TM 11-2369

WAR DEPARTMENT TECHNICAL MANUAL

LAMINATING EQUIPMENT PH-523/GF

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WAR DEPARTMENT *15 OCTOBER 1944*

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WAR DEPARTMENT,

WASHINGTON 25, D. C., 15 July 1944

TM 11-2369, War Department Technical Manual, Laminating Equipment PH-523/GF, is published for the information and guidance of all concerned.

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For explanation of symbols, see FM 21-6.

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DESTRUCTION NOTICE

WHY —To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN—When ordered by your commander.

HOW —1. Smash—Use sledges, axes, handaxes, pickaxes, hammers, crowbars, heavy tools.

2. Cut—Use axes, handaxes, machetes.

3. Burn—Use gasoline, kerosene, oil, flame throwers, incendiary grenades.

4. Explosives—Use firearms, grenades, TNT.

5. Disposal—Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT

WHAT—1. Smash—Gauge, cylinder casing, and plates. Strip threads on release-valve screw by tightening with a wrench and using all possible force. Smash cylinder, pump base unit, and corner rounder.

2. Cut—All wiring, power cords, electrical connections, and hose.

3. Burn—Cord, stacks of cards, blotters, all means of identification, and this technical manual.

4. Bend—All tools and spare parts, supporting steel columns, lever and gauge base.

5. Bury or scatter—All of the above parts after destroying their usefulness.

DESTROY EVERYTHING

SAFETY NOTICE

To avoid any possibility of the operator burning his hands, the heating plates have been stamped with the word HOT. Always use the holding clamps in transferring the hot stack of laminations to the cooling plates.

Always check the current before plugging in the press. This press is built to operate on 110- or 115-volt alternating current ONLY. Do not remove the safety guard from the corner rounder.

NOTICE

Do not use a wrench on the release-valve screw (fig. 5, 107). Always use the slotted end of the long pump lever (fig. 1, 370). Do not use a Stillson wrench to tighten the gauge. Always use a square socket wrench.

SECTION I

DESCRIPTION

1. GENERAL DESCRIPTION AND APPLICATION.

a. **Major Units.** Laminating Equipment PH-523/GF consists of two major components, the laminating press (fig. 1), and the Model 20 corner rounder (fig. 9).

b. **Purpose.** The laminating press has been designed to fabricate identification cards between sheets of acetate. The Model 20 corner rounder is used to cut 1/4-inch radius corners on the identification cards. The basic press is comprised of a cast-iron base supporting a cylinder, a pump, and two columns. The cylinder supports a platen. The two columns hold the support plate and head, and act as guides for the platen and support plate. A gauge attached to the base indicates the total pressure load.

2. LIST OF COMPONENTS, WEIGHTS AND DIMENSIONS. When packed, Laminating Equipment PH-523/GF weighs 234.25 pounds and measures 18 by 18 by 32 inches. The equipment consists of the following components:

Quantity	Component	Dimensions (in.)			Weight (lb)
		Length	Width	Height	
1	Laminating press, less gauge	13 5/8	17 3/4	30	179.7
1	Pressure gauge	2 (thick)	6 3/8 (diam.)	8 1/2	5.3
1	Long pump lever	20	13/16 (diam.)	..	1.1
1	Thermometer	..	..	..	.046
50	Blotters	5	6	..	..
24	Polished plates	5	6	..	4.2
6	Holding plates	6	7	..	6.0
2	Holding clamps	..	..	..	2.18
1	Model 20 corner rounder	9	4 1/2	2 3/8	4.25
1	One quart No. 10-W motor oil	..	..	..	..

3. PRESS. The basic press is illustrated in figures 1, 2, 3, and 4. It consists of the press base, two columns, a cylinder, a pump, a platen with a cooling plate attached, the support plate with a hot plate on top and a cooling plate underneath, and the gauge coupling with its connection.

a. **Press Base (fig. 2, 100).** This is made of semisteel, designed so that it has four legs and four feet for support. It measures 13 5/8 by 17 3/4 by 3 1/2 inches and weighs 40.5 pounds. Each foot has a hole in the center so

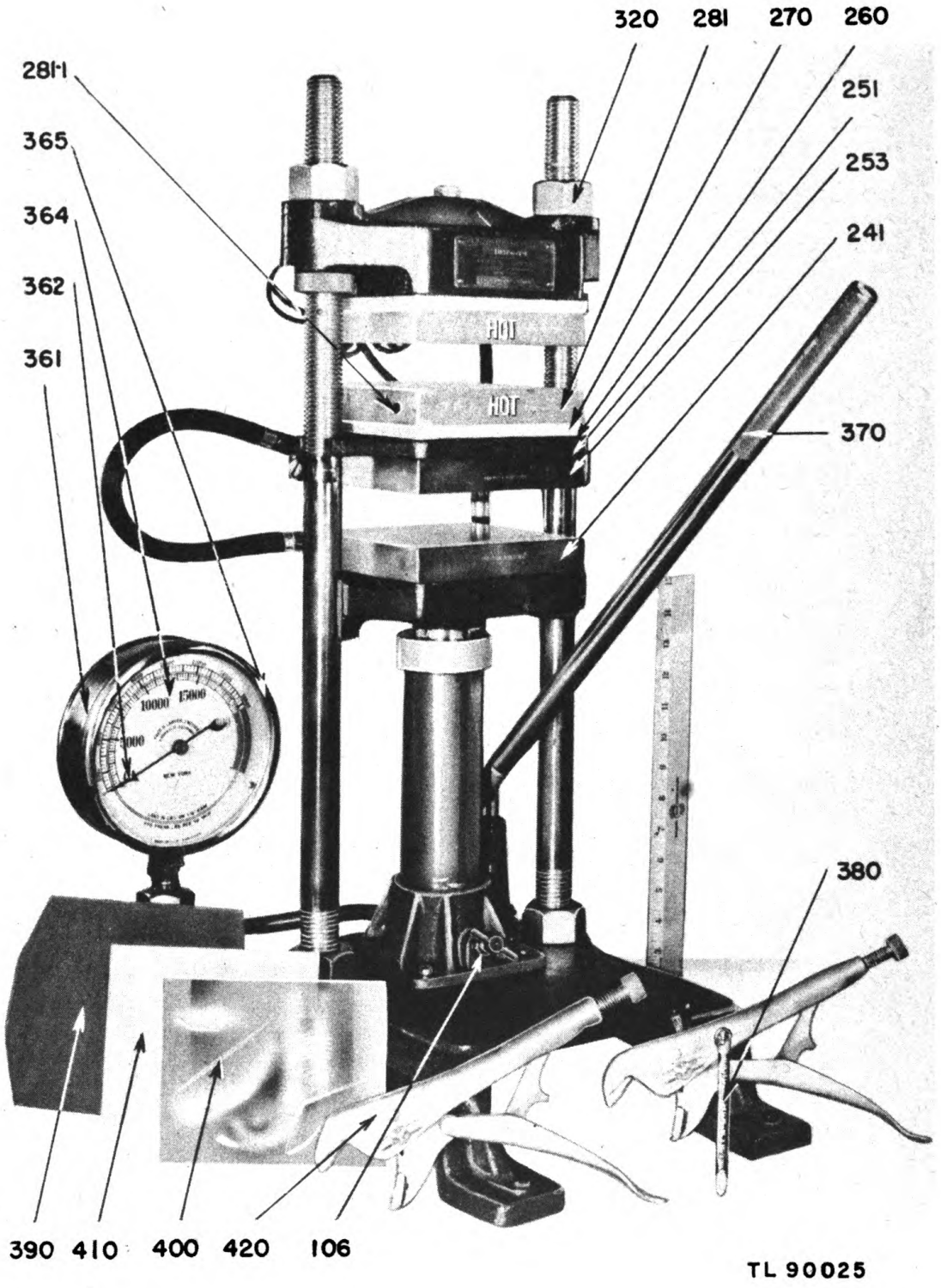

Figure 1. Laminating press with components.

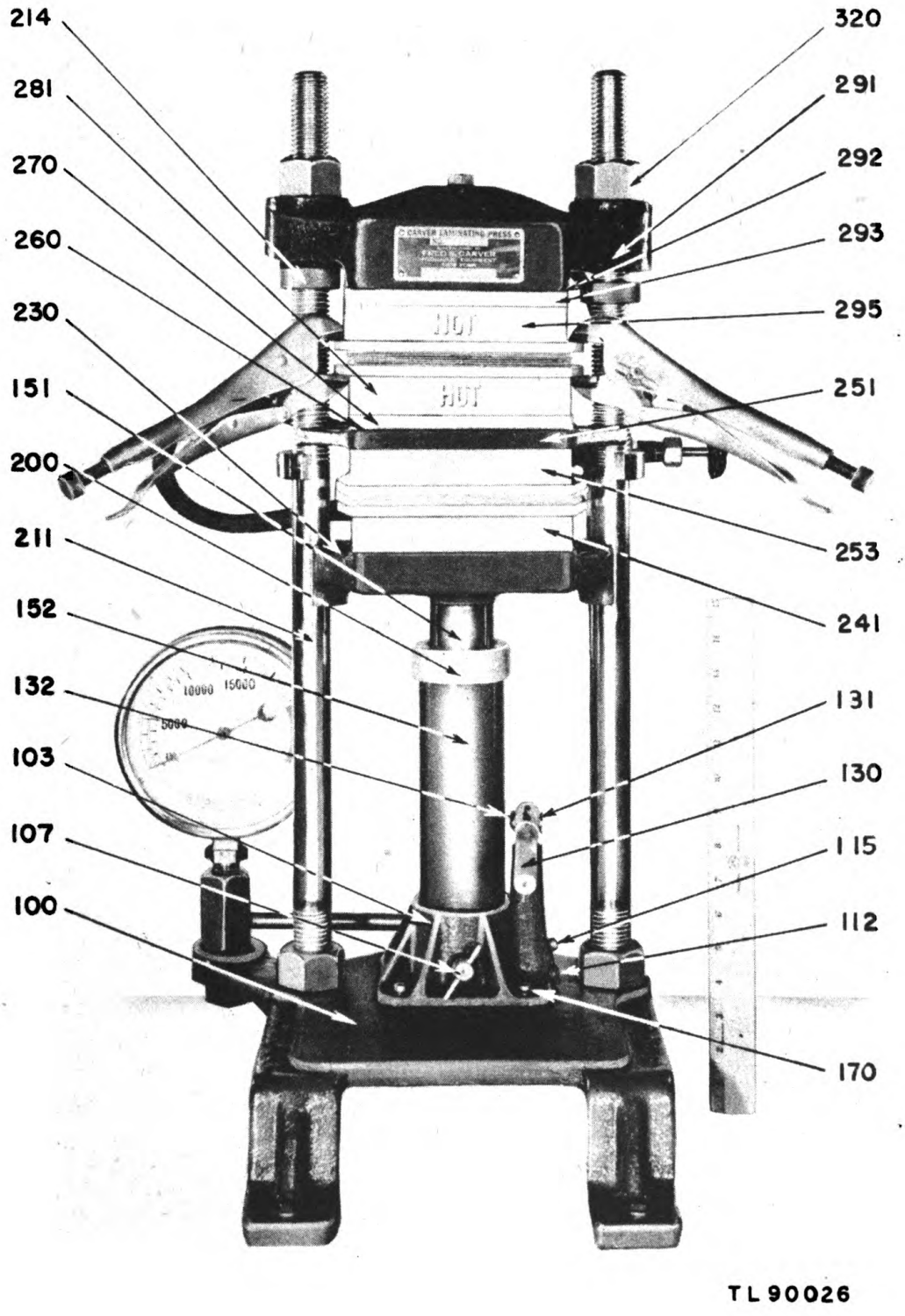

Figure 2. Press, with stacks of laminations.

that a screw may be used to hold the base on a worktable. The brass gauge coupling (fig. 4, 162), weighs 1.6 pounds and is fastened to the left rear by the steel hexagon nut (fig. 4, 165).

b. **Two Columns (fig. 2, 211).** These are made of nickel-plated steel, measure 1⅛ inches in diameter, and extend for 26½ inches above the press base. They are threaded at the top so that the head (fig. 2, 291) may be moved up and down, and are threaded at the bottom so that they can be held in position by the steel hexagon nuts (fig. 3, 215), attached above and below the press base. A nickel-plated, semicircular support collar (fig. 3, 212) attached on each column holds the support plate (fig. 1, 251) in position. The support collar is held in place on the column by a nickel-plated oval-head cap screw (fig. 3, 213). These two columns hold the support plate and head as well as act as guides for the platen (fig. 2, 230) and the support plate.

c. **Cylinder and Pump.**

(1) THE CYLINDER AND PUMP BASE (fig. 2, 103). One Meehanite casting forms the base for both the cylinder and pump. It weighs 6.4 pounds, measures 5⅛ by 4¾ by 4⅛ inches, and is held on to the press base by four fillister-head machine screws (fig. 2, 170).

(a) Release-valve Screw (fig. 2, 107). This steel screw is 1¾ by ½ by 1½ inches and is held in position in the cylinder and pump base by an internal- and external-threaded release-valve nut (fig. 7, 106). A ¼-inch steel ball at the inner end of this release-valve nut forms the release valve. By tightening the release-valve screw the release valve (fig. 7, 104) is forced into the oil channel in the cylinder and pump base so that the pressure in the cylinder may be created and maintained. The pressure is released by loosening this screw so that the release valve drops out of the channel, allowing the oil to run out of the channel from the ram.

(b) Suction-valve Screw (fig. 5, 112). This is the lower steel screw on the right side of the pump and cylinder base. A ¼-inch steel ball at the inner end of this screw acts as a suction valve. As the pump plunger (fig. 5, 122) is raised it pulls the suction valve (fig. 5, 110) up out of oil channel A (fig. 12), permitting the oil to pass up into the pump base. As the plunger is lowered, the suction valve falls back to its original position, closing the channel so that the oil displaced by the plunger must flow out through the discharge valve (fig. 6, 141) into the ram.

(c) Discharge-valve Screw (fig. 5, 115). The upper steel screw on the right side of the cylinder and pump base in the discharge-valve screw. It is screwed into channel C (fig. 12). A steel rod (fig. 5, 113), $\frac{3}{32}$-inch in diameter by 2¼ inches long, lies at the end of this screw. This rod acts as the suction-valve retainer, and keeps the suction valve from being pulled up into the pump by the suction created by the pump plunger.

(d) Steel Gauge Connection. The $\frac{9}{16}$-inch diameter steel gauge connec-

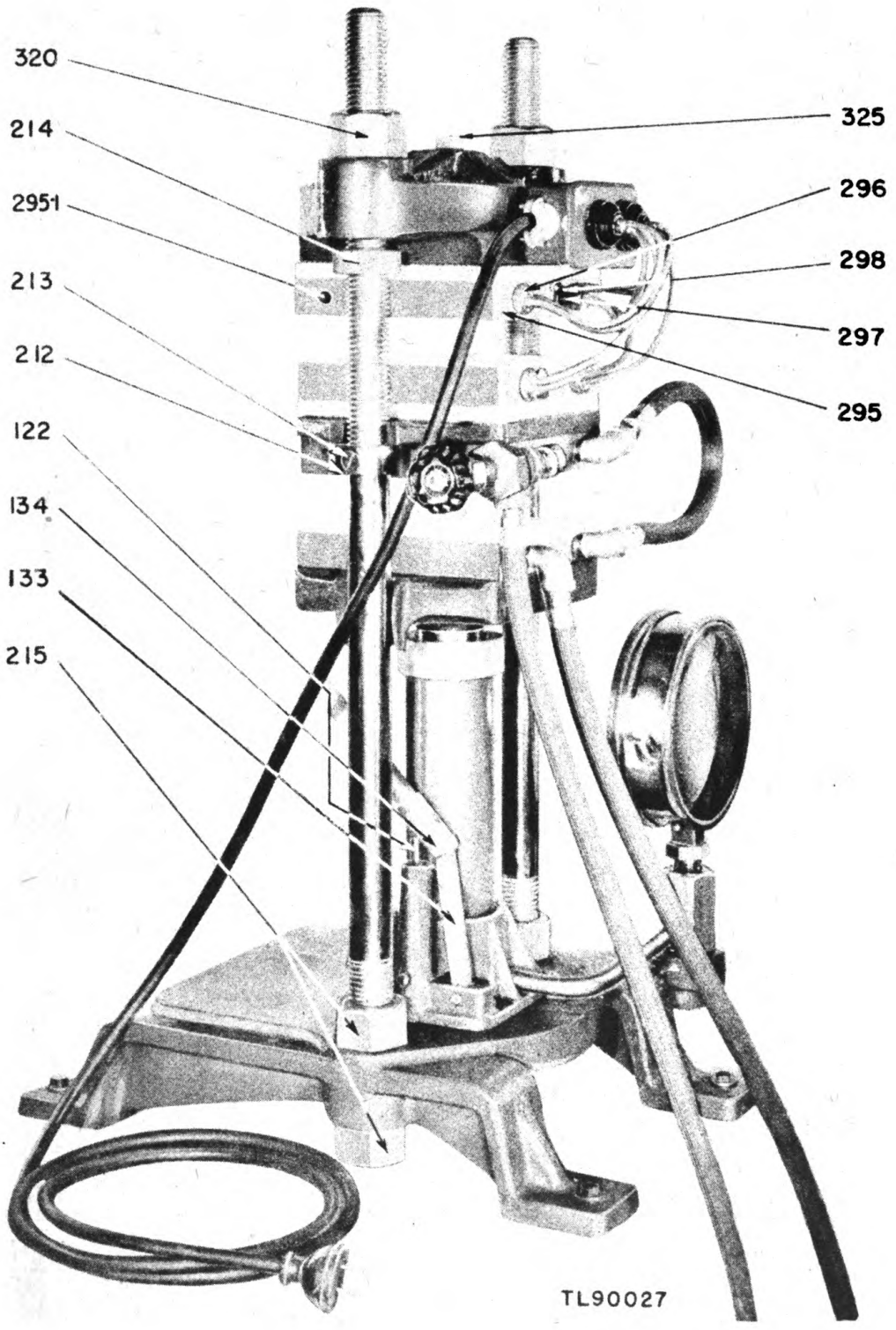

Figure 3. Press, side view.

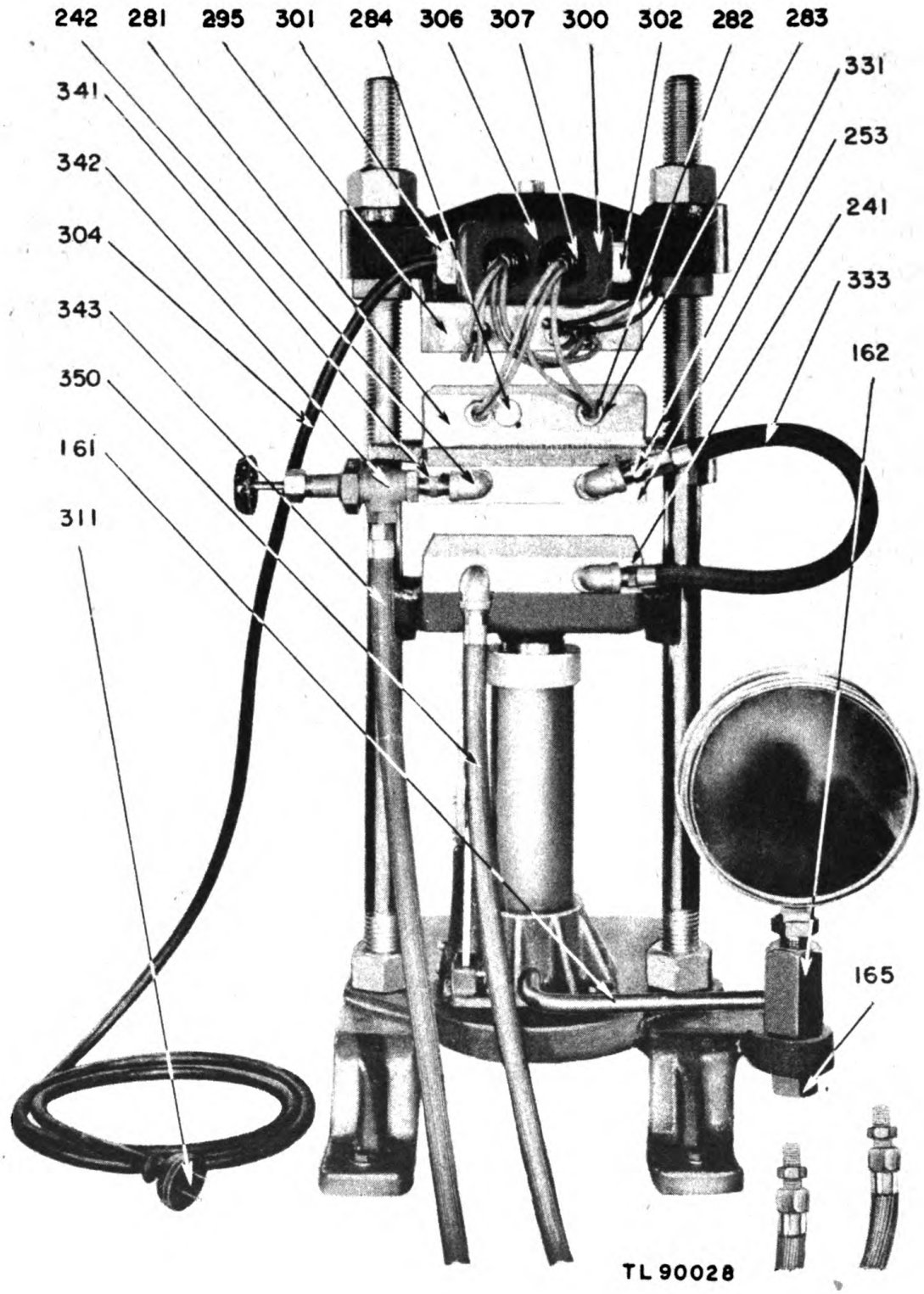

Figure 4. Press, back view.

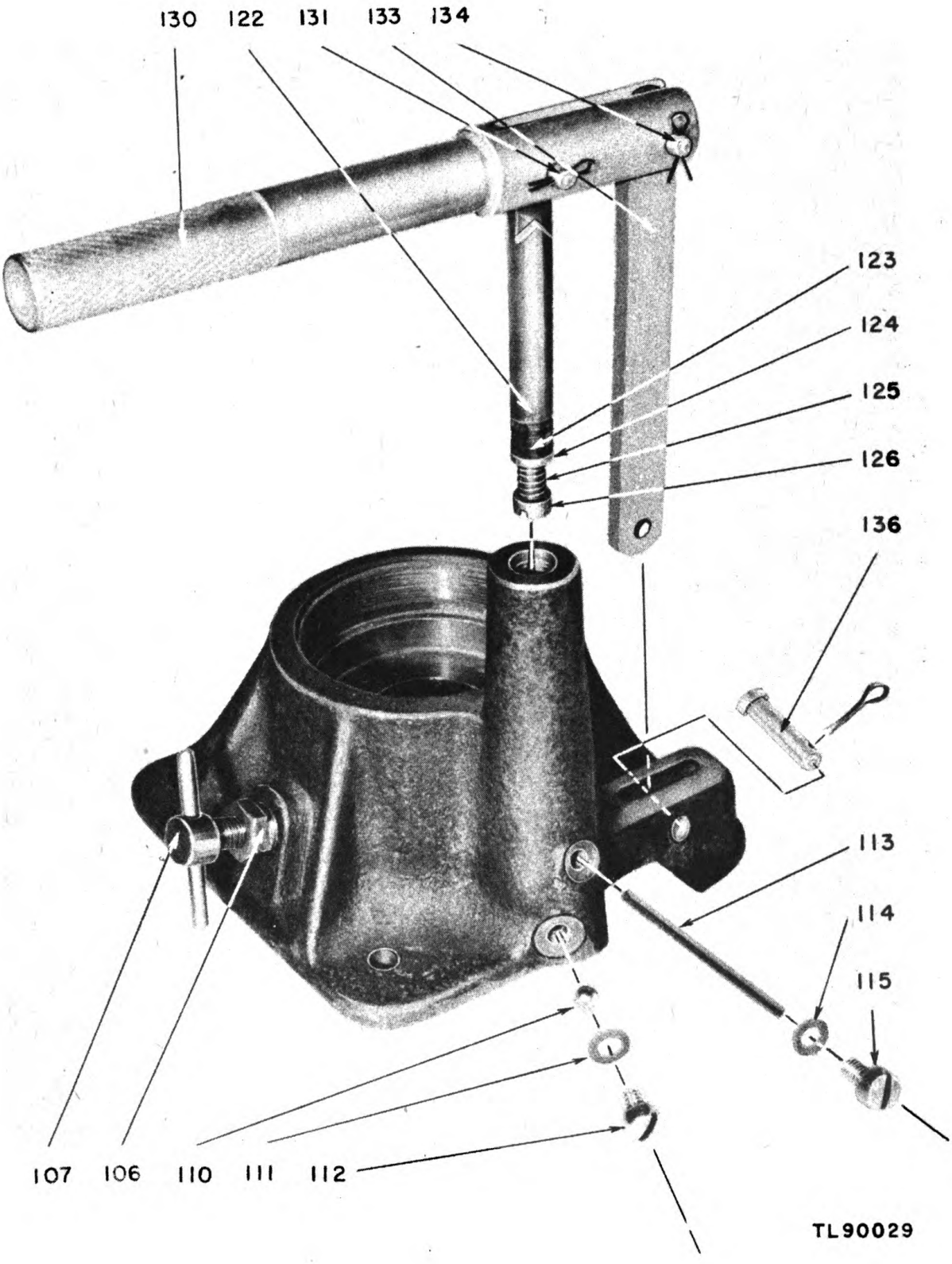

Figure 5. Cylinder and pump base unit.

tion (fig. 4, 161) is screwed into the rear of the cylinder and pump base. This connection carries oil from the cylinder base so that the pressure may be registered on the gauge.

(2) PUMP. This consists of a steel plunger (fig. 5, 122), 3/8 inch in diameter by 2 5/8 inches long. It is attached to the short pump lever, 130, 3/4 inch in diameter by 6 inches long, by a pump lever link pin, 131, and secured with a cotter pin. The pump-packing steel screw, 126, in the bottom of the plunger holds the steel pump-packing spring, 125, in place against the bronze pump-packing washer, 124, and the three pump packings, 123. The short pump lever is attached to the steel-pump lever link, 133, and the steel link pin, 134, is secured with a cotter pin. The pump lever link is attached to the base by a steel link pin, 136, which is secured with a cotter pin. As the pump lever is lifted, the plunger moves upward, causing the suction. This pulls the suction up against the suction-valve retainer, and permits the oil to be drawn up into the pump from the reservoir, through channel A (fig. 12). As the lever is lowered the plunger falls, forcing the suction valve to close channel A. The oil is then forced into channel C leading to the discharge valve.

(3) CYLINDER ASSEMBLY (fig. 6). The cylinder assembly consists of a steel cylinder case, 152, a cast iron cylinder cap, 200, a steel cylinder, 151, a steel ram, 145, a fibre ram gasket, 142, a steel discharge-valve retainer, 143, and a steel discharge valve, 141.

(a) The cylinder casing is 2 1/2 inches in diameter by 8 inches long, and screws into the cylinder and pump unit base, 103. This casing acts as a sleeve for the cylinder and as the outer wall of the reservoir.

(b) The cylinder cap rests on top of the cylinder casing, keeping out dirt and dust.

(c) The cylinder is 1 7/8 inches in diameter by 9 1/4 inches long. When the cylinder is not under hydraulic pressure it rests on a platform inside the cylinder casing. The cylinder moves upward under pressure so that the platen (fig. 2, 230), which rests on the 1-inch knob on top of the cylinder, is borne upward.

(d) The ram, which is 1 1/4 inches in diameter by 8 7/8 inches long, is screwed into the cylinder and pump unit base. This ram is grooved on the bottom so that it forms a tight fit against the fiber gasket (fig. 6, 142). The 1 1/4-inch brass section at the top of the ram has been designed to prevent any possibility of like metals *freezing*. The four holes at the bottom of this brass section merely act as vents for any slight seepage. This ram (fig. 8) has a leather cup-packing washer, 146, a leather cup packing, 147, a steel packing washer, 148, a steel spring washer, 149, and a brass packing nut, 150 on the top. This forms a cup to keep the oil in the cylinder and retains pressure until

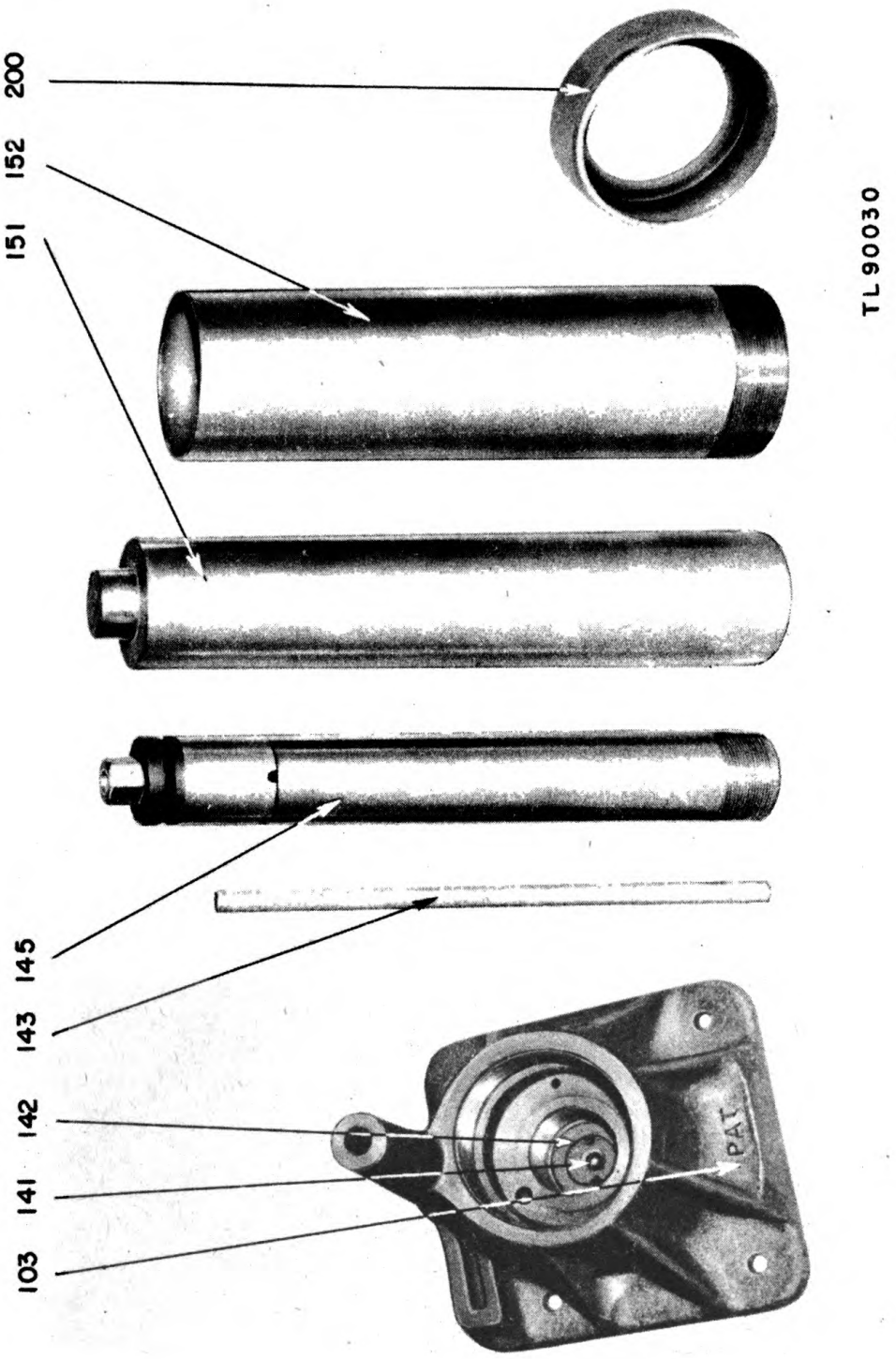

Figure 6. Cylinder assembly.

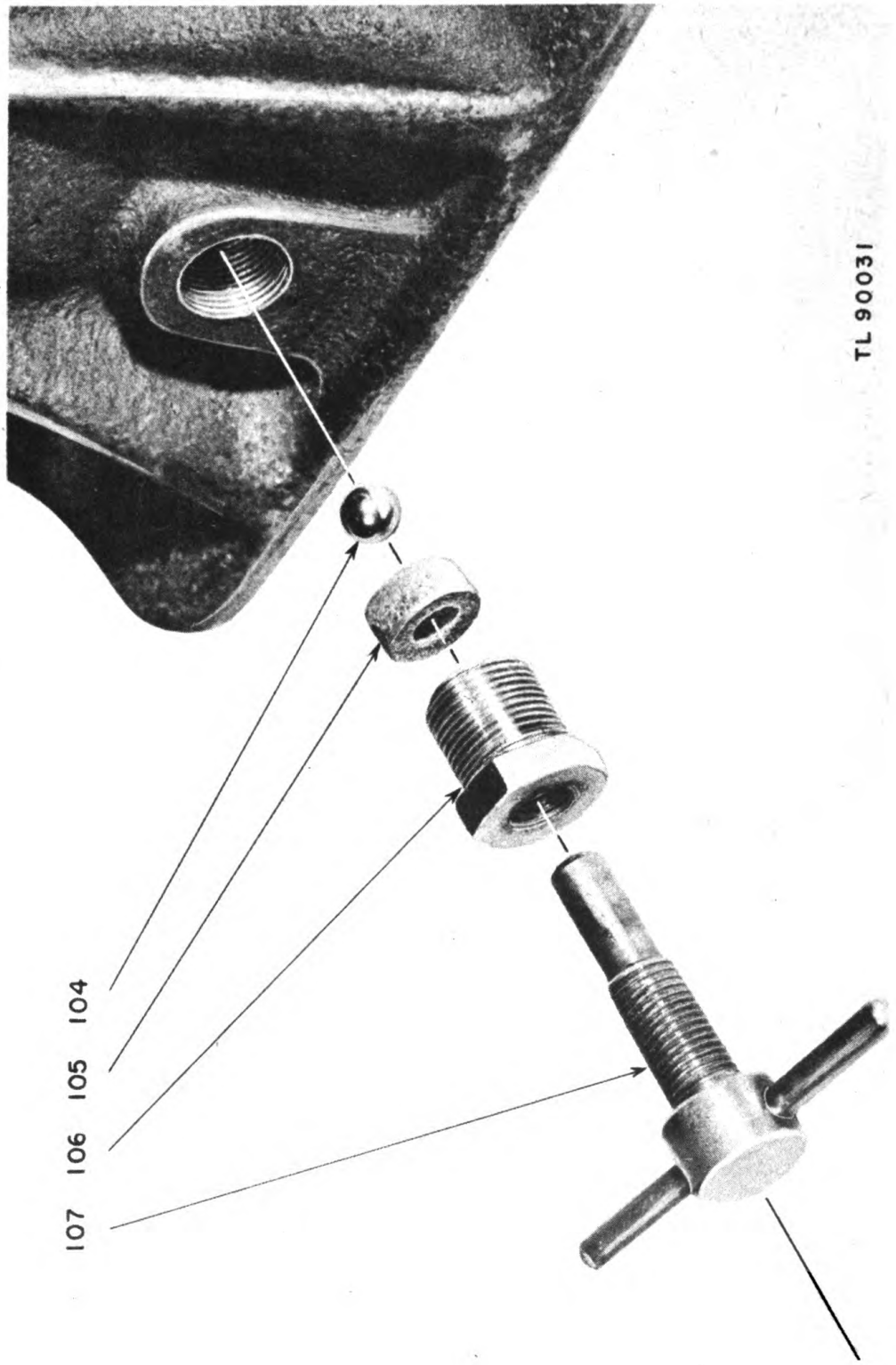

Figure 7. Release-valve assembly.

the release-valve screw (fig. 5, 107) is loosened.

(e) The fiber ram gasket is placed in the cylinder and pump base unit, so that the ram will fit tightly to avoid any possibility of seepage causing loss of pressure.

(f) The discharge-valve retainer (fig. 6, 143) rests on the discharge valve, inside the ram. This retainer is $\frac{5}{16}$ inch in diameter by 6⅝ inches long.

(g) The discharge valve is a ¼-inch steel ball, and rests in the opening to channel C (fig. 12), which carries oil forced through by the pump (par. 3 *c* (1)). The oil is forced out through this discharge valve, up through the ram, and out through the brass packing nut into the pressure cup. As the pressure is increased in the cup at the top of the ram, it forces the cylinder to move upward.

d. **Platen (fig. 2, 230).** The platen is a semisteel iron casting, 8¼ by 6⅛ by 1¾ inches, holding a cooling plate and acting as a distributor of the pressure exerted by the hydraulic action of the cylinder. This platen weighs 13.1 pounds, and has been designed so that it rests on a knob on the top of the cylinder. It is guided up and down on the columns by two metal projections.

(1) A cooling plate (fig. 2, 241) is made of Meehanite and measures 6 by 6 by 1 inch. It cools the stack of laminations. It is held on the platen by two steel dowel pins (fig. 17, 243).

(2) The plate is cooled by the cold water passing from the upper cooling plate (fig. 2, 253), through the connected hose (fig. 4, 333), and into the lower cooling plate. After the water has passed through the plate, it flows into the drain through the connected hose, 350.

e. **Support plate (fig. 1, 251).** A semisteel support plate measures 9¼ by 6⅛ by ½ inch. It serves as a separator between the hot and cold stacks of laminations. It has a hot plate on top and a cooling plate underneath. The hot plate holds one wire plate and three asbestos boards, 6 inches by 6 inches, to the support plate. The support plate has been designed so that it has two metal guides to rest against the columns. This plate is held in position on the columns by semicircular support collars (fig. 3, 212).

(1) The cooling plate (fig. 1, 253) is made of Meehanite and measures 6 by 6 by 1 inch. It cools the stack of laminations and is held on the support plate by a steel screw (fig. 17, 255) which extends from the middle of the support plate. The plate is cooled by cold water passing from the water supply through a connected hose (fig. 4, 343), through the plate and out to the lower cooling plate through a connected hose, 333.

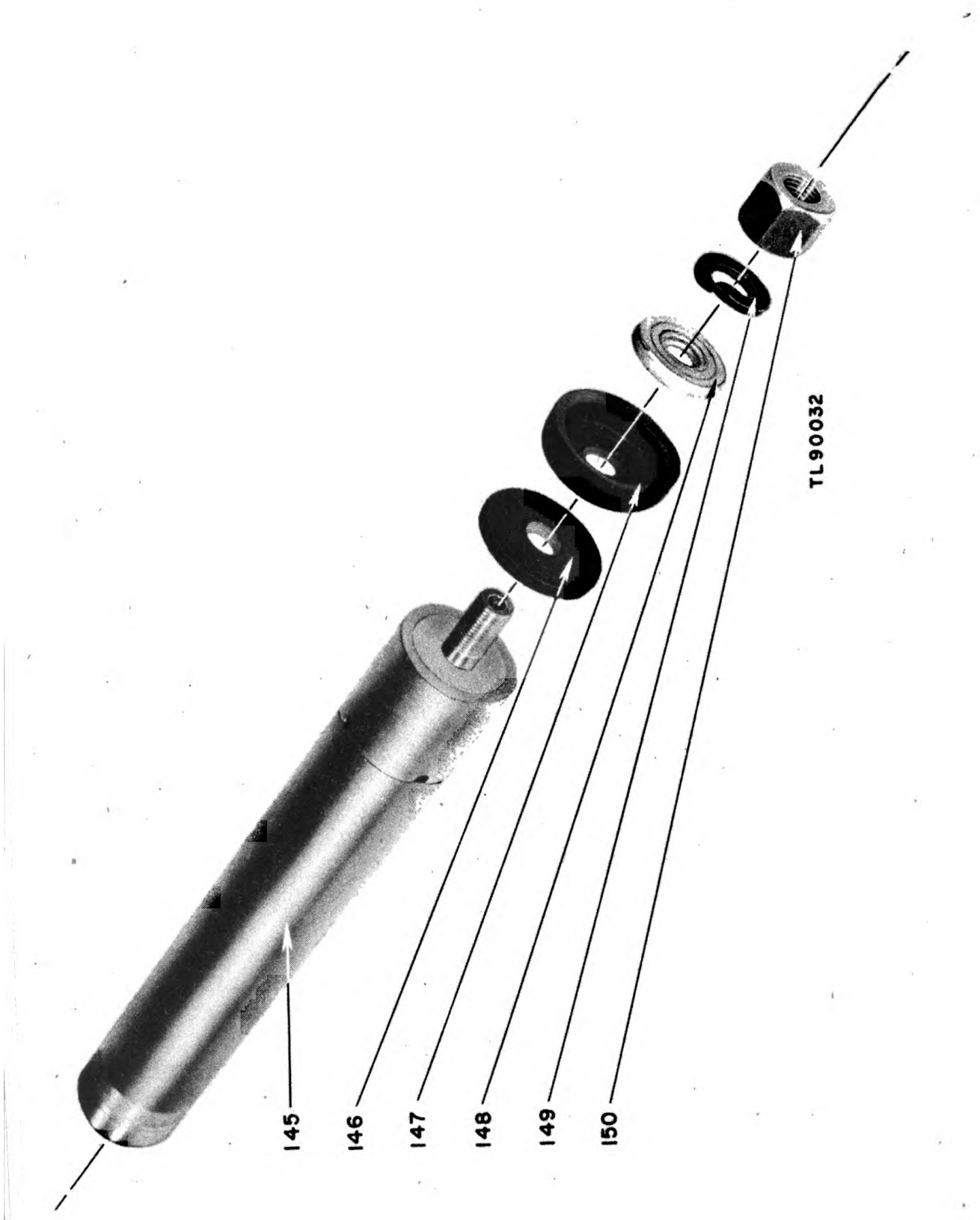

Figure 8. Ram assembly.

(2) The hot plate (fig. 1, 281) is also made of Meehanite and measures 6 by 6 by 1 inch. It heats the stack of laminations and is held on the support plate by two steel dowel pins (fig. 17, 285). This plate is heated by the two cartridge heating units (fig. 4, 282), operated simultaneously with the cartridge heating units, 282, in the upper hot plate. The heat is controlled by the thermoswitch (fig. 3, 297), located in the upper hot plate. These cartridge heating units are connected to the outlet box (fig. 4, 300).

f. **Head (fig. 2, 291).** The head acts as a stop for the material, the plates, and the platen, which are forced upward by the hydraulic action of the cylinder. It is made of semi-steel, measures 10⅞ by 6 by 3 inches, and is designed so one lug on each side fits over the columns, 211. It is supported on the columns by the round, steel, knurled column nuts (fig. 3, 214) and held tight by the steel hexagon nuts, 320. A steel holding screw (fig. 3, 325) extending through the head holds wire plate (fig. 2, 292), three asbestos boards, 293, and a hot plate, 295, to the bottom of the head.

(1) The hot plate (fig. 2, 295) heats the stack of laminations. It is made of Meehanite, measures 6 by 6 by 1 inch, and is heated by the two cartridge heating units (fig. 4, 282) operated simultaneously with the heating units in the lower hot plate.

(2) The heat is controlled by the thermoswitch (fig. 3, 297), which is adjusted by the thermoswitch screw, 298.

4. GAUGE (fig. 1, 361). The gauge indicates the total pressure load in the hydraulic system by the indicating hand, 362. It is made of cast iron, steel, and brass, and measures 8½ by 6⅜ by 2 inches. It has two rows of figures. The inner row, ranging from 0 to 20,000, is the *only* row to be considered. *Totally disregard the outside row of figures.* The face of the gauge is covered by a glass, 364, held in place by the metal rim, 365.

5. LONG PUMP LEVER. (fig. 1, 370). This lever is used on both the release valve and the pump. It is made of steel and measures $\frac{13}{16}$ inch in diameter by 20 inches in length. The lever is knurled on one end to give a good grip; the other end is slotted to fit the pin handle of the release-valve screw (fig. 2, 107). It fits over the short pump lever (fig. 5, 130), and gives greater leverage to produce more pressure.

6. THERMOMETER (fig. 1, 380). The thermometer checks the temperature of the hot plates. It may be inserted in either hole (fig. 1, 281-1) or hole (fig. 3, 295-1). After checking the temperature, remove the thermometer from the press and hang by its ring in a safe place.

7. BLOTTERS (fig. 1, 410). The fifty blotters each measure 5 by 6 inches. When making up a stack of identification cards for laminating place

Figure 9. Model 20 corner rounder.

Figure 10. Corner rounder, with shearing unit removed.

two blotters between the holding plates, 390, and the polished plates, 400. These blotters help to control the flow of heat and to equalize the pressure.

8. POLISHED PLATES (fig. 1, 400). There are 24 of these plates with each press, which measure 5 by 6 inches. They are made of steel and are double-polished to give a smooth polished surface to the finished laminated card. They are used between each layer of identification cards. Seven polished plates are required to each stack, so that it is possible to have one stack between the hot plates, one between the cooling plates, and another in state of preparation.

9. HOLDING PLATES (fig. 1, 390). Six of these plates are supplied with each press. One is used at the top and one at the bottom of each stack. They measure 6 by 7 inches and protrude beyond the hot and cooling plates, so that the holding clamps may be easily applied.

10. HOLDING CLAMPS (fig. 1, 420). Two clamps are furnished with each press. They are placed over the hot stack of laminations *before pressure is released,* so that they may be used as holders in removing the heated stack from the hot plates to the cooling plates. At the same time, they maintain the pressure required to assure proper adhesion of the acetate sheets.

> **NOTE:** The holding clamps should be kept with the press, so that they will not be lost.

11. MODEL 20 CORNER ROUNDER.

a. **General.** The Model 20 corner rounder (fig. 9) is a machine used to cut 1/4-inch radius corners in thermoplastic or similar material up to a thickness of 1/2 inch. Approximately 12 cards can be cut in one operation. The corner rounder is a self-contained unit of sheet metal and die cast metal, and is of rugged construction. Its weight is 4 1/4 pounds.

b. **Detailed description.** The corner rounder consists of a field housing (fig. 10, 1), 9 inches long, 4 1/2 inches wide, and 2 3/8 inches high. A 2 1/4-inch sliding panel (fig. 10, 5) in the rear of the field housing provides an outlet for cutting scraps. The field housing incorporates the working table, shearing handle, and shearing unit. The shearing unit is designed so it may be replaced easily if damaged. This eliminates supplying a complete corner rounder unit when replacement is necessary. The complete unit lifts out of the field housing by pressing a small lever under the shearing handle. This releases the shearing handle spring and allows the handle to raise, providing sufficient room for the unit to be removed.

c. **Parts.**

(1) The working table of nickel-plated die cast metal is mounted on the top of the field housing (fig. 10, 2).

(2) A friction plate of imitation leather 1¼ by 2½ inches (fig. 10, 7), is recessed in the working table. This holds material in position while cutting.

(3) Sheet metal guides mounted along the table edges of the cutter assist in centering material properly.

(4) An extension leaf the length of the field housing (fig. 10, 3) and an attached pivot increase the size of work surface. When not in use, it drops against side of field housing.

(5) The shearing handle is constructed of 18-gauge sheet steel (fig. 10, 4). It is pivot-mounted by a sheet metal bracket to the field housing. The guide handle rides against the cutting blade unit. A spring under the forepart of the handle raises it automatically after each operation.

(6) The shearing unit, constructed of sheet metal stampings and die castings (fig. 10, 6), is self-contained. Figure 11 illustrates shearing unit disassembled. It consists of five parts: an elliptical blade (fig. 11, 9) with a cutting edge ground at 45°, a safety guard (fig. 11, 8), a shearing unit housing (fig. 11, 15), a loop spring (fig. 11, 12), and a spring cover (fig. 11, 10).

12. MOTOR OIL. One quart of No. 10-W Motor Oil is supplied with each press. This is used to fill the cylinder casing.

> **CAUTION:** Capacity of the press is only ⅛ quart of oil. Pour oil slowly into cylinder casing. Do not let oil overflow.

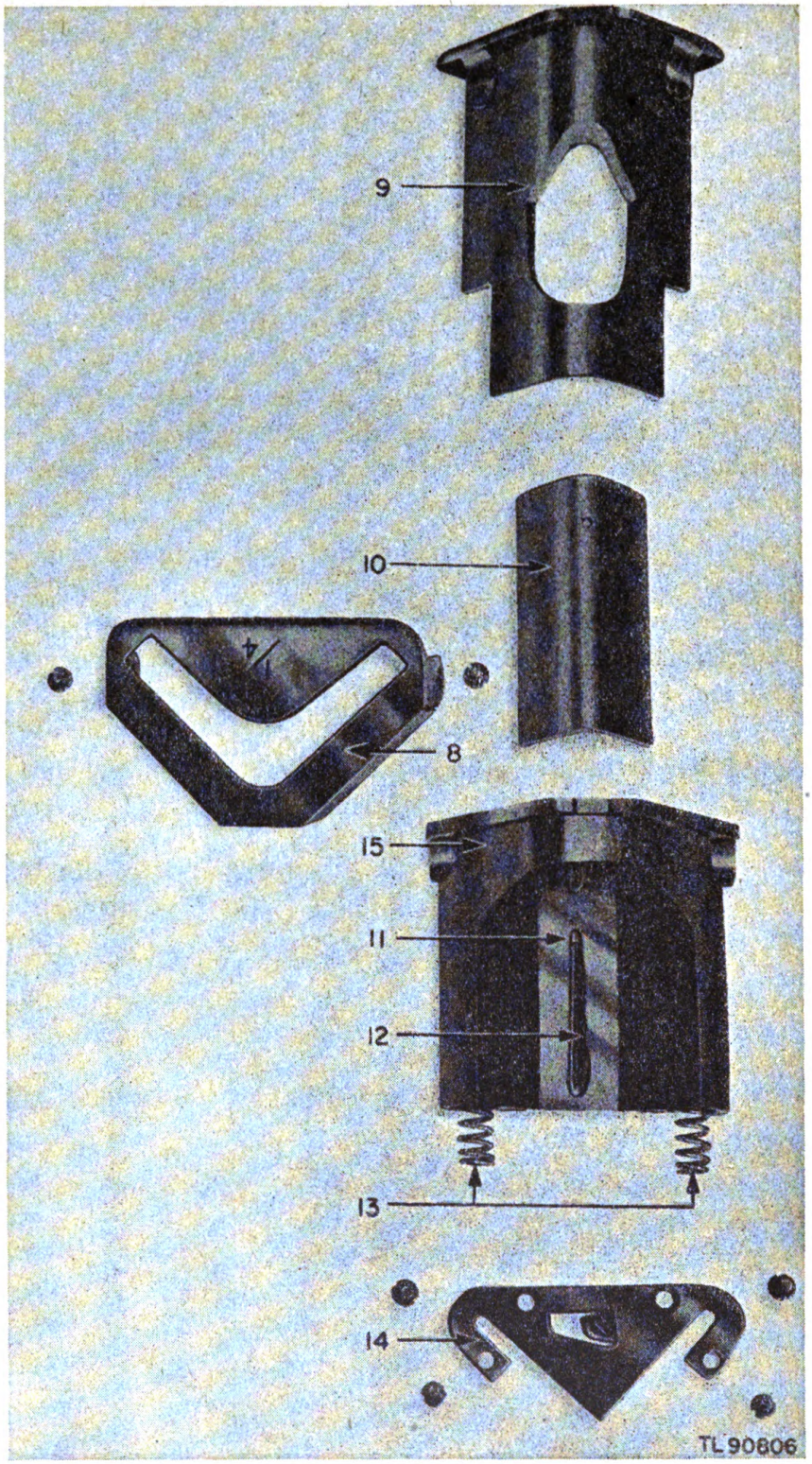

Figure 11. Shearing unit, disassembled.

SECTION II

INSTALLATION AND OPERATION

NOTE: Each press has been thoroughly checked and operated before shipping, so that traces of oil will be found in the press. All heating units have been checked, and the Thermoswitch adjusted so that no changes or adjustments should be necessary.

13. INSTALLATION.

a. Set the packing box on end so that the cleat is up. Unpack the laminating equipment carefully to avoid any possibility of breaking either the gauge or the thermometer. Follow this procedure:

(1) Remove long boards from the front.

(2) Remove the corrugated box containing the gauge and the thermometer and unpack carefully.

(3) Remove bracings.

(4) Remove the long pump lever from the package.

(5) Remove the press.

b. For convenience, set the press on a sturdy worktable about 28 to 30 inches high and with a top at least 24 by 30 inches. Set the table as near as possible to an electric outlet providing 110- or 115-volt alternating current only, a water supply, and a drain. There are four holes in the feet of the press for screws to fasten and locate the press on the table. However, the weight and balance of the press is sufficient to keep it upright when operated, so that the use of screws is not essential.

c. Before attaching the gauge, remove the paper plug from the gauge coupling (fig. 4, 162). Set the gauge into the coupling, and tighten it firmly with a square socket wrench. Do not use a Stillson wrench, as this will mar the hexagon nut on the bottom of the gauge. Do not turn the gauge by the case. The gauge should face and be parallel with the front of the press when it has been properly tightened. Each gauge has been installed and tested and should be ready for operation.

CAUTION: The $\frac{9}{16}$ inch gauge connection (fig. 4, 161) has been shellacked in position at the factory, and should not be touched except as a repair measure.

14. PREPARATION FOR USE.

a. **Filling (fig. 2).** The press is shipped with the cylinder casing empty. Fill it as follows:

NOTE: Use Engine Oil, S.A.E. 10.

(1) Disconnect the plugs, 307, from the outlet box, 300 (fig. 4).

(2) Turn up hexagon nuts (fig. 2, 320) as high as possible on the columns, 211.

(3) Raise the press head, 291, to meet the hexagon nuts, and hold it there by following up with the round knurled column nuts, 214.

(4) Lift and remove the lower hot plate, 281, from the support plate, 251.

(5) Remove the three asbestos boards, 270, and the wire plate, 260, from the support plate.

(6) Lift one side of the support plate (fig. 2, 251) until it can be removed from between the columns. Lift the lower cooling plate (fig. 2, 241) from the platen. Remove them simultaneously.

(7) Raise, tilt, and remove platen, 230, from the press.

(8) Remove the cylinder cap, 200.

(9) Tighten release-valve screw, 107.

NOTE: Always use the slotted end of the long pump lever, to avoid any possibility of stripping the threads.

CAUTION: Be sure the cylinder is all the way down before filling.

(10) Pour oil into the cylinder casing, 152, filling the casing within approximately 1 inch from the top.

CAUTION: Capacity of the press is only 1/8 quart of oil. Pour oil slowly into the cylinder casing. Do not let the oil overflow.

(11) Restore parts by reversing the procedure in which they were removed.

(12) Pump up the press, using the long pump lever; release by loosening release-valve screw, 107. Run the press up and down several times after filling to work out any air. It may be necessary to push the platen down by hand several times when the press is stiff and new.

b. **Adjustment (fig. 1).** The normal opening between the hot plates should be approximately 1½ inch. The head should be parallel with the platen. After getting the approximate location of the head, loosen the hexa-

gon nuts (fig. 2, 320); pump up the press so that the head rests on the support plate and the platen. Tighten the hexagon nuts, 320, and follow up with round knurled column nuts, 214.

c. **Cooling Plates (fig. 4; 241, 253).** Connect the hose, 343, from the valve, 342, to the cold water supply. Connect the hose, 350, from the lower cooling plate to the drain. Check to be sure that the valve, 342, is open, so that the water may pass into the upper cooling plate. The water is carried from the upper cooling plate to the lower cooling plate by a connected hose, 333. The water passes through the lower cooling plate and out into the drain through a connected hose, 350. A moderate stream of water is sufficient to keep the plates cool.

d. **Hot Plates (fig. 4; 281, 295).** Insert plug, 311, into the nearest electric outlet.

> **NOTE:** This press must be operated only on alternating current of 110 or 115 volts. It is rated at 1,140 watts.

Be sure to insert the plugs, 307, in the outlet box, 300. Allow the press to heat for approximately 25 minutes before checking with the thermometer. Insert the thermometer in either hole (fig. 1, 281-1) or hole (fig. 3, 295-1), and allow 5 minutes before checking. For proper lamination the thermometer should read approximately 340° F. Temperature can be lowered by turning the mill-slotted stud of the thermoswitch (fig. 3, 297) clockwise; temperature can be raised by turning it counterclockwise. A full turn of the screw changes the temperature approximately 70°. If it is necessary to make any adjustment, allow at least 10 minutes to elapse before checking with the thermometer as this will give sufficient time for the heat to stabilize.

e. **Acetate.** Best laminating results are obtained by storing the acetate in a place with average humidity; a hot, dry location has a tendency to dry the acetate and cause trouble in lamination.

15. OPERATION.

a. **Pressure Load.**

(1) Set the temperature of the press to range from 335° F. to 340° F.

(2) Apply 10,000 pounds pressure to the press.

b. **Stacks for lamination.** Refer to fig. 2 which illustrates a stack between the hot plates and one between the cooling plates. Prepare one stack for laminating, building up from the work table in the following sequence:

> **NOTE:** Always use the same area acetate for each layer in a stack. This insures equal distribution of pressure on acetate.

(1) One holding plate (fig. 1, 390).

(2) Two blotters, 410.

(3) One polished plate, 400.

(4) If the finished acetate card is to be small enough so that two may be placed on the polished plate at one time, lay the two pieces of acetate on the polished plate. If the desired card is too large to place two pieces of acetate on the polished plate at one time, however, place only one piece of acetate on the polished plate.

(5) Place identification card in the center of the acetate.

(6) Place acetate over the card, so that it is even with the acetate placed in the operation in subparagraph (4) above.

(7) One polished plate.

(8) Repeat steps in subparagraph (4) through (7) above until there are six layers of cards. Finish with one polished plate.

(9) Two blotters, 410.

(10) One holding plate, 390.

c. **Release-valve Screw.** Tighten the release-valve screw (fig. 2, 107) using the slotted end of the long pump lever.

d. **Procedure.** Place a stack of laminations prepared as directed in subparagraph *b* above between hot plates 295 and 281. Turn the holding plates so that the straight sides are at the front and back. Pump up the press quickly, using the short pump lever. As soon as it is tight, place the long pump lever (fig. 1, 370) over the short pump lever and pump until the hand on the gauge indicates the desired load (subparagraph *a* above) on the inner row of figures. Initially, it is always desirable to pump up a few hundred pounds over the computed load to compensate for immediate compression of blotters and acetate. Additional pumping to maintain pressure at correct level (subparagraph *a* above) may be done for the first 2 minutes of heating time, but should not be done after that time. Allow the stack of layers to remain under pressure for a period of time, determined by adding one to the actual number of layers in the laminating stack. For example: the time required to apply the pressure load of 10,000 pounds on six layers is seven minutes ($6 + 1 = 7$ minutes).

> **NOTE:** The pressure may fall as much as several hundred pounds below the desired pressure load, without cause for alarm. If it falls below this, re-tighten the release-valve screw.

e. **Transferring the Stack.** The two holding clamps (fig. 1, 420) are used to hold a stack of laminations firmly while it is being transferred from the hot plates to the cooling plates. Aside from the fact they make it more convenient to hold the stack of heated laminations, the use of the clamps is *essential* because they permit the maintenance, on the stacks, of the pressure required to assure proper bonding of the acetate sheets.

(1) Adjust the clamps for the thickness of the stack as follows:

(a) Hold the clamp tightly in one hand with the lever tight against the main body of the press.

(b) Back off the end screw by turning it in a counterclockwise (to the left) direction until the jaws of the clamp are far enough apart to be placed around the stack.

(c) Open the clamp lever.

(d) Place the clamp in position on the projecting side of the stack (fig. 2),

(e) Screw the end screw a half-turn or so in a clockwise (to the right) direction.

(f) Close the clamp by squeezing on the lever. The lever should snap up tightly against the main body of the clamp, grasping the stack in a firm grip. If it does not, adjust the end screw until it performs as specified above.

(2) Grip the stack with the two clamps, one at the center of each projecting side near the columns (fig. 2), making sure that the lever snaps tightly against the main body of the clamp.

(3) Loosen the release-valve screw to relieve the pressure. When the platen has lowered to the bottom of its travel, close the release valve tightly using the slotted end of the long pump lever, remove the hot stack, by the clamps, to the cooling plates and leave there for the same period of time the stack was left between the hot plates, under pressure of 10,000 pounds.

CAUTION: Do not remove the clamps at this point.

(4) Place a fresh stack between the hot plates.

(5) Pump up the pressure (par. *d* above). When the full pressure has been reached, remove the clamps by loosening the lever.

f. **Procedure:** When the new stack has been subjected to the proper heat and pressure for the proper time (subpar. *d* above), repeat the procedure outlined in paragraph *e,* with the following exception: After the clamps have been applied to the hot stack, and after the platen has lowered to its original position, the cooled stack should be removed from the cooling plates before transferring the stack in process from the hot plates to the cooling plates.

g. **Using the Corner Rounder.** A housing plate (fig. 11, 11) is held against the blade by the loop spring (fig. 11, 12). The cutting blade is returned to its initial position by two coil springs (fig. 11, 13) which are held in position by the end plate (fig. 11, 14).

(1) Place material to be cut in position on friction plate.

(2) Center by aid of guides previously described.

(3) Press down the shearing handle, forcing the self-sharpening cutting blade along the slotted shearing unit. This cuts the material.

CAUTION: A safety guard prevents the operator from coming in direct contact with the blade and must not be removed.

SECTION III

FUNCTIONING OF PARTS

16. PRINCIPLES OF OPERATION. The purpose of the laminating press is to laminate identification cards between sheets of acetate.

a. The acetates are laminated by fusing them under pressure between two hot plates, and by cooling them under pressure between the cooling plates. The pressure is obtained by the cylinder forcing the platen against the head. The cylinder rises by the hydraulic action of the oil forced by the pump.

b. As the lever of the pump is raised upward, the plunger will be pulled up (fig. 12). As this plunger travels upward it creates a vacuum or suction in the pump base. The suction valve, 110, is drawn upward, so that oil channel A is open, permitting oil to be drawn up into the pump base. When the lever is lowered, the plunger falls so that the suction valve returns to close oil channel A. The oil displaced by the plunger is forced into the channel C and out through the discharge valve, 141, into the ram, 145. As the lever is raised and lowered the pressure in the ram is increased so that the oil is forced out through the top of the ram into the cup, 147. The pressure created in the top of the cup forces the cylinder to move upward. The pressure is released by loosening the release-valve screw (fig. 2, 107).

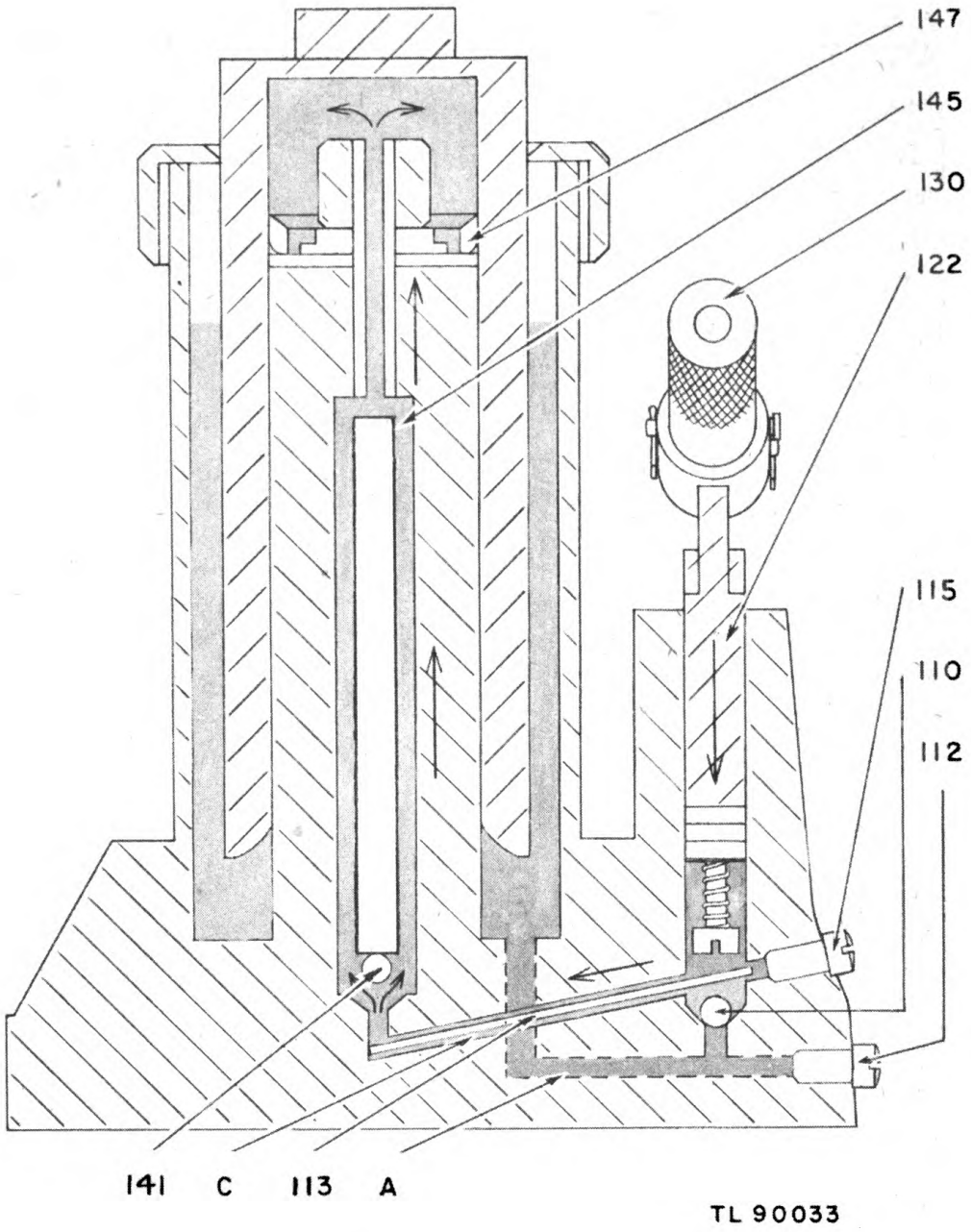

Figure 12. Schematic drawing of oil flow.

SECTION IV

MAINTENANCE

Unsatisfactory performance of this equipment will be reported immediately on W.D. A.G.O. Form No. 468. If form is not available, see TM 38-250.

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17. GENERAL. Laminating Equipment PH-523/GF has been constructed and designed so that with proper care, little or no maintenance is required.

18. INSPECTION.

a. **Pressure.** Tighten release valve (fig. 2, 107), using the slotted end of the long pump lever (fig. 1, 370). Pump up the press with the short lever (fig. 2, 130) until platen, 230, is tight against the support plate, 251, and the head, 291. Place the long pump lever over the short lever and pump so that the pressure on the gauge registers at least 6,000 pounds. Check to be sure that this pressure is held at approximately 6,000 pounds for 7 minutes. If the pressure falls in the first 2 minutes due to the compression of the blotters, apply additional pressure to bring it back up to 6,000 pounds. Do not pump after the first 2 minutes. If the pressure falls below 5,000 in 5 minutes, refer to the trouble and remedy chart in paragraph 32.

b. **Lamination.** In checking the lamination, it has been found that one blotter is equivalent to one layer of cards and acetate. Make a trial stack as instructed in paragraph 15 *b,* substituting one blotter for each layer of acetate and cards, except in the center of the stack. In center laminations use acetate and cards as outlined in paragraph 15. Figure the desired pressure load, following instructions in paragraph 15 *a.* Place the stack in the press and pump up the pressure (par. 15 *d*). After 7 minutes of applied pressure place clamps over the stack (fig. 2), loosen the release-valve screw, 107, and tighten this screw as soon as the platen has returned to its lowest position. Then remove the stack from the hot plates and place between the cooling plates, pump up pressure to the desired load, and remove the stack after 7 minutes and check. If the card is not smooth, refer to the trouble and remedy chart in paragraph 32.

19. LUBRICATION. See paragraph 14 *a* for procedures in filling the cylinder casing, and paragraph 31 for procedures in cleaning, flushing, draining, and refilling.

20. MOISTUREPROOFING AND FUNGIPROOFING. Moistureproofing and fungiproofing will not be required for this equipment.

21. REPLACEMENT OF HEATING UNITS.

a. **Removal.** Remove heating units in the following manner:

(1) Remove the plugs, 307, from the outlet box, 300 (fig. 4).

(2) Remove the insulating cover from the plugs, 307.

(3) Disconnect the heating unit lead wires from the plug.

(4) Separate the soldered lead wires.

(5) Unscrew the cartridge retainer bushing, either 296 (fig. 3) or 283 (fig. 4), and pull it off over the wires.

(6) Remove the heating unit from the hot plate.

b. **Replacement.** Replace heating units in the following manner:

(1) Place the new cartridge heating unit in position in the hot plate.

(2) Thread the heating unit lead wires through the cartridge retainer bushing. Screw bushing into position in the hot plate.

(3) Solder the lead wires together as they were.

> **NOTE:** The cartridge heating units in each hot plate are connected in parallel through one plug. The two sets of cartridge heating units are connected in a series with the thermoswitch by the internal wiring in the outlet box.

(4) Connect the heating unit wires to the plug.

(5) Replace the insulating cover on the plug.

(6) Insert the plug into the outlet box.

22. REPLACEMENT OF THERMOSWITCH.

a. **Removal.** Remove thermoswitch (fig. 3, 297) in the following manner:

(1) Remove the thermoswitch screw, 298.

(2) Remove the thermoswitch.

(3) Remove screw (fig. 14, 308) from the center of the outlet box, 300, and remove the cover, 306.

(4) Remove the two screws, 309, from the duplex receptacle (fig. 14, 303).

(5) Remove the two screws (fig. 14, 310) from the bottom of the outlet box.

(6) Loosen the two screws in the twin screw connector, 301, so that the connecting cord may easily be moved back and forth.

(7) Remove the solderless wire connector, 305, covering the union of the one wire from the thermoswitch and one wire from the connecting cord.

(8) Pull these two wires apart.

(9) Disconnect the one thermoswitch wire from the duplex receptacle.

(10) Discard the worn thermoswitch.

b. **Replacement.** Replace thermoswitch in the following manner:

(1) Thread the lead wires from the new thermoswitch through the porcelain bushing, 302, into the outlet box.

(2) Connect one thermoswitch wire to the duplex receptacle.

(3) Connect the other thermoswitch wire to the one wire of the connecting cord, covering the union with the solderless wire connector. If no solderless wire connector is available, cover this union with any standard electrician's tape.

(4) Tighten the two screws in the twin screw connector.

(5) Replace the outlet box by replacing the two screws in the bottom of the box.

(6) Replace the two screws in the duplex receptacle.

(7) Replace cover and screw in the center of the cover.

(8) Place the thermoswitch in position in the hot plate.

(9) Replace the thermoswitch screw.

23. REPLACEMENT OF CONNECTING CORD.

a. **Removal.** Remove the connecting cord in the following manner:

(1) Remove the screw (fig. 14, 308) from the cover of the outlet box.

(2) Remove the cover, 306.

(3) Remove the two screws, 309 from the duplex receptacle.

(4) Loosen the two screws in the twin screw connector, 301.

(5) Remove the solderless wire connector, 305, and separate the wires.

(6) Remove the other connecting cord wire from the duplex receptacle.

(7) Remove the plug, 311, from the old cord and place on the new cord.

b. **Replacement.** Replace new connecting cord in the following manner:

(1) Remove the old cord and pull the new cord through the twin screw connector.

(2) Connect one wire of the connecting cord to the duplex receptacle and the other wire to the thermoswitch wire, covering the latter union with the solderless wire connector.

(3) Replace the two screws in the duplex receptacle.

(4) Tighten the two screws in the twin screw connector.

(5) Replace the cover on the outlet box.

(6) Replace the screw in the center of the cover.

24. MINOR REPAIRS. Minor repairs and replacement for upkeep of equipment are given in the following paragraphs. These instructions are based on the assumption that a square socket wrench and a standard pair of small pliers are available.

25. REPLACEMENT OF UPPER HOT PLATE.

a. **Removal.** Remove the upper hot plate in the following manner:

(1) Unscrew the cartridge retainer bushings (fig. 3, 296) and remove the cartridge heating units.

(2) Remove the thermoswitch screw, 298.

(3) Remove the thermoswitch, 297.

(4) Loosen screw, 325, so that the hot plate may be removed.

b. **Replacement.** Reassemble the upper hot plate in the following manner:

(1) Replace the hot plate.

(2) Tighten screw, 325.

(3) Remove the cover cap (fig. 4, 284) by prying it off with a screwdriver. The hot plates are reversible, but this sover cap is removed only when the plate is used on the head.

(4) Insert the thermoswitch.

(5) Replace the thermoswitch screw.

(6) Insert the cartridge heating units.

(7) Tighten the cartridge retainer bushings.

26. REPLACEMENT OF LOWER HOT PLATE.

a. **Removal.** Remove the lower hot plate in the following manner:

(1) Unscrew the cartridge retaine r bushing (fig. 4, 283).

(2) Remove the cartridge heating units, 282.

(3) Remove the lower hot plate.

(4) Remove the dowel pins (fig. 17, 285), using any small pliers.

b. **Replacement.** Reassemble the lower hot plate in the following manner:

(1) Replace the dowel pins in the new plate.

(2) Set the plate in position on top of the asbestos boards.

(3) Replace the cartridge heating units.

(4) Tighten the cartridge retaining bushings.

27. REPLACEMENT OF UPPER COOLING PLATE.

a. **Removal.** Remove the upper cooling plate in the following manner:

(1) Disconnect the short connected hose (fig. 4, 333) from the street ell, 242.

(2) Unscrew and remove the double male adapter, 341.

(3) Disconnect plugs, 307, from the outlet box, 300.

(4) Lift and remove the lower hot plate, 281, the three asbestos boards, 270, and remove the wire plate (fig. 1, 260) from the support plate.

(5) Remove the screw (fig. 17, 255), thus freeing the upper cooling plate.

(6) Remove the cooling plate.

(7) Unscrew and remove the two street ells (fig. 4, 242).

b. **Replacement.** Reassemble the upper cooling plate in the following manner:

(1) Place the street ells in position in the new plate and tighten them.

(2) Hold the cooling plate in position against the support plate and tighten

the screw extending down through the center of the support plate.

(3) Replace the wire plate, the three asbestos boards, and the lower hot plate on the support plate.

(4) Insert the plugs in the outlet box.

(5) Screw the double male adapter into the street ell.

(6) Screw the short connected hose into the street ell.

28. REPLACEMENT OF LOWER COOLING PLATE.

a. **Removal.** Remove the lower cooling plate in the following manner:

(1) Unscrew and remove the short connected hose (fig. 4, 333).

(2) Unscrew and remove the long connected hose, 350.

(3) Lift the cooling plate off the platen.

(4) Remove the dowel pins (fig. 17, 243) from the cooling plate, using any small pliers.

(5) Remove the street ells (fig. 4, 242).

b. **Replacement.** Reassemble the lower cooling plate in the following manner:

(1) Insert the dowel pins in the new cooling plate.

(2) Set the cooling plate on the platen so that the dowel pins fit into the holes provided.

(3) Replace the street ells.

(4) Replace the long connected hose.

(5) Replace the short connected hose.

29. REPLACEMENT OF GAUGE GLASS.

a. **Removal.** Remove the gauge glass in the following manner:

(1) Turn the rim on the gauge counterclockwise and remove.

(2) Turn the collar on the inside of the rim clockwise and remove.

(3) Remove the felt ring.

(4) Remove the glass.

b. **Replacement.** Replace the gauge glass in the following manner:

(1) Place new glass in position in the bezel.

(2) Replace the felt ring.

(3) Replace the collar.

(4) Replace the rim.

NOTE: In changing the glass on the gauge, *do not touch* either the hand or the face.

30. REPLACEMENT OF WASHERS AND PACKINGS.

NOTE: Spare packings and washers are supplied with each press.

a. Replace gauge coupling washers (fig. 13; 163, 164) in the following manner:

(1) Loosen and remove the gauge (fig. 1, 361), using a square socket wrench.

(2) Remove and replace the washers with new ones. Be sure to have the leather washer underneath the fiber washer.

(3) Replace and tighten the gauge with a square socket wrench. If the gauge does not face the front when tightened, remove it and replace the leather washer with another.

NOTE: Do not turn the gauge by the case.

b. Replace discharge-valve screw washer (fig. 5, 114) in the following manner:

(1) Remove the discharge-valve screw, 115.

(2) Remove and replace the washer.

(3) Replace the discharge-valve screw.

c. Replace suction-valve screw washer, 111, in the following manner:

(1) Remove the suction-valve screw (fig. 2, 112).

(2) Remove the old washer and replace it with a new one.

(3) Replace the suction-valve screw.

d. Replace release-valve packing washer (fig. 7, 105) in the following manner:

(1) Remove the release-valve nut (fig. 7, 106) with the release-valve screw in position.

(2) Back the release-valve screw out of the release-valve nut about ½ inch.

(3) Remove the old washer.

(4) Place the new washer over the end of the release-valve screw.

(5) Replace the release-valve nut with the release-valve screw and washer in position.

e. Replace the pump packing in the following manner:

(1) Remove the cotter pin at the base of the lever link (fig. 5, 133).

(2) Remove the link pin, 136.

(3) Raise the pump lever as high as possible.

(4) Lift the pump lever, pulling the pump plunger, 122, out of the base.

(5) Release the pump-packing screw, 126, with the pump packings in place.

(6) Remove the three pump packings, 123, from the pump-packing screw. To prevent loss, hold one hand over the pump-packing spring, 125, and the pump-packing washer, 124.

(7) Place the pump packings on the screw.

(8) Replace the pump plunger packing screw on the pump plunger.

(9) Place the pump plunger in the pump base and drive down, so that the pump lever link will line up with the hole in the pump base, and so that link pin can be replaced.

(10) Replace the cotter pin.

NOTE: The pump packings are special impregnated packings. Do not use ordinary leather washers.

f. Replace the ram gasket only as a last resort. Flush the entire system (par. 31), and force a wire in the opening for the discharge-valve screw (fig. 5, 115). Then check to be sure that it is absolutely necessary to replace the ram gasket. If it is *necessary* to replace the ram gasket, follow this procedure:

(1) Drain the oil (par. 31).

(2) Remove the plugs (fig. 4, 307) from the outlet box, 300.

(3) Unscrew and remove the hexagon nuts (fig. 2, 320).

(4) Lift and remove head, 291, and the upper hot plate assembly, without detaching it from the head.

(5) Lift the lower hot plate, 281, the three asbestos boards, 270, and the wire plate, 260. Remove them from the support plate, 251.

(6) Tilt and remove the support plate with the upper cooling plate attached and at the same time, remove the lower cooling plate.

(7) Remove the platen, 230.

(8) Remove the cylinder cap, 200.

(9) Place a few drops of alcohol around the base of the cylinder casing to loosen the shellac.

(10) Unscrew and remove the cylinder casing, 152.

(11) Pull the cylinder, 151, and remove it.

(12) Unscrew and remove the ram (fig. 6, 145), taking care to leave the discharge valve, 141, in position, and to lay the discharge-valve retainer, 143, to one side.

(13) Remove the old ram gasket, 142, and place the new ram gasket in position.

(14) Replace the discharge-valve retainer.

(15) Replace the ram.

(16) Replace the cylinder.

(17) Place a few drops of shellac around the threads of cylinder casing.

(18) Replace the cylinder casing, screwing it tightly into the cylinder unit base.

(19) Fill the cylinder casing, within 1 inch of the top with oil.

(20) Replace the cylinder cap.

(21) Replace the platen.

(22) Replace the lower cold plate and at the same time replace the assemblies with the support plate.

(23) Replace the head and the assembly attached.

(24) Replace and tighten the hexagon nuts.

(25) Insert the plugs in the outlet box.

g. Replace ram cup packing washer and the ram cup backing washer in the following manner:

(1) Remove plugs (fig. 4, 307) from the outlet box, 300.

(2) Lift the lower hot plate, 281, the three asbestos boards (fig. 1, 270) and the wire plate, 260 Remove them from the support plate, 251.

(3) Tilt and remove the support plate with the upper cooling plate attached, and the lower cooling plate simultaneously.

(4) Remove the platen (fig. 2, 230).

(5) Remove the cylinder cap, 200.

(6) Pull the cylinder, 151, upward and remove it.

(7) Remove the ram-packing nut (fig. 8, 150).

(8) Remove the spring washer (fig. 8, 149).

(9) Remove the ram-packing washer (fig. 8, 148).

(10) Remove and replace the ram cup packing, 147, and the ram-backing washer, 146.

(11) Replace the ram-packing washer with grooves down against the packing.

(12) Replace the spring washer.

(13) Replace and tighten the ram packing nut.

(14) Place the cylinder over the ram and push it down to position.

(15) Replace the cylinder cap.

(16) Replace the platen.

(17) Replace the support plate with the upper cooling plate and, at the same time place the lower cooling plate on the platen.

(18) Replace the wire plate, the three asbestos boards, and the lower hot plate on the support plate.

(19) Insert the two plugs (fig. 4, 307) into the outlet box.

31. FLUSHING.

a. **Procedure.** Flush the entire hydraulic system in the following manner:

(1) Remove the gauge (fig. 1, 361).

(2) Tilt the press so that the oil may be caught in a container.

(3) Pump up for approximately one minute to force out excess oil.

(4) Place any convenient cover over the opening in the gauge coupling.

(5) Fill the press with Solvent, dry cleaning, following directions in paragraph 14 *a.*, (1) through (10).

(6) Pump up the press. In doing this remove the cover from the top of the gauge coupling for an instant, to be sure that the oil flows freely from that point.

(7) Replace the cover on the gauge coupling.

(8) Pull up and remove the cylinder.

(9) Pump to be sure the oil spurts up through the ram packing nut.

(10) Replace the cylinder.

(11) Remove the cover from the gauge coupling.

(12) Tilt the press so that the Solvent, dry cleaning, may be caught in a container.

(13) Pump up the press to remove any excess flushing fluid.

b. **Replacement and Refilling.**

(1) Replace the gauge.

(2) Fill the press with oil, following the directions given in paragraph 14 *a.* (10) through (12) and in paragraph 14 *b.*

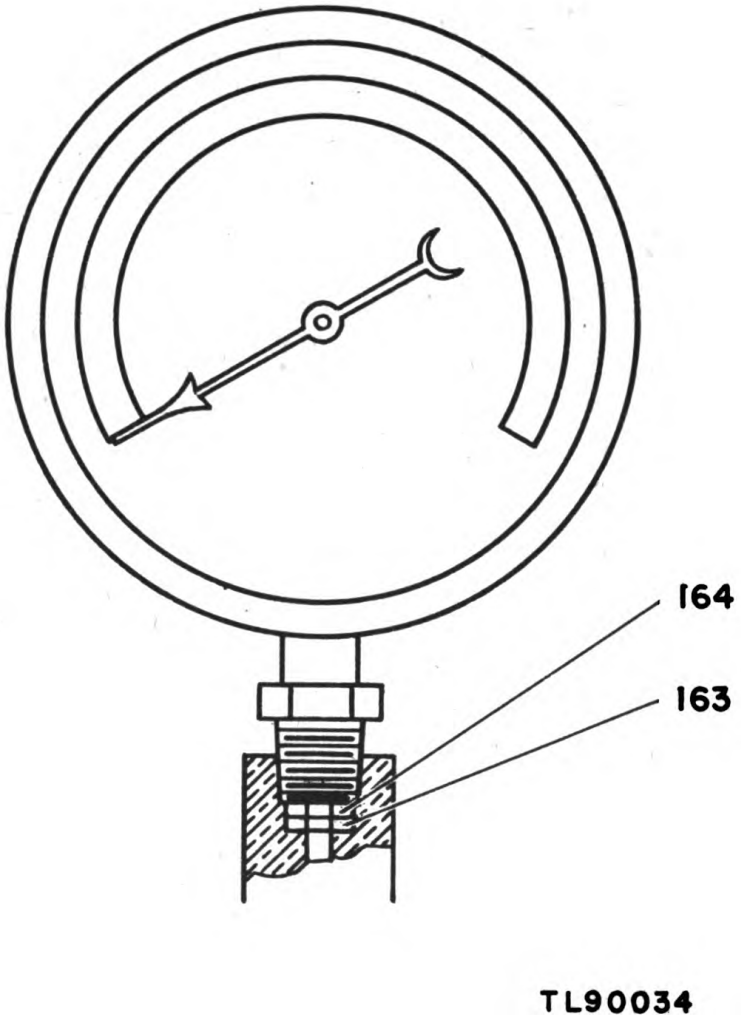

Figure 13. Schematic drawing of gauge.

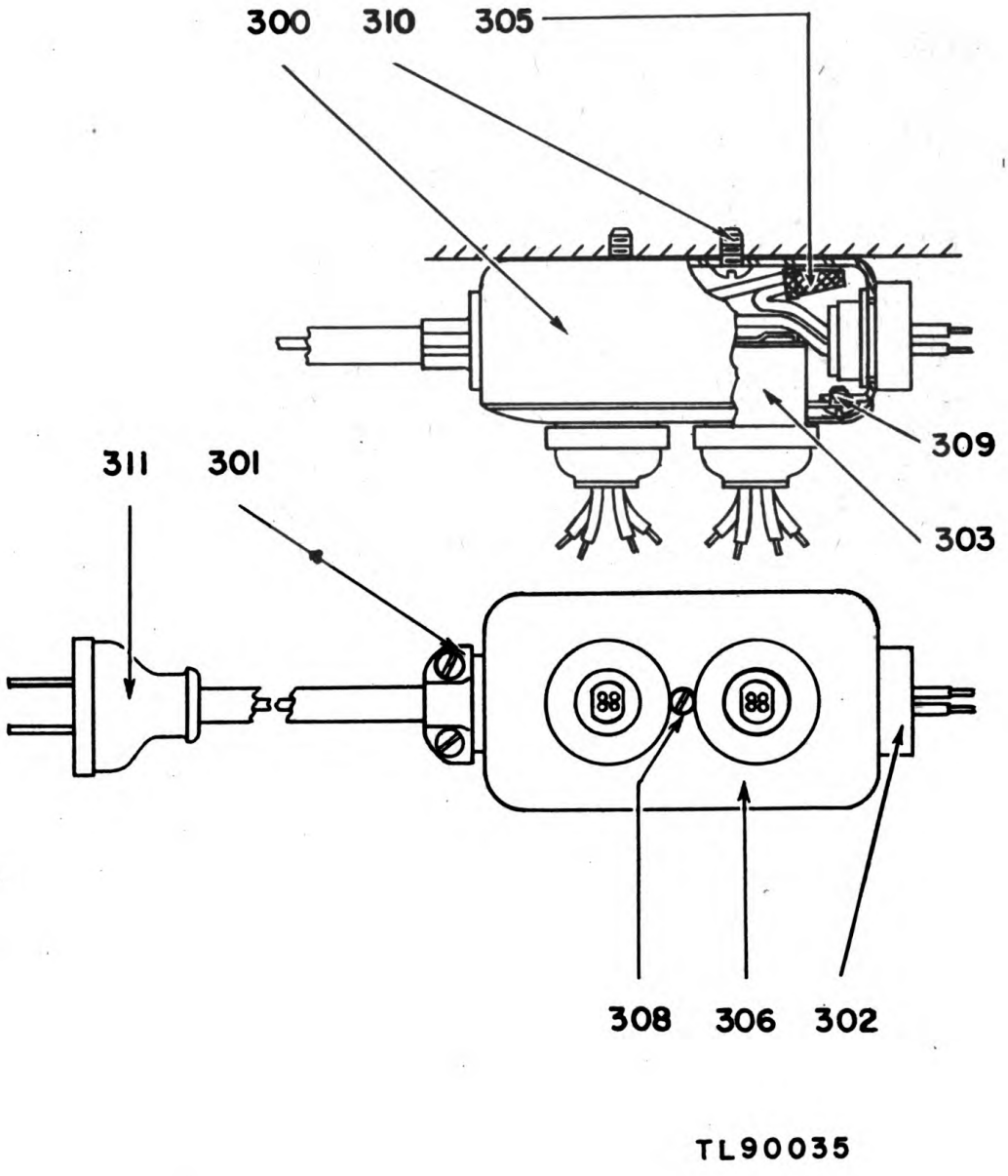

Figure 14. Schematic drawing of outlet box.

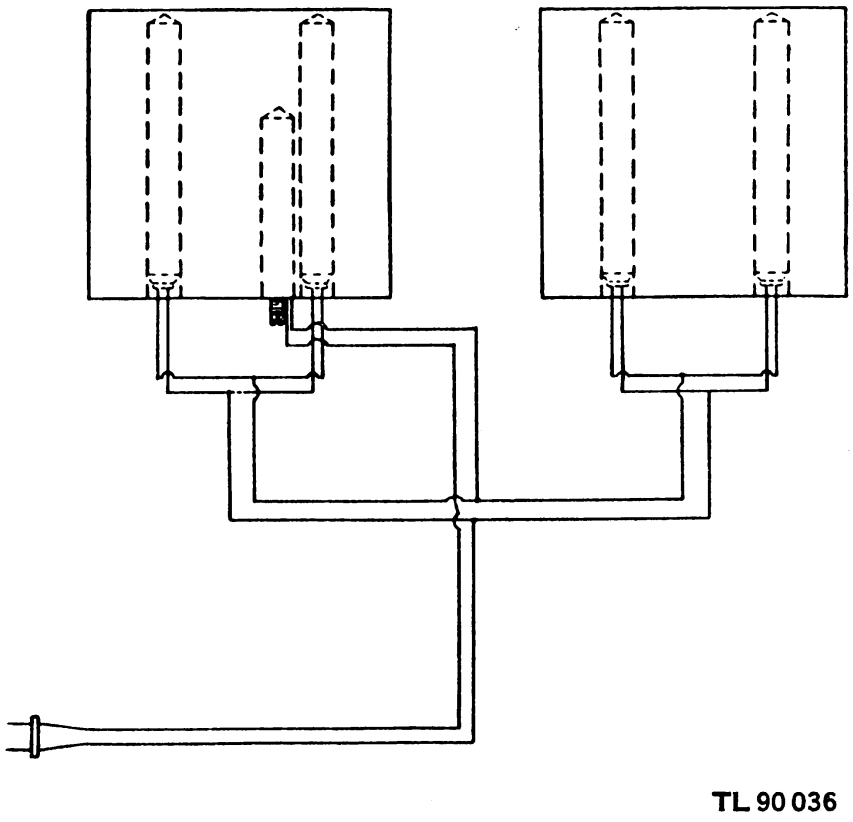

Figure 15. Schematic drawing of thermoswitch and cartridge heating unit wiring.

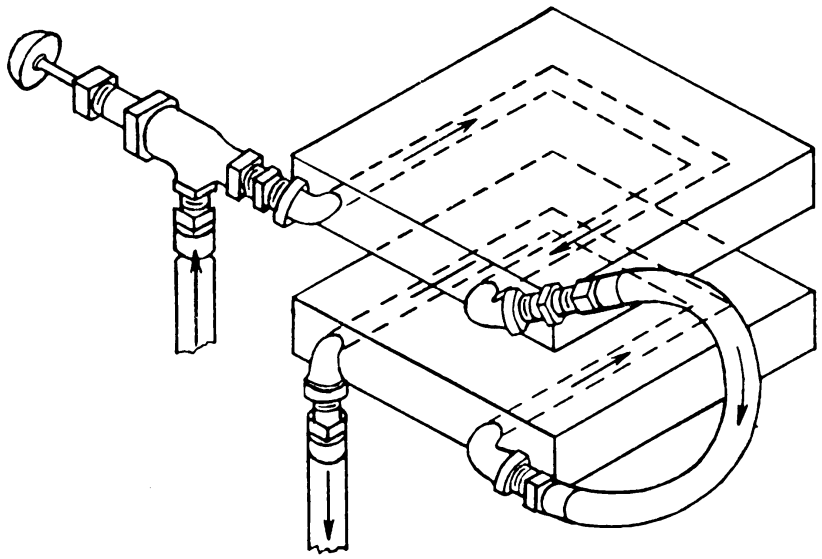

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Figure 16. Schematic drawing of water flow through cooling plates.

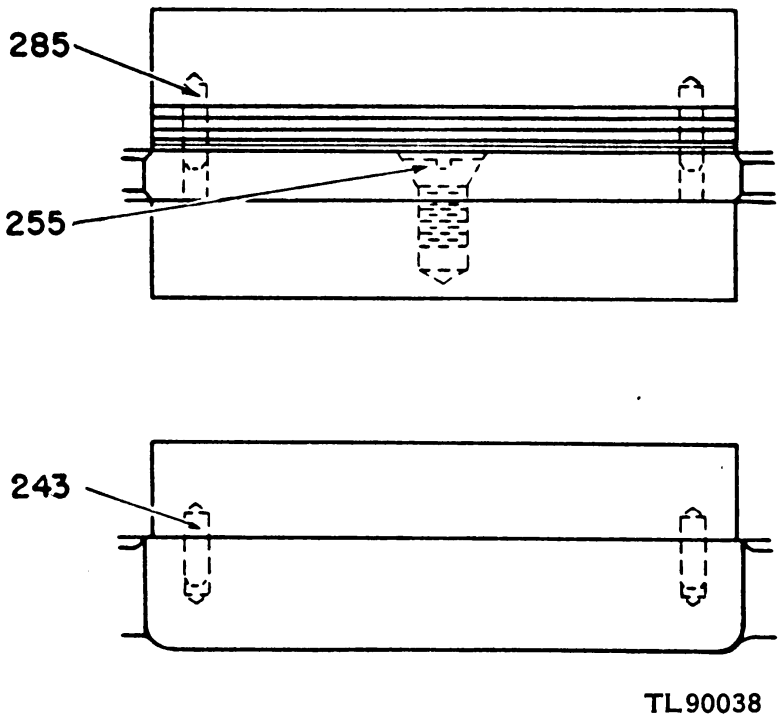

Figure 17. Schematic drawing of lower hot plate and cooling plates.

32. TABLE OF OPERATING TROUBLES AND REMEDIES.

Symptom	*Possible Cause*	*Remedy*
Losing pressure.	Loose release valve.	Tighten, using the slotted end of the long pump lever.
Losing pressure.	Dirt in the oil.	Remove oil, flush entire system and refill (par. 31).
Losing pressure.	Loose ram packing.	Tighten ram packing nut.
Losing pressure.	Loose suction-valve screw.	Tighten with screwdriver.
Losing pressure.	Worn washers and packings.	Replace (par. 30).
Losing pressure.	Loose discharge-valve screw.	Tighten with a screwdriver.
Excessive oil seepage at top of pump base.	Worn plunger washers.	Replace (par. 30).
Poor lamination.	Dry acetate.	Use greater pressure per square inch.
Excessive flowing of the acetate.	Too much pressure or too much time. enough at the time of	Shorten the time first, then if unsuccessful, decrease the pressure.
Wrinkled lamination.	Holding clamps not tight enough at the time of transferring the stack from the hot plates to the cold plates.	Tighten clamps and make transfer as rapidly as possible.
Elongated bubbles along edge.	Lack of fusion of acetate.	Use greater pressure per square inch.
Small bubbles.	Too much heat or left in the press too long.	Shorten time. If not corrected, lower the heat.

SECTION V—SUPPLEMENTARY DATA

33. MAINTENANCE PARTS LIST FOR LAMINATING EQUIPMENT PH-523/GF

Ref symbol	Signal Corps stock No.	Name of Part and Description	Quan per unit	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
293 and 270	6Q62573/B1	BOARD: asbestos; 6″ x 6″ x ⅛″ with $\frac{3}{16}$″ hole in two opposite corners, ½″ from edges; (forms insulation to retain heat in hot plates).	6				*	*	*
283	6Z1653-1	BUSHING: cartridge-retainer; ¾″ knurled shoulder x $\frac{7}{16}$″ long; brass; ⅝″-16 thread; ⅜″ ID special; (holds heating units in hot plates).	4				*	*	*
304	3E7194	CABLE: power; two-conductor; rubber-insulated; black 8″ long; with an inserted single-pole single throw 5-amp, 250-v (Gaynor) switch; bakelite; with a two-conductor male plug; (conducts electricity from source to outlet box).	1		*		*	*	*
420	6Q26460	CLAMP: holding; sheet-metal construction; 0″ to 1¾″ capacity, (vice grip); (maintain pressure on stack as it is transferred from the hot plates to the cooling plates).	2		*		*	*	*
212	6Q62573/C1	COLLAR: support; steel; nickel-plated; $\frac{7}{16}$″ thick x $\frac{11}{16}$″ wide with $\frac{5}{16}$″ hole in the center countersunk in outside curvatuve; (holds support plate on the columns).	2					*	*
142	6L50543	GASKET: ram; fiber; 1 $\frac{3}{16}$″ thick; (seats ram in cylinder base).	1		*		*	*	*
361	6Z4251-7	GAUGE: hydraulic pressure; brass; 6⅜″ diam x 1 $\frac{13}{16}$″ thick; capacity 0-2000 lb per sq in; (used to register pressure plate); U. S. Gauge Co.	1				*	*	*
282	6Z8862	HEATING UNIT: cartridge-type; brass; ⅝″ diam x 5⅝″; 285-w, 115-v; (heats the hot plates); GE No. 185H.	4				*	*	*
350 343	6Q62573/H2	HOSE: long; rubber; ¾″ x ⅝″ x 30″; with ¼″ male and female brass pipe fittings; (carries water from supply to angle valve).	2				*	*	*
333	6Q62573/H1	HOSE: short; rubber; ¾″ x ⅝″ x 15″; with ¼″ male and female brass pipe fittings; (to carry water from the upper to the lower cooling platen).	1				*	*	*
331, 341 344, 351	8204	NIPPLE: close; brass; No. 18 thread; ¼″ right hard threaded with hex. shoulder; (connects short hose to street ells).	4				*	*	*
106	6L3505-28-9	NUT: release valve; brass; internal and external threaded, $\frac{5}{16}$″ across flat; inside thread $\frac{5}{16}$-28 x ⅝″; outside thread ½-28 x ½″; with hex. head; (forms seat for release valve screw).	1				*	*	*
165	6L3514-9	NUT: steel; hex. ⅞″-9 threads per in.; 1 $\frac{3}{16}$″ across flat, ¾″ thick; (used to fasten gauge coupling to base).	1				*	*	*

215 and 320	6L3518-7-28	NUT: steel; hex.; 1⅛″-9 threads per in.; 1¾″ across flat, 1⅛″ thick; (holds columns to base; also used to lock head in place).	6					*	*
214	6L3437-7	NUT: steel; round; knurled; 1⅛″-7 threads x ⅝″ thick x 1 $\frac{3}{16}$ diam; (positions head on columns).	2				*	*	*
123	6Q62573/P2	PACKING: pump; impregnated rubber; special; ⅜″ diam x ⅛″ thick; (prevents oil seeping up past plunger).	3				*	*	*
147	6Q62573/P1	PACKING: ram-cup; impregnated leather; special; plunger-shaped; 1¼″ diam x ⅜″ thick; (forms pressure plunger at top of the ram).	1				*	*	*
135 and 132	6L974-4-32	PIN: cotter; steel; $\frac{1}{16}$ x ½″; (secures pump lever link pins).	3				*	*	*
243	6L3943-16	PIN: dowel; cold rolled steel; over-all length 1″; with shaft ⅞″ long x $\frac{3}{16}$″ diam and head ⅛″ thick x ¼″ diam; (holds cooling plate on the platen).	4				*	*	*
400	6Q62573/P9	PLATE: polish; nickel-plated; sheet steel; 6″ x 5″ x 0.028″; (used in the lamination stack for obtaining a high gloss).	19		*		*	*	*
260	6Q62573/P8	PLATE: wire-mesh steel; 6″ x 6″ x $\frac{1}{16}$″, with two holes $\frac{3}{16}$″ diam drilled on diagonal corners and ½″ from edge; (rests between the support plate and the asbestos boards reducing the conductivity of heat).	2		*		*	*	*
307	6Z7561	PLUG: male; electric; bakelite; 1¼″ diam x 1¼″; two copper conductors; (connects heating units to outlet box).	2		*		*	*	*
107	6L20925-24S	SCREW: release valve; steel; capstan-type head; $\frac{1}{16}$-28 x ⅝″, threads have undercut tip $\frac{3}{16}$″ x ¼″ diam; head is ½″ diam x $\frac{3}{16}$″ long with bar-type handle 1¾″ long x⅛″ diam; (forces the release valve into valve seat upon the exertion of pressure).	1		*		*	*	*
308	6Z8643-1	THERMOMETER: mercury; glass; with brass housing; registers heat from 100° to 500° F in 5° graduations; 4″ long x ⅜″ diam; (registers degree of heat in hot plates); Moeller Instrument Co.	1		*		*	*	*
297	3Z9695-2.3	THERMOSWITCH: brass; ⅝″ diam x 4 $\frac{3}{16}$″; capacity 10 amps, 110-v; 65 amps, 230-v; (controls temperature of the heating units); Fenwal Inc.	1				*	*	*
342	6Z8892	VALVE: angle; steel and brass; ¼″ diam; (controls water supply to cooling plates); Lukenheimer No. 78, dwg No. 214-G.	1					*	*
104 and 110	6Z806-1	VALVE: release; ¼″ diam; hardened steel ball; (closes oil channel in the base of the cylinder so pressure may be exerted and retained).	1					*	*
164	6L50524-5	WASHER: gauge coupling; fiber; $\frac{23}{32}$″ diam x $\frac{3}{32}$″ thick; (prevents any seepage around the gauge).	1		*		*	*	*

*Indicates stock available.

SECTION V—SUPPLEMENTARY DATA

33. MAINTENANCE PARTS LIST FOR LAMINATING EQUIPMENT PH-523/GF

Ref symbol	Signal Corps stock No.	Name of Part and Description	Quan per unit	Running spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
163	6L51804	WASHER: gauge coupling; impregnated leather; $\frac{23}{32}$" diam x $\frac{1}{32}$" thick; (prevents any seepage around the gauge).	1		*		*	*	*
124	6L53013-2	WASHER: pump-packing; bronze; special; $\frac{3}{8}$" x $\frac{1}{32}$" thick; (forms backing for pump packing).	1				*	*	*
146	6L51806	WASHER: ram-cup backing; impregnated leather; special; 1¼" OD x $\frac{3}{8}$" ID x ⅛" thick; (seats the ram cup packing on the ram).	1					*	*
148	6L58026-6	WASHER: ram packing; steel; $\frac{7}{8}$" OD x $\frac{3}{8}$" ID x $\frac{1}{16}$" thick; (seats the spring washer in the ram-packing cup).	1					*	*
105	6L51804-1	WASHER: release; valve packing; impregnated leather; special; $\frac{1}{16}$" diam x $\frac{1}{16}$" thick; (forms tight fit around release valve screw).	1					*	*
149	6L58026-7	WASHER: spring steel; $\frac{11}{16}$" OD x $\frac{3}{8}$" ID x 3 $\frac{1}{32}$" thick; (applies tension on the ram packing washer).	1					*	*
	6L80081	WASHER ASSORTMENT: spare packing; consists of: gauge-coupling washers (fiber); gauge-coupling washers (impregnated leather); ram-cup packing washers (impregnated leather); release valve packing washers (impregnated leather).	12	*	*		*	*	*
		MISCELLANEOUS PARTS							
410	6M196	BLOTTERS: 5" x 6" x ⅛"; (used to equalize heat in stack of laminations).	4				*	*	*
	6G1309	OE-OIL: engine; SAE No. 10; all-working temperature; (used in hydraulic system).	1		*		*	*	*
170	6L7920-4-24.3S	SCREW: machine; steel; fillister head; ¼"-20 x 1½"; (holds cylinder unit base to press base).	4				*	*	*
	6L3504-20-7	NUT: steel; hex.; ¼"-20; head is ⅛" thick and $\frac{7}{16}$" across flat; (holds cylinder unit base to press base).	4					*	*
		CORNER ROUNDER, MODEL 20							
6	6Q29520/S1	SHEARING UNIT: sheet-steel housing; 2 ½" x 2½" x 4½"; triangular shaped, consisting of five parts: sheet-steel housing, steel elliptical blade with cutting edge ground at 45°, loop spring, blade guard and spring cover; (unit cuts corners of thermoplastic material at a 90° angle).	1		*		*	*	*

*Indicates stock available.