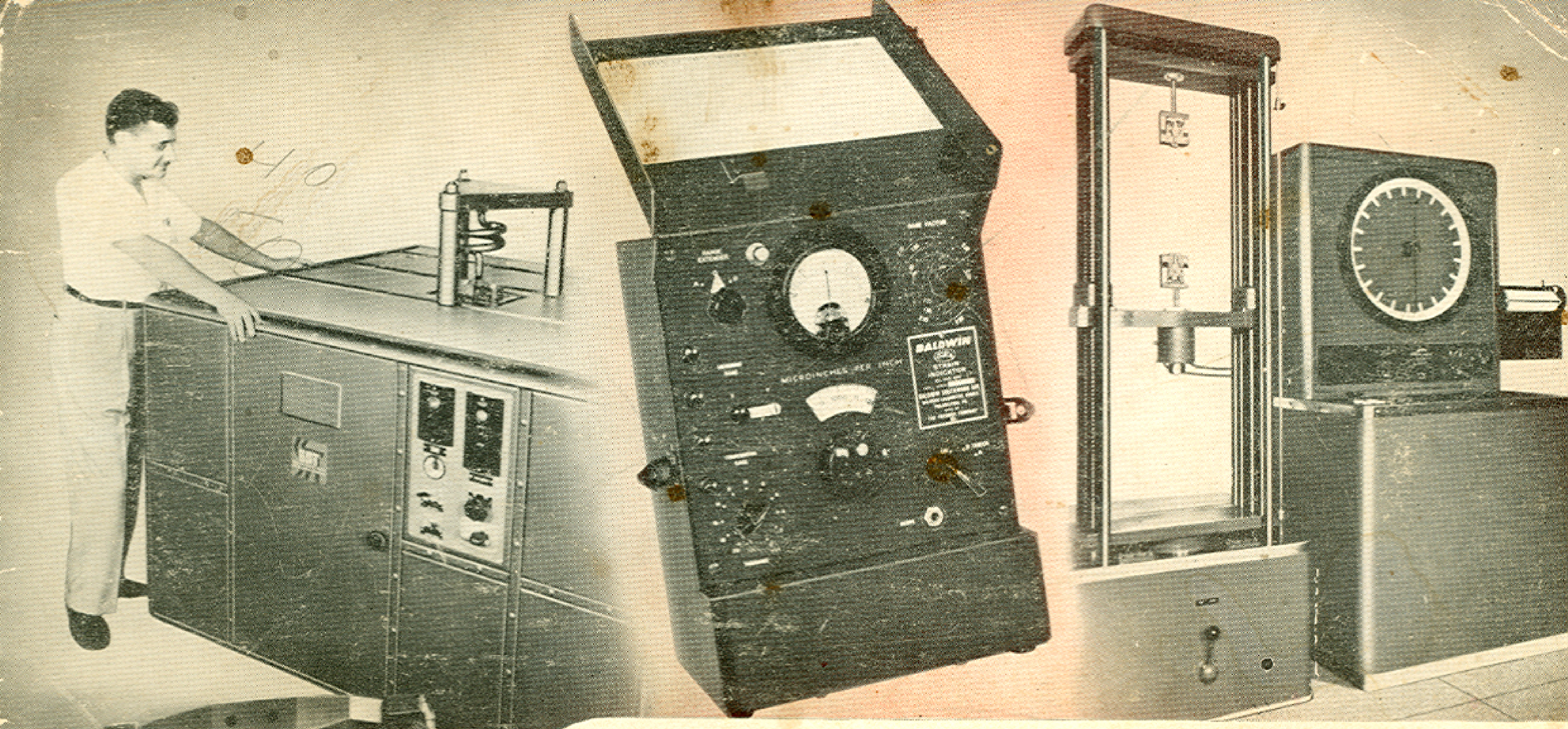
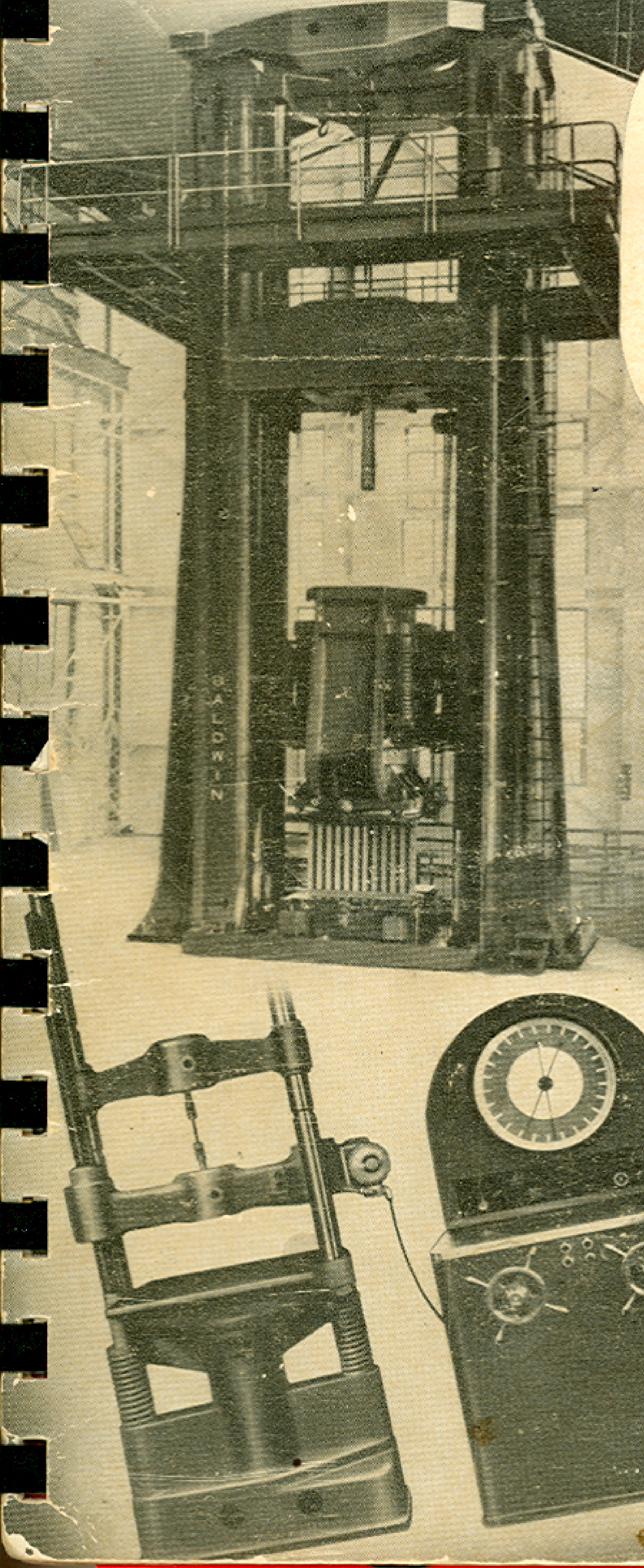
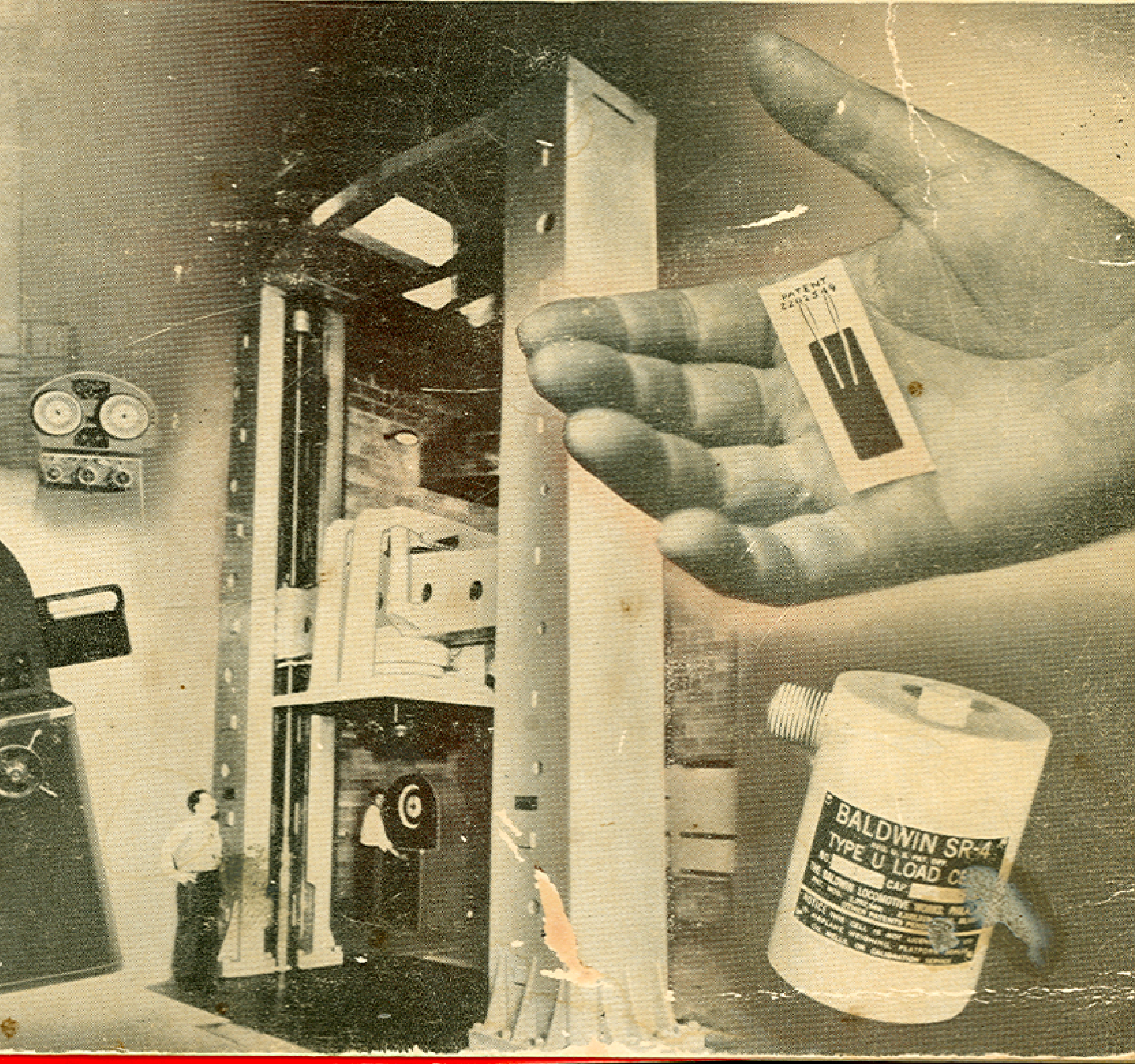


BALDWIN-LIMA-HAMILTON

Instruction B





CARE IS IMPORTANT

All of our testing equipment is built to withstand rugged usage with a long and satisfying service life. However, this equipment is primarily a precision instrument and deserves the care and attention necessary to maintain this precision throughout its life.

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 this equipment.

If for any reason a service or parts call is necessary, it is important that you specify the serial number stamped on the nameplate of your machine. This number is also listed below, along with the District Sales Offices.

Serial Number 040-1666

TYPE 60,000# B.T.E. Universal Testing Machine

DISTRICT SALES OFFICES

CHICAGO
627 Railway Exchange Bldg.
80 E. Jackson Blvd.
Chicago 4, Illinois
Phone: Harrison 7-3750

EASTERN
Lincoln Bldg.
60 E. 42nd St.
New York 17, N.Y.
Phone: Murray Hill 2-4747

SAN FRANCISCO
2929 19th Street
San Francisco 10, Calif.
Phone: Mission 7-6781

CLEVELAND
520 Terminal Tower Bldg.
Cleveland 13, Ohio
Phone: Cherry 1-5395

LOS ANGELES
600 St. Paul Avenue
Los Angeles 17, Calif.
Phone: Madison 6-5631

ST. LOUIS
514 Shell Bldg.
1221 Locust Street
St. Louis 3, Mo.
Phone: Chestnut 1-6315

SOUTHEASTERN
Philadelphia 42, Pa.
Phones: Saratoga 9-9161
Chester 3-8211

PITTSBURGH
567 Union Trust Bldg.
Pittsburgh 19, Pa.
Phone: Atlantic 1-4896

WASHINGTON
1336 Wyatt Bldg.
14th & New York Ave., N.W.
Washington 5, D.C.
Phone: Executive 3-3858

In Canada, PEACOCK BROTHERS, LTD., PO BOX 1040, Montreal, Quebec

Also Branch Offices in Vancouver, Calgary, Edmonton, Winnipeg, Sudbury, Toronto, Sydney and Montreal.

MAIN OFFICE AND PLANT

BALDWIN-LIMA-HAMILTON CORPORATION

Testing Equipment Department • Philadelphia 42, Pa.

No. IS-4900

BALDWIN instruction sheet

BALDWIN-TATE-EMERY UNIVERSAL TESTING MACHINE

FOUNDATION – ERECTION – INSTALLATION INSTRUCTIONS

FOUNDATION

Special foundations are usually not required for machines of 120,000 lb. capacity and less except where the weight of the machine exceeds the permissible floor loading. No additional load is imposed on the foundation during normal operation of the machine, however, it is advisable to insure the stability of the equipment by the use of anchor bolts, for which holes are provided in both the loading unit and control console. Where extreme vibration or shock is encountered from nearby machinery, the control console should be isolated by resilient type pads.

Where a specific foundation (200,000 lb. capacity and above) is required, you will have received, well in advance of the arrival of the equipment, an arrangement drawing which carries instructions for the preparation of a suitable foundation. This drawing should be followed carefully to facilitate the installation when the equipment arrives.

It is important that the spacing between the loading unit and control console, as shown on the arrangement drawing, be maintained since the hydraulic and electric lines are cut to a predetermined length. This spacing, however, can be changed, within reason, by altering these connecting lines. It is advisable when locating this machine, that adequate work space be made available behind the two units to facilitate maintenance.

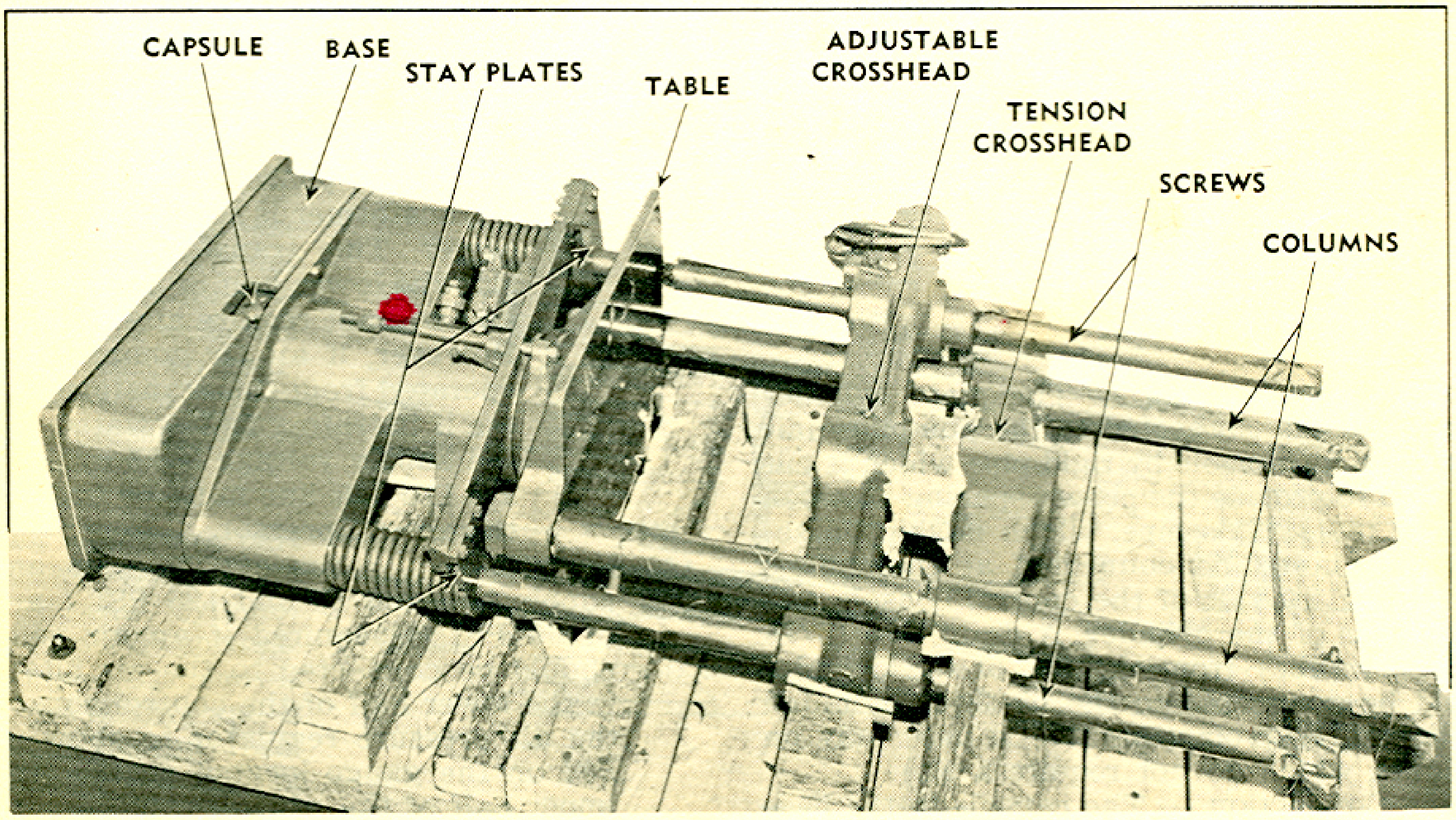


Photo showing Loading Unit on skid.

BALDWIN-LIMA-HAMILTON CORPORATION
PHILADELPHIA 42, PENNA.

ERECTION

The method of erection of any machine will be determined by the facilities and space available. Therefore, it is difficult to give specific instructions except for a few important rules. Whenever possible, the handling of this machine should be placed in the hands of a competent rigger who should read these instructions carefully before proceeding.

The loading unit is shipped front down, properly skidded for ease in handling (See Figure 1). If for any reason, the machine must be moved a considerable distance at some future time, it is advisable that this same method of crating be used. Before lifting the machine from the skids, remove all restraining blocks and make sure that the wood spacer and bolt between the adjustable crosshead and the tension crosshead are secure. The machine should always be lifted by the tension crosshead which is well above the center of gravity, and which will insure an even distribution of load on both the screws and columns. This crosshead and the edges of the table can be used as jacking and cribbing points if required. Never apply jacks, cable, etc. when raising the machine unless pads of blocks are used to protect the surface. It is important that the screws, stayplates and bottom crosshead are not used to handle or support the machine. After the loading frame has been lowered over the anchor bolts and is standing vertically, it should be leveled and grouted if required. When installing the loading unit, care should be taken that the bottom crosshead and the screws do not touch the floor or the walls of the pit. The bottom crosshead is attached to the screws by nuts and is located under the base. The table top can be used as a reference surface for leveling. When the grouting is set, the nuts can be put on the anchor bolts and pulled down tight.

The control console should be moved into position taking care that it will be in the vertical position at all times. Although it is not absolutely necessary, it is advisable to bolt the control console securely to the foundation since appreciable shifting may cause erratic operation of the indicating system.

INSTALLATION

(1) Hydraulic Connections — The main cylinder pressure line is connected to the pumping unit in the control console by rigid pipe which is cut to length to provide the proper spacing between the two units. This pipe, which is shipped separately, should be connected at the unions provided at the side of the control console and at the rear of the cylinder. A drain line (5/16 in. copper tube) from the top of the cylinder should be connected to the oil filter mounted on the oil reservoir (this line is used only on machines which do not require a pit).

(2) Capsule Connection — The capsule in the base of the loading unit is connected to the indicator in the upper half of the control console by a 1/4 in. copper tube. This tube should be connected at the capsule end first. Oil should then be pumped through the capsule and the tube until all the air in this system is expelled. With oil still flowing the tube should be connected to the block fitting located in the upper half of the control console. The capsule should be gauged and filled as necessary in accordance with instruction sheet No. IS 4902.

(3) Wiring Connections — The following steps if taken in sequence will insure the proper electrical operation of this equipment.

(a) Connect the conduit and wires from the limit switch on the cylinder to the pump motor starter in the lower half of the control console. The conduit required for this operation is shipped separately and the wires are coiled up inside the starter enclosure.

(b) Connect the flexible cable from the crosshead motor to the terminal strip inside the lower half of the control console. Be certain that the color of the wires matches the color of the terminals.

(c) Check the pump motor and crosshead motor for current requirements. Connect the power lines to the proper terminals in the pump motor starter box as indicated by the wiring diagram on the inside of the box cover.

(d) Check the rotation of the motors and reverse the power input lines if necessary. The pump rotation is marked on the pump and should be checked with the loading valve (right hand) closed.

(e) Certain of the accessories, such as, the neon dial light, pacing disc drives, recorders, air compressor, etc. require 110 volt single phase current. In most cases, a transformer is furnished to supply this power. This transformer is located inside the lower half of the control console and will not require any external wiring. However, if an air compressor is to be operated from this transformer, check to see if its rating is 750 watts. If not, or if the supply voltage is 25 cycles, a separate 110 volt line must be used to operate the air compressor.

(4) Air Supply — A reasonably clean and dry air supply between 35 and 125 PSI (a minimum of 60 PSI is required if an air cell is used) should be connected to the air filter provided in the lower half of the control console. Adjust the air pressure regulator to show exactly 25 PSI on the gauge located on the front of the upper half of the control console.

No. IS-4901

BALDWIN instruction sheet

BALDWIN-TATE-EMERY UNIVERSAL TESTING MACHINE

LOADING SYSTEM

GENERAL

The Baldwin-Tate-Emery universal testing machine, functionally speaking, contains three basic elements: the loading system, the weighing system, and the indicating system. This instruction will be concerned mainly with the loading system, the other two elements being covered in separate leaflets.

DESCRIPTION

Efficient operation of this equipment demands that the operator have some knowledge of its construction. The loading system consists of a loading frame which applies the load to the specimen, a sensitive frame which transmits this load to the weighing system, and a pumping unit. (See Fig. 1.)

The loading frame is supported by the base, which is rigidly anchored to the foundation. Integral with this base is the hydraulic cylinder which contains the loading ram. The work table attached to this ram carries two compression columns on which the tension crosshead is mounted.

The screws which are part of the sensitive frame, are supported by the cylinder through preload springs. The adjustable crosshead is mounted on the screws and is located between the top crosshead and table of the loading frame. The lower ends of the screws are tied together by the bottom crosshead to complete the sensitive frame. The weighing capsule is located between bottom crosshead and the underside of the hydraulic cylinder. The preload springs besides supporting the weight of this sensitive frame are also used to apply an initial load to

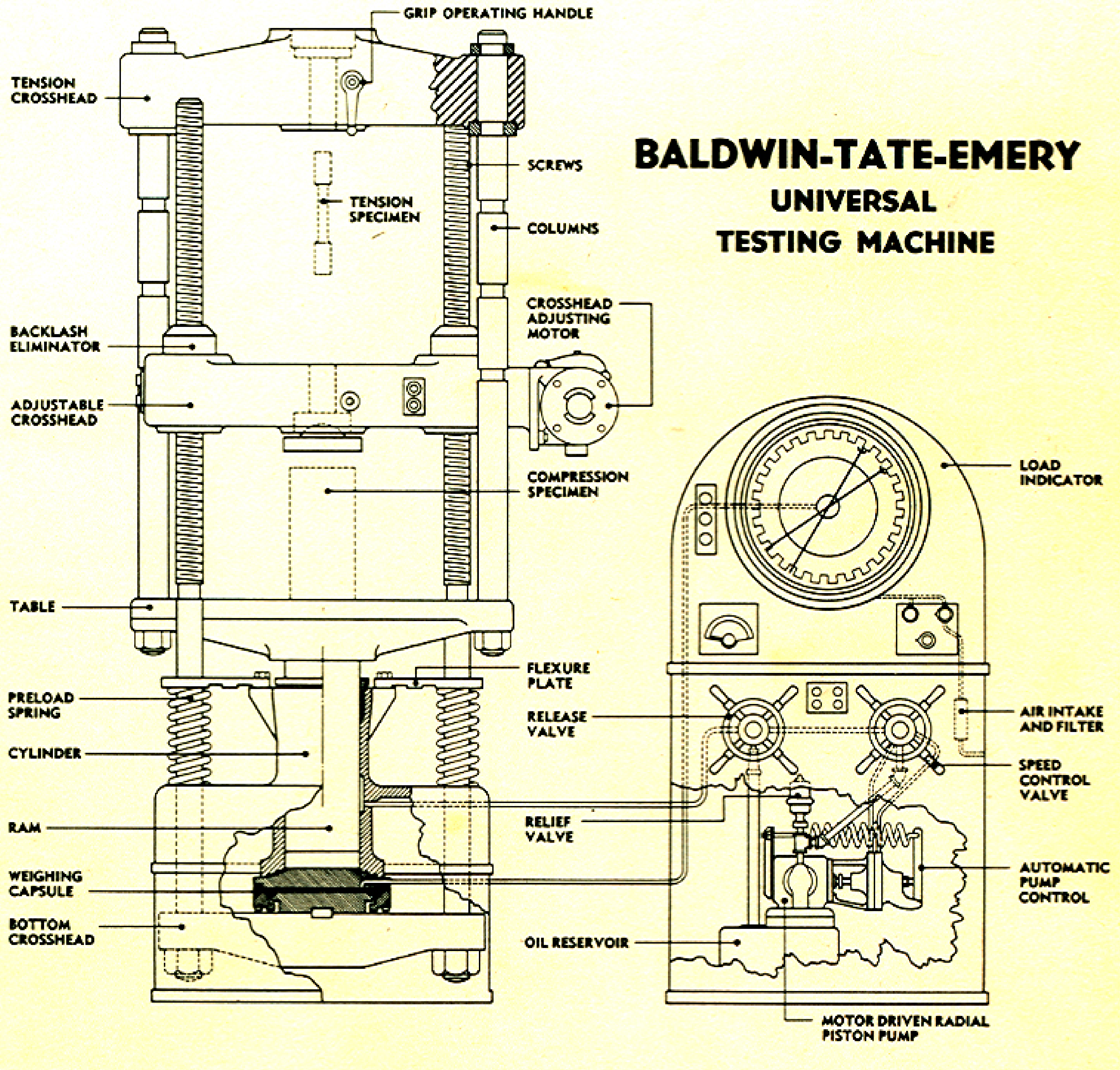


FIGURE 1

OPERATION

Positioning the tension crosshead—

(1) Remove the upper retaining rings and split collars. (See Fig. 4.)
(2) Raise the adjustable crosshead (using the push-button crosshead motor) to make contact with the tension crosshead. After smooth contact, continue to raise the adjustable crosshead to move the tension crosshead clear of the lower split collars.
(3) Remove the lower split collars.
(4) Move the tension crosshead to the desired position leaving room for insertion of the lower split collars.
(5) Insert lower split collars and lower tension crosshead until it rests on the lower split collars.
(6) Insert upper split collars and replace the retaining rings.

STANDARD COMPRESSION TEST

(1) Insert the compression plate in the adjustable crosshead.
(2) Move the adjustable crosshead, to provide a compression space about ½ inch greater than the specimen to be tested.
(3) Place compression specimen on table making certain that it is centrally located in relation to the compression plate.
(4) Open release valve and close the loading valve.
(5) Start pump.
(6) Close release valve and open loading valve. Just as soon as the specimen makes contact with the compression plate, close the coarse control and open the fine (micrometer) control so that the load is applied at the desired rate.
(7) When the test is completed, close the fine loading control and open the coarse release valve.

STANDARD TENSION TEST (FLAT OR VEE GRIPS)

(1) Move tension crosshead to the position which will give the desired tension space.
(2) Insert grip operating pinion shaft in top crosshead. Screw "angle-bolts" in top of the grips; then lower the grips into the slot in tension 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 the start of the test, the lower ends of the wedge grips are ¼ to ½ inch above the lower surface of the tension crosshead. Apply small plate and screw in top of the crosshead to prevent upper grips from jumping out when the specimen breaks. Arrange grips and liners in the adjustable crosshead in the same way so that the top ends of the grips are ¼ to ½ inch below the 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 the crosshead to prevent grips from falling through.
(3) Insert specimen in tension crosshead. *Be sure the grips have a full "bite" on the specimen.*
(4) Raise the adjustable crosshead until its grips are in a position to "bite" the greatest possible area of the specimen.
(5) Set grips tight with handles on pinion shafts and start the test, repeating steps 4 through 7 under STANDARD COMPRESSION TEST. As soon as load starts to increase, remove handles.

CAUTION

- **DO NOT shut off pump motor with load on the machine. This puts an undue strain on the diaphragm of the pump control.**
- **DO NOT lower the adjustable crosshead close to the work table without first raising the table slightly and holding it there. In this way, any jamming can be overcome by merely dropping the table.**
- **DO NOT undertake a tension test without a full "bite" on the specimen. This is a very common mistake and is responsible for most of the damage done to flat and vee grips and thread end specimen holders.**

the weighing capsule. This frame is stabilized horizontally by the stayplates and the weighing capsule.

When hydraulic fluid is applied to the cylinder, a specimen placed between the table and the adjustable crosshead will be compressed by upward motion of the table and a specimen gripped between the tension crosshead and sensitive crosshead will be put in tension by the upward travel of the tension crosshead. In either case, the force on the sensitive crosshead will always be exerted in the upward direction. This force is transmitted by the screws to the bottom crosshead to compress the weighing capsule.

The adjustable crosshead is infinitely adjustable to any position between the table and the top crosshead. Gear nuts retained in the ends of this crosshead ride on the screws and are rotated by worms driven by a gear motor. These nuts are split and spring loaded to eliminate backlash in the threads between the nut and the screw.

The tension crosshead is adjustable in fixed steps to provide convenient heights for tension testing. This crosshead is attached to the columns by split collars and can be raised or lowered by using the adjustable crosshead as an elevator.

The pumping unit which is located in the lower half of the control console supplies the hydraulic fluid required for load application. It contains a variable volume radial piston pump driven by an electric motor. The discharge of the pump is controlled by a differential device (see Fig. 2), which is, essentially, a two-chamber unit separated by a flexible diaphragm. One chamber is connected to the pump side of the control valve and the other to the cylinder side. 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 change the stroke of the pump and thus its displacement, thereby tending to equalize the forces against the diaphragm. In other words, the speed of the ram is automatically maintained constant regardless of variations in resistance against the ram or internal leakage in the pump. The pump discharge after passing through the control valve enters the cylinder to drive the ram upward. A second valve of similar construction as the control valve is used to drain the cylinder allowing the ram to return by gravity. The pumping unit is protected by a spring-loaded relief valve which is set slightly above the pressure required to produce the capacity load of the machine. The control and release valves are actually two valves in one. (See Fig. 3.) The large handwheel on each valve controls a large spindle to produce the fast testing speeds and a micrometer knob within this handwheel controls a small spindle to produce the slower testing speeds.

MAINTENANCE . . . KEY TO SATISFACTORY PERFORMANCE

CYLINDER GLAND

If leakage of oil from cylinder is excessive, tighten the gland nuts evenly. (See Fig. 6.) If they will tighten no more, raise the ram hydraulically and block it up. (Never block on the stayplates.) Remove all gland nuts, and raise gland. Replace packing and re-install gland. Do not tighten gland nuts too firmly or the ram will not return quickly by gravity. When replacing packing use the recommended type shown on the packing data sheet included in this manual.

CONTROL AND RELEASE VALVES

If these valves become loose and too easy to operate, they can be stiffened by merely tightening the glands after the set screw has been loosened. (See Fig. 3.) If glands will tighten no more, add to or replace packing. Oil leakage past the main spindles should fall in the leakage collector and be returned to the oil reservoir. If oil spills down the front instead, remove the top half of the collector and seal the bottom half with a few drops of paint.

PUMP CONTROL

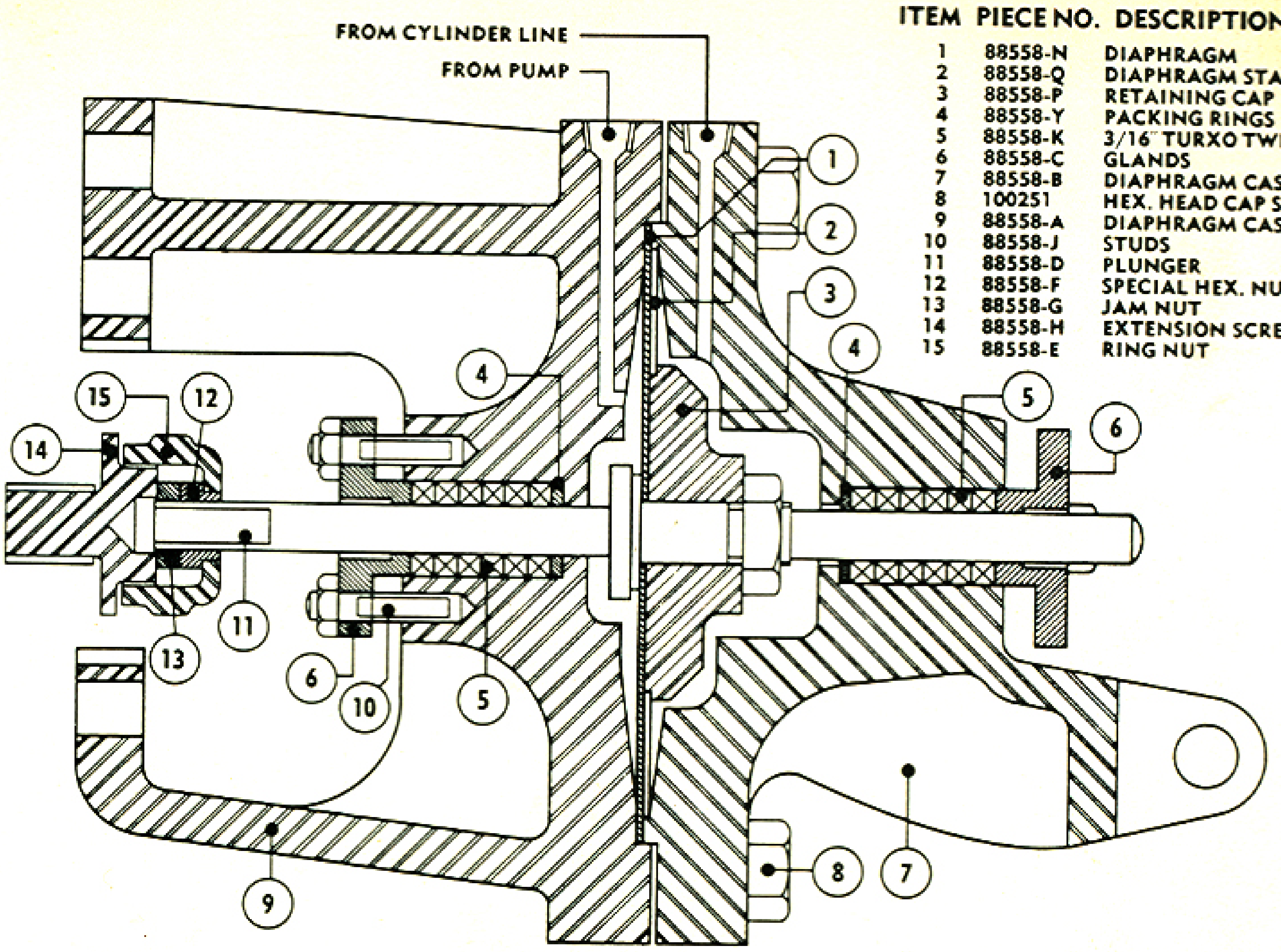
If much oil collects under the automatic pump control, tighten the gland nuts on each side of the unit. If they will tighten no more, add to or replace packing. (See Fig. 2.) Instructions for adjusting the automatic pump control are shown in Fig. 5.

OIL SUPPLY

The machine is shipped with the oil reservoir filled. If there has been much leakage, check the level on the rod gauge in the reservoir. If the level has fallen below the lower notch add oil having 600 SSU at 100°F (See lubrication data sheet for specific recommendations.)

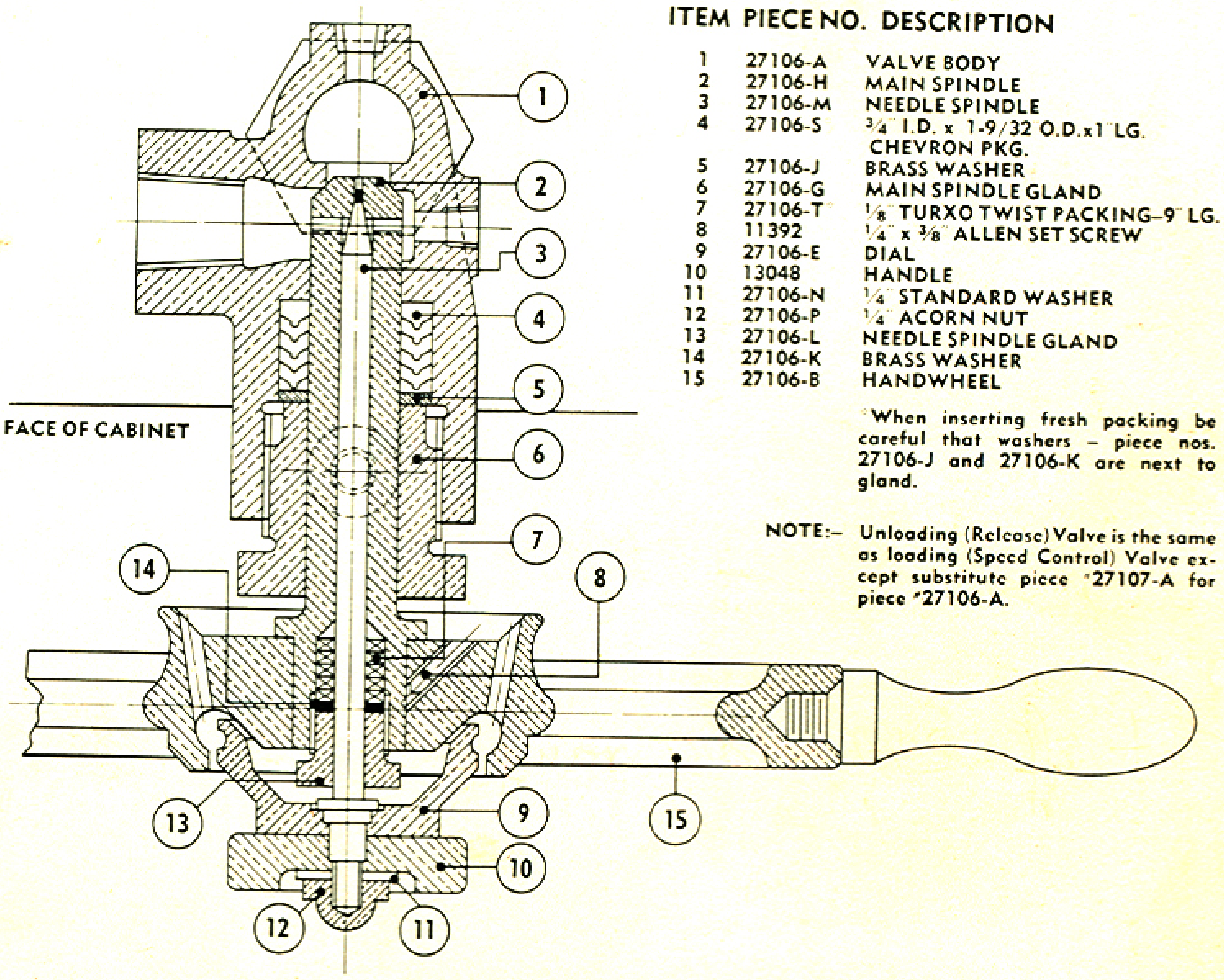
RELIEF VALVE

The setting of the hydraulic relief valve can be changed by loosening the locknut and turning the adjustment in or out. Turning it in will increase the pressure setting.



ITEM	PIECE NO.	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	100251	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-E	RING NUT

Figure 2—Automatic Pump Control



ITEM	PIECE NO.	DESCRIPTION
1	27106-A	VALVE BODY
2	27106-H	MAIN SPINDLE
3	27106-M	NEEDLE SPINDLE
4	27106-S	3/4" I.D. x 1-9/32" O.D. x 1" LG. CHEVRON PKG.
5	27106-J	BRASS WASHER
6	27106-G	MAIN SPINDLE GLAND
7	27106-T*	1/8" TURXO TWIST PACKING–9" LG.
8	11392	1/4" x 3/8" ALLEN SET SCREW
9	27106-E	DIAL
10	13048	HANDLE
11	27106-N	1/4" STANDARD WASHER
12	27106-P	1/4" ACORN NUT
13	27106-L	NEEDLE SPINDLE GLAND
14	27106-K	BRASS WASHER
15	27106-B	HANDWHEEL

*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 substitute piece #27107-A for piece #27106-A.

Figure 3—Speed Control Valve

SCREWS

If the adjustable 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 lubricant. (See lubrication data sheet.) The temperature under which the machine operates will to some extent determine the viscosity of the lubricant. It is very important to keep the screws free from chips and dirt; therefore, they should be protected as well as possible.

STAYPLATES

Do not permit fragments to collect on stayplates, as they may be trapped between the table and the stayplate, bending the latter and entailing a troublesome repair job.

ADJUSTABLE CROSSHEAD CAPS

The adjustable crosshead drive gearing and backlash eliminator nuts should be well lubricated. Periodically grease should be pumped into the fittings provided until leakage appears around the tops of the caps.

TABLE

Unless the 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

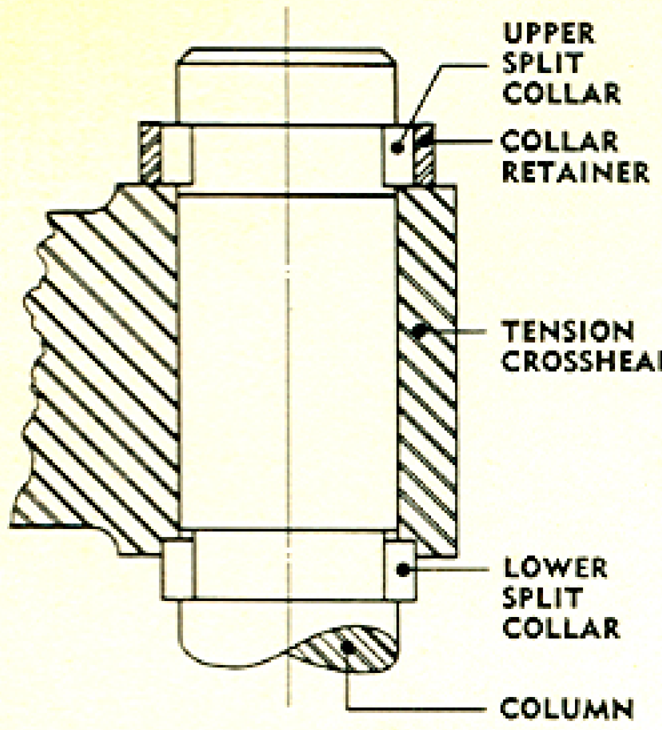


Figure 4—Section through tension crosshead showing upper retaining rings and split collars.

material such as linoleum, fibre, copper, masonite, plywood, or steel plate.

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" 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.

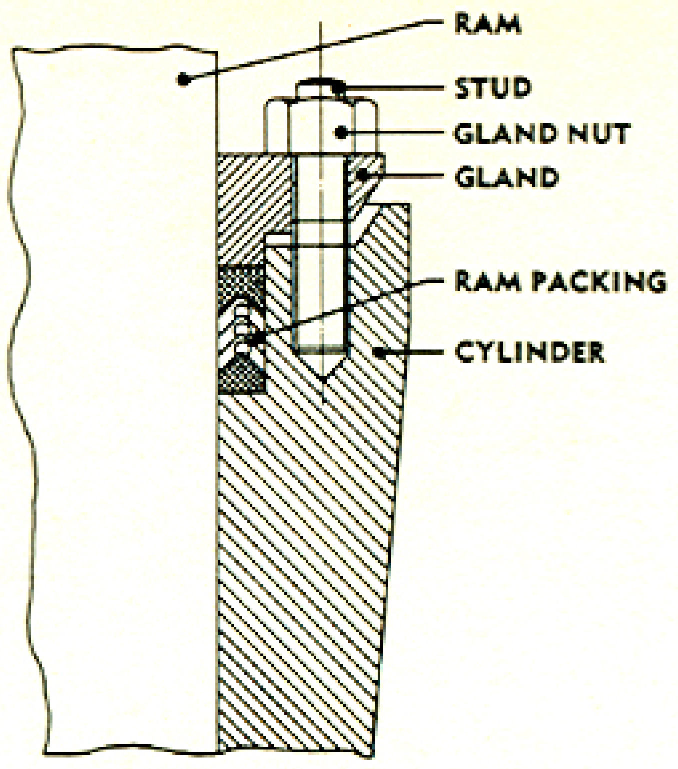


Figure 6—Section showing gland and packing assembly.

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 a set of file face insert grips.

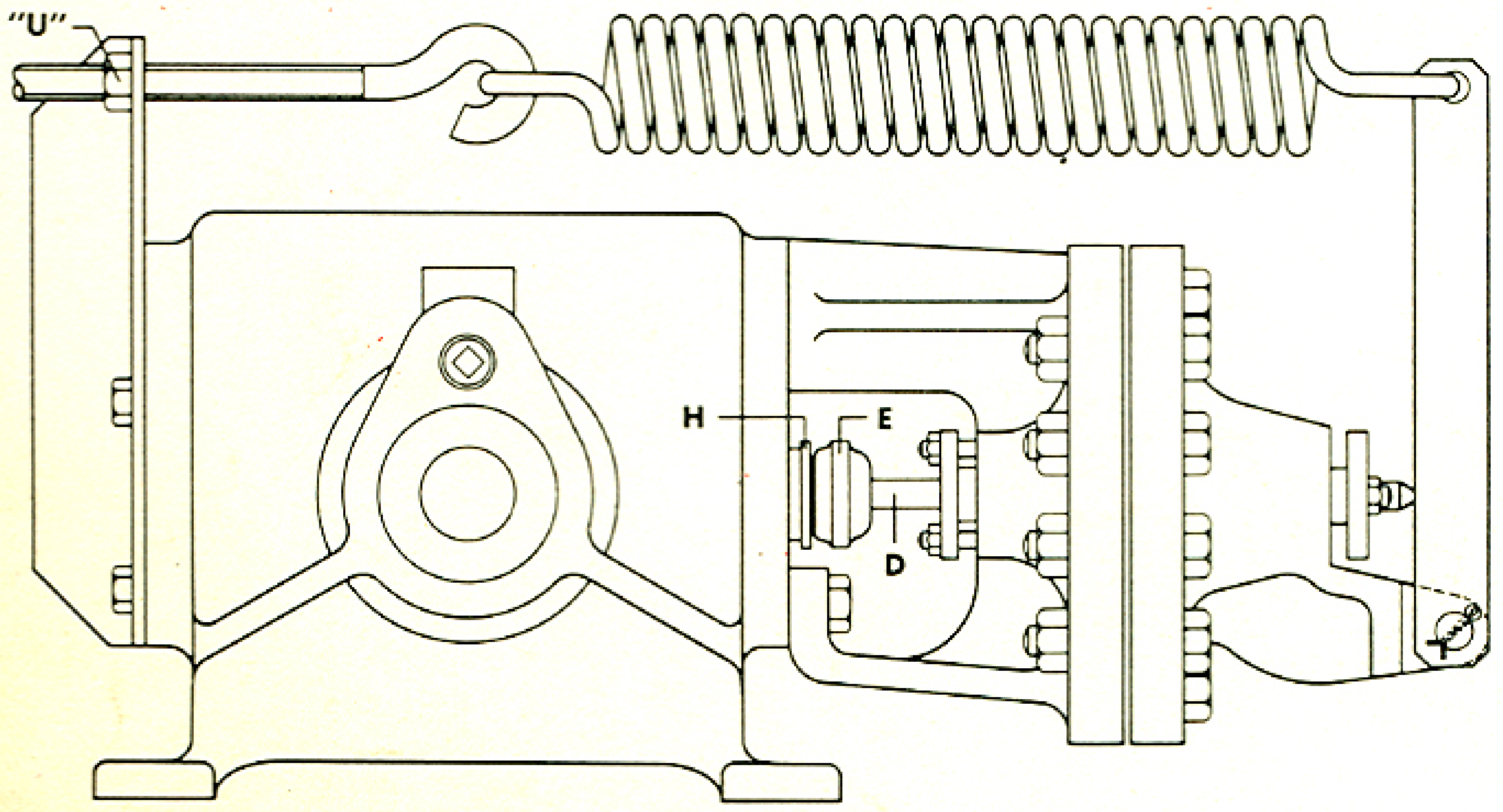
Before a specimen is pulled, the double pinion gears used for moving the grips in the slots should be centered and anchored in place with the set bolts. Otherwise the specimen will not be centered and may not be pulled axially.

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.

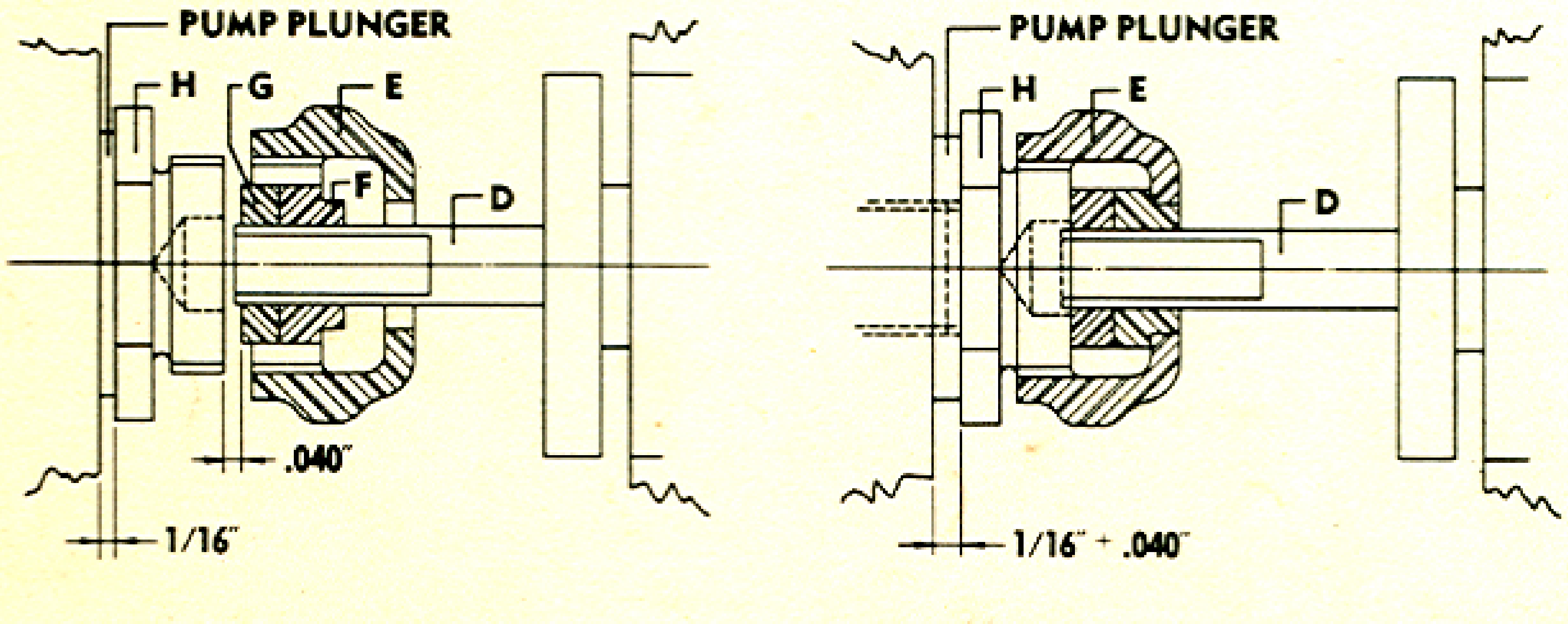
When grips do not move smoothly in the heads, as revealed by a clicking noise and a jump on the load indicator, a high pressure dry lubricant should be used on the back of the grips. Use only a small amount — and only on the backs — or it will collect scale and dirt.

Always use grip retainers furnished for bolting to crosshead castings, otherwise recoil may throw the grips out of the machine.



INSTRUCTIONS FOR ADJUSTING AUTOMATIC PUMP CONTROL

1. Attach to pump as shown.
2. Tighten nut "U" until spring has been stretched ⅜", 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"

Figure 5

No. IS-4902

BALDWIN instruction sheet

BALDWIN-TATE-EMERY UNIVERSAL TESTING MACHINE

WEIGHING SYSTEM

DESCRIPTION

The weighing system consists primarily of a piston and cylinder which will be designated in this instruction as the capsule. In this capsule (See Figure 1), the piston is held central to the cylinder by a flat "bridge ring" so that the piston itself does not touch the cylinder wall (See Figure 2). A metal diaphragm is clamped by the cylinder head in such a way that it stretches across the bridge ring and piston face. A layer of fluid, approximately .030 in. thick, fills the space between this diaphragm and the cylinder head. Since there is no appreciable hydraulic flow, the pressure set up in this layer of fluid is directly proportional to a force exerted on the piston. The total motion of this piston is equal to the compression of the fluid, which is normally between .002 in. and .004 in. at full capacity. This motion is permitted by the elastic flexibility of the bridge ring and is not affected by friction since there is no contact between the cylinder and piston.

MAINTENANCE

(1) Capsule Gauging—The capsule is a sealed system which must contain the correct amount of fluid. Three equally spaced openings around the periphery of the capsule provided through which "feeler" gauges can be inserted to determine the thickness of the fluid layer within the capsule. The correct amount of fluid is indicated when the average of the three gaugings is within .003 in. of the number stamped on the capsule of your machine. When the machine is first installed, gauging measurements should be checked daily. After the first week under normal conditions, gauging should be checked weekly or monthly.

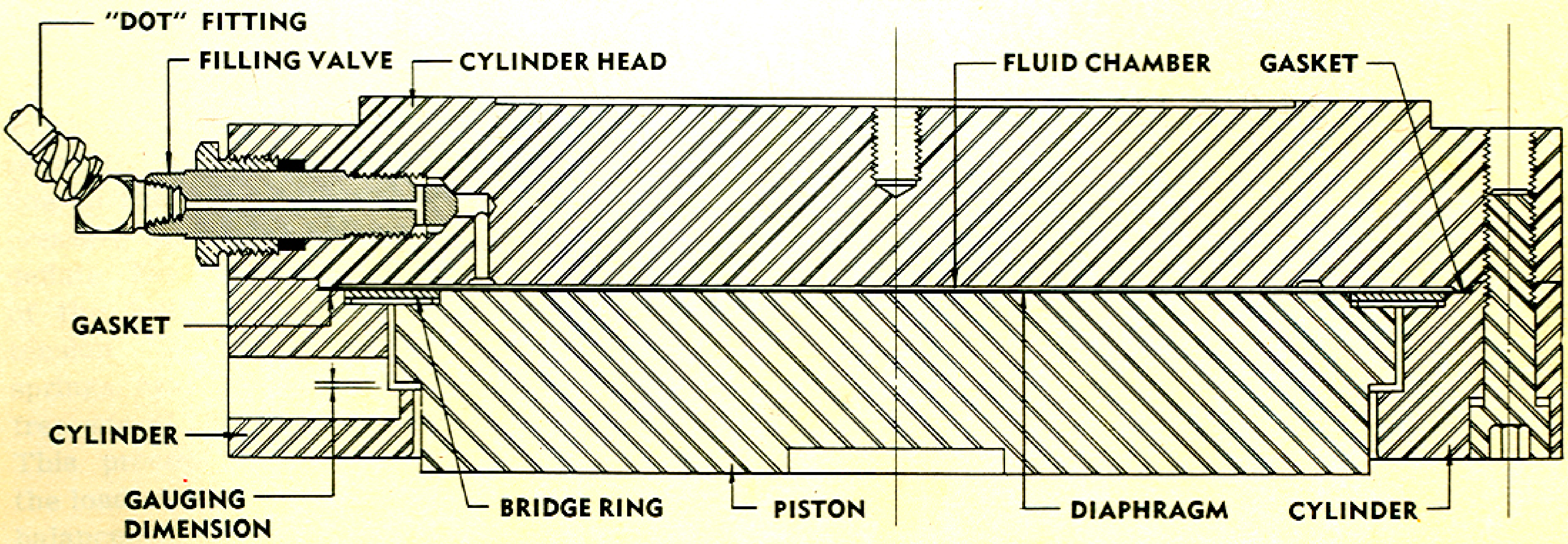


FIGURE 1
Section through capsule of B-T-E Universal Testing Machine.

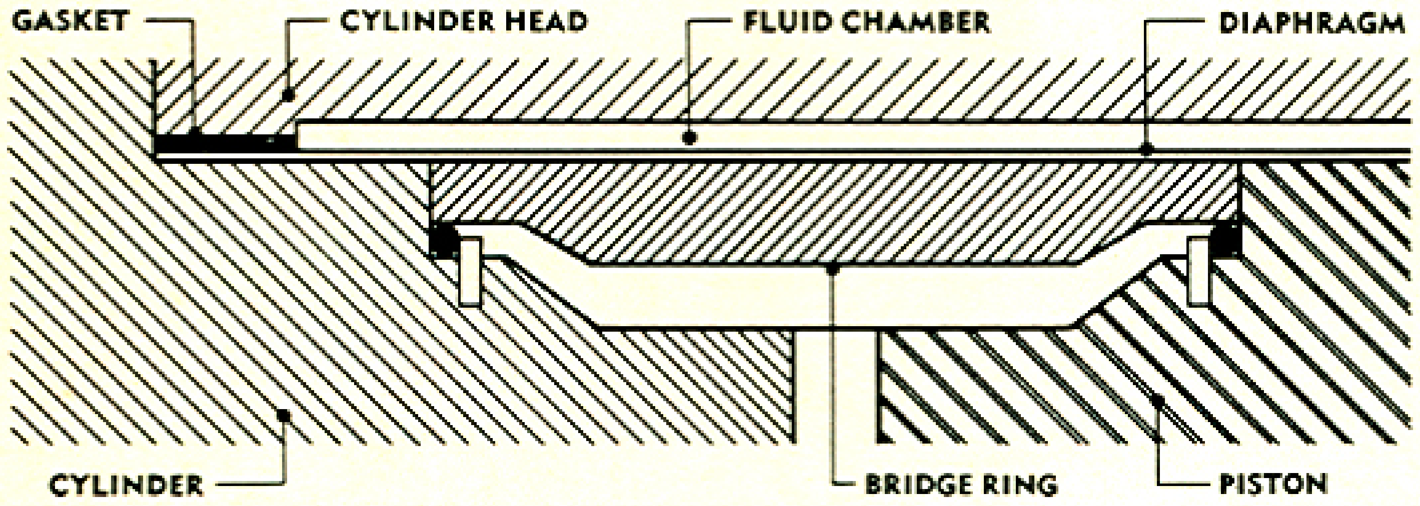


FIGURE 2

Section showing detail of capsule bridge ring.

(2) Capsule Leakage—Loss of fluid is evidenced by an increase in the capsule gauging, a slight increase of which over a period of time is normal. However, if all connections are tight and it still becomes necessary to refill more often than every three months, report to the nearest sales office, giving full details. In particular, note whether gauging holes are wet.

(3) Capsule Filling—When the capsule gauging increases beyond the recommended operating range, more fluid must be added. All filling should be done with no load on the machine, using the following procedure. Fill the "dot" gun supplied for this purpose with fluid making certain that it is free from air bubbles. Attach the gun to the "dot" fitting of the filling valve on the capsule making sure that it is pointed downward at all times. This prevents any air which is trapped in the gun from being forced into the system. Open the valve with the special 19/32 in. hex wrench supplied and pump in fluid until the desired gauging is obtained. Add oil slowly when proper gauging is approached to prevent pinching feeler gauge. Close the valve firmly with the wrench. If too much fluid is inserted and the gauging decreases below the recommended limit, open the shut off valve, and depress the ball at the end of nipple until the required gauging is secured. Always be sure the shut off valve is closed and recheck gauging after closing.

(4) Capsule Fluid—The fluid used in the capsule has been carefully selected for its properties and it is recommended for best operation of the system. Additional quantities of this fluid can be obtained through the Sales Office nearest you. If, in case of emergency, this fluid cannot be obtained, any good grade of light mineral oil (obtainable in most drug stores) would probably be satisfactory.

(5) Air in the Weighing System—The accuracy of the weighing system is affected by any appreciable amount of air which may be in the system. Since the capsule is always under pressure as a result of the preload springs, the only way air can enter the system is by careless filling procedure. Therefore, it is important that every precaution to prevent entry of air into the capsule when inserting additional fluid. Air in the capsule is apparent when the capsule deflection is greater than recommended. The capsule deflection is the difference between the average "feeler" gauging at no load and for a load of any given amount.

The deflection for capacity load should not exceed 0.004 in. for machine capacities up to 400,000 pounds; 0.006 in. for 600,000 pounds and 0.010 in. for 1,000,000 pounds and above. This measurement of capsule deflection should always be made before any calibration of the machine is performed.

Shut off 240 & 1200 range when filling capsule.

No. IS-4903

BALDWIN instruction sheet

BALDWIN-TATE-EMERY UNIVERSAL TESTING MACHINE

TATE-EMERY INDICATING SYSTEM

GENERAL

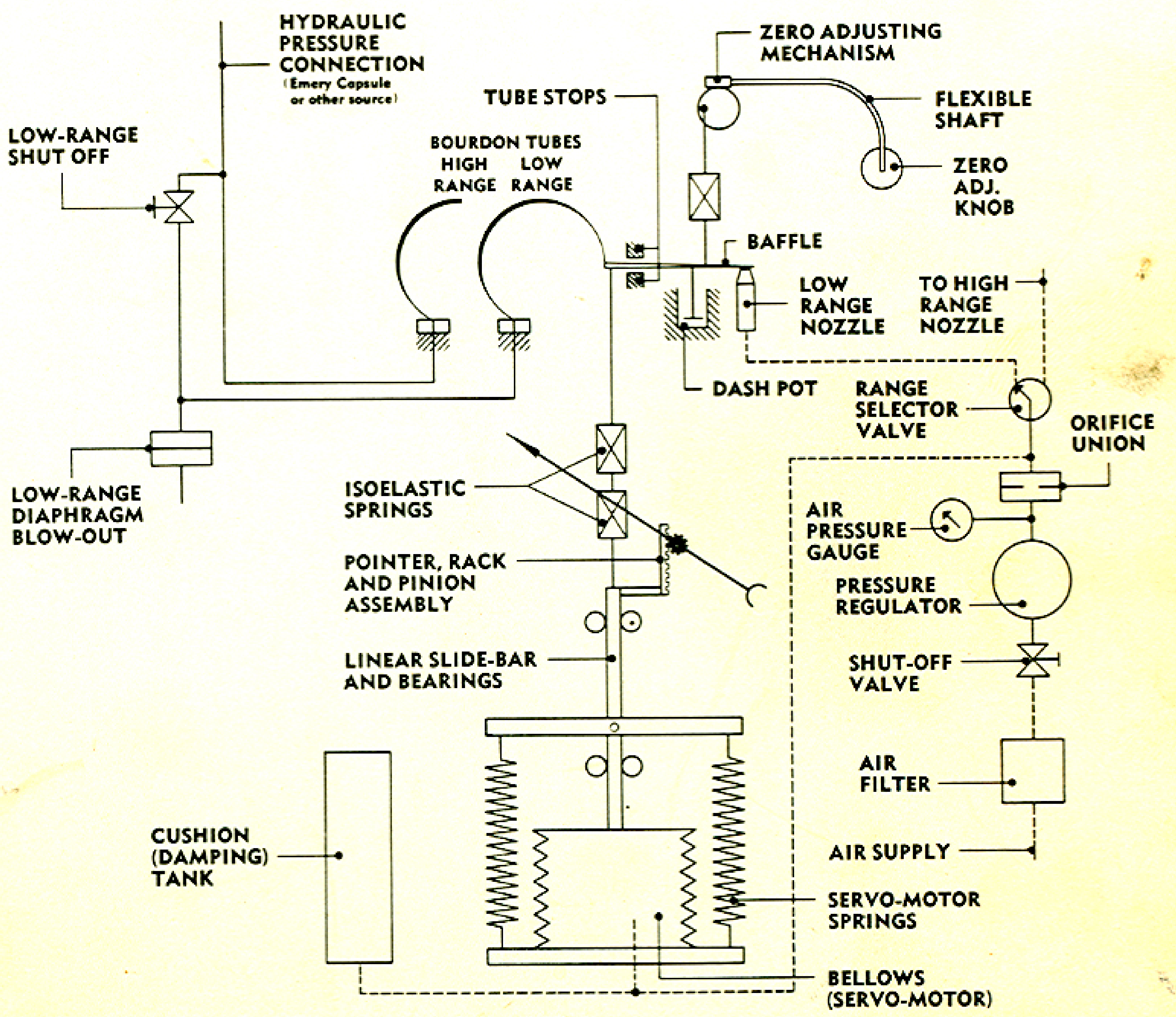
The Tate-Emery load indicator is basically a null balance pneumatic servo device used to accurately convert hydraulic pressure to pointer motion. The pointer scans a circular scale to indicate load directly in pounds.

DESCRIPTION

The detailed operation of the indicating system is best explained by considering the action of a single range (See Fig. 1 and Fig. 2).

Let us assume an increase in hydraulic pressure to the Bourdon tube, which will cause the free end of the tube 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 nozzle. This reduces the air pressure in the nozzle pipe line. The bellows is connected to the nozzle pipe line so that the decreased air pressure causes the bellows to deflate. The downward motion of the bellows increases the tension on the isoelastic 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 original 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



TATE-EMERY LOAD INDICATOR
SCHEMATIC DIAGRAM

FIGURE 1

BALDWIN-LIMA-HAMILTON CORPORATION
PHILADELPHIA 42, PENNA.

end will fall. This will make the flow of air from the nozzle 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 isoelastic springs will decrease. Consequently, the end of the Bourdon tube will rise to its original position.

This 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 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 the bellows, springs, and slide bearing assembly which move as a unit. This motion is used to drive the dial pointer.

Additional load ranges are provided using a separate Bourdon tube for each range, each with its own load spring and air nozzle. 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 nozzle. The shift knob also causes the scale to rotate behind the dial mask exposing the desired range.

Each load range has a zero adjusting mechanism which allows setting the pointer to zero on the dial. This is a mechanical linkage which adjusts the position of the baffle and thus the pointer position.

On indicators where any range is 1/25 (or less) the capacity of the maximum range, a shut off valve is provided to protect the Bourdon tube from overloads. Additional protection for these low range tubes is provided in the form of a blow out diaphragm which acts in the event that the low range shut off valve is not closed.

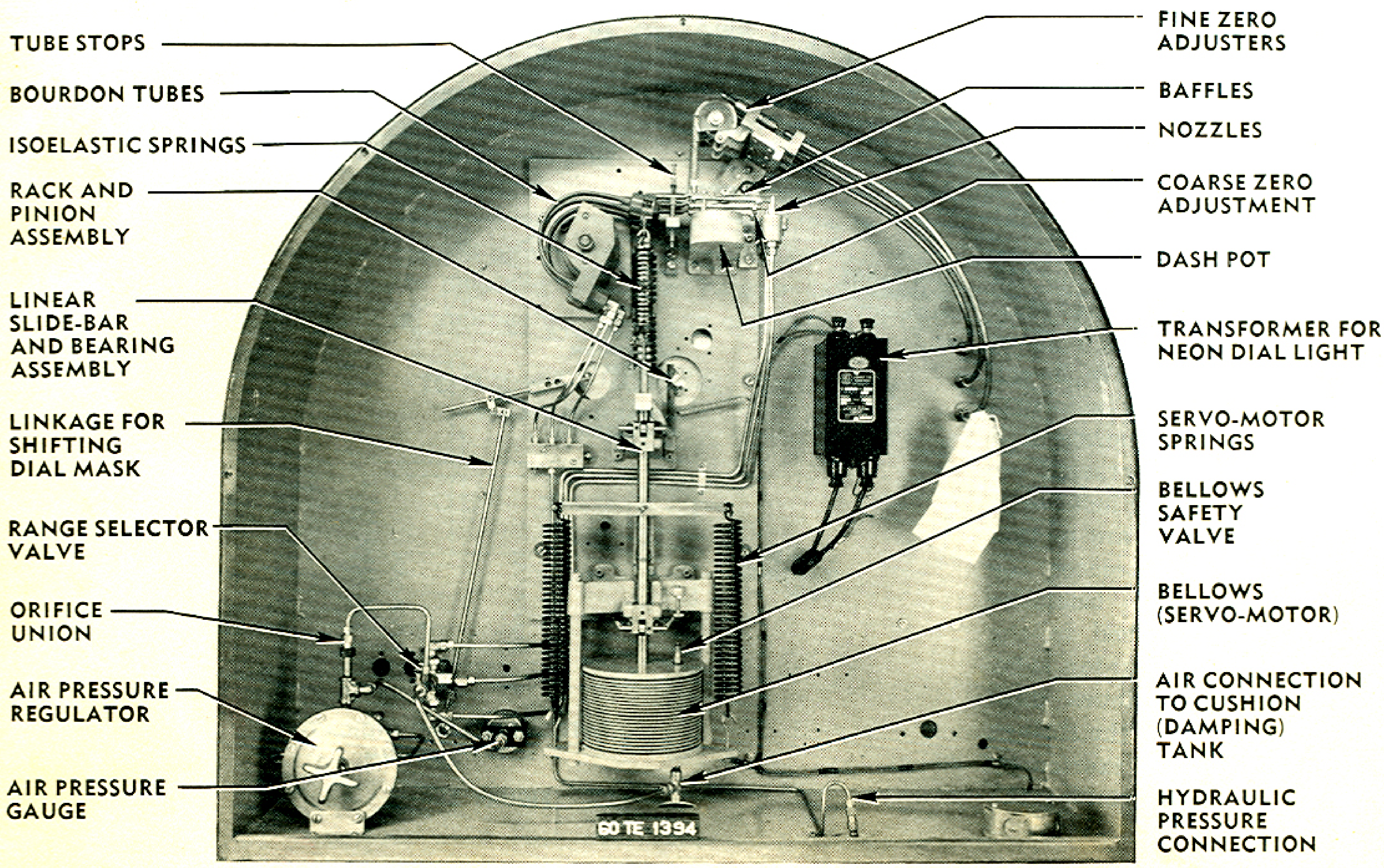


FIGURE 2

Tate Emery Load Indicator — rear view.

The air supply necessary for operation of this indicator enters through a filter and shut off valve. It then passes through an air pressure regulator which is set to deliver 25 psi as indicated by the gauge on the panel. The air next passes through a fixed orifice which limits the flow rate. From there it flows to the nozzles, the bellows, and the cushion tank.

A valve is controlled by the range selector switch so that air flows only to the nozzle for the range in use.

● ● ● ● ●

MAINTENANCE—Before an indicator is allowed to leave our plant, its accuracy is checked against a rigid standard. A calibration curve for each range of the indicator is attached to this instruction. This accuracy is not lost in shipment or in erection provided the indicator has not been abused. Thus, under normal circumstances, there is no necessity for further adjustment after the indicator is installed. However, over a period of time it is possible that certain unfavorable conditions may develop, the most common of which are listed below.

● ● ● ● ● ●

1. FOULING AT ORIFICE— This condition produces a slow return of the pointer to zero and an unstable zero. It will be evident on all ranges of the indicator. To remedy this condition, remove the orifice, clean and replace.

2. FOULING AT NOZZLE AND BAFFLE— Slow pointer return and an indefinite zero on one range can be caused by dirt particles around the nozzle. To clean, draw a piece of paper between nozzle and baffle while pressing down gently on the baffle.

3. LEAKAGE IN SYSTEM OPEN TO NOZZLE 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, nozzle piping, cushion tank piping, that is, all parts open to nozzle pressure. To determine whether there is leakage, shut off air at panel and raise baffle until bellows is about half full. Then, insert a piece of Scotch tape (sticky side down) on nozzle and seat firmly

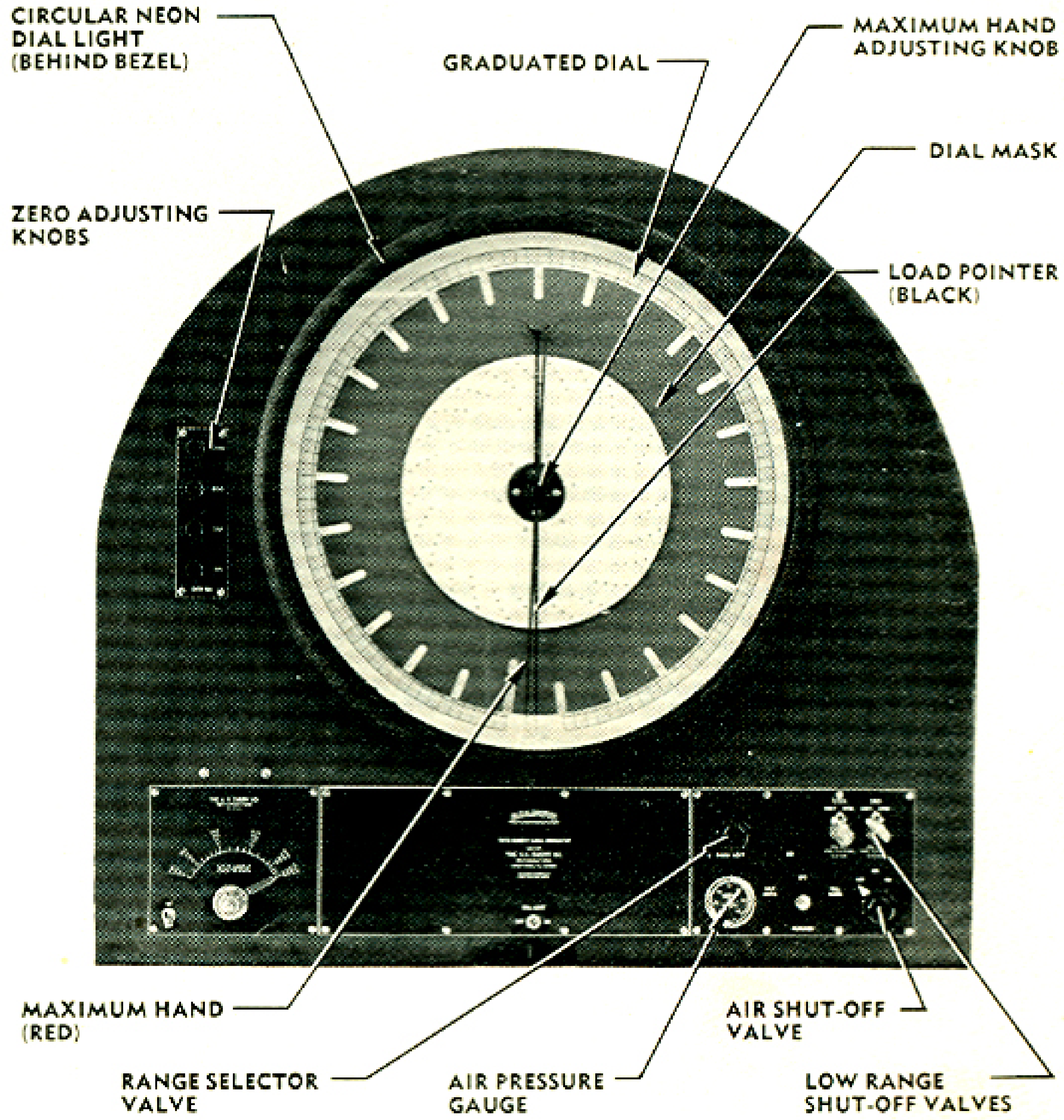


FIGURE 3
Tate Emery Load Indicator — front view

by pressing down on baffle with finger. If there is no leakage, the indicator hand will remain almost stationary. If it continues to fall, search for leak by sprinkling all possible points of leakage with a soap solution or gasoline. If bellows safety valve shows evidence of leakage, adjust valve on its seat.

4. 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. When the air supply is off and there is no pressure in the bellows (bellows at bottom of stroke) the pointer should be pointing downward so that it bisects the dead space at the bottom of the dial. If the pointer does not bisect this dead space, 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.

5. STIFF RANGE SELECTOR KNOB—This condition can usually be corrected by merely pulling out on the knob.

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

SATISFACTORY POINTER OPERATION

Your indicator system is operating satisfactorily if the pointer returns to zero in 12 seconds or less.

To check this operation, shut off air at panel and hasten the escape of air by lifting baffle slightly with finger until pointer goes to capacity of dial. Turn on the air supply valve and time the return of pointer to zero.

If the suggestions outlined above do not result in improved performance, please get in touch with the nearest B-L-H office giving full details.

7. ZERO ADJUSTMENT—If the zero cannot be set by the adjusting knobs and the pointer 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 coarse adjustment provided.

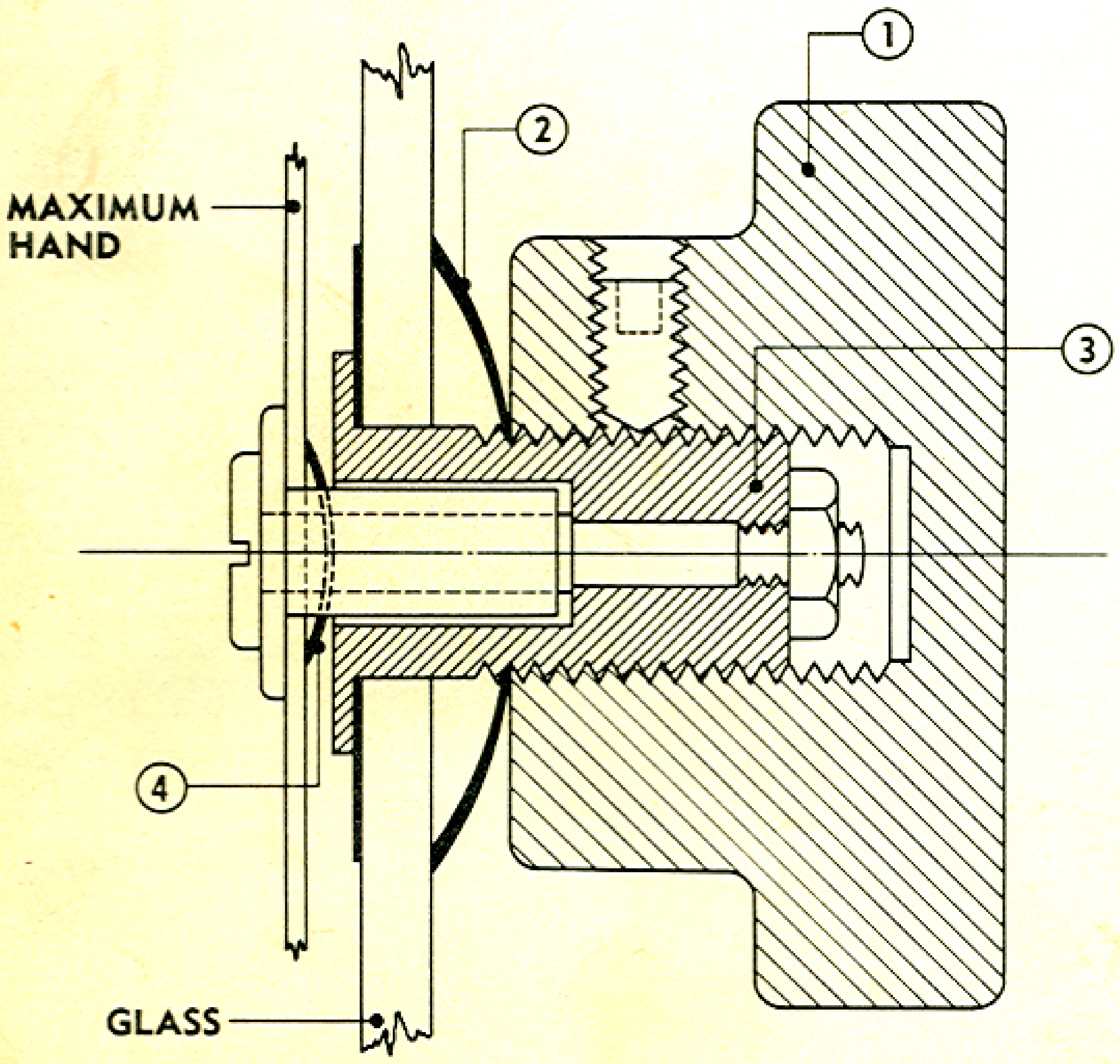


FIGURE 4
Section through Maximum Hand Assembly

To make this adjustment, remove the panel at the back of the indicator. 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 segments in Fig. 1. On a three-range Tate-Emery indicator the rearmost Bourdon tube controls the low range, the middle tube the intermediate range, and the front tube the high range. To make the adjustment, loosen the lock nut, Fig. 1, and turn the screw slightly. This adjusts the baffle, up to set the indicator higher, down to set it lower.

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

8. LOOSENESS OF MAXIMUM HAND

(a) General Looseness of "Max" Hand Axis

There is a phosphor bronze cupped washer (see Item 2 in Fig. 4) between the Bakelite knob (Item 1, Fig. 4) and the glass. Its purpose is to hold the axis of the maximum hand steady and to contribute a small amount of friction to the Bakelite knob (not to the maximum 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 necessary to remove the dial ring and glass so that a screwdriver may be used to prevent rotation of the threaded sleeve, Item 3, which carries the Bakelite knob.)

(b) When The Maximum Hand Moves Too Freely

A small amount of friction is desirable to dampen the maximum hand, so it will not "coast" after being struck or moved suddenly. This is provided by a small bent washer (Item 4) between the hub of the maximum hand and the sleeve (Item 3) which goes through the hole in the glass.

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

BALDWIN
instruction sheet

Maintenance.

NO. IS-4904

OIL AND LUBRICATION DATA

FOR

BALDWIN-TATE-EMERY UNIVERSAL TESTING MACHINES

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

Clean air jets once per month with solvent + clean rag.

General cleaner: Parson's ammonia and water

Screw cleaner: kerosene

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BALDWIN-LIMA-HAMILTON CORPORATION
PHILADELPHIA 42, PENNA.

PACKING DATA

BALDWIN-TATE-EMERY TESTING MACHINES

CAPACITY OF MACHINE	CYLINDER	SPEED VALVE	RELEASE VALVE	DIAPHRAGM
60,000#	Raybestos-Manhattan #1204 - "V" Flex Packing Rings 8½" I.D. x 9½" O.D. x 1-13/32" High, with Bottom Homogeneous Ring	9" of 1/8" Turxo Twist & Chevron #431 - 3/4" I.D. x 1-9/32" O.D. x 1"	9" of 1/8" Turxo Twist & Chevron #431 - 3/4" I.D. x 1-9/32" O. D. x 1"	3'-0" of 3/16" Turxo Twist #251
120,000#	Raybestos-Manhattan #1204 - "V" Flex Packing Rings - 9½" I.D. x 10½" O.D. x 1-13/32" High, with Bottom Homogeneous Ring	- Duplicate for each machine -	- Duplicate for each machine -	- Duplicate for each machine -
200,000#	N. Y. Belting & Packing #204 29'-0" of 5/8" Sq.			
300,000#	N. Y. Belting & Packing #204 32'-0" of 5/8" Sq.			
400,000#	N. Y. Belting & Packing #204 35'-0" of 3/4" Sq.		Chevron #431 1" I.D. x 1-5/8" O.D. x 1-3/16" and 9" of 1/8" Turxo Twist, Pc. #27106-T	

BALDWIN

GRIPS, ACCESSORIES, AND AUXILIARY EQUIPMENT

ESSENTIALLY, testing machines are simply devices for applying a controlled and measured load to a specimen or structure. To adapt these basic machines to the widest possible variety of testing situations, Baldwin has developed a long list of supplementary devices. In this bulletin, these supplementary devices are grouped, more or less arbitrarily, under four headings:

(I) *Grips, specimen holders and compression plates*—items related primarily to the problem of transferring tension or compression load to the specimen;

(II) *Auxiliary testing equipment,* such as sub-presses, flexure tools, etc., designed to widen the range of tests, of test materials, and of test conditions;

(III) *Testing machine accessories*—devices such as load maintainers, ram pacers, and the like, whose function is to enhance some aspect of testing machine performance;

(IV) *Conveniences*—items not essential in testing but useful in any testing laboratory.

The equipment described in this bulletin includes, for the most part, only such items as have become more or less standard and does not by any means represent all the devices which can be supplied. Baldwin is prepared to build virtually any type of testing device which may be required. It should be pointed out, however, that such special equipment is, necessarily, more expensive than standard equipment and delivery may require considerably more time.

SPECIMEN HOLDERS, GRIPS, AND COMPRESSION PLATES

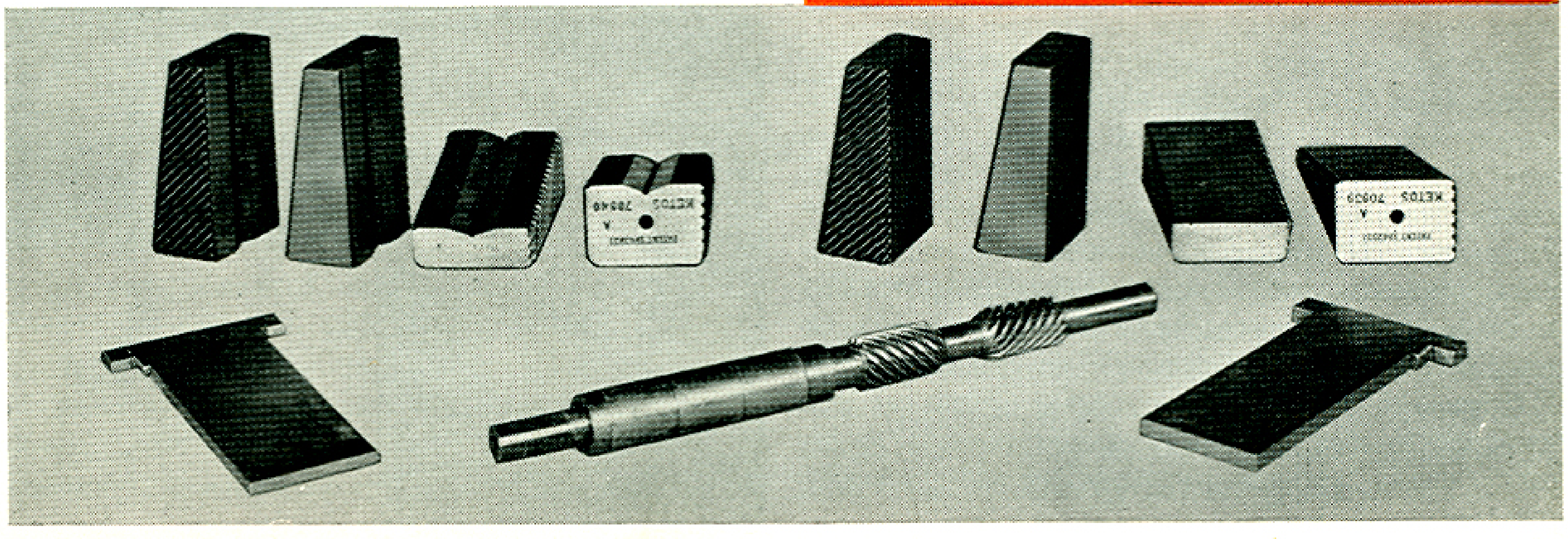
A primary requirement of all testing is that the specimen be held firmly in the correct position for the test. In tension testing, straight specimens, either flat or round, may be held by wedge-shaped jaws which fit into grip slots in the crossheads of the testing machine or, for better stress distribution, better alignment, and greater convenience, by special grips of the Baldwin or Templin types. Thread-end or shoulder-end specimens are held in specimen holders, which are in turn held in testing machine crossheads. Compression testing requires the use of a compression plate in the sensitive crosshead of the testing machine and, in some applications, of a special sub-press which rests on the table of the testing machine.

Baldwin Wedge Jaws

Baldwin Wedge Jaws are of several types, each especially designed for the shape and type of specimen with which it is to be used. Flat-faced jaws are available for flat specimens and vee jaws — which have a V-shaped, toothed groove in the face — for round specimens. Jaws are cut with different tooth spacing, for use with different materials.

Both flat and vee jaws are also made with a slotted face into which a removable file face is inserted. The major advantage of this type of jaw is that only the file face need be changed to provide the tooth spacing required for various types of material. Life of jaws is extended, since worn or broken teeth require only the

Fig. 1—Baldwin Standard Wedge Jaws, vee-type and flat faced. Helical pinion and spacers are shown in front.



replacement of the file face instead of the whole jaw.

All of these jaws are of heat treated tool steel, with teeth cut to an accurate profile on a special gang miller. Average hardness is 55 to 60 Rockwell C. They are operated by means of a rack on the side of each jaw, used in conjunction with a double helical pinion on each crosshead of the testing machine. This patented construction causes the jaws to "open" laterally when they are moved vertically in the grip slots, without auxiliary means such as guide slots, etc.

Specimen sizes and tooth spacings of jaws for the various Baldwin-Tate-Emery Universal Testing Machines are given in the tables below:

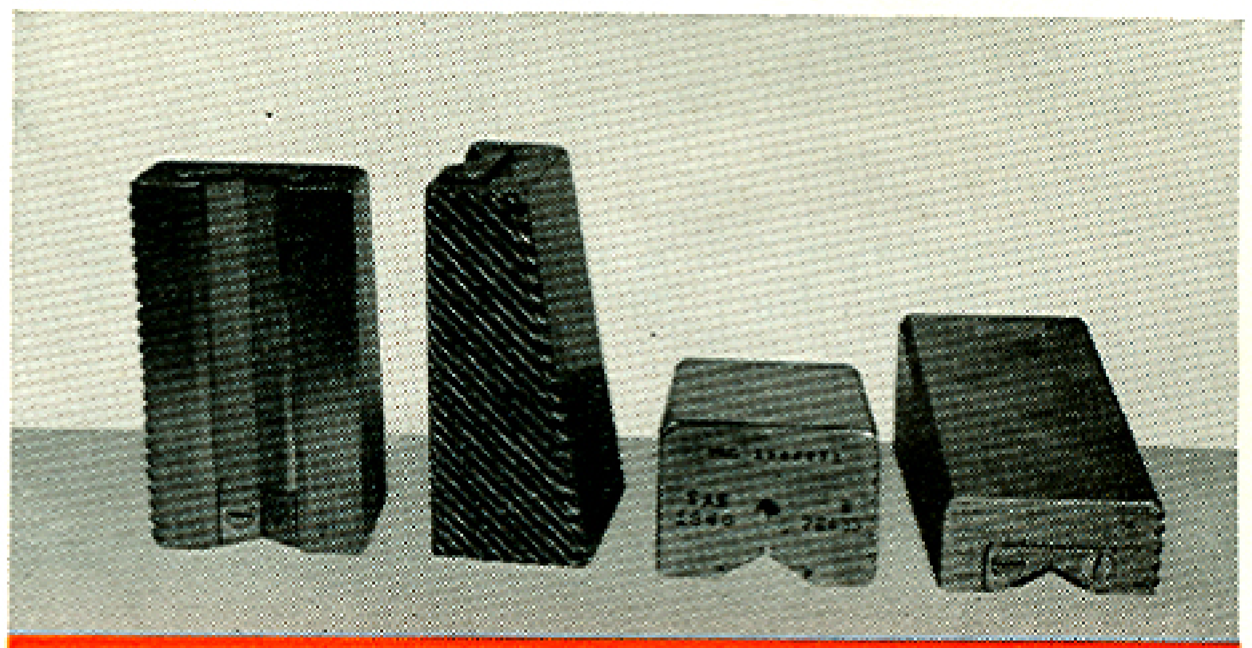


Fig. 2—Baldwin Vee-type Wedge Jaws with replaceable file face inserts.

STANDARD WEDGE JAWS

Machine Capacity (Pounds)	Specimen Sizes (Inches)*		Number of Teeth Per Inch	
	Flat	Vee	Flat	Vee
60,000	2½ x 1½	½ to 1½	8, 16	8, 16
120,000	2¾ x 2¾	½ to 2	8, 16	8, 16
200,000	3¼ x 1¾	½ to 2½	8, 16	8, 16
300,000	3¾ x 2¾	½ to 2½	8, 16	8, 16
400,000	4½ x 3¼	½ to 2½ & 1¼ to 4¼	8, 16	8, 16

REPLACEABLE FILE FACE JAWS

Machine Capacity (Pounds)	Specimen Sizes (Inches)*		Tooth Spacing
	Flat	Vee	
60,000	1 3/16 x 2	¾ to 1¼	Inserts are provided with either 10 or 16 teeth to the inch.
120,000	2 x 2¼	¾ to 1½	
200,000	2¼ x 2½	¾ to 1½	
300,000	2½ x 2¾	¾ to 1½	

* Specimen sizes for flats are given as maximum dimensions; for rounds as range of diameters.

Baldwin and Templin Grips

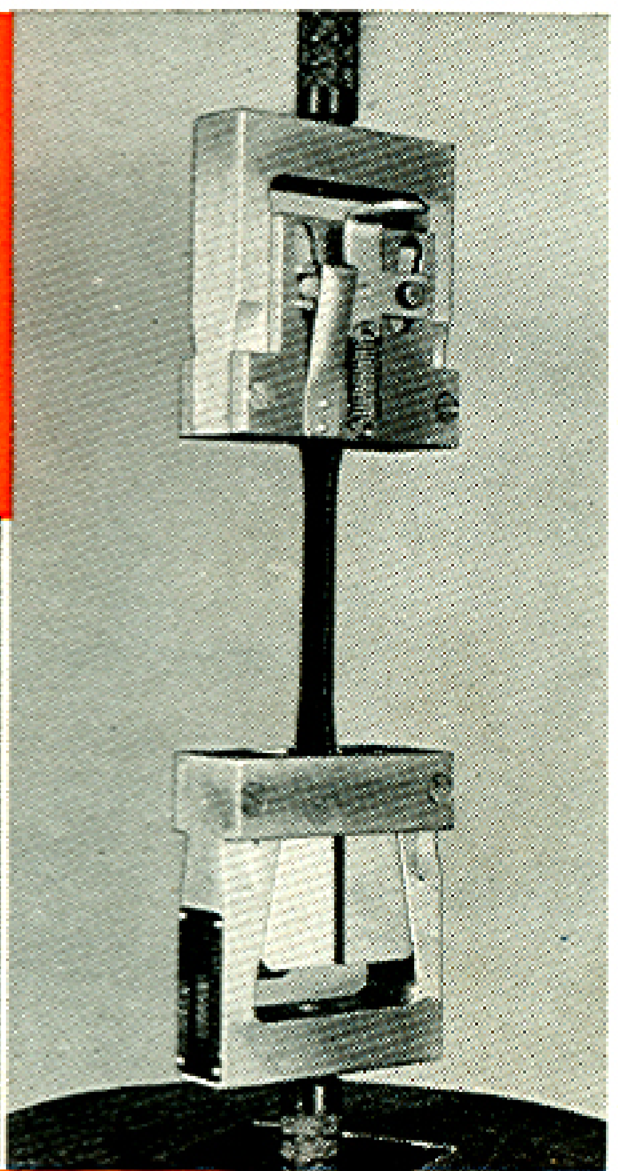
Templin Grips

It will have been noted that the gripping apparatus described in the preceding section is housed within the crossheads of the testing machine. Grips which are outside the crossheads offer obvious advantages in greater convenience and speed in inserting specimens. The design of Baldwin and Templin grips increases these inherent advantages and—what is of much greater importance—provides better alignment and consequently more even stress distribution in the specimens.

The widely-known Templin grips are built under license from R. L. Templin, Associate Director of Research, Aluminum Company of America. Two major types of these grips are available—one of 5,000 pounds capacity, very light in construction, designed especially for plastics but also very satisfactory for thin sheet metal specimens; and two open front models of 8,000 and 10,000 pounds capacity. These last can also be supplied in the closed-front style on special order.

Grips with capacities above 10,000 pounds are custom-built to meet customer's specifications as to capacity, size of specimen accommodated and spacing of jaw teeth.

Fig. 3—*Right:* Templin Closed-front Grips.



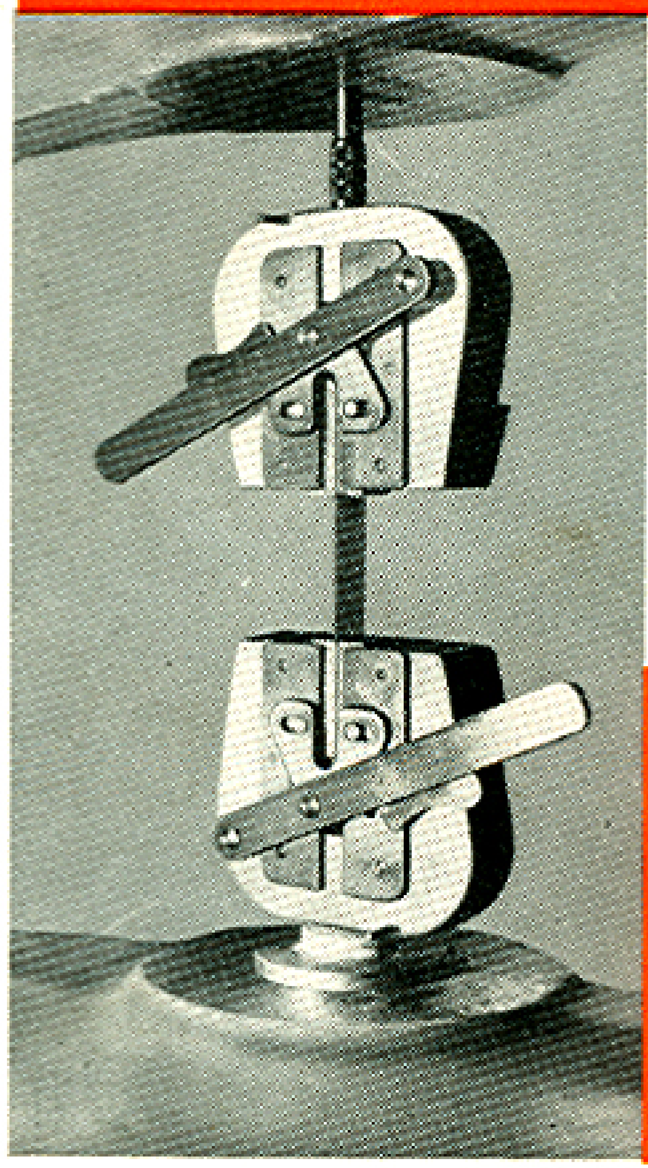


Fig. 4—*Left:* Templin Open-front Grips.

Detailed information on Templin Grips is given in the table below:

Grip Capacity	Grip Front	Specimen Sizes (Inches)*		
		Flats	Rounds	
			With triple Vee jaws	With single Vee jaws
5,000	Closed	1 x 1/4**	***	1/4 to 3/8; 3/8 to 1/2
8,000	Open	3/4 x 1/2	0.06 to 0.24	1/4 to 1/2; 1/2 to 3/4
10,000	Open	1 x 1/2**	0.06 to 0.24	1/4 to 1/2; 1/2 to 3/4

* Specimen sizes for flats are given as maximum dimensions; for rounds as range of diameters.
** Self-centering jaw assembly for 3/4 inch specimens can be supplied.
*** Available on special order.

Jaws of Templin grips are self-closing under spring pressure, and are readily removable from the jaw holder. In the closed-front model, parallelism between gripping faces is attained by employing mortised front and back plates to prevent warping or spreading of the backing surfaces which support the jaws. There is also an equalizer surface in the jaw to compensate for variation in specimen thickness. This distributes the lateral gripping force evenly over the surface of the specimen shank. In the open front models, the flat gripping jaws have rounded backs to aid in equalizing the lateral gripping force over the surface of the specimen shank.

Baldwin Universal Open Front Grips

These grips 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. Spherically seated holder rods and individual wedge blocks are provided for mounting the grips in each size machine.

The standard model of these grips is made in 60,000-pound capacity only. Grips of this type, modified to fit Models 20-35 and 60-35 (lapped ram type) Baldwin-Tate-Emery testing machines, are available in 20,000 and 60,000-pound capacities.

Jaws available for Baldwin Open Front Universal Grips are listed in the table below:

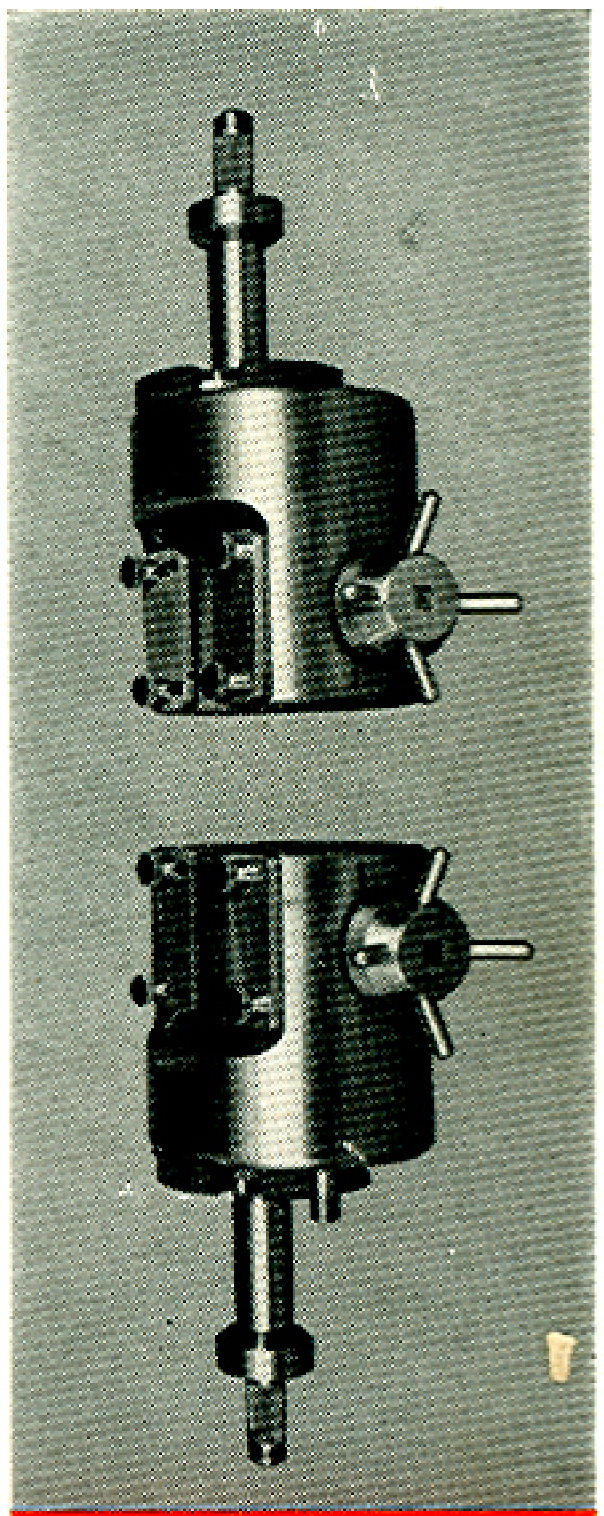


Fig. 5—Baldwin Open-front Universal Grips.

Capacity	Solid Type		Number of Teeth to the Inch	Replaceable Insert Type		
	Specimen Sizes (Inches)*			Specimen Sizes (Inches)*		Teeth to the Inch
	Flat	Vee		Flat	Vee	
20,000**	1 3/8 x 3/4	1/2 to 1	16	1 1/8 x 1/2	Not available	20, 40
60,000***	2 x 1 1/4	1/2 to 1 1/2	8, 16	1 3/4 x 7/8	3/4 to 1 1/4	10, 16

* Specimen sizes for flats are given as maximum dimensions; for rounds as range of diameters.
** Special grip for Model 20-35 testing machine only.
*** Two types—the standard Baldwin Open Front Universal Grip and the special grip for Model 60-35 testing machine only.

Baldwin Self-Aligning Specimen Holders

Baldwin Specimen Holders are designed for use with thread-end and shoulder-end specimens.

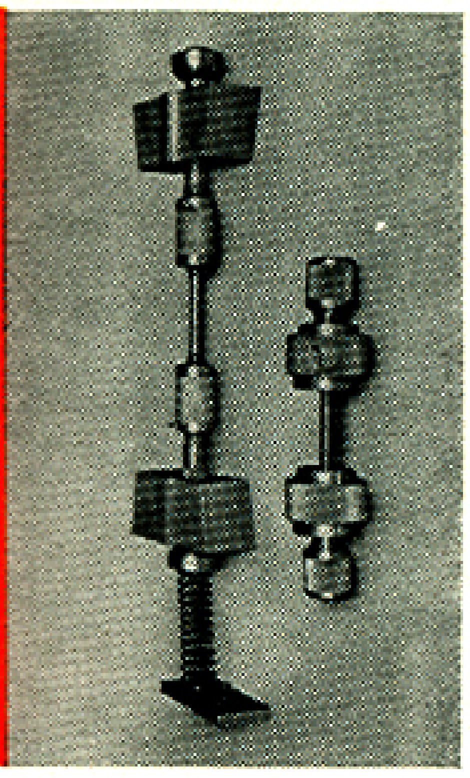
The basic structural elements of the two types of holders are identical, consisting of a pair of wedge blocks which fit into the crossheads of the testing machine, a pair of spherical-headed studs which pass through the wedge blocks, and adaptors which are fastened to the adjacent ends of the studs. The spherical heads, resting in spherical seats in the wedge blocks, make the holders self-aligning when the assembly is under tension.

The standard adaptors supplied with the holders for thread-end specimens will accommodate the standard 0.505-inch diameter, 2-inch gauge length specimen with 3/4-inch U. S. Standard thread shank (10 threads to the inch). Adaptors for thread-end specimens of other sizes can be supplied on special order.

Specimen holders for shoulder-end specimens have adaptors with shoulder shanks, using a split bearing and retaining ring. These are supplied only for 0.505-inch diameter, 2-inch gauge length specimens. Either type of holder may be supplied as a separate unit, or both may be combined in a single unit consisting of a thread-end holder plus adaptors which will accept shoulder-end specimens.

Special High-Temperature Specimen Holders for 0.505-inch thread-end specimens are also available. These can be supplied for use with either a 12-inch or a 16-inch furnace. Construction of the High-Temperature holders is the same as that of the standard holders, but they are made of heat-resisting stainless steel instead of the standard heat-treated tool steel.

Fig. 6 — Baldwin Self-aligning Specimen Holders. Complete unit, with thread-end specimen in place shown at left; adaptors, with shoulder-end specimen in place, at right.



Baldwin Compression Plates

These compression plates are blocks of hardened tool steel, the faces of which are scribed with concentric circles. Standard blocks are circular, but rectangular blocks can be supplied on special order.

Two types are available—one plane, the other spherically seated. The plane block fits directly into a cylindrical depression provided for it in the under side of the sensitive crosshead of the testing machine. The spherically seated block is a two-piece unit, so constructed that the piece in contact with the specimen can, within limits, accommodate itself to angular displacement of the top of the specimen.

Compression plates for the various Baldwin-Tate-Emery testing machines are available in the following sizes:

Machine	Plane Plates		Spherically-Seated Plates	
	Diameter of Plate (in.)	Number of Scribed Circles	Diameter of Plate (in.)	Number of Scribed Circles
Model 20-35	6⅜	5	6⅜	5
Model 60-35	6⅜	5	6⅜	5
60,000 lb. B-T-E	6⅜	5	6⅜	5
120,000 lb. B-T-E	7	6	7	6
200,000 lb. B-T-E	9	7	9	7
300,000 lb. B-T-E	10	8	10	8
400,000 lb. B-T-E	10	8	10	8

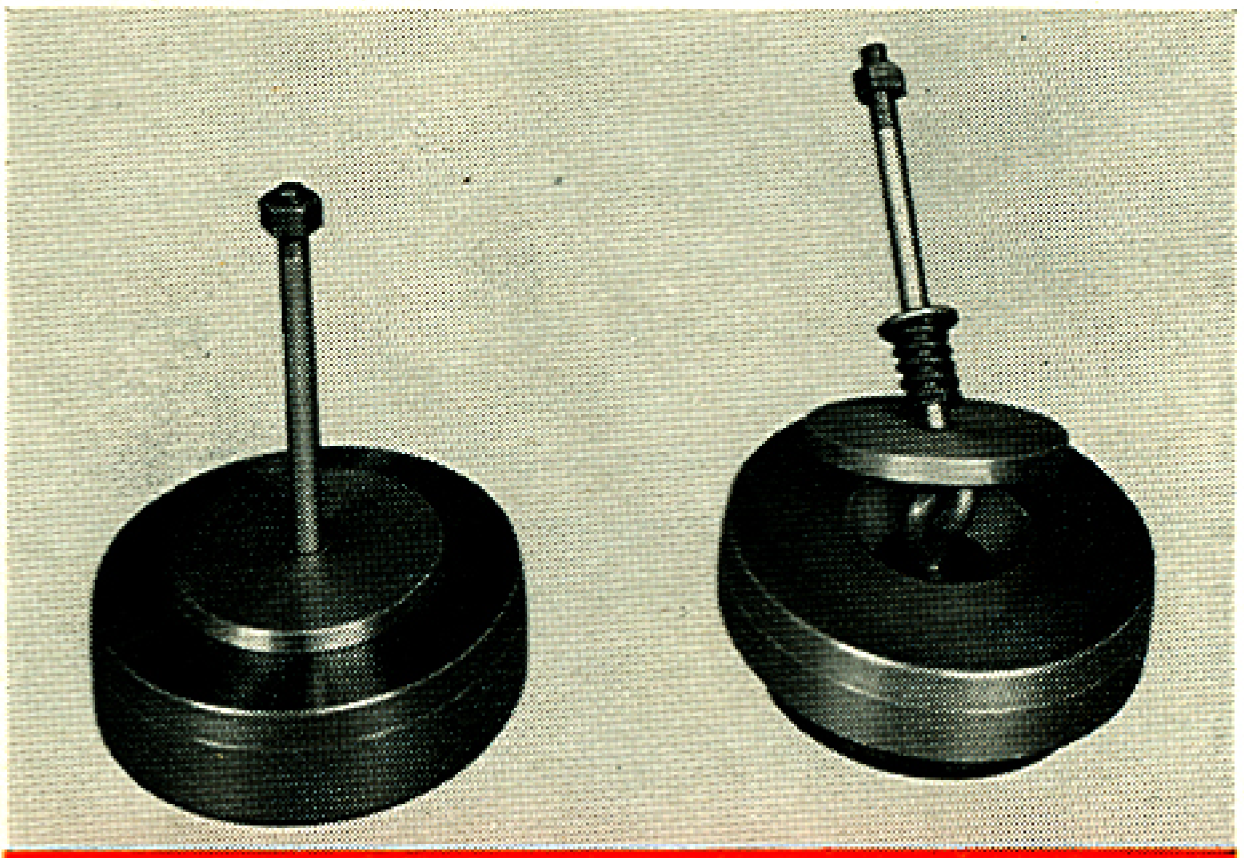


Fig. 7—Baldwin Compression Plates, plane shown at left, spherically seated at right.

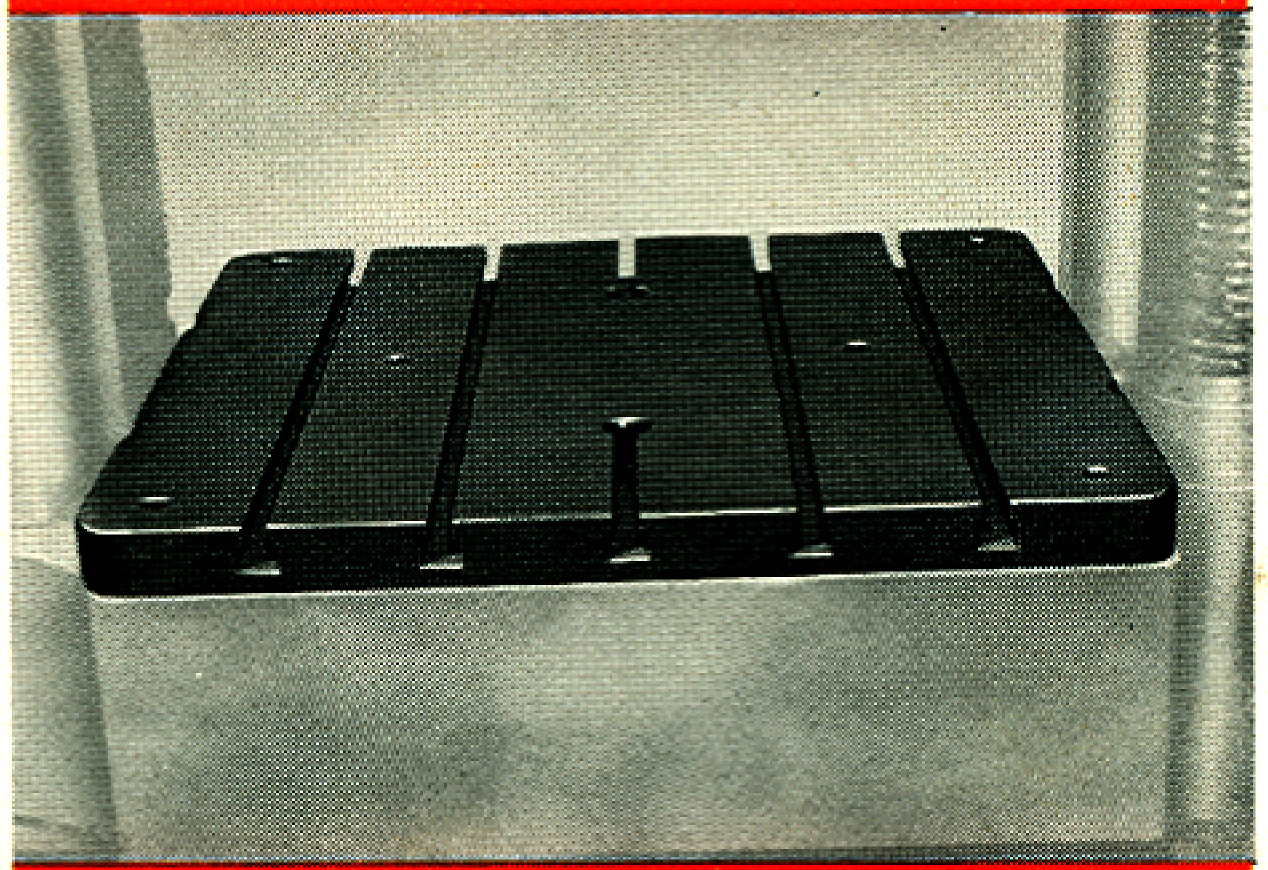


Fig. 8—Slotted Table Attachment.

Slotted Table Attachment

A T-slotted table, which bolts fast to the table of the testing machine, is available for the standard 60,000-pound, 120,000-pound, 200,000-pound and 300,000-pound testing machines. It can be supplied to fit other machines on special order.

AUXILIARY TESTING EQUIPMENT

The usefulness of Baldwin testing machines has been steadily extended over a period of years by the development of a wide variety of devices which make it possible to make additional types of tests, to test a wider range of materials, and to make tests under a greater variety of conditions. Some of these devices were originated by Baldwin, others by testing experts to meet special needs in their own or other fields. All of them, however, bear the stamp of Baldwin engineering and Baldwin precision construction.

Baldwin Transverse Testing Tool for Cast Iron Bars

This device consists of a base plate on which is mounted a pair of support edges adjustable in increments of 2 inches for spans from 10 inches to 30 inches. The specimen rests on these support edges and is loaded by means of a hardened loading edge which is attached to the sensitive crosshead of the testing machine.

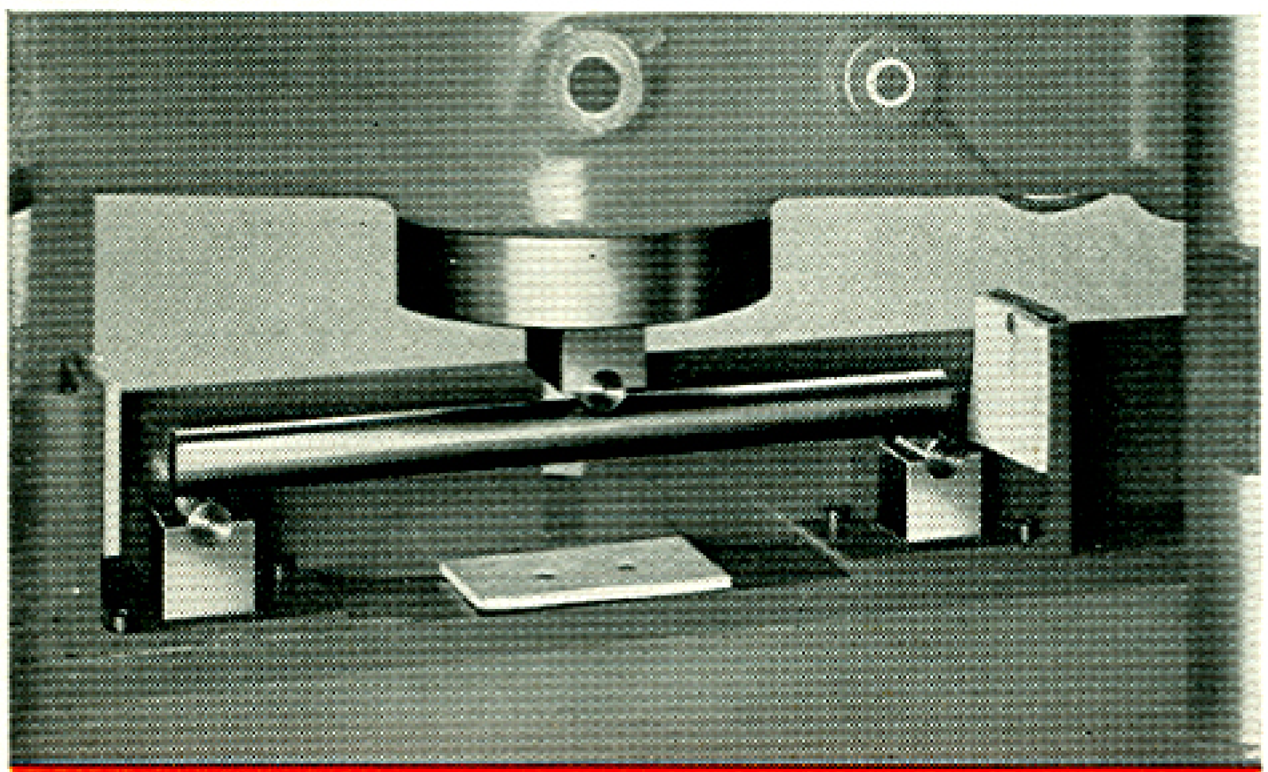


Fig. 9—Baldwin Transverse Testing Tool for cast iron bars.

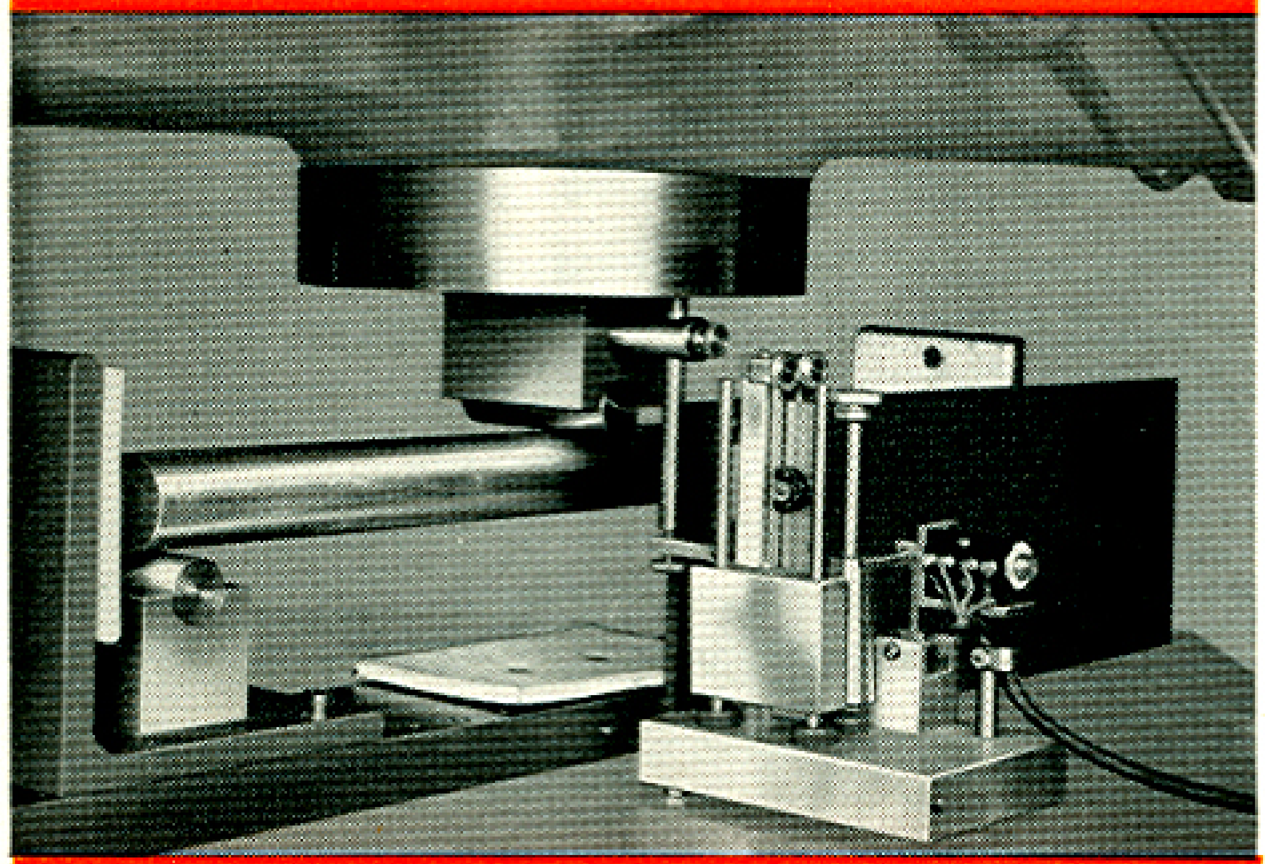


Fig. 10 — Transverse Tool in use with Baldwin Deflectometer Model PD-1M.

Adjustability of span lengths permits testing in accordance with A.S.T.M. specification A 48-46. In addition, the tool is designed to permit its use with Baldwin Deflectometer, Model PD-1 or PD-1M.

Baldwin Third-Point Loading Apparatus

The Third-Point Loading Apparatus consists of a pair of self-aligning knife edge supports adjustable for spans of 18, 24 and 30 inches, and a pair of self-aligning loading knife edges. These loading edges are adjustable for spans of 6, 8 and 10 inches. The apparatus thus conforms to A.S.T.M. Standard C 78-44.

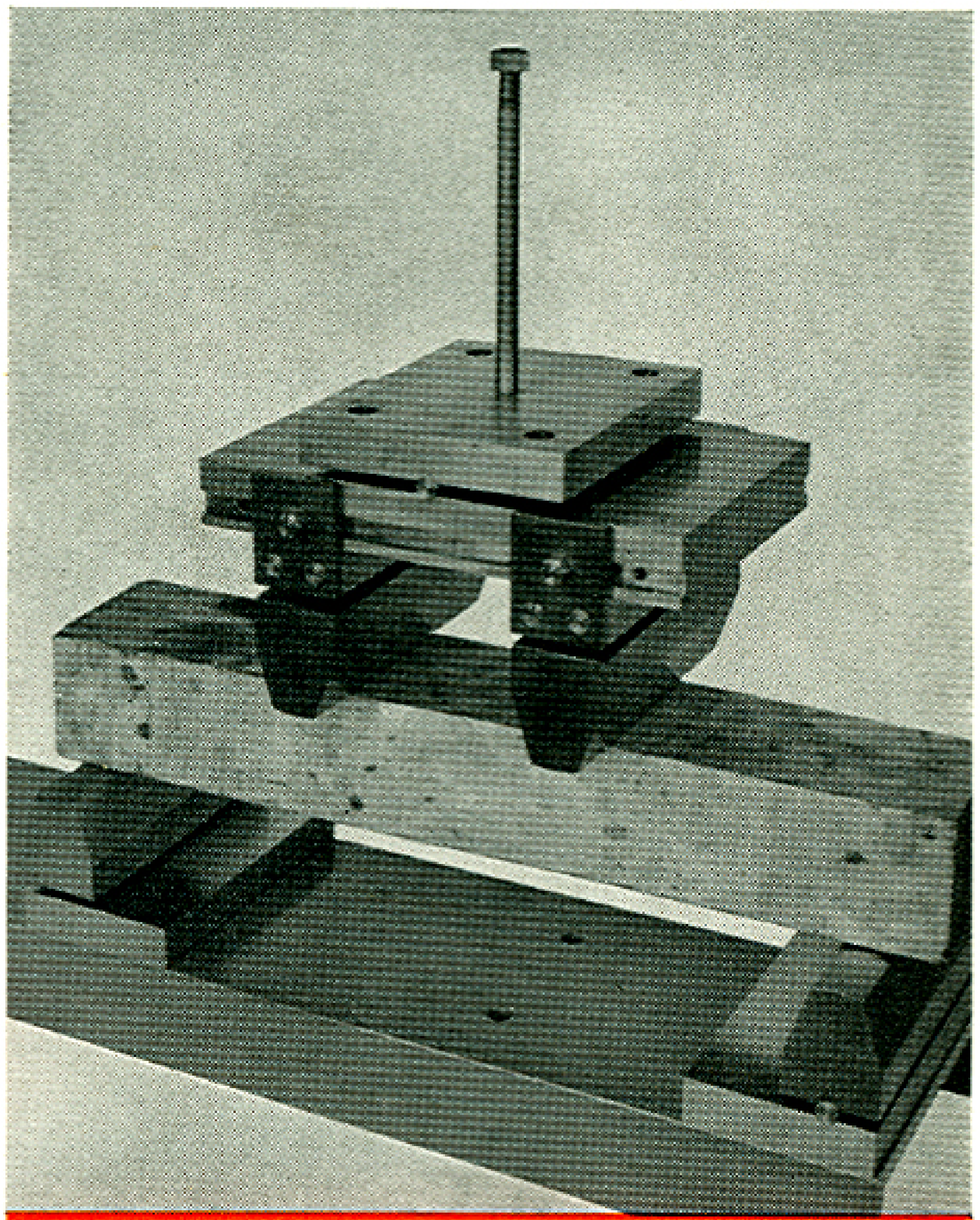


Fig. 11—Baldwin Third-Point Loading Apparatus.

Two models are available, one for use with the Baldwin-Tate-Emery universal testing machines and one adapted to Baldwin Cement and Concrete Testing Machines.

Baldwin Loading Edge and Supports for Transverse Testing

In addition to the specialized tools used in transverse testing of cast iron bars and concrete columns, Baldwin offers equipment for use in other types of transverse testing. This equipment consists of a loading edge, and a pair of knife-edge supports which can be placed on any flat surface as a base. The loading edge is complete with support plate and fits into the recess on the underside of the sensitive crosshead of the testing machine.

This equipment is available for all Baldwin-Tate-Emery testing machines. Machine capacity must be specified.

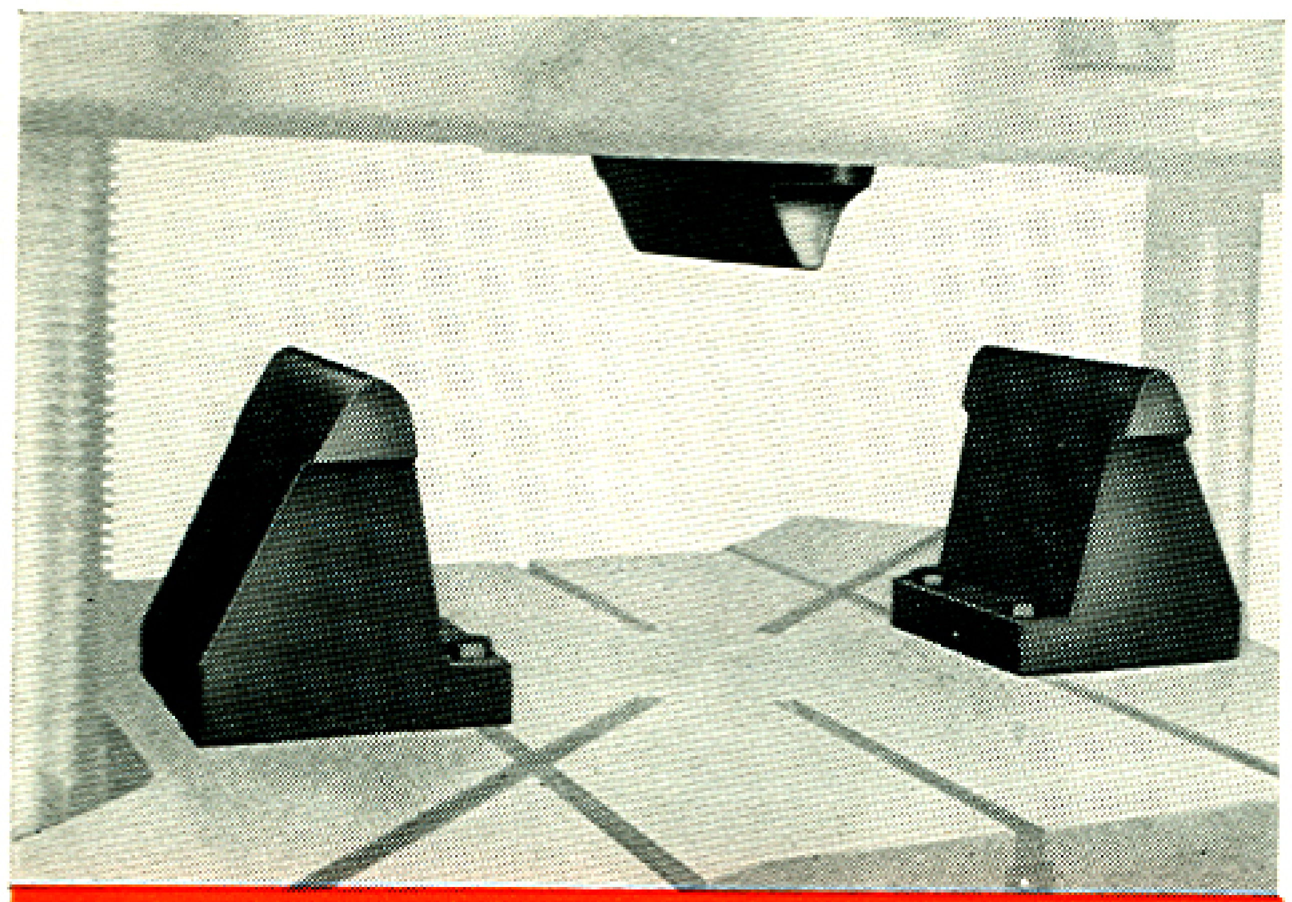


Fig. 12—Baldwin Transverse Testing Equipment.

Scholer Cold Bend Testing Device

This device provides a method of cold bend testing with comparatively small force. It permits close control

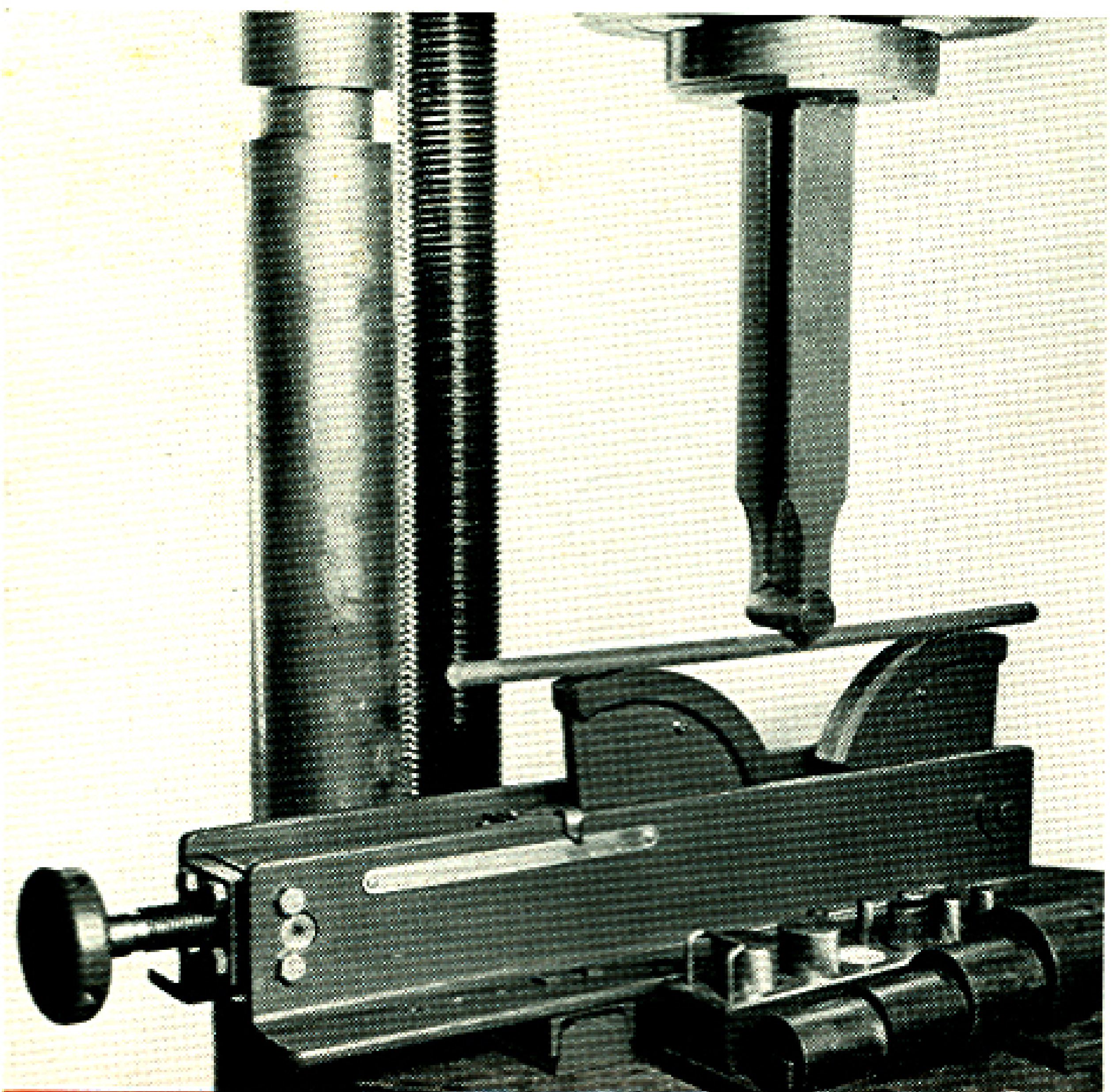


Fig. 13—Scholer Cold Bend Testing Device.

of bending speed and also permits a quantitative measure of the bar's behavior during the test, so that the margin by which a test bar fails or passes can be determined. Its distinctive feature is the long span provided by two oversize segmented rollers which move freely with the bar as it bends. The position of one roller is adjustable along a graduated frame, permitting proper spacing of the rollers for any combination of bar and pin size.

The pin is held in a V-groove in the bending ram. A complete set of hardened steel bending pins is furnished, the set consisting of thirteen pins ranging from 3/8 inch to 3 3/4 inches in diameter. The maximum size bar that can be bent is a 2 1/2-inch diameter round or a 2 1/2-inch square.

The Scholer Cold Bend Device is designed for use with a spherical-seated compression plate.

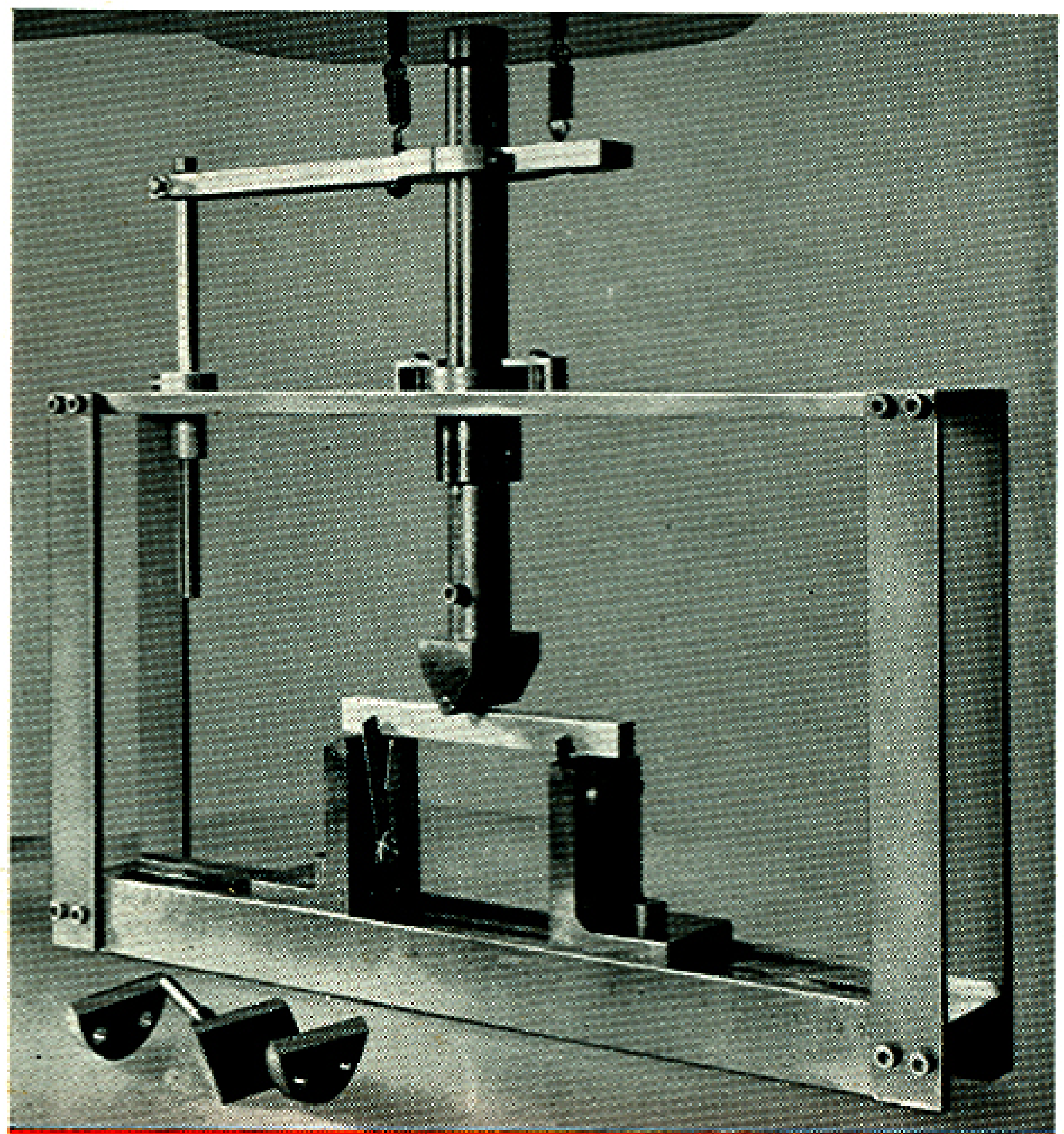


Fig. 14—Baldwin Flexure Tool for Plastics.

Baldwin Flexure Tool

This tool is especially designed to facilitate the testing of plastic specimens in flexure. It can accommodate specimens from 1/2 inch to 16 inches long, up to 2 inches wide and up to 2 inches thick.

A special loading nose and knives are required for specimens under 2 inches in length. The loading nose is automatically centered; it travels with the crosshead of the testing machine and so imposes no dead weight load on the specimen.

Deflection may be measured by a Baldwin Deflectometer of either the dial type or the recording type. (Dial type instruments are described in detail in Baldwin Bulletin 263; recording strain followers in Bulletin 262.)

Baldwin Sub-Press

The Baldwin Sub-Press provides axial loading of compression specimens of plastics, 1/2 inch by 1/2 inch in cross section, by 2 inches over-all length. It consists of a heavy cast iron frame in which are located a hardened steel base plate and a vertically moving plunger. The opposite load applying surfaces are plane and normal to the axis of movement of the plunger. The upper end of the plunger terminates in a spherically-seated loading block through which load is transmitted from the testing machine crosshead.

The design permits the use of a recording compressometer attached directly to the specimen at 1 inch gauge length, or measurement of plunger movement relative to the base plate, the latter by means of a Model PD-1 Deflectometer.

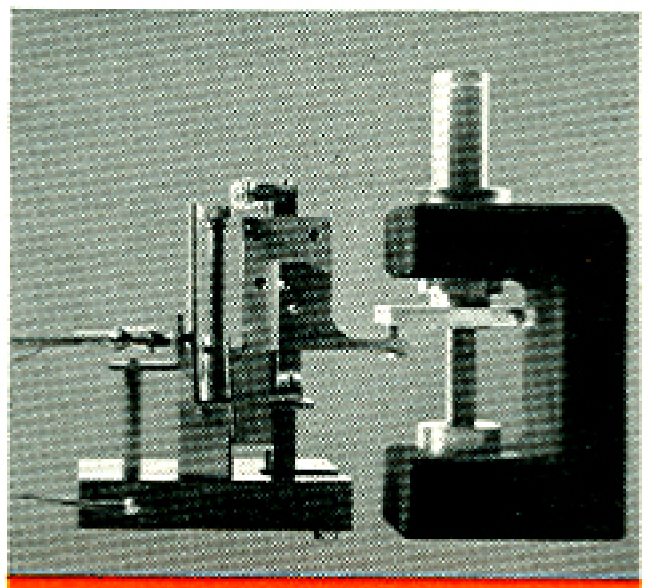


Fig. 15—Baldwin Sub-Press, shown here with Baldwin Deflectometer, Model PD-1.

Montgomery-Templin Compression Jig

This jig is designed to support specimens of sheet materials, both metals and plastics, preventing premature buckling in tests for the determination of compression yield strength.

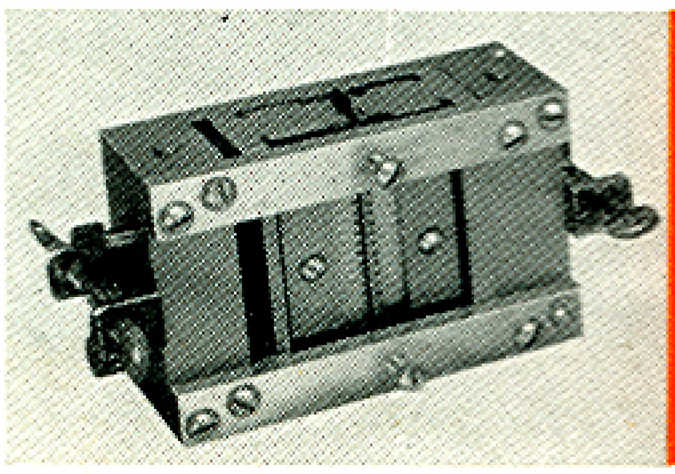


Fig. 16 — Montgomery-Templin Compression Jig.

It accommodates a specimen 0.010 to 0.50 inches thick, and up to 2½ inches by ½ inch in length and width. Compression devices for sheet materials of other dimensions can be supplied on special order. Baldwin Model PC-5 Compressometer is designed for use with this jig.

Baldwin Brinell Attachment

This attachment is offered primarily for the benefit of laboratories in which the amount of hardness testing required does not justify the purchase of a special testing machine for this purpose. With it, Brinell hardness tests may be carried out on the compression side of any standard testing machine. The attachment permits the use of 5 mm. or 10 mm. Brinell balls.

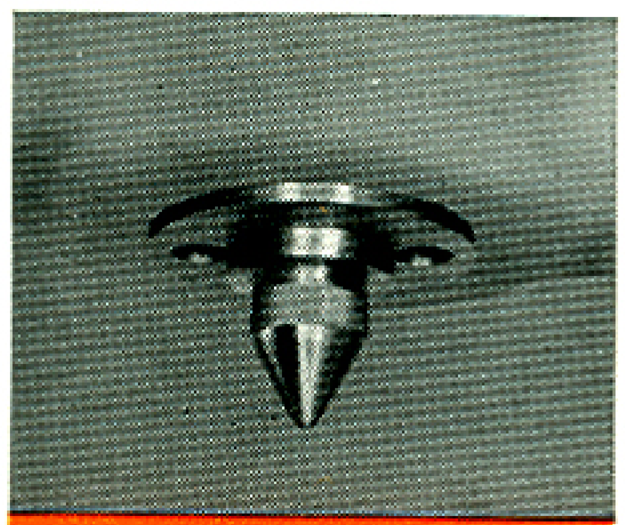
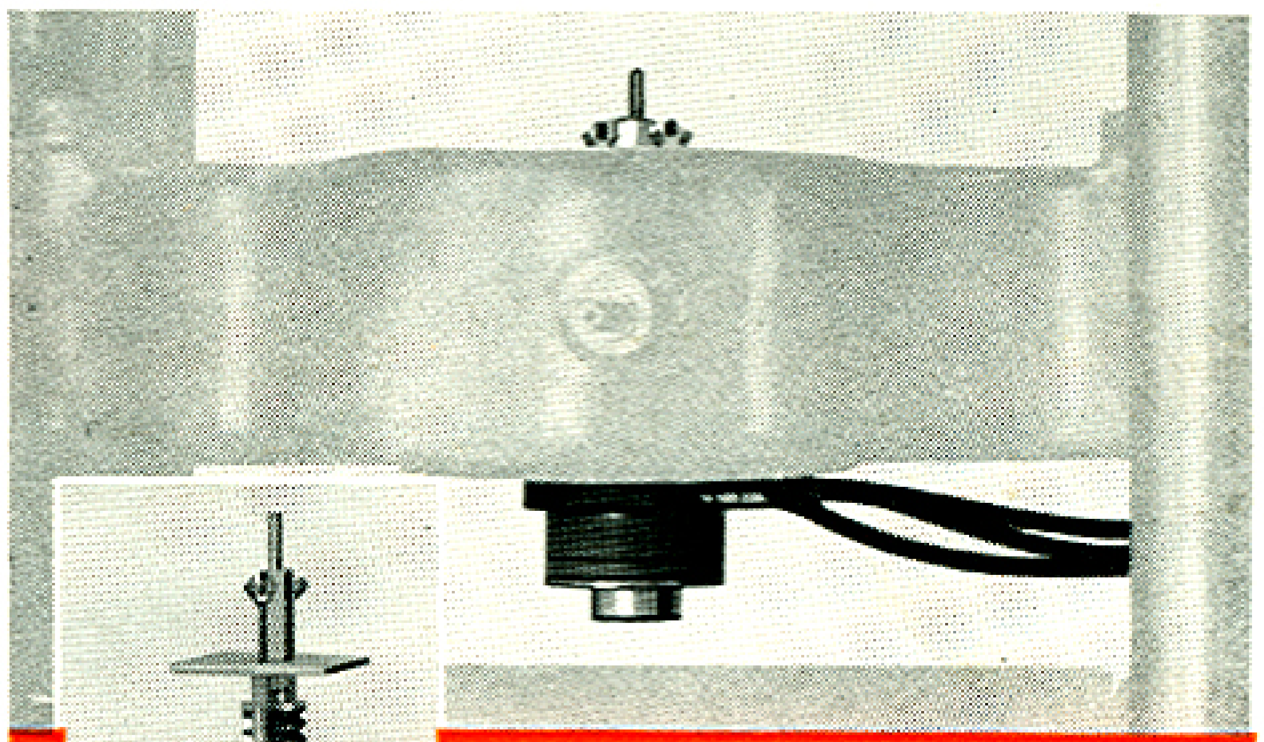


Fig. 17 — Baldwin Brinell Attachment.

Baldwin-Tate-Emery Air Cell

The Air Cell is an independent load-weighing device, made to insert in the head of a testing machine, which extends the precision range of the machine downward to a very small value of load. It has its own compression head for compression testing and a threaded extension for the attachment of grips for tension testing. It is available in several models, providing capacities as low as 2 pounds and as high as 1,200 pounds.



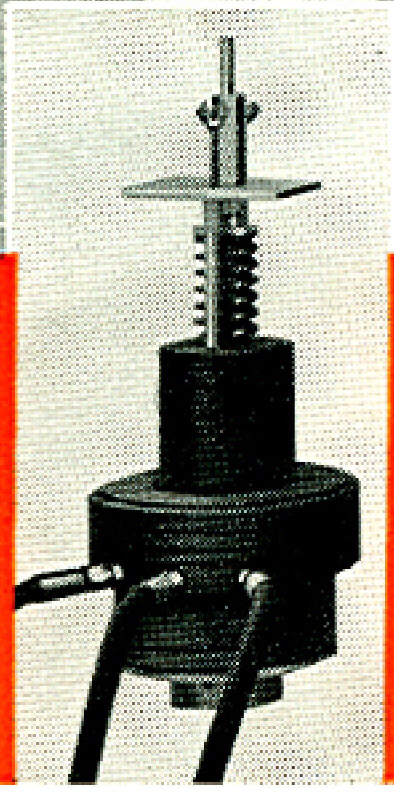


Fig. 18—Baldwin-Tate-Emery Air Cell, at left. Shown above as inserted in grip slot of Baldwin-Tate-Emery Testing machine.

Loads picked up by the Air Cell may be indicated in a variety of ways. When the Cell is to be used with a new Baldwin-Tate-Emery testing machine, provision can be made for a fourth or fifth range, covering the range of the Air Cell, in the standard Tate-Emery indicator. When the Air Cell is to be used with existing testing machines, a fourth range can be added to the existing indicator. Stress-strain recording in the air cell range, involves no additional problems.

A portable indicator may be used if desired. One such self-contained indicator is actually a two-range Tate-Emery indicator housed in a portable cabinet which has the appearance of the upper half of a standard testing machine cabinet. A portable indicator of the Emery Bourdon tube type is also available. The Bourdon tube indicator is lighter and more convenient, but the Tate-Emery indicator has the advantage of permitting the use of standard Baldwin stress-strain recorders.

Either portable type may be used with testing machines of almost every type and capacity—in fact with almost any load-applying device.

Full information on the various models of Air Cells and indicators will be found in Bulletin 264.

Baldwin Controlled-Temperature Cabinet

This cabinet permits testing at controlled temperatures between — 70 ° and + 200° F. on standard Baldwin-Tate-Emery 60,000-pound and 120,000-pound testing machines. Temperature control to within plus or minus 1° is readily obtainable over the entire operating range.

It is a self-contained unit with built-in dry ice compartment and built-in heater system with blower, fan and controls. It is constructed of stainless steel and is thoroughly insulated to minimize heat transfer through the walls. It has a front opening door with thermopane window and two heat-insulated hand holes.

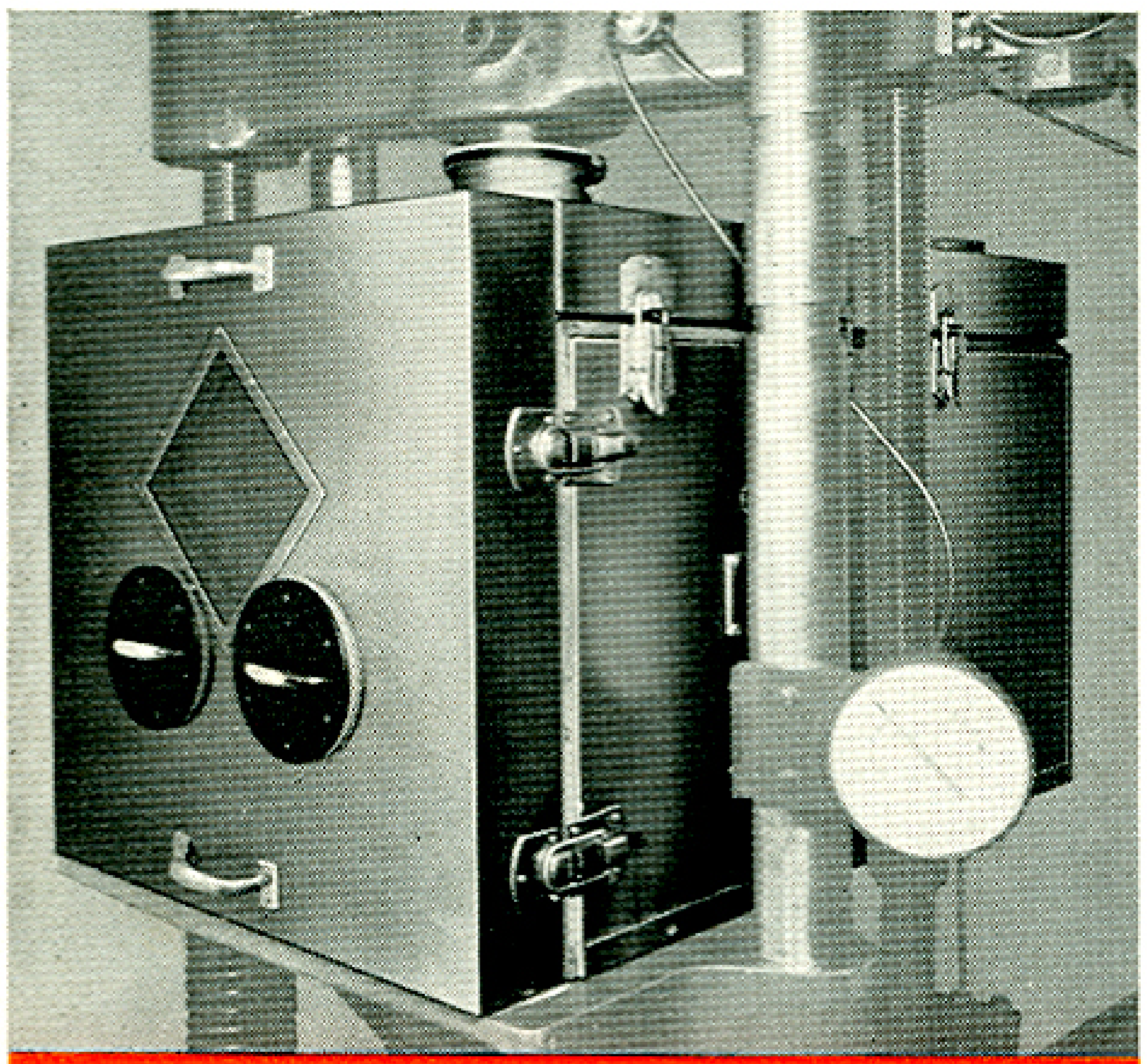


Fig. 19—Baldwin Controlled-Temperature Cabinet, arranged for compression testing.

The cabinet is designed for tension, compression or flexure testing of plastic materials. Standard tools and autographic stress-strain recording equipment of either the Templin or Microformer * type may be used with it. It can readily be adapted for tension testing of standard steel specimens of 2-inch gauge length. The work chamber permits specimen deformation of as much as 2 inches.

Two thermometers are furnished with the cabinet, one reading from — 140° F. to + 80° F., the other from 0 to 220° F.

Working space inside the cabinet is approximately 18 inches wide by 18 inches high by 20 inches front to back. Overall dimensions are 27 by 27 by 40 inches. Electrical equipment extends another 6 inches to the rear.

The complete cabinet, less adapters, weighs about 300 pounds. For ease of handling, the front door and the top have been made removable, making the weight of the largest section about 200 pounds.

The cabinet is described in detail in Bulletin 284.

* Baldwin Trade Mark.

Equipment for High Temperature Testing

Furnaces for high-temperature tensile testing are available in 12-inch or 16-inch length with an inside diameter of 2⅜ inches, designed to operate on 110 volt single-phase current, and providing temperatures up to 1800° F. They can be supplied for 220-volt service, if so specified, and can be furnished with extra heavy windings for temperatures up to 2000° F. Equipped with bracket for easy attachment to testing machine column.

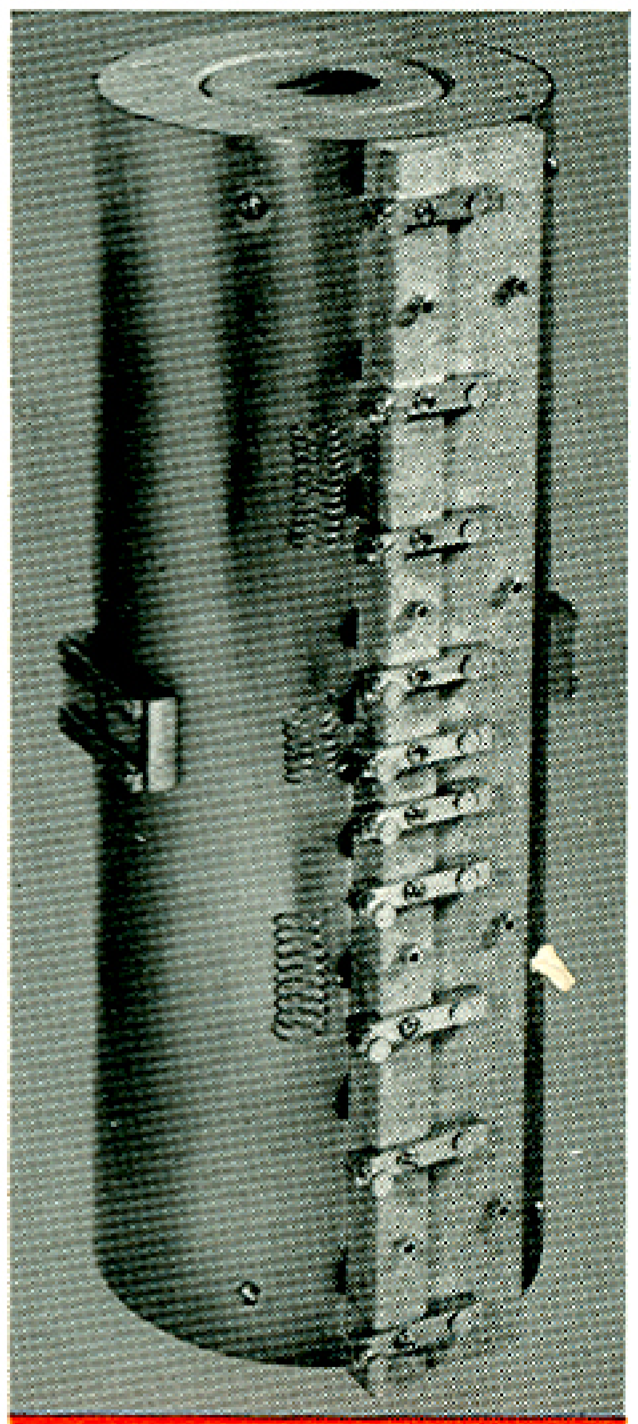


Fig. 20 — Furnace for high temperature tensile testing.

Zone-by-zone adjustment of temperature is provided, permitting compensation for variations in heat distribution caused by changes in specimens, grips, extensometers or other apparatus. Temperature uniformity of ± 3° F. is readily obtainable, and maintenance within ± 1° is not uncommon.

Furnace Control Panel regulates furnace heat and holds temperature fluctuation to a minimum. A variable transformer provides precise adjustment of volt-

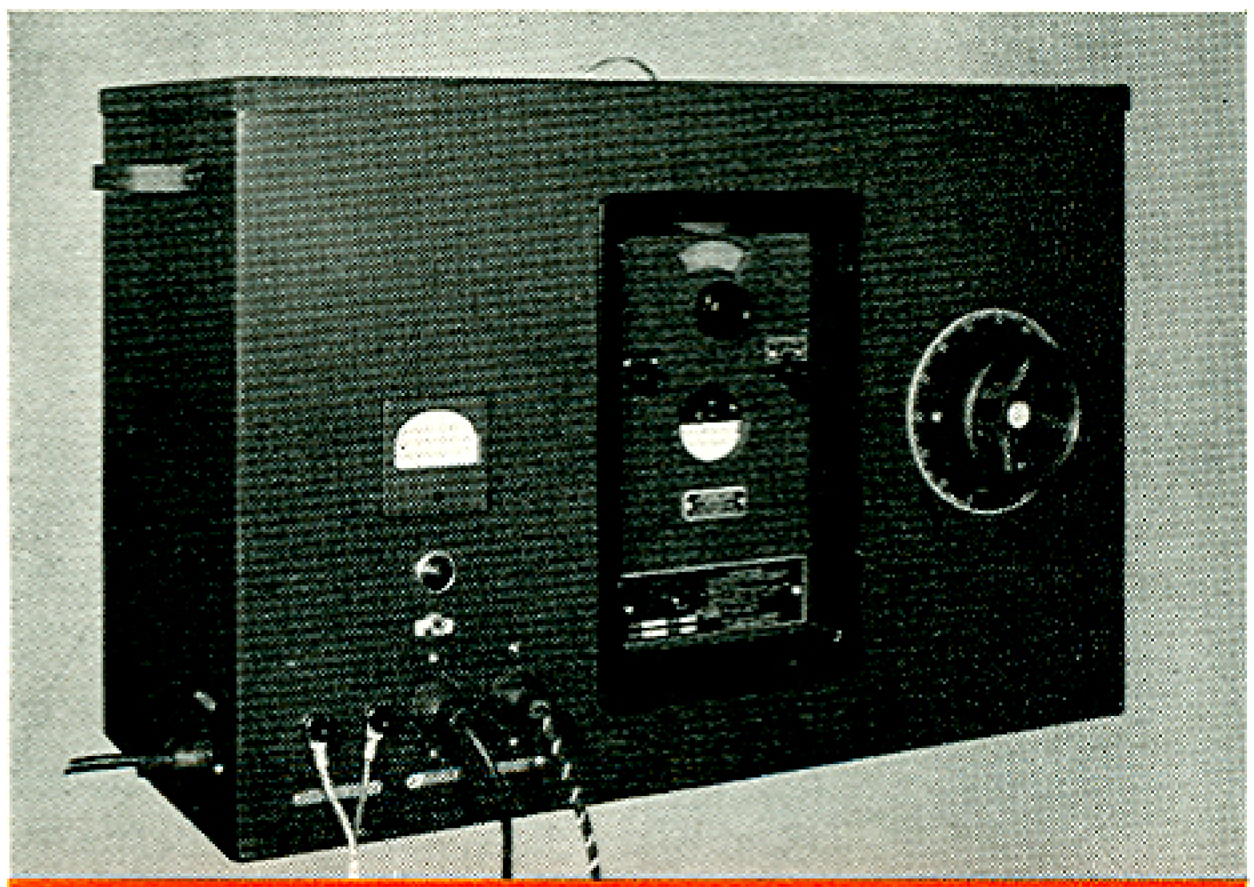


Fig. 21—Furnace Control panel.

age, and a sensitive potentiometer controller, responding to the control thermo-couple, automatically keeps temperature extremely close to the desired point.

Control panel comes equipped with thermo-couple, heater loop, lead wire and power line cord. Operates on 110-120 volts, 60 cycle, 1 phase current. Maximum current, 15 amperes. Housed in metal cabinet with black wrinkle finish.

Baldwin Extensometer Model PSH-8 (Microformer Model PSH-8M) is suitable for use with this and other furnaces. It is an averaging extensometer for use with standard threaded-end test bars at temperatures up to 1600 degrees Fahrenheit.

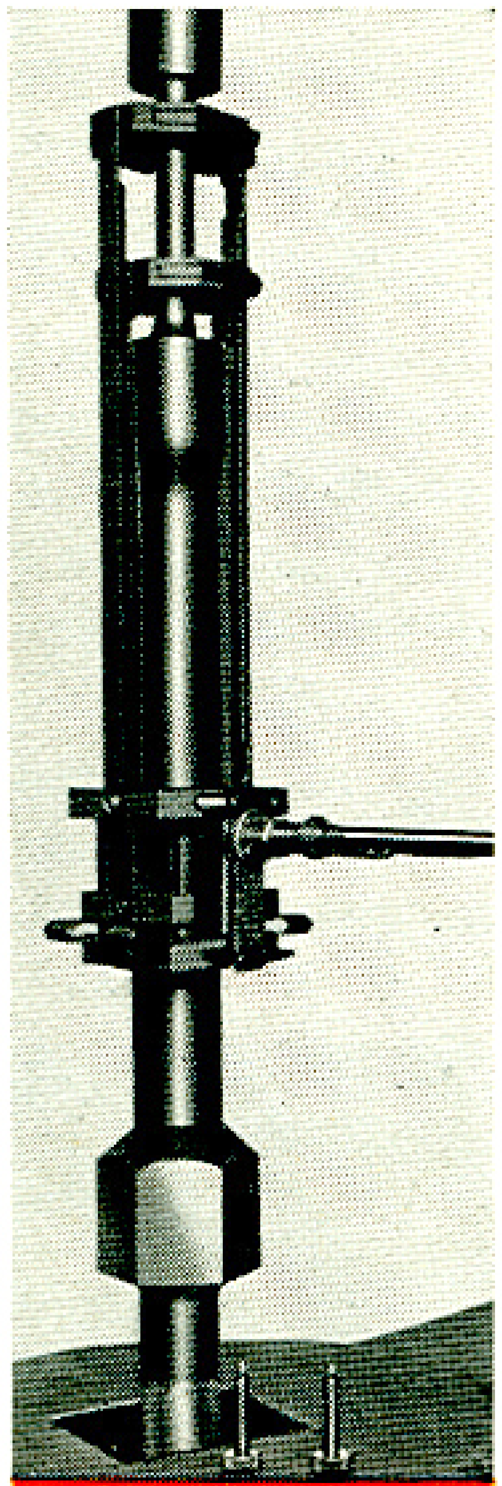


Fig. 22—Baldwin Extensometer for high temperatures, Model PSH-8.

Gage blocks and suspension arms extend into furnace and are exposed to high temperature. Measuring unit is suspended below furnace. Gage blocks and arms are of stainless steel, with stellite knife edges for attachment to specimen. For use with furnace having 2½" diameter opening.

Gage length, 2 inches; specimen diameter, 0.505 inch; magnification ratios, 250:1; 500:1; 1,000:1; measuring range, 0.04 inch. At intermediate strain magnification range, 0.04 inch. At intermediate strain magnification one inch of chart represents 0.001 inch of strain. Weight: Model PSH-8, 25 ounces; Model PSH-8M, 27 ounces.

Baldwin Specimen Holders for high temperature use are described on Page 3 of this Bulletin.

TESTING MACHINE ACCESSORIES

Under this heading we have grouped certain devices whose function is to enhance some phase of testing machine performance. Some of these devices have become virtually standard equipment on the newer testing machines; others, which are necessary only in a limited number of applications, are still optional.

Baldwin Load Rate Pacer*

The Load Rate Pacer controls loading in terms of "pounds per minute," thus eliminating mechanical variables which affect testing speed at the gage points of the specimen. These variables include elastic deformation in the testing machine and in the specimen outside the gauge length, slippage in specimen grips and slippage of grips in the heads of the machine, take-up of slack and other factors.

The desired loading rate is adjusted by setting a pointer on the Tate-Emery indicator cabinet. This fixes the speed of the dotted turntable which is rotated by a synchronous motor through a variable speed drive. To control load at a selected rate, the loading control valve of the testing machine is adjusted so that the load indicator pointer follows the nearest dot on the turntable. The multiplicity of dots insures always having a dot in position to pick up.

* R. F. Blanks Patent.

Baldwin-Tate-Emery Load Maintainer

The mechanism of the null method indicator lends itself particularly well to the addition of a simple and reliable automatic load maintainer capable of holding load within two dial divisions over extended periods. The 96-hour test run for the Navy Department is an indication of this, though it by no means represents a maximum figure. The load maintenance is effected by the addition to a standard indicator of an adjustable air jet actuated by the main draw shaft and a standard automatic air operated valve. The servo-motor does the work; the indicator governs the operation.

The jet and baffle unit is adjustable vertically by a screw which parallels the line of action of the servo-motor operated main draw rod of the Tate-Emery load indicator. A knob marked "Increase-Decrease" turns this adjusting screw to fix the control point for load maintaining at any position on any range desired. Once fixed, the tendency of load to move away from the control point is automatically corrected by the air-operated valve which is actuated in turn by the jet-baffle unit.

The normal guarantee written into specifications calling for the load maintainer states that the device will maintain load within plus or minus two divisions.

Baldwin-Beggs Load Maintainer

This apparatus is a piston valve in which the load acts against dead weights. An accumulator and a high and low pressure switch in the pump motor circuit provide the simple auxiliaries necessary to complete this equipment. The pipeframe serves as the accumulator.

It can be arranged for long time load holding so that the pump operates only intermittently to make up oil which has leaked from the closed system. Can be used with hydraulic jacks or as an auxiliary to any hydraulic testing machine.

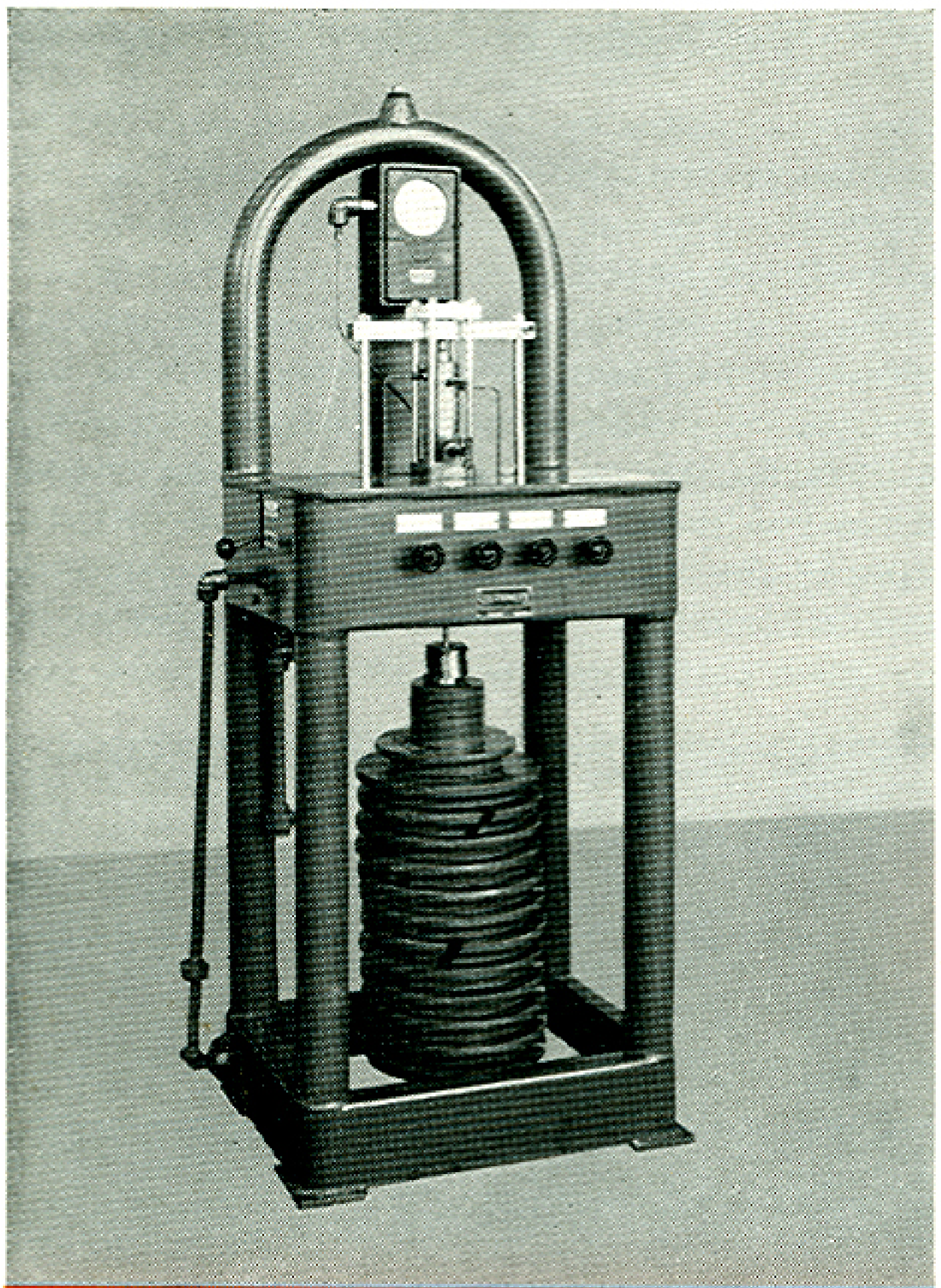


Fig. 23—Baldwin-Beggs Load Maintainer.

Baldwin-Tate-Emery Head Position Maintainer

The Baldwin Head Position Maintainer will hold head position within a tolerance of 0.002 inch for extended periods. Tests have been made in which head position was maintained for periods of 8 hours, but there is no reason why it should not function indefinitely.

It is used with the Tate-Emery Null-Method indicator and employs exactly the same jet-and-baffle principle as the Baldwin Load Maintainer which is described on the preceding page.

Baldwin Ram Pacers

The function of a Ram Pacer is to maintain a constant rate of separation of testing machine crossheads. Baldwin offers three types, each having different performance characteristics. Choice will, of course, depend on the user's requirements.

The Baldwin-Emery Tape-Drive Ram Pacer gives infinitely variable speeds, but within limited ranges, and the desired range must be specified when the order is placed. Available ranges are 0.005 inch to 1.0 inch per minute; 0.01 inch to 2.0 inches; and 0.02 inch to 4.0 inches.

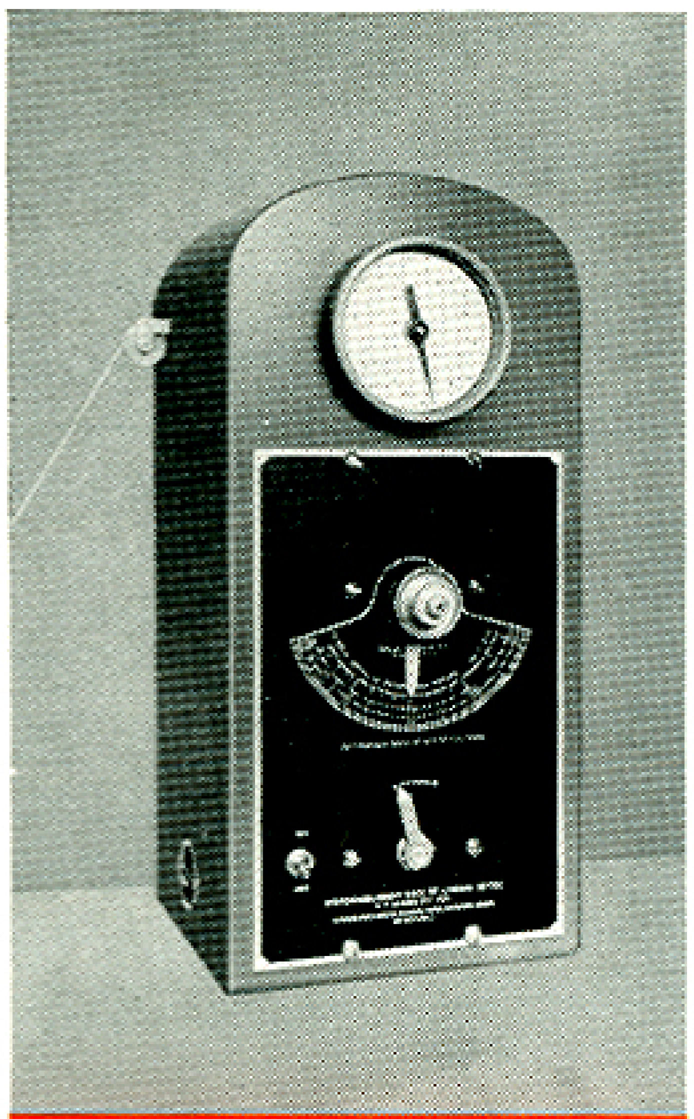


Fig. 24 — Baldwin-Emery Tape Drive Ram Pacer.

The dotted disc in the control cabinet rotates at a constant speed proportional to the desired ram speed, while a pointer rotates at a rate proportional to actual ram speed. The loading control valve on the testing machine is adjusted by hand so that pointer and disc rotate at the same speed, maintaining the ram speed at the predetermined value.

Pointer is driven by means of a steel tape connected to the testing machine table.

The Baldwin Chain-Drive Ram Pacer, by means of a readily-accessible, gear-change arrangement, provides eight pacing speeds: 0.01, 0.02, 0.05, 0.10, 0.20, 0.40, 0.50, and 1 inch per minute.

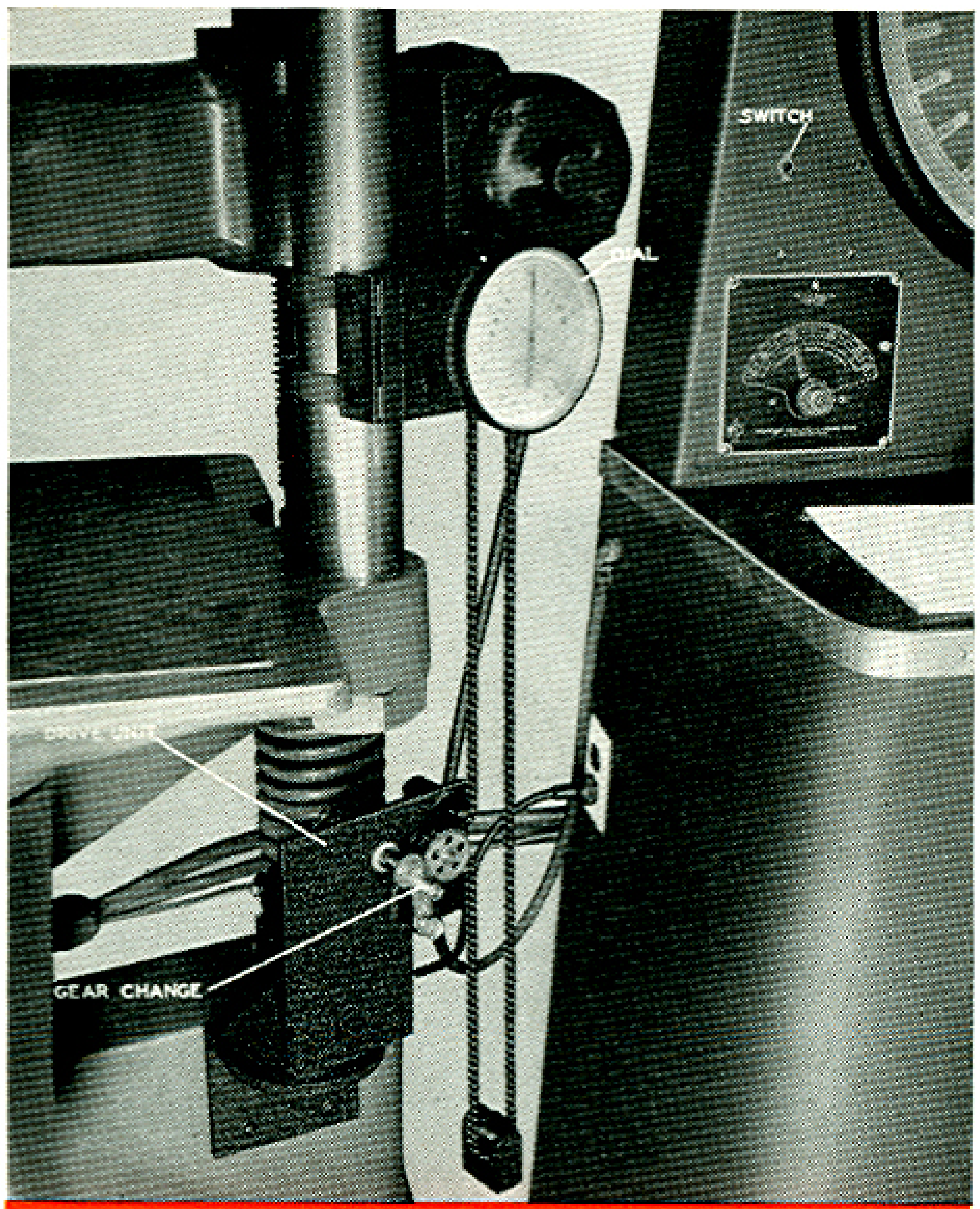


Fig. 25—Baldwin Chain-Drive Ram Pacer.

An endless roller chain, driven by a synchronous motor at any of the pacing speeds, operates a dial attached to the ram. When the ram speed coincides with the chain speed, the pointer stands still; if the ram speed is too slow, the pointer moves around the dial in the direction marked "slow," and moves in the opposite direction if the ram speed is too fast. To maintain a predetermined ram speed, the loading control valve on the testing machine is adjusted by hand so that the pointer remains stationary.

The dial has 200 graduations in increments of 0.001 inch. With the synchronous motor turned off, the dial measures ram displacement and becomes a deflection indicator.

The Baldwin High Magnification Ram Pacer covers a range of pacing speeds from 0.002 to 4 inches per minute, obtainable in stepless variation. Other ranges, with the same 2,000 to 1 ratio, for higher testing speeds, can be supplied on special order.

This ram pacer functions in exactly the same way as the cord drive ram pacer described above, except that ram movement is transmitted through a rack to a gear case, and a Selsyn motor-generator combination forms an electrical link with the control unit.

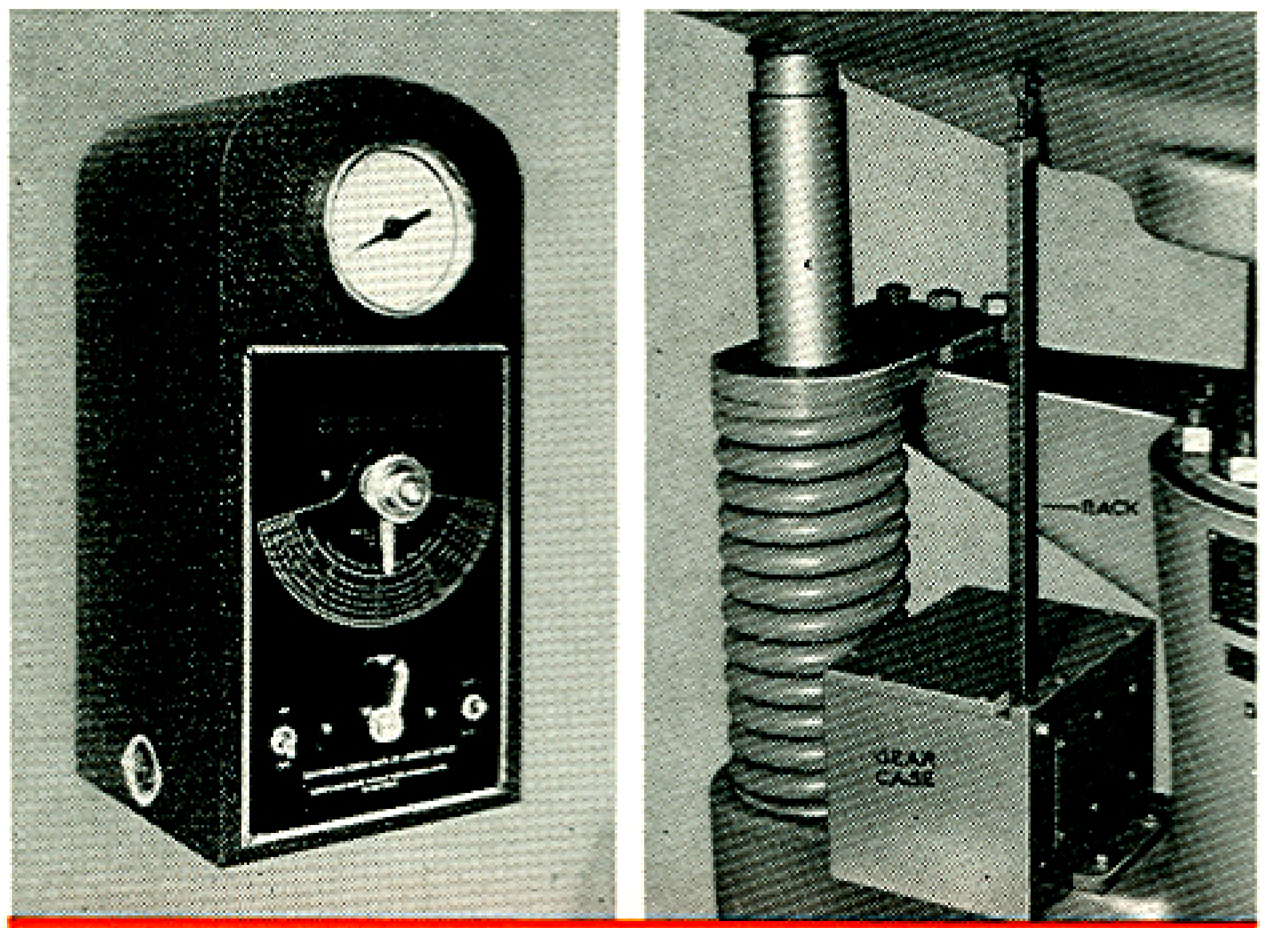


Fig. 26—Baldwin High Magnification Ram Pacer. Control unit is shown at left, transmitter unit at right.

Baldwin Strain Pacer

The distinguishing feature of the Baldwin Strain Pacer is that it permits the testing machine operator to maintain a constant rate of displacement between specimen gage points, rather than a constant rate of separation of testing machine crossheads.

The Strain Pacer equipment consists of a small cabinet containing the pacing disc and pointer, and a transmitter unit. The cabinet may be placed in any convenient location on the testing machine indicator cabinet, and the transmitter unit is mounted in the stress-strain recorder. The pacing disc is rotated by a synchronous motor, and moves at a speed determined by the desired rate of strain. A pointer, mounted coaxially with the disc rotates in proportion to actual rate of strain.

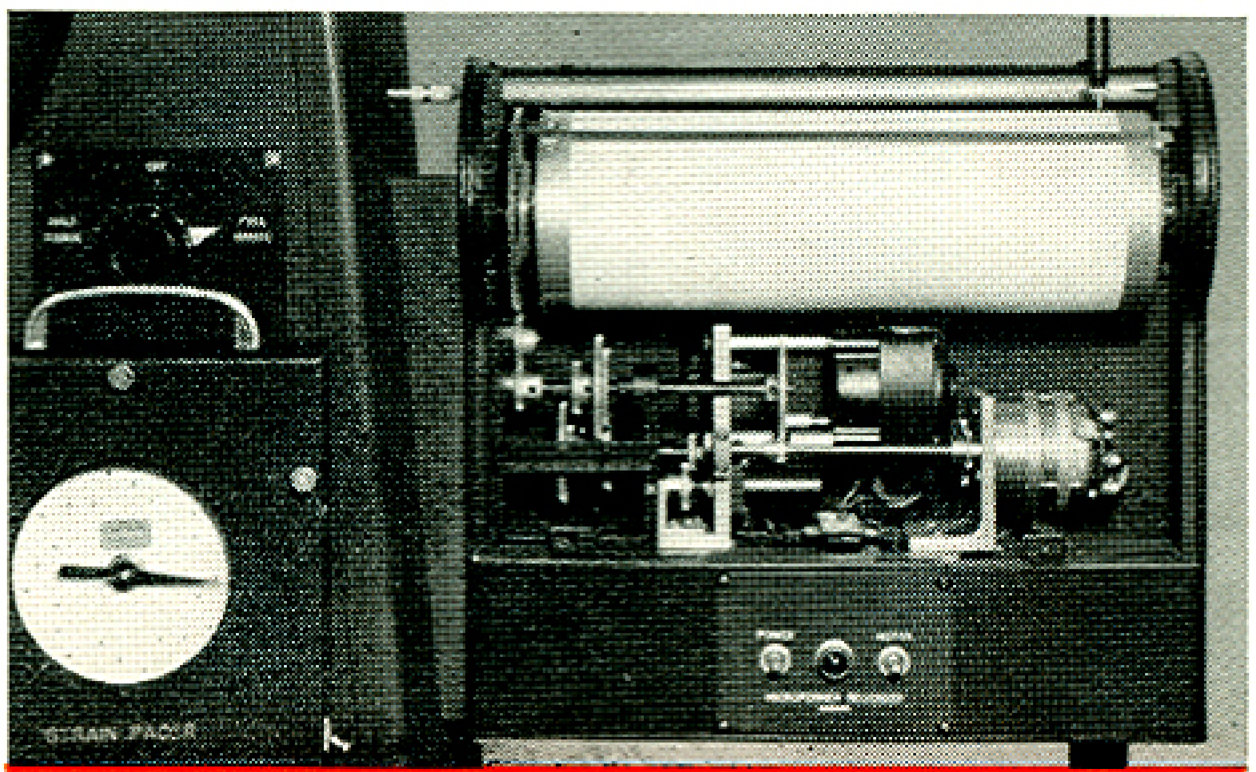


Fig. 27—Baldwin Strain Pacer.

By manipulating the testing machine control valves so that rotation of the pointer coincides with rotation of the pacing disc, the straining rate in the specimen can be maintained at the desired value.

Baldwin Program Controller

The Baldwin Program Controller is a device which permits the testing machine operator to obtain either of two predetermined testing machine speeds during a test by merely shifting a lever instead of by adjustment of the main control valves. It is especially useful in such applications as the testing of large numbers of standard plate specimens, where the machine is usually run at high speed until the grips bite and the indicator begins to show a load, then run at slow speed until the yield point is noted.

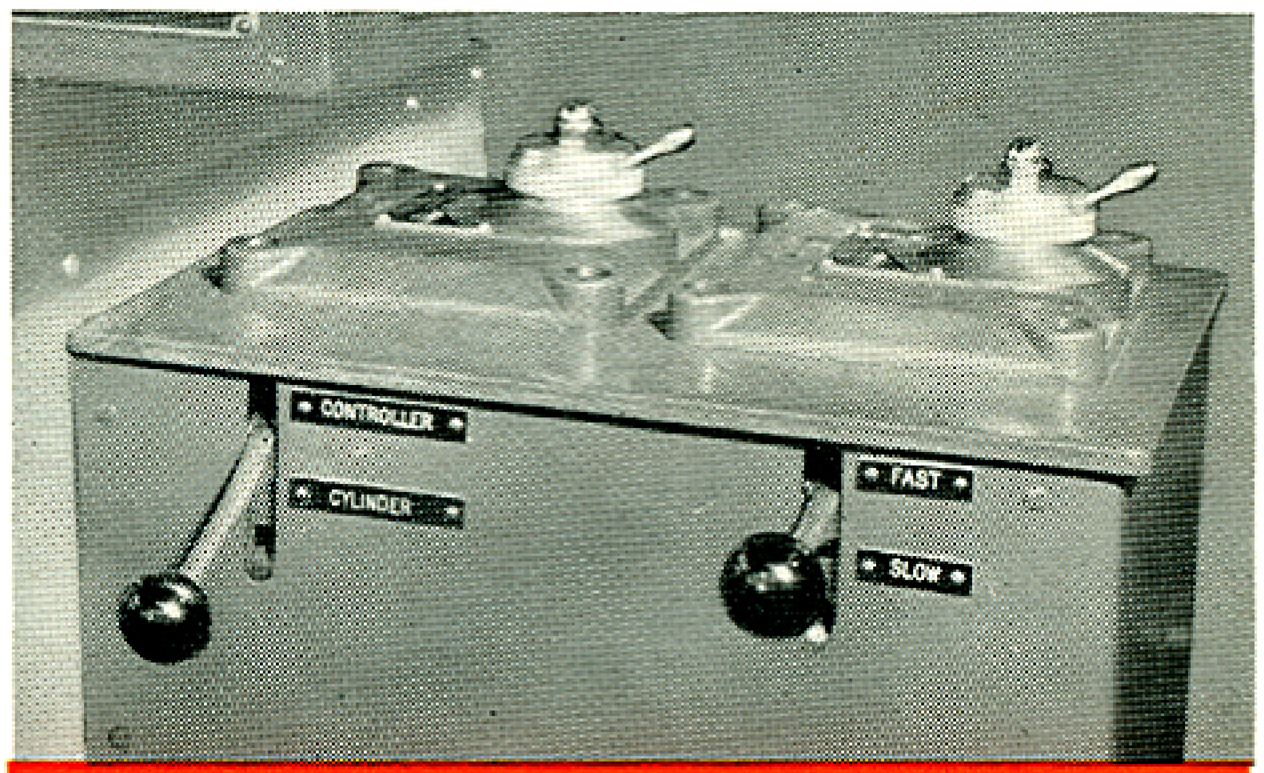


Fig. 28—Baldwin Program Controller.

TESTING CONVENIENCES

Baldwin Reduction-of-Area Gage

A useful instrument for a quick and accurate determination of the reduction of area of a test specimen. The dial, protected by an unbreakable crystal, is graduated in divisions of .001 inch, over a range of 0 to 1 inch. Metric dial can be supplied without extra cost. Gage is provided with a triangular anvil having a radius of 1/32 inch, thus permitting the measurement of short specimens. Approximate weight, 6 ounces.

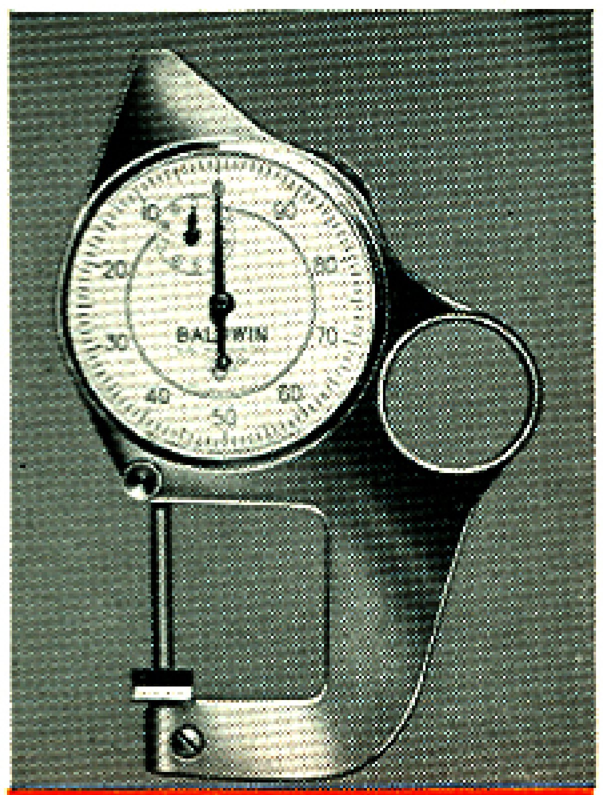


Fig. 29—Reduction-of-area Gage.

Baldwin Gage Point Punch

Automatically centers either flat or round specimens, and marks two uniform centers on each side of the specimen with one push of the handle. Impact, and size of punch marks are adjustable to suit soft and hard specimens, and impact force is automatically controlled by adjustable spring release.

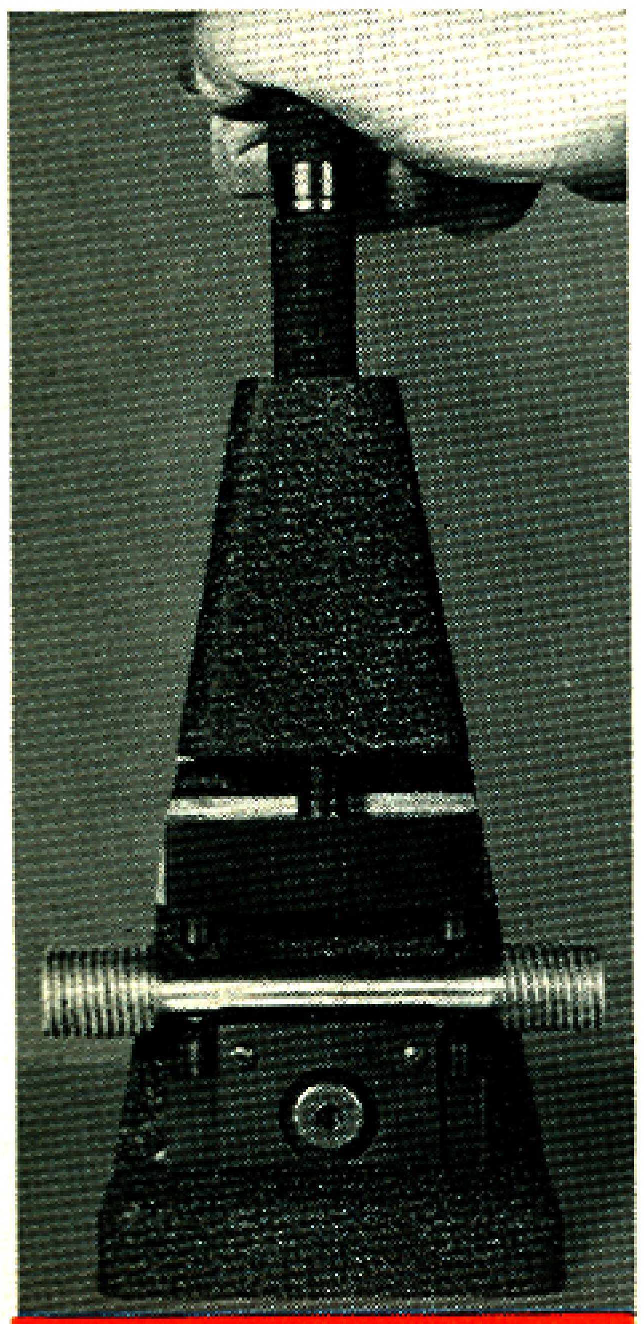


Fig. 30—Baldwin Gage Point Punch.

V-shaped to center round specimens with respect to the axis of the punch points and with an anvil for flat specimens of various widths, the specimen support is carried by two springs in such a manner that the under surface of the specimen regardless of size of shape is held slightly above the point of the lower punch. The points of the punch themselves are held in a rigid rocker pivoted in the center causing all punch points to contact the specimen before impact is applied.

The upper punch holder, guided in a heavy frame, is attached to an impact-adjustable handle. The entire upper punch point assembly is spring supported to keep the gap between punch points open for largest specimen.

When the specimen is placed on the support, the upper handle is pushed down until all punch points rest on the specimen. A continued push downward on the handle brings to a pre-adjusted compression a second spring within the tubular knurled handle, releasing potential energy to produce impact on the specimen.

Standard model is designed for specimens of 2-inch gauge lengths, but it can be supplied on special order for other gauge lengths.

Morehouse Proving Rings

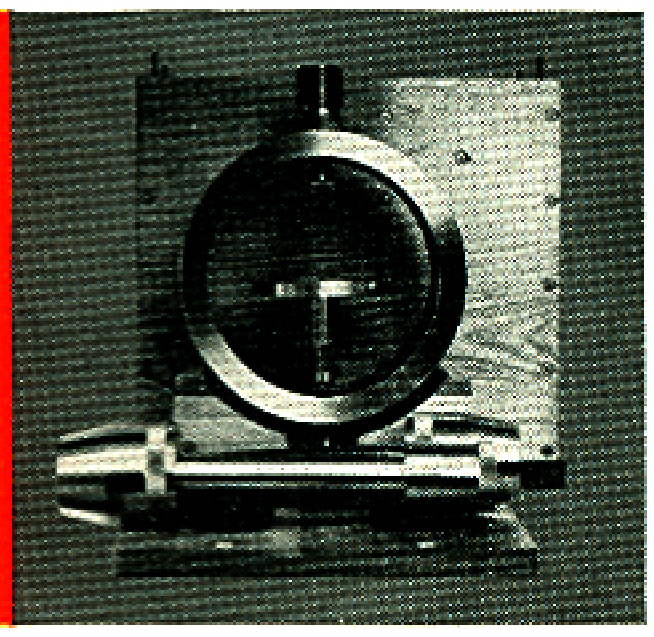


Fig. 31—Morehouse Proving Ring, for tension and compression. Hardwood carrying case in background.

Most testing machine operators prefer to avail themselves of Baldwin's calibration service, rather than to attempt this work themselves.

However, for the benefit of those who have enough of this kind of work to justify the investment, and who do not require an outside "audit" of testing machine accuracy, Baldwin offers a full line of Morehouse Proving Rings of both the Compression and the Tension-Compression types. The following capacities are available:

Compression Type	Tension and Compression Type
2,000 lb.	2,000 lb.
3,000 lb.	5,000 lb.
5,000 lb.	10,000 lb.
10,000 lb.	25,000 lb.
20,000 lb.	50,000 lb.
25,000 lb.	100,000 lb.
30,000 lb.	
50,000 lb.	
60,000 lb.	
100,000 lb.	
200,000 lb.	
300,000 lb.	

Rings are packed in padded cases of polished hardwood, and are accompanied by a calibration certificate and graph from the National Bureau of Standards.

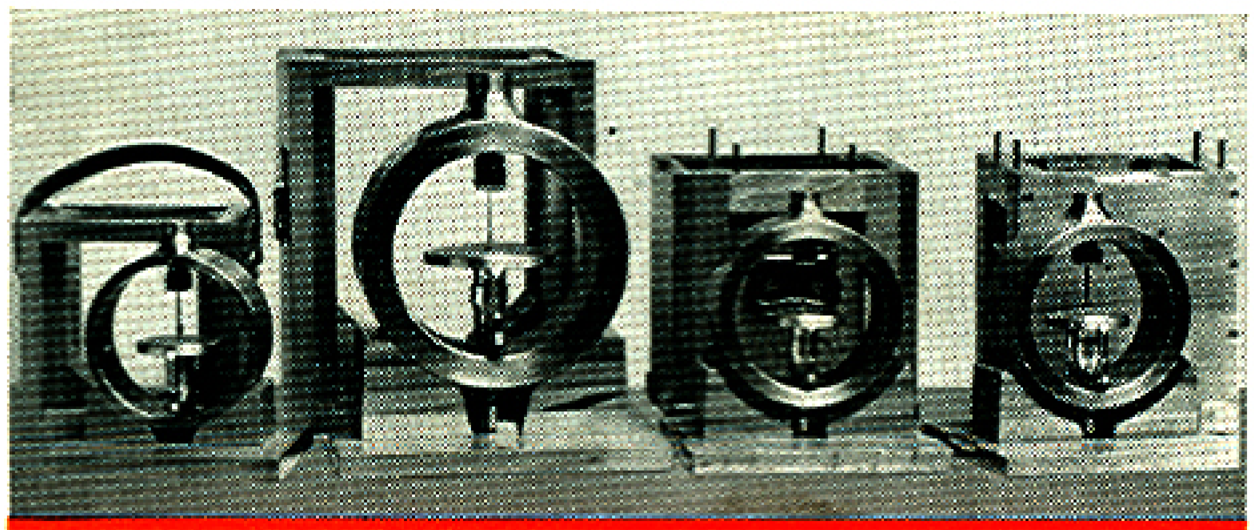


Fig. 32 — Set of four Morehouse proving rings, for compression only.

TRIM-PRINT—YORK—9-52—5M

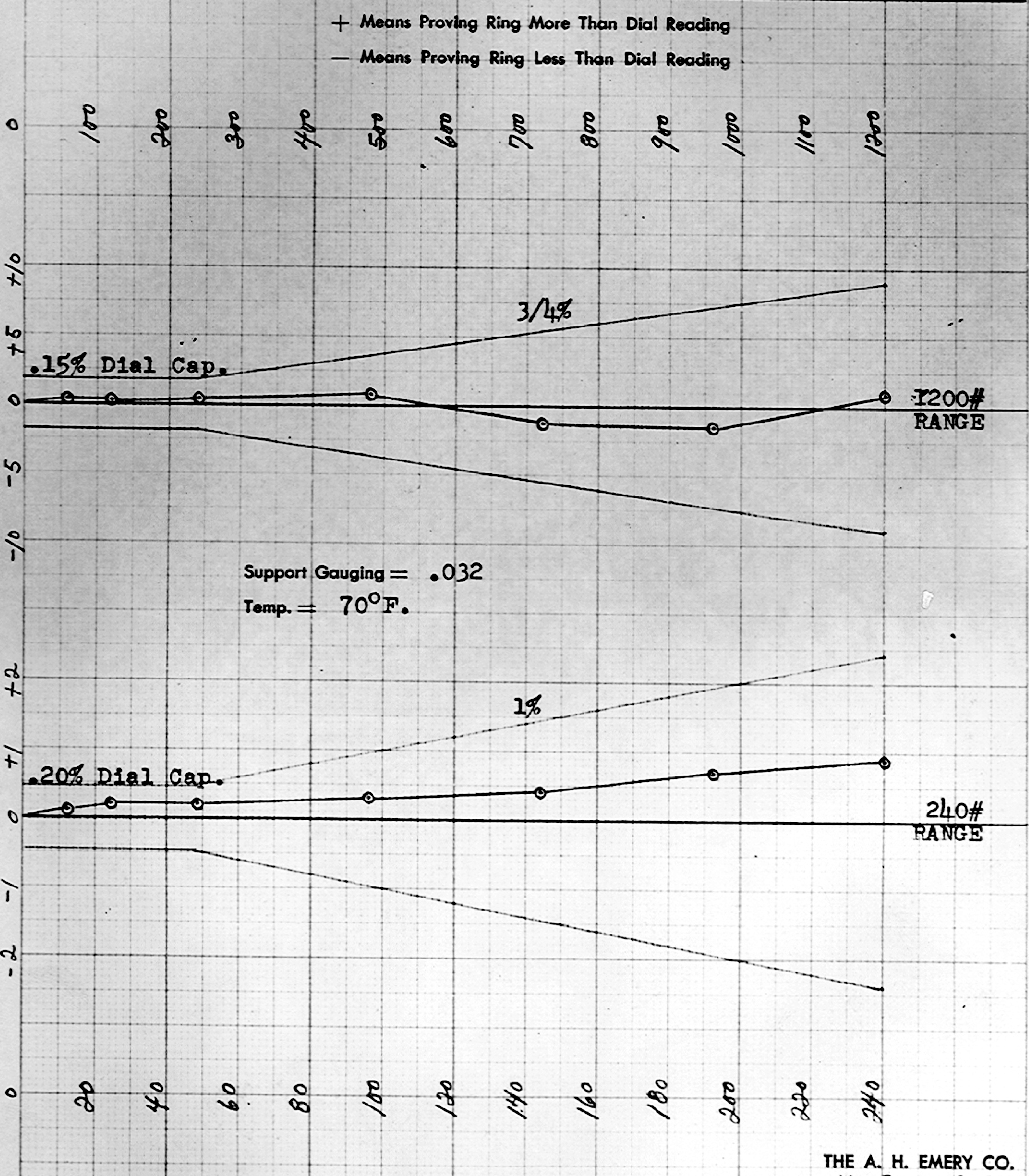
PRINTED IN U. S. A.

60-TE 1474 60,000# 4-RANGE ~~BLH~~ 094-566-.040-1666

UNIV. OF CALIF. - FOREST PROD. LAB. - RICHMOND, CALIF.

FINAL PROVING RING CALIBRATION AT BALDWIN

1-26-56



THE A. H. EMERY CO.
New Canaan, Conn.

60-TE-1474 60,000# 4-RANGE -BLH-094-566..040-1666

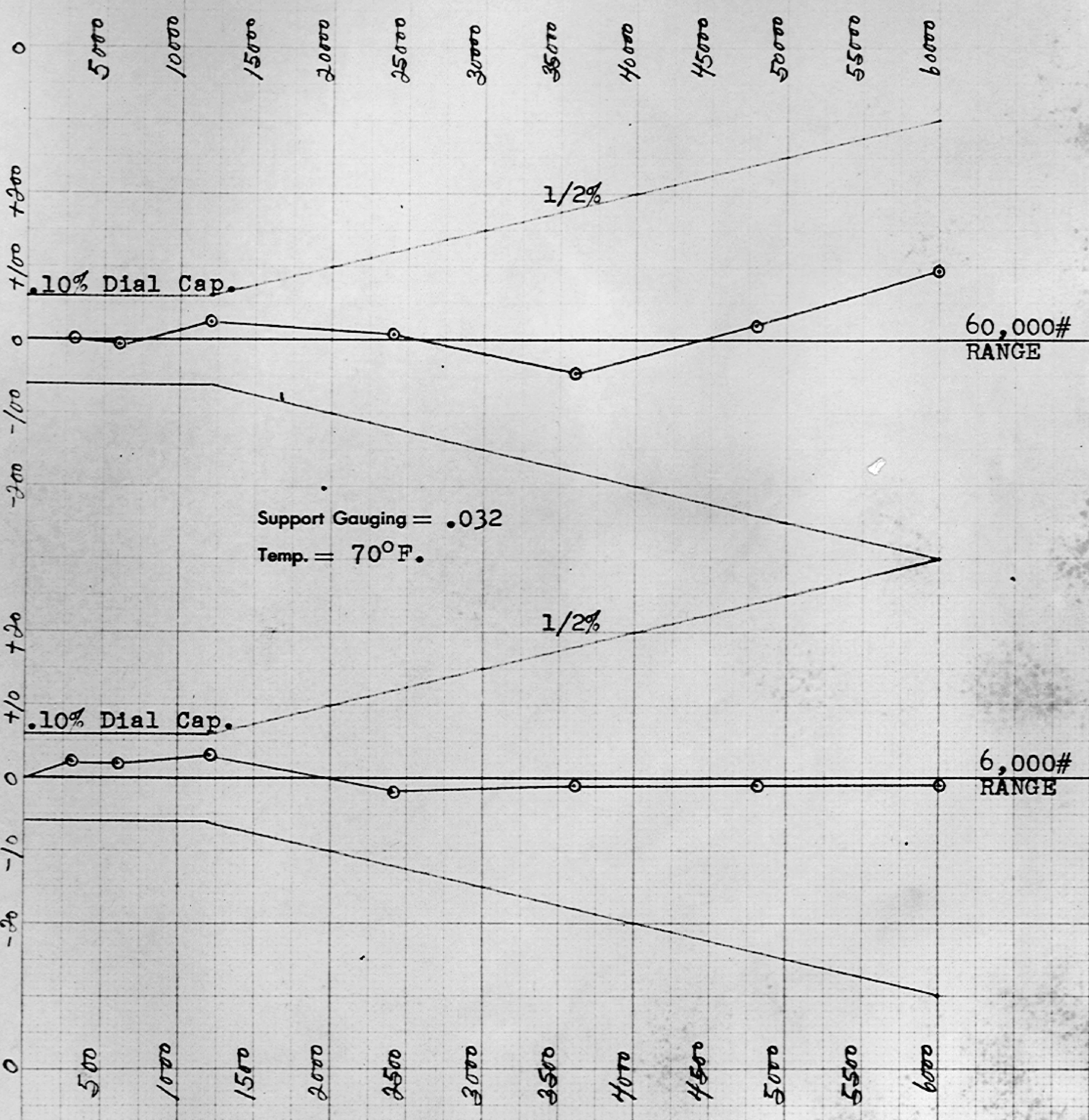
UNIV. OF CALIF. - FOREST PROD. LAB. - RICHMOND, CALIF.

FINAL PROVING RING CALIBRATION AT BALDWIN

1-26-56

+ Means Proving Ring More Than Dial Reading

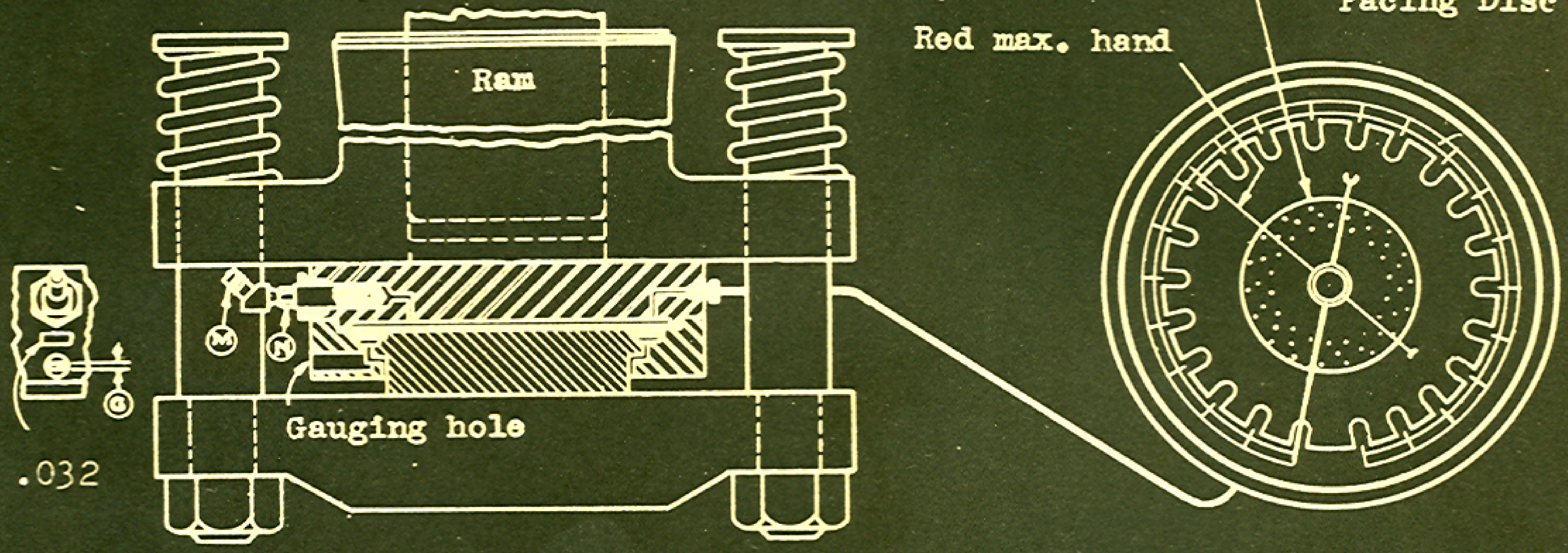
— Means Proving Ring Less Than Dial Reading



THE A. H. EMERY CO.
New Canaan, Conn.

Shut off 240 & 1200 range
when filling capsule

Southwark-Emery Testing Machine with Tate-Emery Load Indicator



GAUGING HOLE NOTES

1. For correct operation space (G) should be .032 , this figure being stamped on the support above the front gauging hole, but space (G) may vary between .029 & .035 . The greater the amount of oil the less opening at (G) .

2. This value of .032 is actually the average of three or more thickness gauge or "feeler" measurements taken in the various gauging holes provided. Noting the difference from the average and allowing for it, any one hole can thereafter be used as a standard.

3. If by leakage opening (G) should become wider, place "Dot" gun on threaded nipple (M) open valve (N) and screw down handle of gun until proper opening is secured.

4. When too much oil is inserted and space (G) shows less than desired, open valve (N) , depress ball at end of nipple (M) until required opening is secured.

5. Always close valve (N) after filling and re-check measurements after closing.

6. When machine is first installed take gauging measurements daily, later under normal conditions, weekly or even monthly measurements should suffice. If necessary to refill too often report to manufacturer giving full details.

7. Support Deflection is the difference between the average "feeler" gauging at no load and for a load of any given amount.

For 60,000# with all but 1200# and 240# ranges open this should not exceed .004"

For 240# with all ranges open this should not exceed .001"

Greater deflections indicate air which should be removed as it affects the accuracy.

8. Machine should be so located as to permit easy access to gauging holes and "Dot" gun filling valve (N) at rear.

CAPSULE FILLING INSTRUCTIONS

SOUTHWARK-TATE-EMERY TESTING MACHINE

CAPACITY 60,000 LBS.

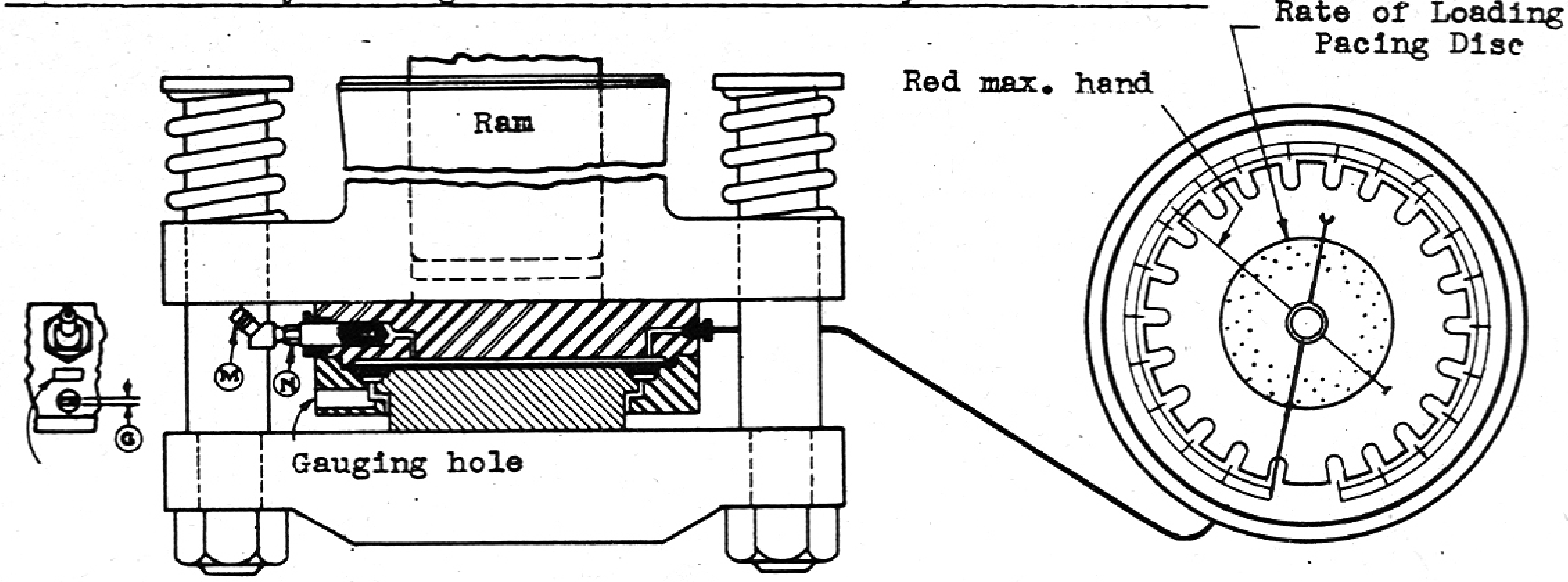
BALDWIN

EMERY-TATNALL CO., LICENSOR

S.O. 040-1666 DATE 1-26-56

B.L.W. 60-TE-1040

Southwark-Emery Testing Machine with Tate-Emery Load Indicator



GAUGING HOLE NOTES

1. For correct operation space G should be .027, this figure being stamped on the support above the front gauging hole, but space G may vary between .024 & .030. The greater the amount of oil the less opening at G.

2. This value of .027 is actually the average of three or more thickness gauge or "feeler" measurements taken in the various gauging holes provided. Noting the difference from the average and allowing for it, any one hole can thereafter be used as a standard.

3. If by leakage opening G should become wider, place "Dot" gun on threaded nipple M open valve N and screw down handle of gun until proper opening is secured.

4. When too much oil is inserted and space G shows less than desired, open valve N, depress ball at end of nipple M until required opening is secured.

5. Always close valve N after filling and re-check measurements after closing.

6. When machine is first installed take gauging measurements daily, later under normal conditions, weekly or even monthly measurements should suffice. If necessary to refill too often report to manufacturer giving full details.

7. Support Deflection is the difference between the average "feeler" gauging at no load and for a load of any given amount.

For 60,000 with 60000 & 12000 ranges open this should not exceed .003

For 1,200 with ALL ranges open this should not exceed .001

Greater deflections indicate air which should be removed as it affects the accuracy.

8. Machine should be so located as to permit easy access to gauging holes and "Dot" gun filling valve N at rear.

CAPSULE FILLING INSTRUCTIONS

SOUTHWARK-TATE-EMERY TESTING MACHINE

CAPACITY 60,000 LBS.

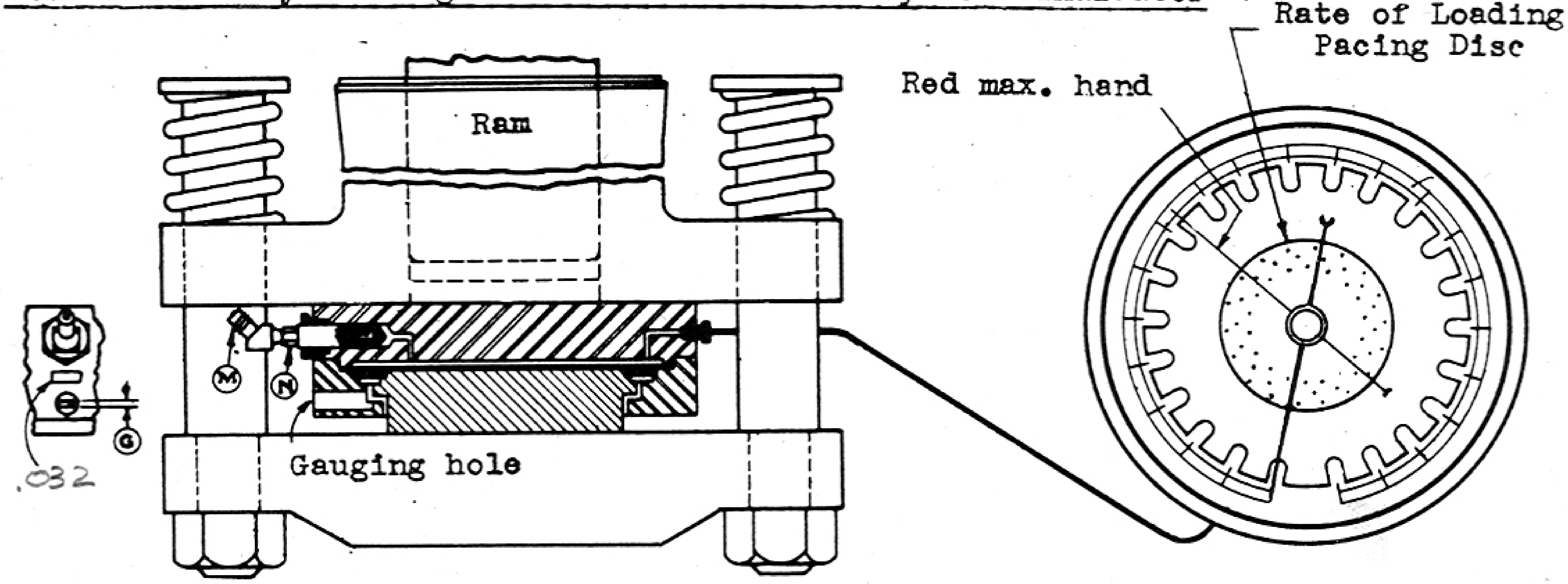
BALDWIN

EMERY-TATNALL CO., LICENSOR

S.O. 492260 DATE 3-23-49

60-TE-1474 B.L.H. Corp.

Southwark-Emery Testing Machine with Tate-Emery Load Indicator



GAUGING HOLE NOTES

1. For correct operation space Ⓖ should be .032, this figure being stamped on the support above the front gauging hole, but space Ⓖ may vary between .029 & .035. The greater the amount of oil the less opening at Ⓖ.

2. This value of .032 is actually the average of three or more thickness gauge or "feeler" measurements taken in the various gauging holes provided. Noting the difference from the average and allowing for it, any one hole can thereafter be used as a standard.

3. If by leakage opening Ⓖ should become wider, place "Dot" gun on threaded nipple Ⓜ open valve Ⓝ and screw down handle of gun until proper opening is secured.

4. When too much oil is inserted and space Ⓖ shows less than desired, open valve Ⓝ, depress ball at end of nipple Ⓜ until required opening is secured.

5. Always close valve Ⓝ after filling and re-check measurements after closing.

6. When machine is first installed take gauging measurements daily, later under normal conditions, weekly or even monthly measurements should suffice. If necessary to refill too often report to manufacturer giving full details.

7. Support Deflection is the difference between the average "feeler" gauging at no load and for a load of any given amount.

For 60,000# with ALL BUT 1200# + 240# ranges open this should not exceed .004"

1,200# " ALL BUT 240# " " " " " .001"

For 240# with ALL ranges open this should not exceed .001"

Greater deflections indicate air which should be removed as it affects the accuracy.

8. Machine should be so located as to permit easy access to gauging holes and "Dot" gun filling valve Ⓝ at rear.

CAPSULE
FILLING INSTRUCTIONS

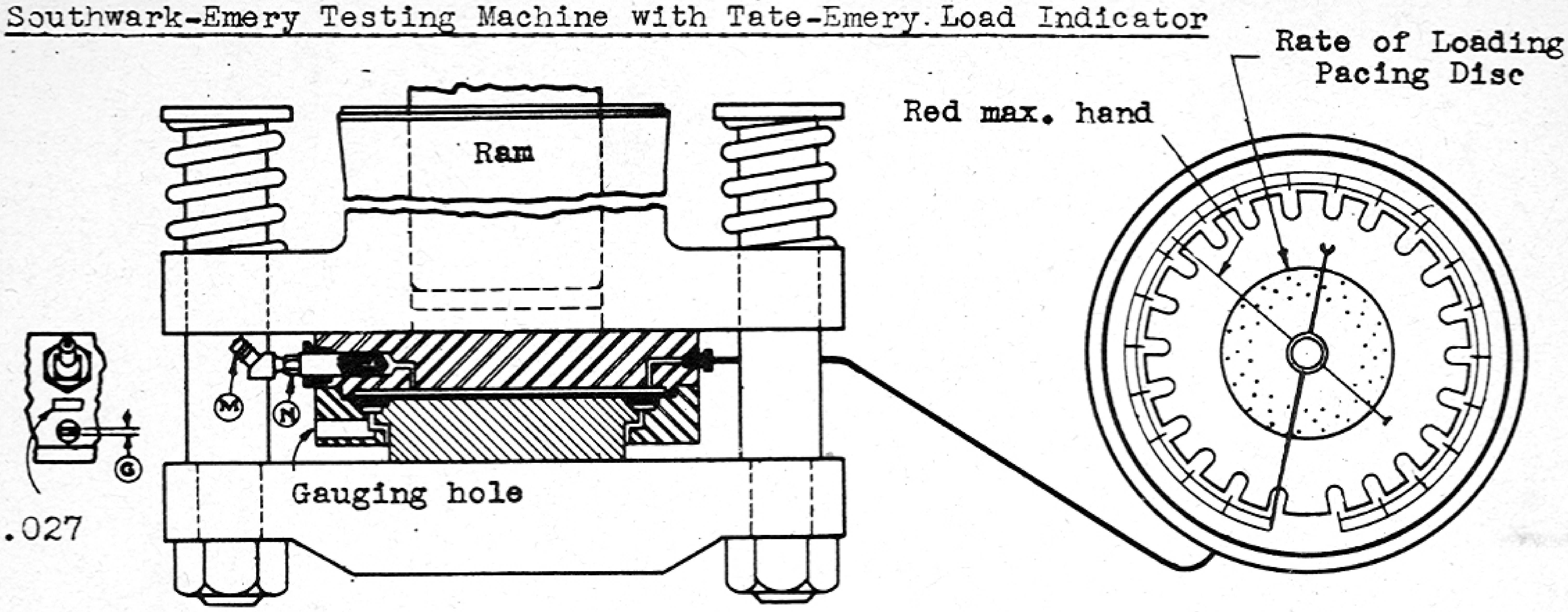
SOUTHWARK-TATE-EMERY
TESTING MACHINE
CAPACITY 60,000 LBS.

BALDWIN

EMERY-TATNALL CO., LICENSOR

S.O. 040-1666 DATE 1/26/56

Southwark-Emery Testing Machine with Tate-Emery Load Indicator



GAUGING HOLE NOTES

1. For correct operation space G should be $\boxed{.027}$, this figure being stamped on the support above the front gauging hole, but space G may vary between $\boxed{.024 \ \&.030}$. The greater the amount of oil the less opening at G.

2. This value of $\boxed{.027}$ is actually the average of three or more thickness gauge or "feeler" measurements taken in the various gauging holes provided. Noting the difference from the average and allowing for it, any one hole can thereafter be used as a standard.

3. If by leakage opening G should become wider, place "Dot" gun on threaded nipple M open valve N and screw down handle of gun until proper opening is secured.

4. When too much oil is inserted and space G shows less than desired, open valve N, depress ball at end of nipple M until required opening is secured.

5. Always close valve N after filling and re-check measurements after closing.

6. When machine is first installed take gauging measurements daily, later under normal conditions, weekly or even monthly measurements should suffice. If necessary to refill too often report to manufacturer giving full details.

7. Support Deflection is the difference between the average "feeler" gauging at no load and for a load of any given amount.

For $\boxed{60,000}$ with $\boxed{60,000 \ \& \ 12,000}$ ranges open this should not exceed $\boxed{".003}$

For $\boxed{1,200}$ with $\boxed{\text{All}}$ ranges open this should not exceed $\boxed{".001}$

Greater deflections indicate air which should be removed as it affects the accuracy.

8. Machine should be so located as to permit easy access to gauging holes and "Dot" gun filling valve N at rear.

CAPSULE
FILLING INSTRUCTIONS

gray Baldwin

SOUTHWARK-TATE-EMERY
TESTING MACHINE
CAPACITY 60,000 LBS.
BALDWIN
EMERY-TATNALL CO., LICENSOR
S.O. 492260 DATE 3-23-49

WIEDEMANN

INSTRUCTION SHEET

WIEDEMANN-BALDWIN TESTING MACHINES

IS-4904

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 O	Mobilux Grease #1	XXX Lubricant #1
Screws, Hand Paint	Pinnacle Cylinder Oil	Mobilux Grease #1	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	Mobilux Grease #1	XXX Lubricant #1
Load Indicator, Dash Pot	Pinnacle Cylinder Oil	Gargoyle Cylinder Oil, 600-W	EP Lubricant 115

WMCo J-41 Rev.

INSTRUCTIONS FOR INSTALLING BLOW-OUT DIAPHRAGMS

9/2/64

60 TE 1474.

240 " Range.

THIS UNIT CONTAINS A "BLOW-OUT" DIAPHRAGM

Material - .0015 Soft brass
Diameter - 2 1/4 inches

The Bourdon tube of the 240 lb. range is designed to carry only 2770 lbs. (= 90 lbs. sq. in.). The diaphragm will rupture if a load of 2420 lbs. (= 85 lbs. sq. in.) is accidentally applied to the 240 lb. range.

To install new diaphragm:

1. Disconnect piping at diaphragm unit. Disconnect electric cut-out.

2. Take out hollow head screws, remove cover and replace ruptured diaphragm with new one supplied. Be sure that seats are clean before assembly. Tighten bolts evenly.

3. Reconnect pipe from valve at panel to center connection. Pump oil through the unit by means of filler gun at weighing capsule of testing machine (with 240 lb. range valve on panel open) until air is expelled from unit at upper connection.

4. Connect pipe from Bourdon tube to upper connection of unit.

5. Fill capsule of weighing system (with 240 lb. range valve on panel open) until average gauging is about .005" less than normal specified on Capsule Instruction Sheet.

6. Load testing machine to 1730 lbs. on 6000 range (with lb. range valve on panel open). This will prestress diaphragm.

7. Release load and recheck capsule gaugings. Add oil if necessary so that gauging conforms to Capsule Instruction Sheet.

8. To set electric cut-out apply 720 lbs. on 1200 lb. range with 240 lb. range valve open.

THE A. H. EMERY CO.
New Canaan, Conn.

By [signature]

~~Box cover~~

~~pumps~~

pointer return

ram pacer

grease motors? fill hole on the side of reducer only.

oil reservoir gauge

Fixed maintenance schedule?

Capsule filled 2-4-58

" (broken Diaphragm) 7/9/58
"