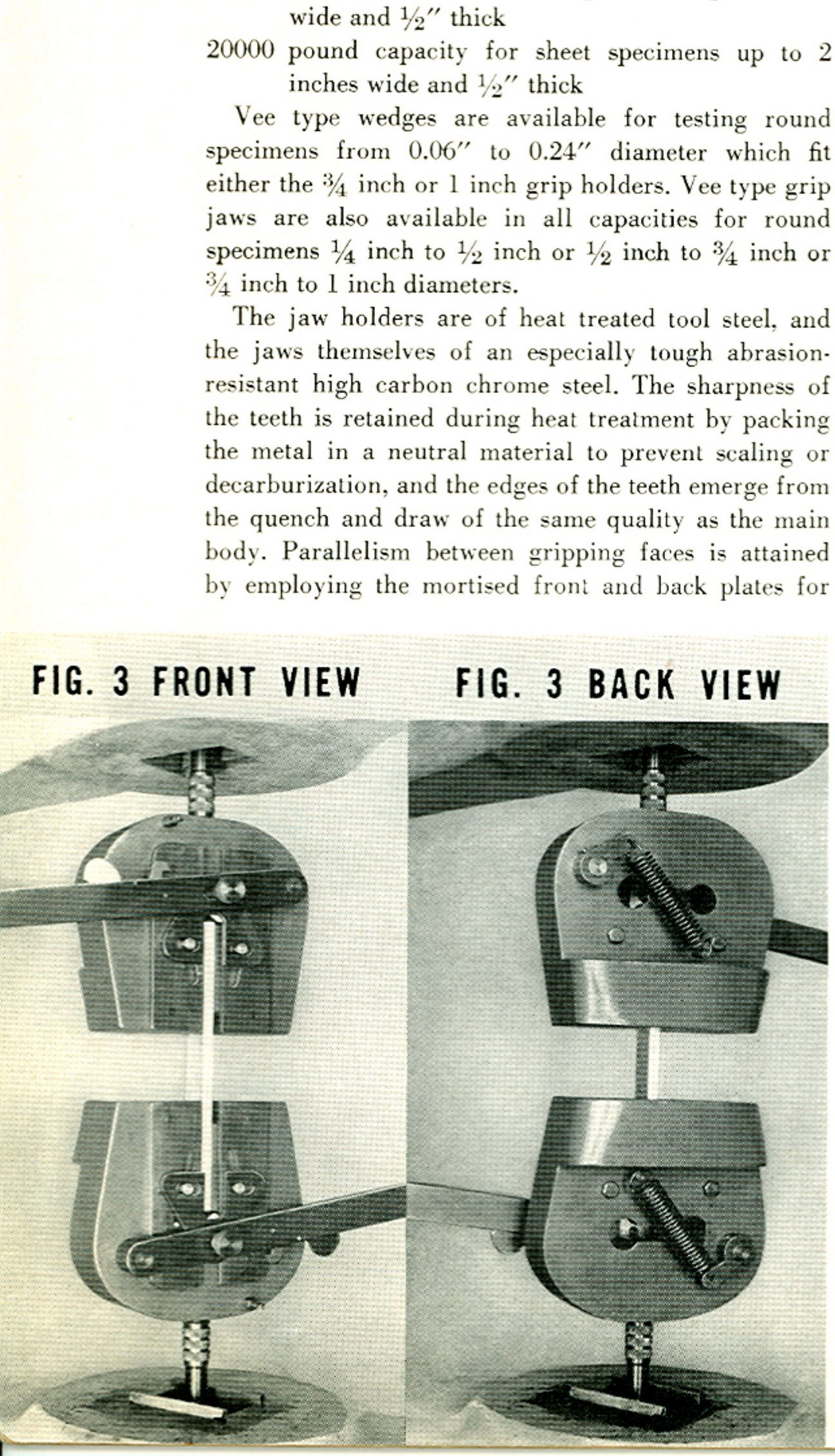


FIG. 4

FIG. 3 FRONT VIEW FIG. 3 BACK VIEW



• PLASTIC GRIPS

These grips (Fig. 4) are specially designed for plastics and are built with a capacity of 5000 pounds only. Their general construction is similar to the Templin grips previously described. They have one inch jaw width and will accommodate flats only up to ¼″ thick. Their light construction makes them easy to handle and very desirable in the testing of plastics.

• SPERICALLY SEATED AND PLANE COMPRESSION PLATE

These plates (Fig. 5) are a hardened tool-steel block, the face of which is scribed with concentric circles. The center of the sphere is located in the face of the block in accordance with standard testing procedure.

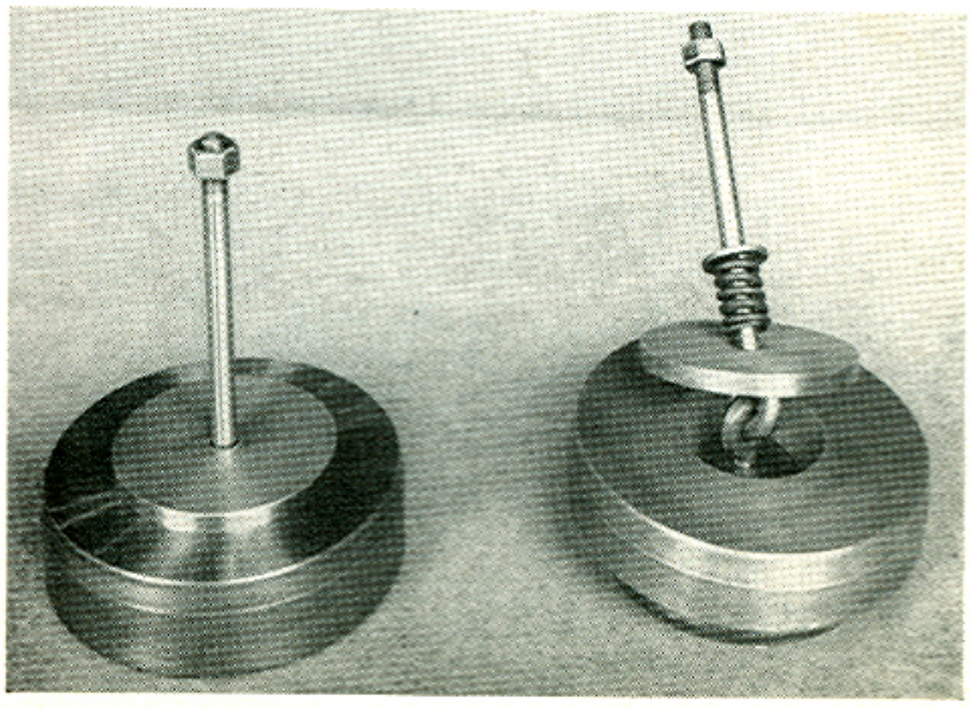


FIG. 5

DOUBLE HELICAL PINION

The double pinion (Fig. 1-C) is designed with a helical gear to mesh with the helical rack on the grips and is used to raise and lower the grips in the crosshead of the Baldwin-Tate-Emery Testing Machines.

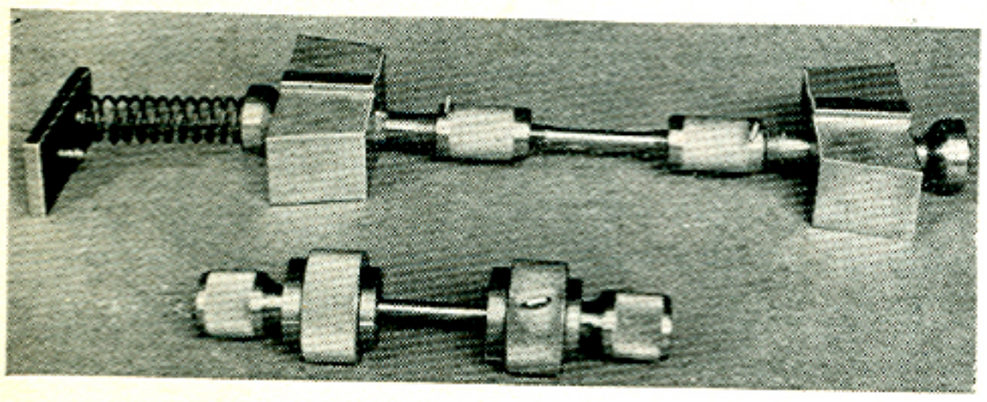
SELF-ADJUSTING SPECIMEN HOLDERS

These specimen holders (Fig. 6) are made of heat treated tool steel. There are two types as follows:

(a) Thread-end holders for standard 0.505 inch diameter, 2 inch gage length specimens with ¾ inch U. S. Standard thread shank (10 threads per inch). Adaptors for use with this assembly can also be furnished for other standard size thread end specimens.

(b) Shouldered-end holders for same specimen with shouldered-shanks using split bearing and retaining ring. These shouldered-end holders are also supplied as adaptors for type "A" in combination sets.

FIG. 6



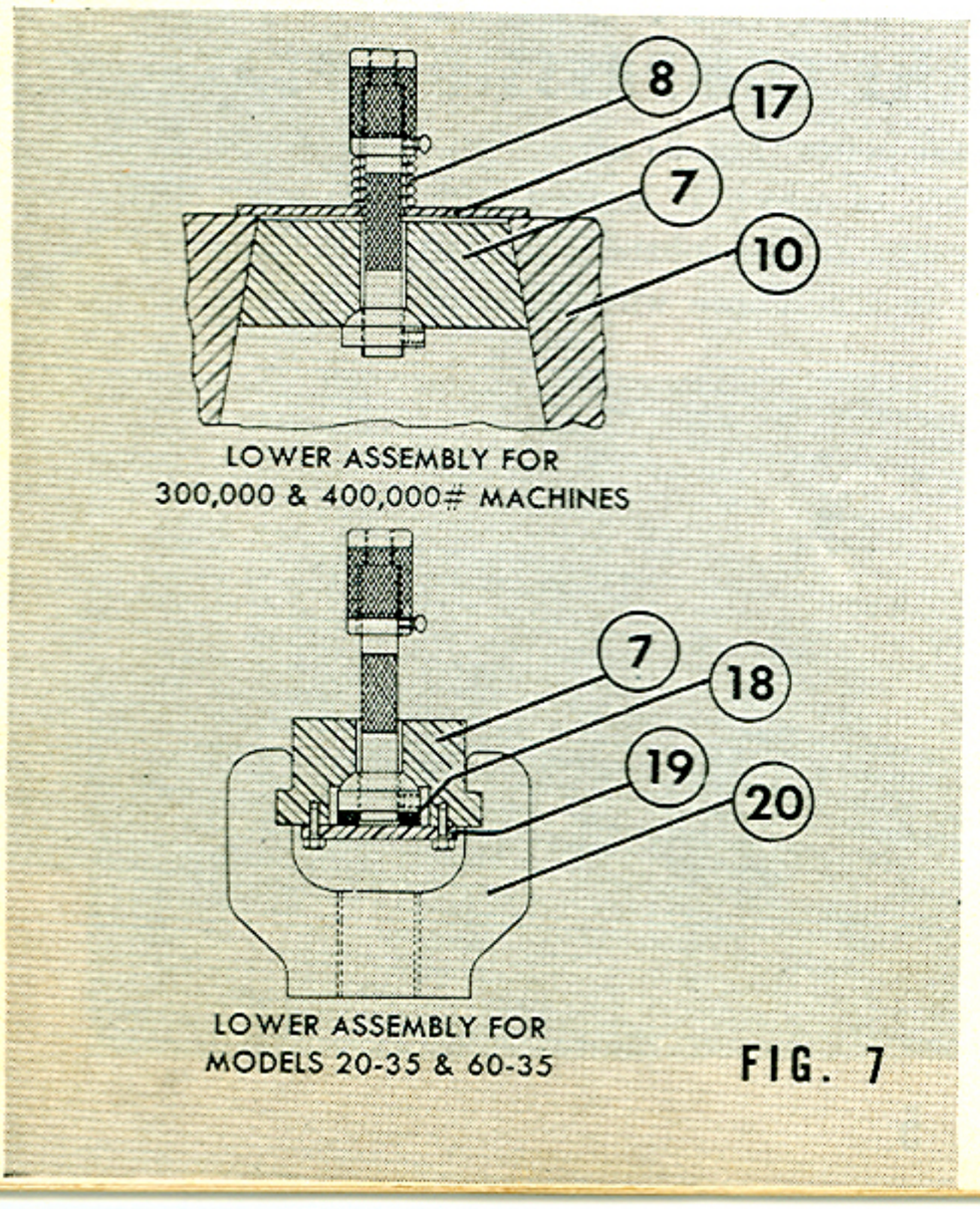


FIG. 7

Cross-Sectional Drawing of Self-Adjusting Specimen Holders, Giving Standard Nomenclature of Various Parts (Fig. 7, below)

1. Top Platen
2. Spherical Head. (Same top and bottom)
3. Stud. (Same top and bottom)
4. Upper Wedge Block
5. Threaded Adaptor. (Same top and bottom)
6. Threaded Specimen
7. Lower Wedge Block
8. Hold-up Spring
9. Spring Support
10. Sensitive Platen
11. Headed Adaptor (Same top and bottom)
12. Upper Split Sleeve
13. Upper Sleeve Retainer
14. Shouldered End Specimen
15. Lower Split Sleeve
16. Lower Sleeve Retainer
17. Spring Supporting Washer
18. Rubber Hold-up Washer
19. Washer Supporting Plate (On Model 60-35 only)
20. Adjusting Screw Head

NOTE: Although these parts are named, it is still important that you state size and serial number of the machine when ordering replacements.

FIG. 7