WATER SUPPLY SYSTEM

The Water System on the 20 " County " series Parlor, Baggage Lounge Cars consists of two seperate systems. The hot and cold water for the ladies' and men's public toilets is supplied from an overhead system and the various fixtures are fed by gravity.

The hot and cold water for Buffet fixtures and Drawing Room is of the conventional air pressure type. The hot water for these fixtures is supplied by a McDonald Duo-Thermal Hot Water Supply System. The McDonald Duo-Thermal Hot Water Supply System used on these cars complies with the new United States Public Health Service Regulations.

The Unit as shown in Figures 156-157 and 158 is installed in a box and located under the car. One side of this enclosure is removable to provide access to the equipment. In addition there is an access panel in this removable side for servicing the circulating pump. Three removable panels on the other side, provide access to:

(a) the low water cut-off switch

(b) the 140 degree thermostat (thermal element which controls the flow of air to the steam admission valve)

(c) the Fenwall thermoswitch, which controls operation of the 140 degree solenoid valve.

This system employes two water heaters. The first heater raises the temperature of the supply water tank to 140 degrees for general use. The second heater raises the 140 degree water to 190 degrees for use in the glass washer as rinse water. In operation this system requires a minimum of 40 pounds steam on trainline, 40 pounds air, and 40 pounds water pressure; electric current at 110 volts, 60 cycle, single phase A.C.

WATER: Refer to Figures 156-157-158 and piping diagram Figure 159. Water from the car water tank is piped to a gate-type shut-off valve, located in heater box, through Fulflo Filter (No. 29), from the filter the water flows through a gate-valve to a low water cut-off system, which includes a McDonnell and Miller low water cut-off switch (No. 32), a 4 inch diameter tank and a Crane No. 976, 1/2 inch air vent valve (No. 31). This valve operates to relieve the low water cut-off system of air which might enter the piping, when the water in the car water tank falls to a low level. The Fulflo Filter is vented by a Hoffman No. 79 Air Vent Valve (No. 18).

The function of the low water-cut-off switch (No. 32) is to automatically close the two solenoid valves in the hot water lines to all the hot water outlets, whenever the water tank is almost exhausted. This low water cut-off is float actuated and opens the circuit to the two solenoid valves, when there is insufficient water to fill the float chamber. One solenoid valve for control of the 140 degree water is located in the line behind the surge tank (No. 37), and the other is located in the Buffet under the sink, and controls the 190 degree water to the glass washer.

The cold water, after passing through the low water cut-off, flows through a check-valve, which prevents any back flow of water from the heater; the water then enters inlet port of the first water heater, (140 degree hot water jacket No. 15), which is located at the back of the box, see Figure 157. From the outlet port of this heater the water flows through a one inch copper tubing in which the thermal unit of a Powers No. 356 thermostatic type air valve (No. 25) is inserted. These valves are controlled by an Invar rod which opens and closes the valve metering the required amount of air to the air actuated Powers Steam Admission Valve (No. 17), opening and closing it to maintain the temperature of the water flowing from the heater, at approximately 140 degrees.

This 140 degree water now flows to a 2 1/2 gallon surge tank (No. 37). The surge tank acts as a reservoir for mixing the heated water. A Watts No. 36 vacuum breaker is installed on the line between the Powers Thermostatic Air Valve and the 140 degree surge tank to prevent any syphoning of water out of the surge tank. Thus, any variation in temperature of the water caused by over or under shooting of the thermal controls is taken care of in this tank. From the outlet port of the surge tank the line branches through a *tee*. One branch flows through a strainer and thence through an Atkomatic solenoid valve, type " A ", size 1/2 inch, (No. 12) to the hot water fixtures in the Buffet and Drawing Room. This solenoid valve is energized " open " and is under control of both the high temperature cut-out switch, which opens at 170 degrees and the low-water cut-off switch, which opens shortly before the car water tank runs out of water, closing the solenoid valve. The second branch from the *tee* flows through a check valve and thence into the inlet port of the 190 degree water heater.

N.H.

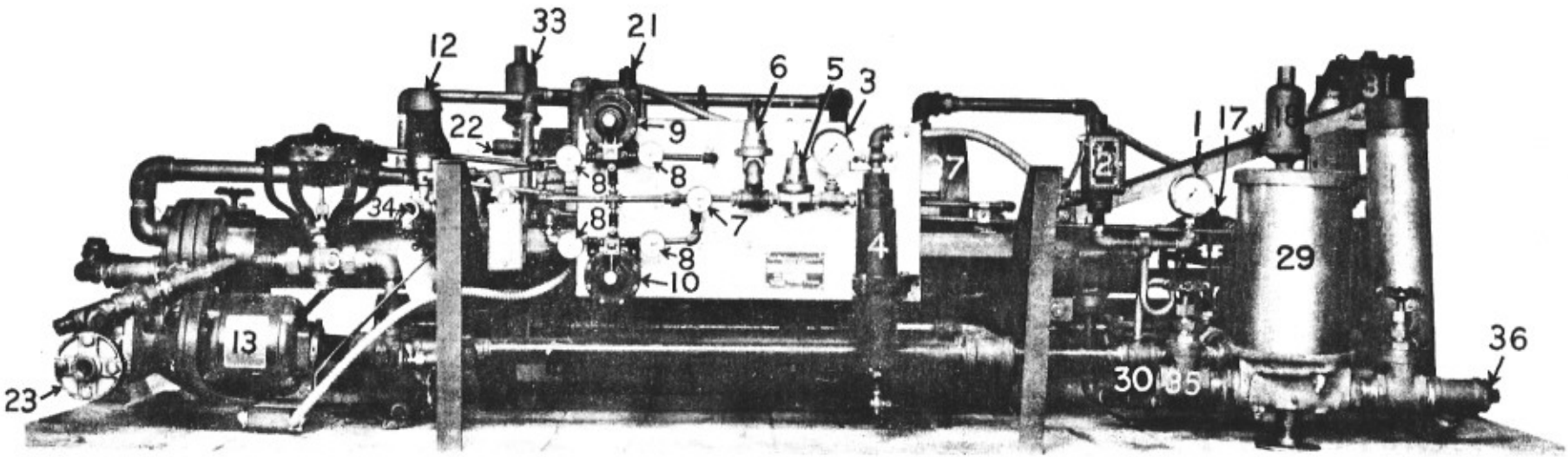


Figure 156

1. Gauge - Reduced Pressure (Steam)
2. Steam - Pressuretrol
3. Gauge - Setting of Governor Reducer
4. Sediment & Water Trap
5. Watts - Reducer (Air)
6. Watts - Blow-off (Air)
7. Gauge - Setting of Watts Reducer
8. Gauges - (4) Thermostat & Relay Operation
9. Reverse Acting Relay
10. Reverse Acting Relay
12. Solenoid Valve (Atkomatic)
13. Circulating Pump
14. 190 Degree Heater
15. 140 Degree Heater
16. Steam Admission Valve - 190 Heater
17. Steam Admission Valve - 140 Heater
18. Hoffman Air Vent - (Fulflo Filter Vent)
19. Fenwall High Temperature Cut-out Switch
20. Lunkenheimer or Watts Relief Valve
21. Air Pressuretrol
22. Water Supply to 190 Degree Loop
23. Return from 190 Degree Loop
24. 190 Degree Thermostat
25. 140 Degree Thermostat
26. 190 Degree Surge Tank
27. Leslie Reducer Valve - (Steam)
28. Crane No. 981 Bucket Trap for 140 Degree Heater
29. Fulflo Filter
30. Crane No. 981 Bucket Trap for 190 Degree Heater
31. Crane No. 976 Air Vent
32. Low Water Cut-off Switch
34. Supply to 140 Degree Outlets
35. Shut-off Valve Fulflo Filter
36. Cold Water Supply to Buffet
37. 140 Degree Surge Tank

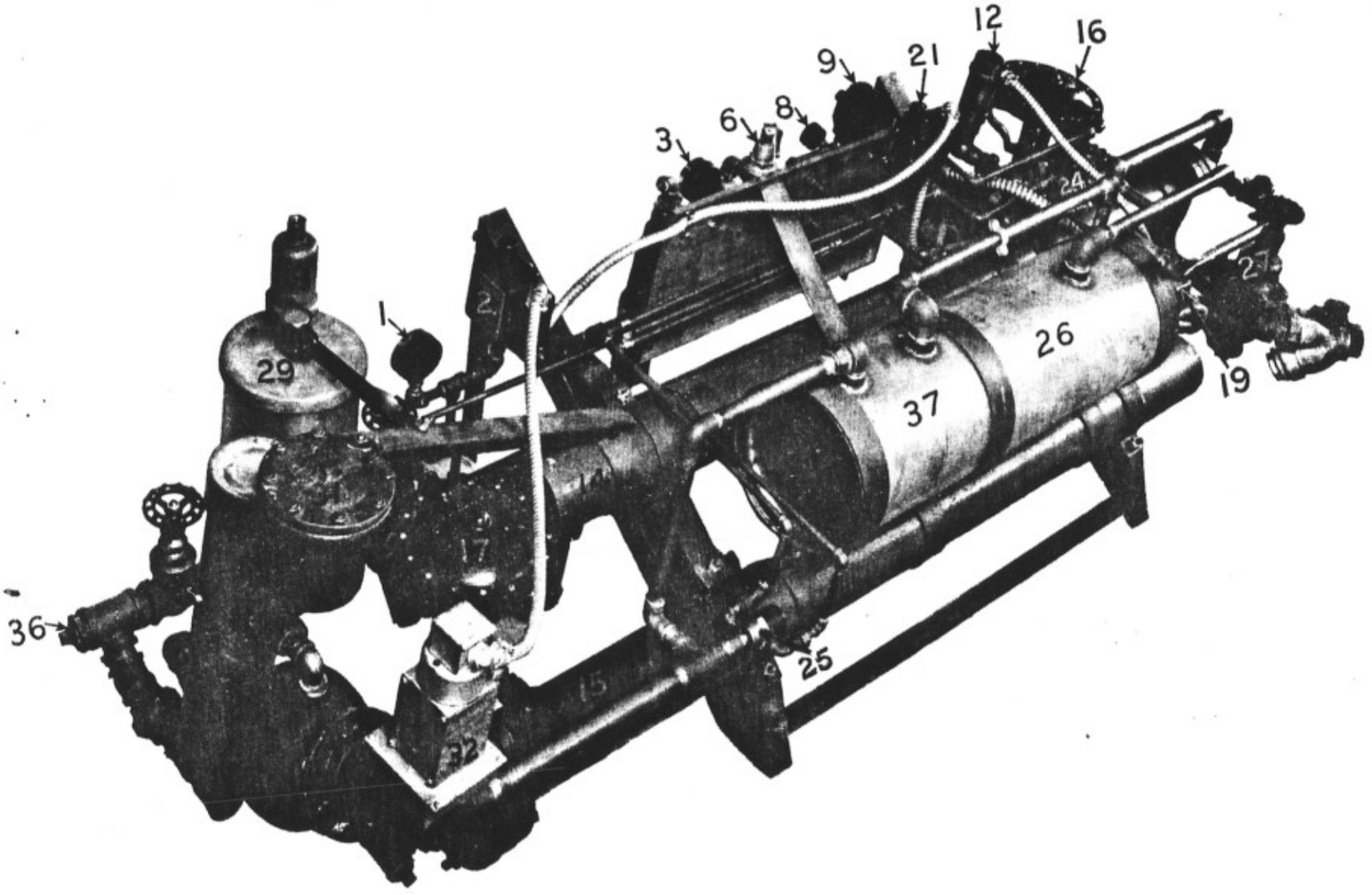


Figure 157

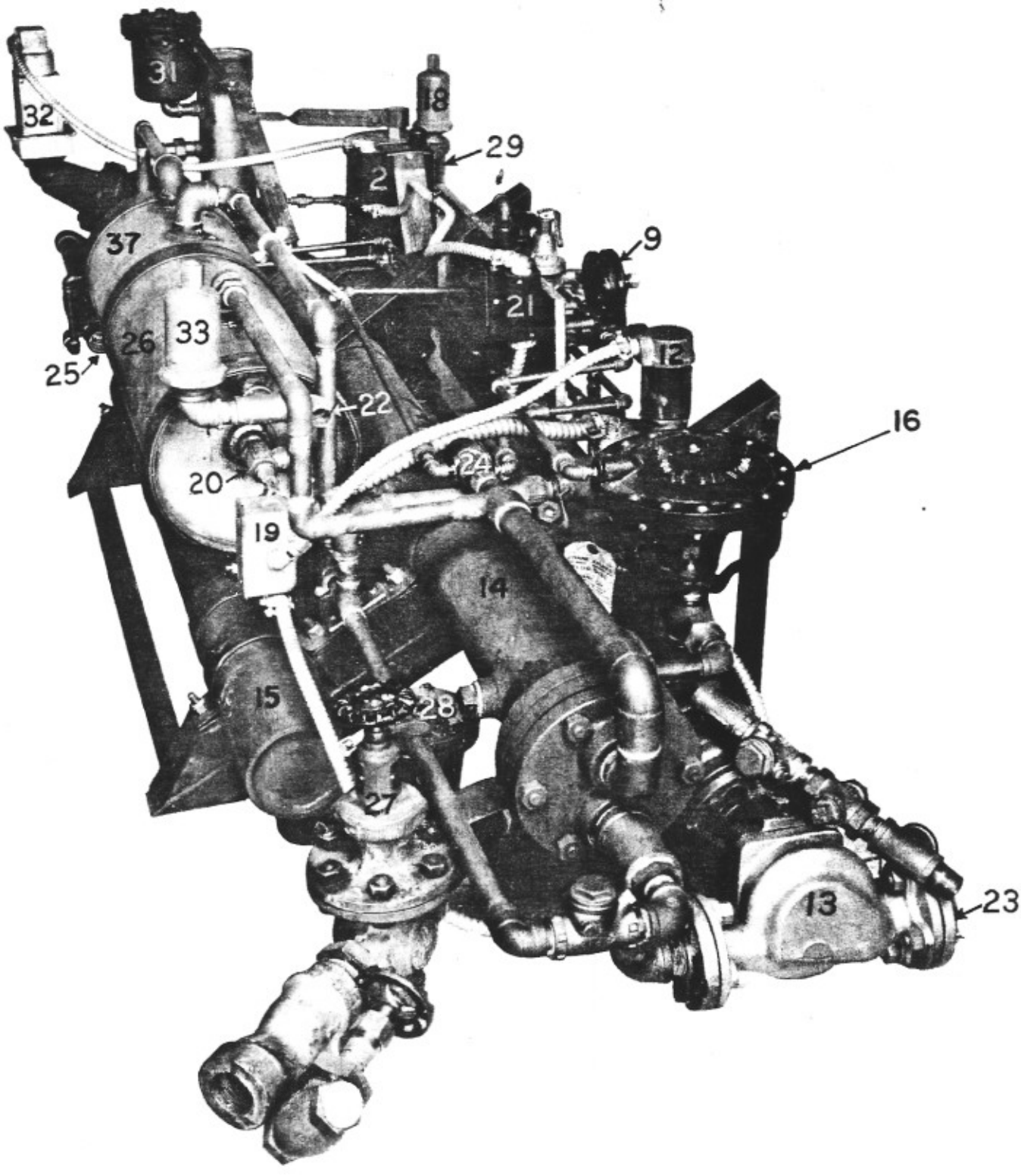


Figure 158

STEAM: Refer to Figures 156-157-158 and piping diagram Figure 160. Steam is taken from the trainline through a 124 shut-off and drain valve and enters the system through a Leslie Strainer and Pressure Reducing Valve 1 1/4 inch Class L3 (No. 27), which reduces the steam from trainline pressure to 40 P.S.I. From the reducer the steam is fed to two steam strainers which are equipped with blow-off valves, then to the two Powers Air Operated Diaphragm Type Steam Admission Valves (No. 16 and 17). These admission valves are both spring loaded closed and are opened by air pressure. The air which operates these two valves is under control of the Powers Thermostatic Air Valves and the Powers Reverse Acting Air Operated Gradual Relays (No. 9 and 10). In the event of air failure, both valves will be closed and steam will be prevented from flowing to the water heaters. The steam leaving the admission valves, flows through the jacket of the water heater. A Crane No. 981 bucket trap (No. 28) is used to drain the condensate from each heater.

AIR: Refer to Figures 156-157-158 and piping diagram Figure 161. The air for the operation of this system is taken from the Governor Reducer Valve which is set at 40 P.S.I. There is a seperate fitting on the Governor Reducer Valve from which the air is piped to a Powers No. 200 Sediment and Water Trap (No. 4); from this trap the air goes to a pressure gauge (No. 3) which shows the setting of the Governor Reducer (40 P.S.I.), then to a Watts No. 26 reducing valve (No. 5) where it is reduced to 20 P.S.I., thence through a No. 30L Watts Blow-off Valve (No. 6) which is set to blow off at 28 P.S.I. A gauge (No. 7) which is located in the line next to this blow-off valve, indicates the reduced pressure of this air.

At this point the 20 P.S.I. air divides into three branches, one to each of the two Powers Reverse Acting Gradual Relays (No. 9 and 10) and one to both of the Powers Thermostatic Valves (No. 24 and 25). The air leaving the thermostat returns to an additional port of the Powers Reverse Acting Gradual Relays, then flows after passing through this relay, to the Powers Reverse Acting Steam Admission Valves. The two Powers Reverse Acting Gradual Relays operate in conjunction with the two Powers Thermostatic Valves to control the flow of steam to the water heaters. This is accomplished by controlling the amount of air supplied to the diaphragm of the Powers Reverse Acting Steam Admission Valves (No. 16 and 17). Gauges (No. 8) are provided on both sides of each air relay.

The operation of the air circuits of this system is as follows. When the temperature of the water rises above the Powers Thermostat setting, increased air is delivered from the thermostat pipe connection to the relay pipe connection. This relay then operates to decrease pressure in the line between the relay connection and the air pipe of the Powers Reverse Acting Steam Admission Valve. This decreased air pressure against the diaphragm allows the spring tension of this valve to gradually close the valve, stopping the flow of steam to the water heaters. When the temperature of the water falls below the Powers Thermostat setting, decreased air pressure is delivered from the thermostat pipe connection to the relay pipe connection. This relay then operates to increase pressure in the line between the relay connection and the air pipe of the Powers Reverse Acting Steam Admission Valve. This increased air pressure against the diaphragm forces the valve open, allowing steam to flow to water heater.

ELECTRICAL: Refer to Figure 162. The electrical components include one solenoid valve, in the 140 degree water line, a low water cut-off switch, steam pressure switch, air pressure switch, a water temperature switch in the 140 degree water, and a circulating pump in the 190 degree loop, which are all located on water heating unit under the car. The remaining controls for the unit are located in the Buffet, these consist of: a solenoid valve which controls the flow of 190 degree water to the glass washer, timer motor, time switch and momentary contact switch, which start the timer motor. The timer motor, time switch and momentary contact switch are at the glass washer. The 140 degree solenoid valve is connected in series with high temperature cut-out switch, Fenwall No. 18000 (No. 19) and low water cut-off switch. The contacts of the high temperature switch open, to prevent high temperature water from flowing to wash basins and buffet fixtures, whenever the water forthe fixtures goes above 170 degrees. The low water cut-off is also in series with the 190 degree solenoid valve. It follows then that when the low water cut-off is open, no hot water is available. This prevents either 140 degree or 190 degree water being drawn from the system, when there is no cold water to replace it.

Two pressure switches (Minneapolis-Honeywell Type 404F Pressuretrols), (one air and one steam) are connected in series with the 190 degree circulating pump. The steam pressure switch must be set to close at 15 pounds and the air pressure switch set to close at 10 pounds. The differential on these switches is twenty-one pounds, therefore, if air pressure from the reducer goes above 31 pounds the pressure switch will open on high pressure cut-out and the circulating pump will stop running. In the event either steam or air pressure falls below these values, the pump motor circuit will be opened and the pump will stop running. This furnishes automatic control of the pump and no relays or stop and start switches are used.

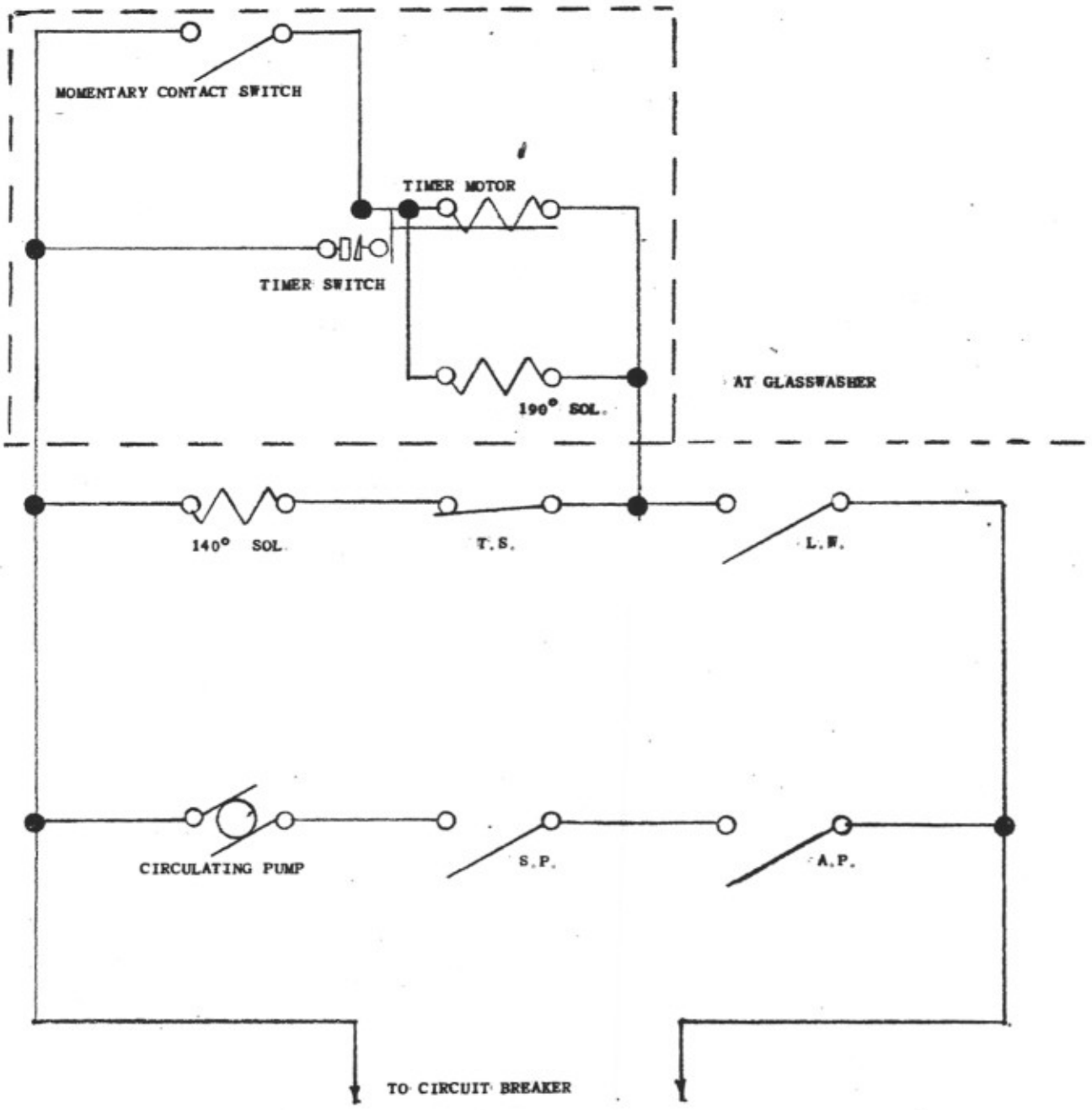


Figure 162

ABOVE CIRCUITS SHOWN WITH NO STEAM OR AIR PRESSURE.

A.P. - AIR PRESSURETROL, MAKES WITH 10 LBS. AIR.

S.P. - STEAM PRESSURETROL, MAKES WITH 15 LBS. STEAM.

L.W. - LOW WATER CUT-OFF, MAKES WITH PROPER WATER LEVEL.

T.S. - (FENWALL) THERMOSWITCH OPENS WITH TEMPERATURE OF 170°.

WATER FILTER: A Fulflo model WX 3 BR-8 filter shown in Figure 163 is used to filter all of the water supplied to the buffet. The honey comb filter tubes are to be renewed once a month. The instructions for this operation are covered in Figure 163.

Two Hoffman number 79 air vent valves are used to prevent air blocking. This valve is shown in Figure 164. One of these valves is located on the cover of the Fulflo filter (No. 18). The other is located under the sink in the buffet at the high point of the circulating loop.

LOW WATER CUT-OFF: The low water cut-off switch is float operated and the contact should be kept cleaned and the spring mechanism loose enough to operate freely. Figure 165 shows the details. A sylphon bellows eliminates the packing around the stem; if leaks are found around this area a new bellows should be applied. A McDonnell snap-action twin switch with two sets of terminals is provided, however, only one set is used. *NOTE:* Do not change adjusting screw " E " as shown in Figure 165. This screw is used for initial factory adjustment to set the switch operating levels to correspond with the mark on the float housing. The low water cut-off switch (terminals 1 and 2) opens when water falls to the line on body casting and closes when water comes up 5/8" above this mark. Therefore, the low water cut-out operates before the water in the water tank is completely exhausted.

RENEW SYLPHON BELLOWS:

1. Remove the 8 hex head cap screws (a) Figure 165, holding head to body and take off head.
2. Unscrew float and rod assembly from the bellows.
3. Remove 4 round slotted head screws which hold the flat cover to the large base box (b) Figure 165. This will enable you to remove the entire top housing including the switch, exposing 4 slotted head cap screws (c).
4. Remove these slotted screws and take off base box.
5. Remove 6 socket head cap screws (d) which will allow the bellows to be removed.
6. Install new bellows assembly and re-assemble.

Crane number 976 air vent valve shown in Figure 166 is part of the low water cut-off system. The operation of this valve is based on the rise of the float resting on water. When chamber is filled with water the float is buoyant, being kept in its raised position which keeps the air outlet closed. When water level falls the float drops thereby opening the air outlet, allowing air to vent. When incoming water fills the float chamber, the float again raises closing the valve.

When opening the valve for inspection, drain the water, remove the nuts from the bolts around the edge of the cover and pry up the lid. This will expose the inner mechanism and allow for any renewal, adjustment or repair of the parts.

In assembling make sure the point of the disc is aligned to enter the valve seat after which it will find its true position.

INSTRUCTIONS FOR CHANGING HONEYCOMB FILTER TUBES

1. Shut inlet and outlet valves. Remove Cover Lock Nut (1) and Cover (3), being careful not to damage Lock Nut Gasket (2) or Top Shell Gasket (4).

2. Remove Shell (5) being careful not to damage Bottom Shell Gasket (6). Remove and discard used Honeycomb Filter Tubes (12). They have no salvage value.

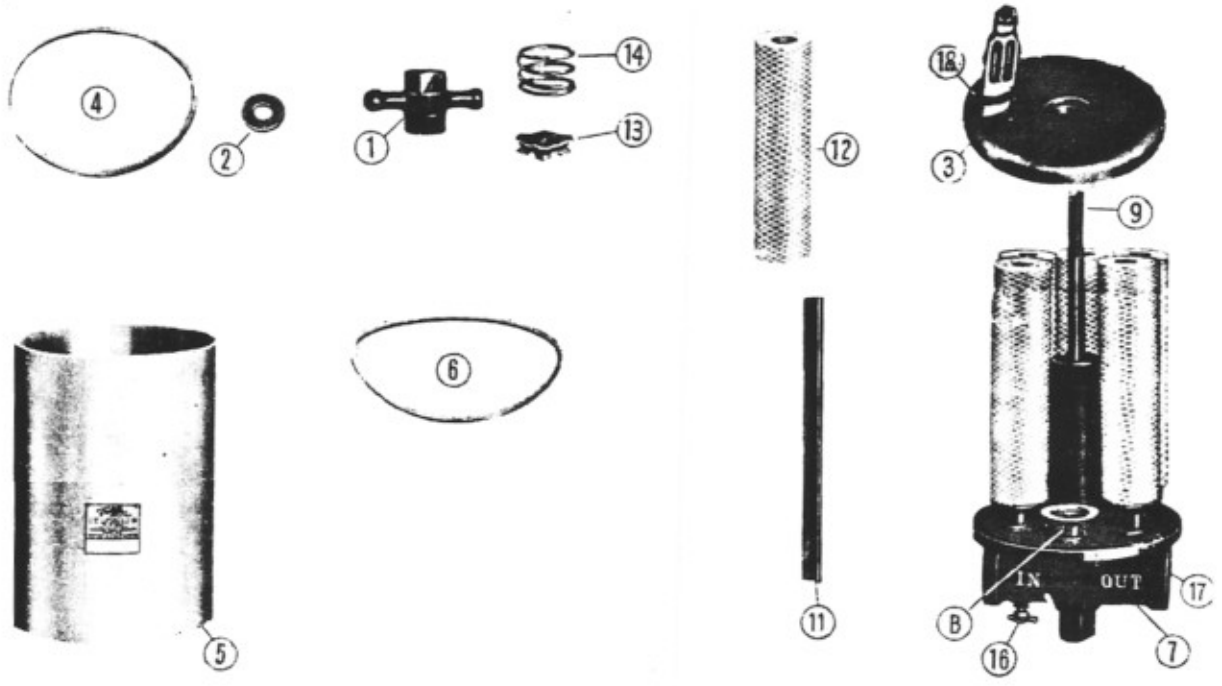
3. Wipe Base (7-8) clean, around and between Bottom Seat Plates (B). Also wipe clean the metal parts . . . Filter Tube Holders (11), Top Seat Plates (13), Compression Springs (14) and the Spacers (15).

4. Insert a Filter Tube Holder (11) in each Bottom Seat Plate (B). Place a new Filter Tube (12) on each Filter Tube Holder.

5. Make sure Bottom Shell Gasket (6) is in perfect condition, (if in doubt, use new one), and properly seated in base. Replace the Shell (5) making sure to seat it carefully against bottom shell gasket. Place the top Seat Plate (13) and Compression Spring (14) on the top of each filter tube. Be sure spring is snapped into groove on seat plate.

6. Inspect Cover (3) to make sure Top Shell Gasket (4) and Lock Nut Gasket (2) are properly seated in their grooves and in perfect condition. If in doubt use new gaskets. Replace Cover on filter. Be careful not to tip any Compression Springs from vertical. Replace Cover Lock Nut (1) and screw down carefully to make sure that Top Shell Gasket (4) seats firmly against top edge of Shell (5). Then tighten Lock Nut securely.

7. Open inlet and outlet valves and check for leaks.



ITEM NO.	DESCRIPTION	CAT. NO.	ITEM NO.	DESCRIPTION	CAT. NO.
1	Cover Lock Nut.....	F21014BNP	*10	Center Post Nut.....	None
2	Lock Nut Gasket.....	G8420-1AB	11	Filter Tube Holder...X108-9 11/16 BNP	
3	Cover.....	F21013-2BNP	12	Honeycomb Filter Tube..	No. 1541 CT.1
4	Top Shell Gasket.....	9 A	13	Top Seat Plate.....	D8650 NP
5	Shell.....	F21012BNP	14	Compression Spring.....	D4910-LXHBNP
6	Bottom Shell Gasket.....	9 A	16	Inlet Drain.....	H4916-2NP
7	Base, 1½ inch.....	D21005BNP	**17	Shell Drain.....	H4916-3NP
9	Center Post.....	C2006BNP	18	Air Vent.....	H4916-2NP

* At bottom of Center Post. Not shown.
** On bottom of Base at back. Not shown.

Figure 163

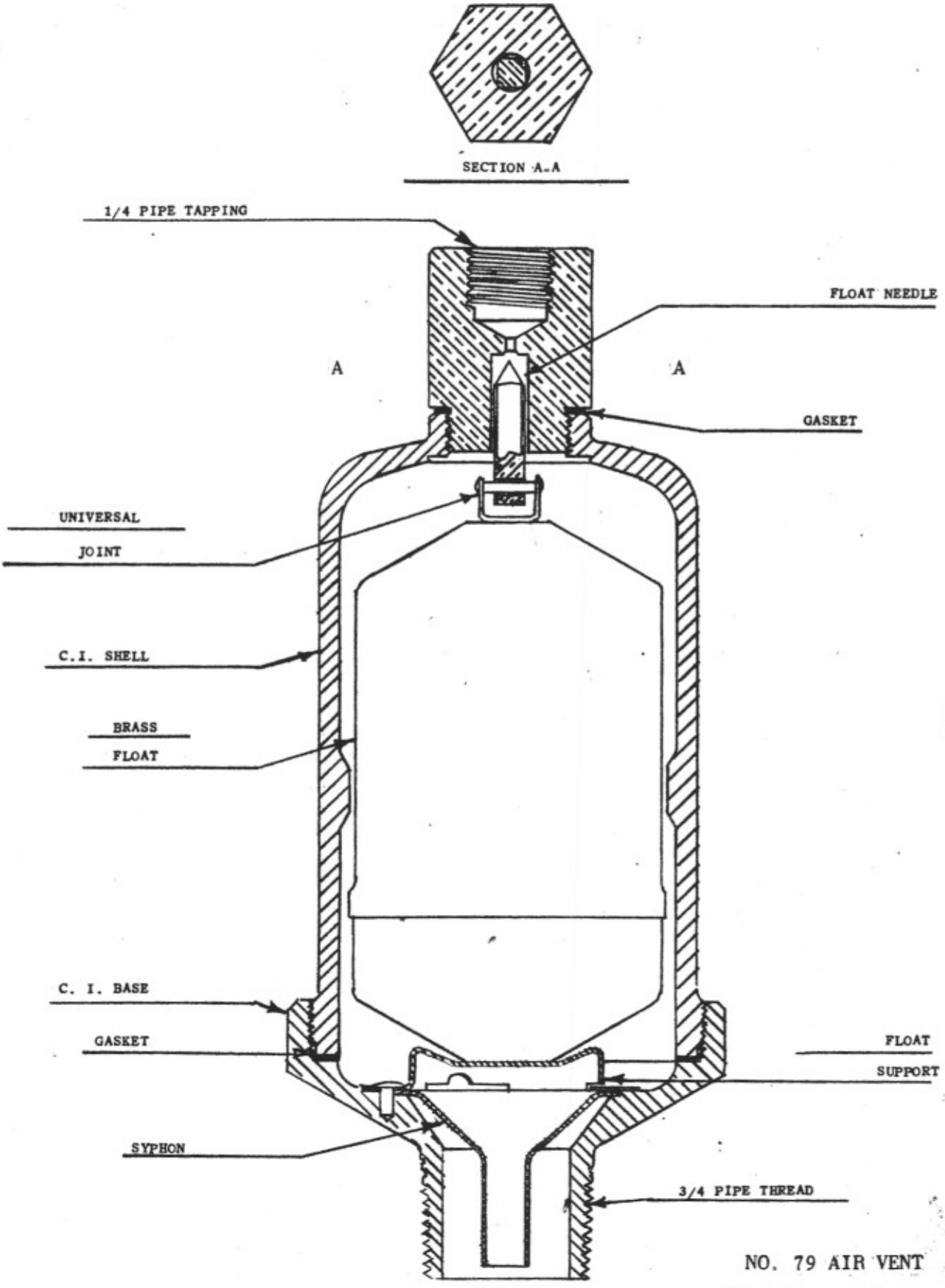
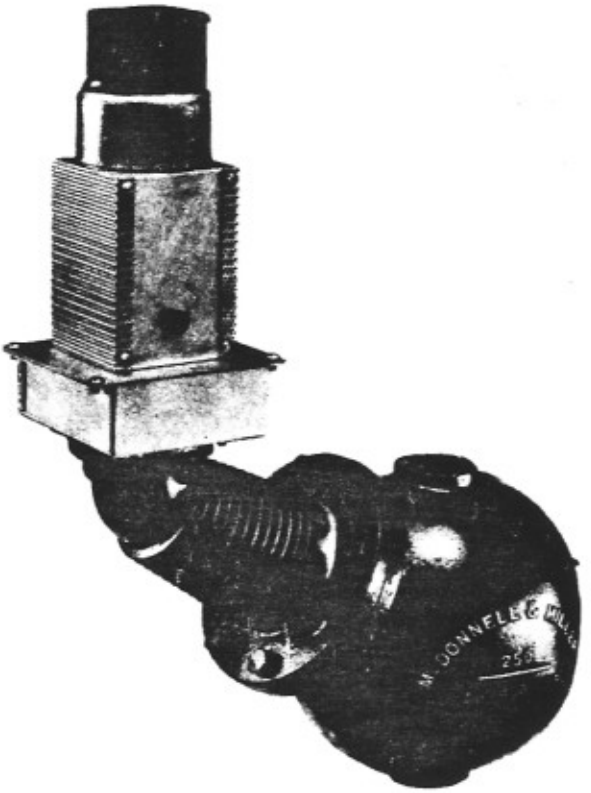


Figure 164



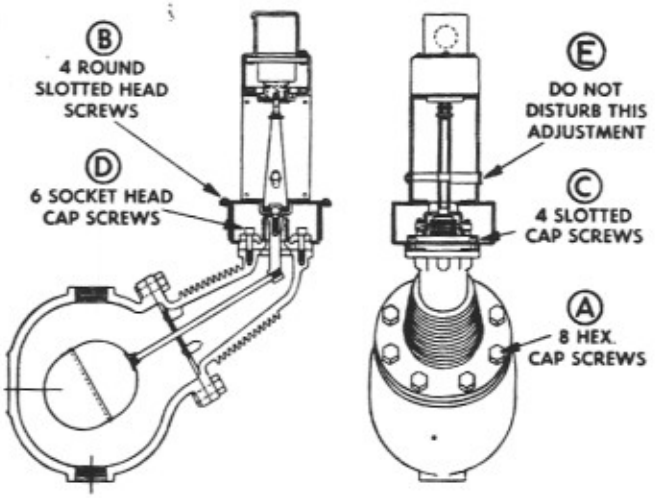
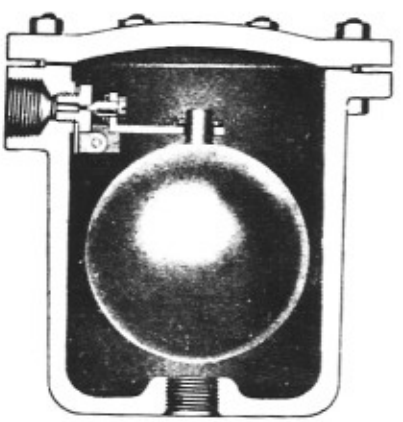
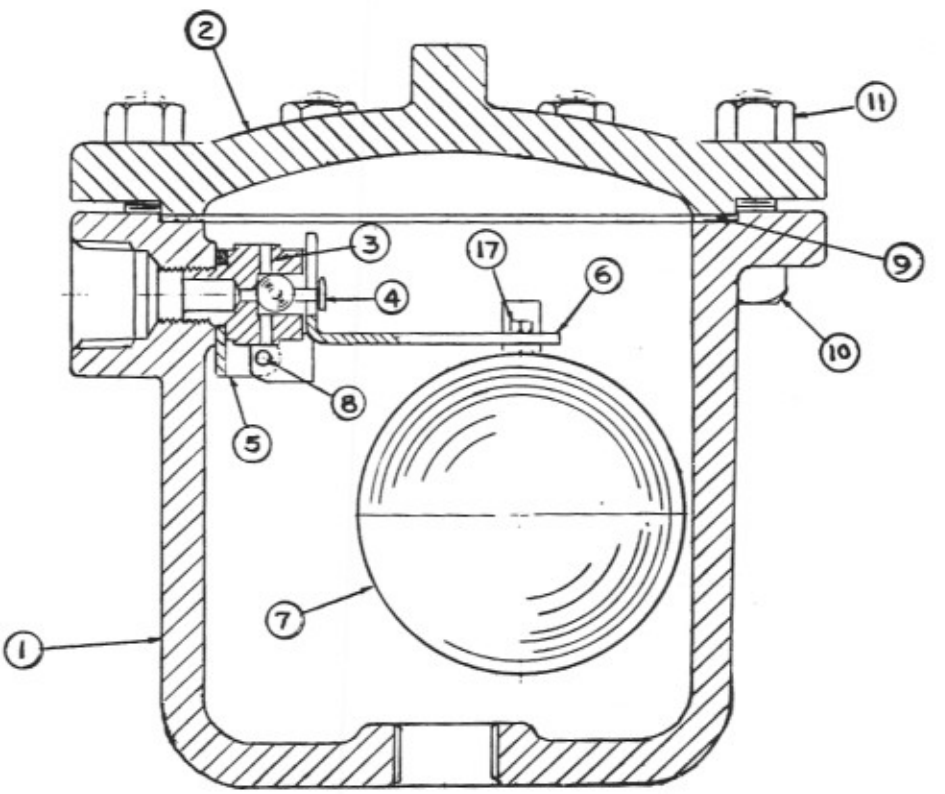


Figure 165





No.	NAME OF PART.
1	Body
2	Cap
3	Seat Bushing
4	Ball Disc
5	Fulcrum Support
6	Float Lever
7	Ball Float
8	Fulcrum Rod
9	Gasket
10	Bolts
11	Nuts
17	Cotter Pin

Figure 166

AIR VENT VALVE HOFFMAN NO. 79. Refer to Figure 164. This valve vents the air from the water line at the Fulflo filter and on the 190 water line in the buffet.

SOLENOID VALVE: Shown in Figure 167 is an Atkomatic type " A " and is used to control the flow of 140 degree water to the Buffet and Drawing Room. There is a self-cleaning strainer used ahead of it which is shown in Figure 168.

The valve consists of two major components; the electrically operated " Pilot " valve and the mechanically operated " Main" valve. The valve is normally closed and is energized open.

The operation of the valve is as follows:

When energized by the contacts of the low water cut-off switch and the high temperature cut-out switch the " Pilot " valve lifts causing the pressure on the top of the piston to the outlet side of the valve. Since the piston orifice is larger than the timing orifice, pressure on the lower side of the piston is greater, which forces the piston up, opening the " Main " valve.

When the coil of the " Pilot " valve is de-energized the " Pilot " valve drops on to the pilot seat, closing piston orifice. Pressure builds up on top of piston and " Main " valve closes. Should the valve fail to open, check for any one or more of the following causes:

1. No line pressure on valve.
2. Low voltage or bad connections.
3. Coil burnt out.
4. Pilot tube distorted.
5. Coil assembly dislocated.
6. Pilot valve seat orifice plugged.
7. 100% back pressure in line.
8. Foreign matter in valve.

Failure to close may be caused by:

1. Pilot tube distorted.
2. Foreign matter under valve disc.
3. Valve disc worn or valve seat damaged.
4. Piston rings distorted.
5. Piston spring broken or missing.

WATER HEATERS: Figure 169 shows cross section of the Bell and Gosset U 45-2 instanteous heaters used with this system.

SELF-CLEANING STRAINER POWERS: Refer to Figure 168. This strainer should be blown through the blow off valve monthly. The strainer should be removed and inspected yearly.

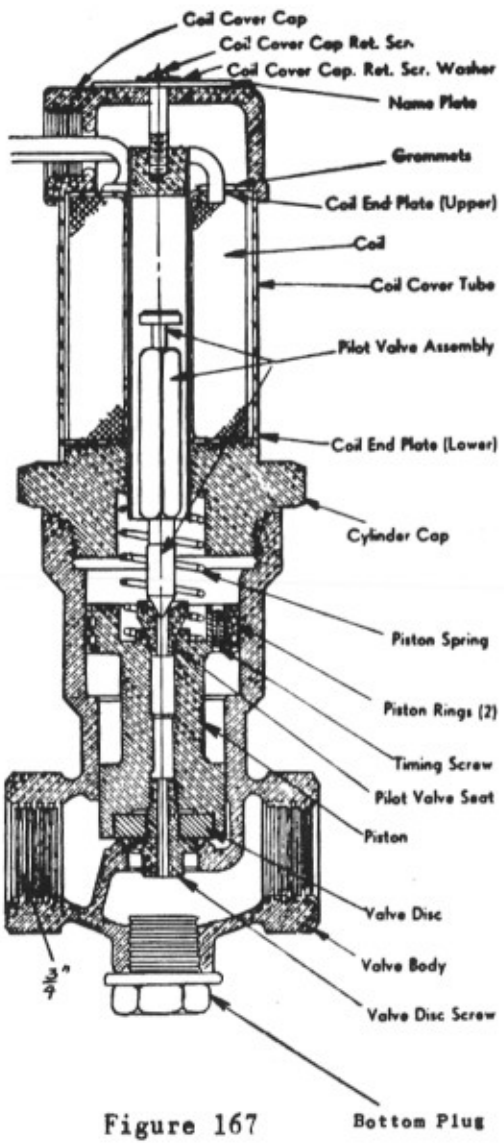
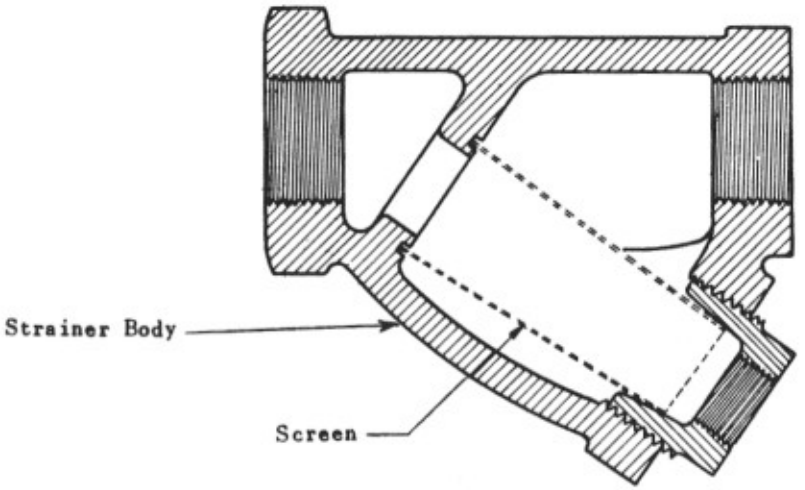


Figure 167



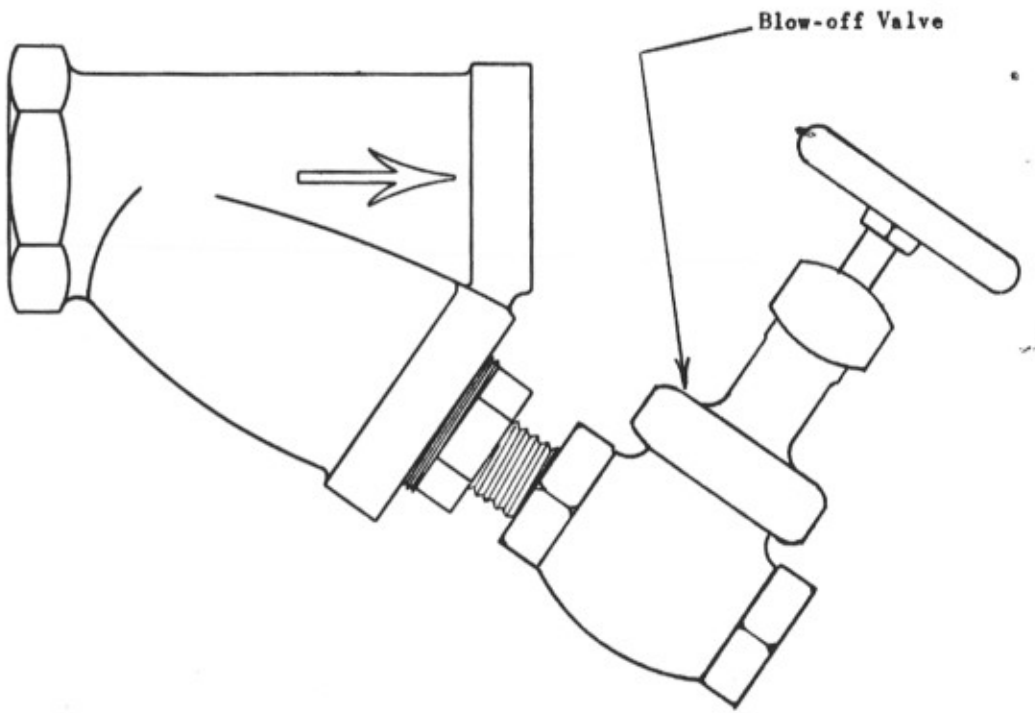
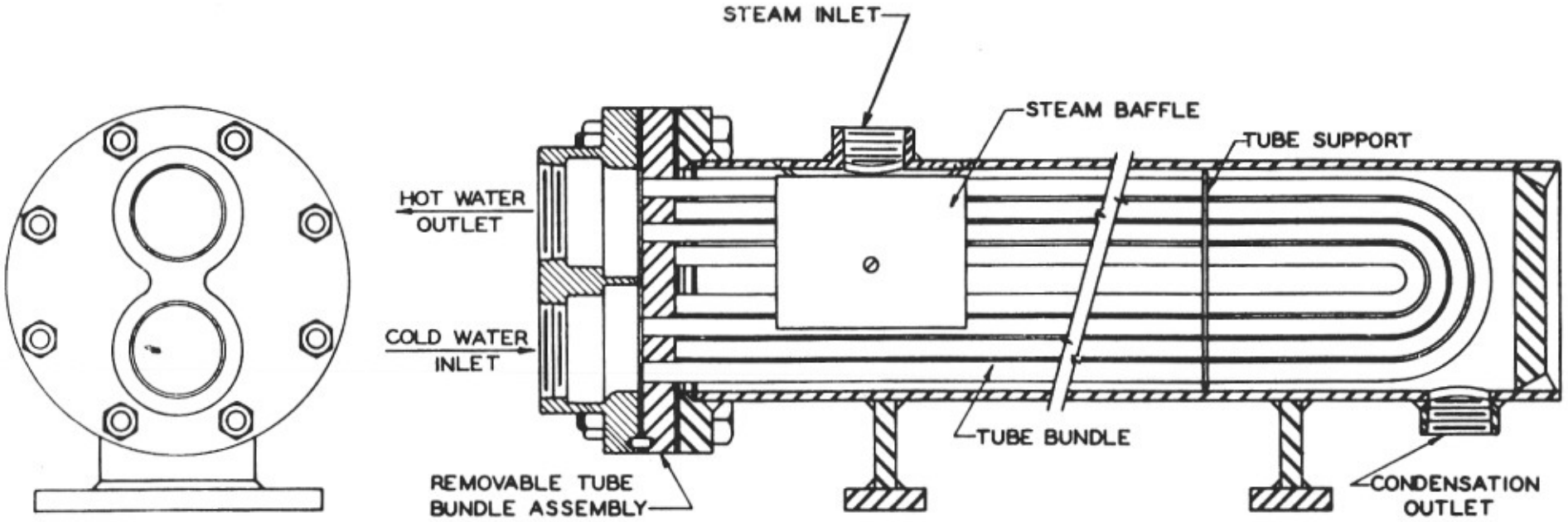


Figure 168



WATER HEATER TYPE U45-2

Figure 169

VACUUM BREAKER WATTS NO. 36. Refer to Figure 170. This is a single line vacuum breaker. The only maintenance required will be the cleaning of the seat and renewing of the disc in the event there is water passing through the breaker.

TEMPERATURE CUT-OUT SWITCH. Shown on Figure 171 is a Fenwal No. 18000. The control is adjustable and has been set at 170 degrees. Refer to Figure 171. With temperature rise shell expands and point A moves toward point B. Tension forces contacts open, which de-energizes 140 degree solenoid valve. With temperature drop shell contracts and point A moves away from point B allowing contacts to close.

NOTE. Extreme temperature overshoot would fracture element assembly.

TEMPERATURE ADJUSTING SLEEVE. Refer to Figure 172. These switches are adjusted by rotation of the adjusting sleeve, a hollow screw having different internal and external thread ratios.

The outside threads of the sleeve mate with the thread of the head of the thermoswitch while the internal threads engage the stud. The differential valve of the two threads results in a linear movement of the stud when the adjusting sleeve is rotated. The stud is permanently mounted to the element and cannot rotate.

RENEW ADJUSTING SLEEVE. If the sleeve has been damaged or tampered with, the adjusting sleeve should be renewed. Upon re-insertion of the sleeve, it is possible to have two undesired effects.

1. Operation of the switch after a few turns, thereby leaving the adjusting sleeve too far extended.

2. Non-operation of the switch because the sleeve has been screwed in so far that it has bottomed internally.

To correct either of the conditions, first connect the switch in series with a lamp, to be able to determine the room temperature operating point, and replace the sleeve as follows:

a. If the switch operates too soon after inserting the sleeve, unscrew the sleeve sufficiently to just free it from the outside thread. Unscrew one additional turn on the stud and push the sleeve into the thermoswitch so that it engages the outer sleeve thread. When properly done, the sleeve will screw in eighteen to twenty-eight turns before operating.

b. If the switch does not operate because the sleeve has bottomed, unscrew until the sleeve is clear. Pull the sleeve out by approximately one thirty-second of an inch and screw the sleeve down on the stud at least one turn before allowing the outside threads of the sleeve to engage. It may be necessary to repeat operations A or B to secure the desired results.

When assembling a vernier screw, never turn it any more than the required number of turns past the room temperature set point (the point where the test light goes "on" or "off" at room temperature) than is necessary to reach the desired temperature setting. To increase temperature setting, turn the adjusting sleeve counter-clockwise. One complete turn of the sleeve is equal to 80 degree change.

RELIEF VALVE LUNKENHEIMER NO. 986. Refer to Figure 173. This valve functions to prevent over-pressures in the 190 degree surge tank and is set to blow off at 60 P.S.I.

The valve starts to open at 60 P.S.I. and gradually continues until full open at 72 P.S.I. As the pressure drops, the valve starts to close and shuts off at approximately the set pressure.

TO ADJUST: Remove cap and loosen regulating screw lock-nut. Turn regulating screw down to increase pressure and up to reduce pressure. When setting is obtained, tighten lock nut and replace cap.

Figure 174 shows the Watts Regulator Type which is being replaced with Lunkenheimer Valves.

N.H.

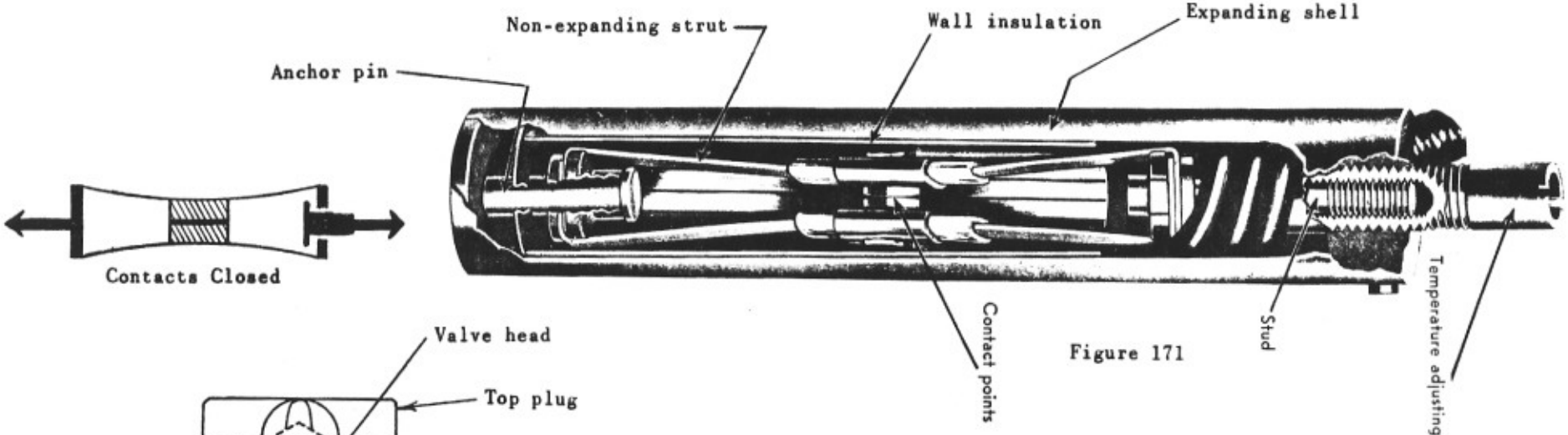


Figure 171

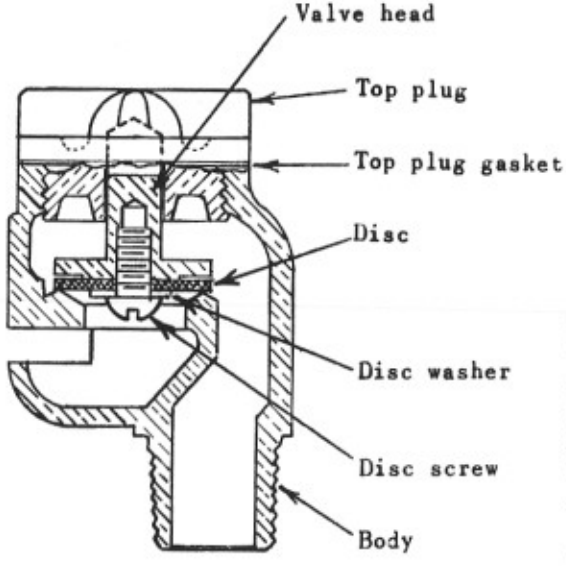


Figure 170

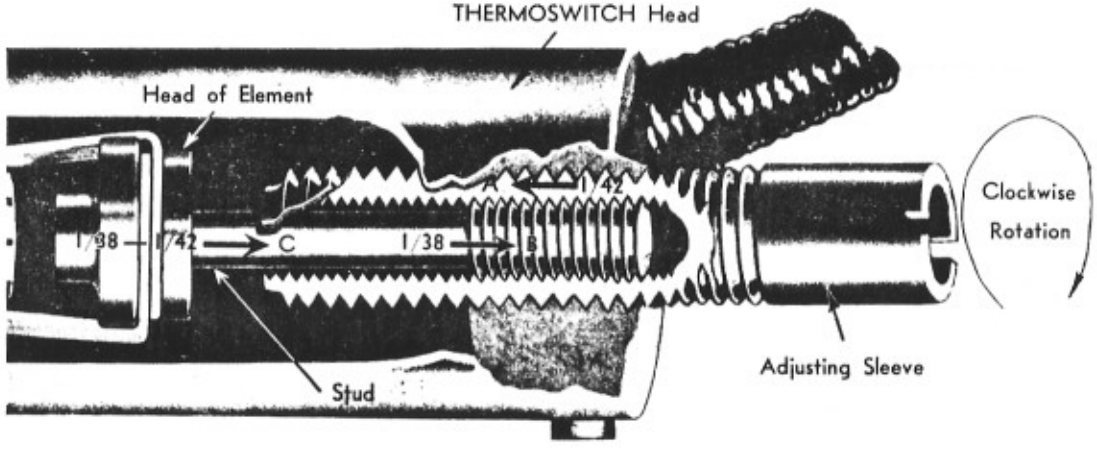


Figure 172

One clockwise turn of the adjusting sleeve moves the sleeve linearly 1/42 inch (A) toward the element. The same rotation pulls the stud away from the element and into the sleeve by 1/38 inch (B). Since the stud threads are coarser than the external threads on the adjusting sleeve, the relative movement of the stud to the THERMO-SWITCH head is outward, away from the element, in the amount of 1/38 inch minus 1/42 inch (C) which reduced to decimal equivalents equals .0263 – .0238 or .0025 inch per turn of the adjusting sleeve.

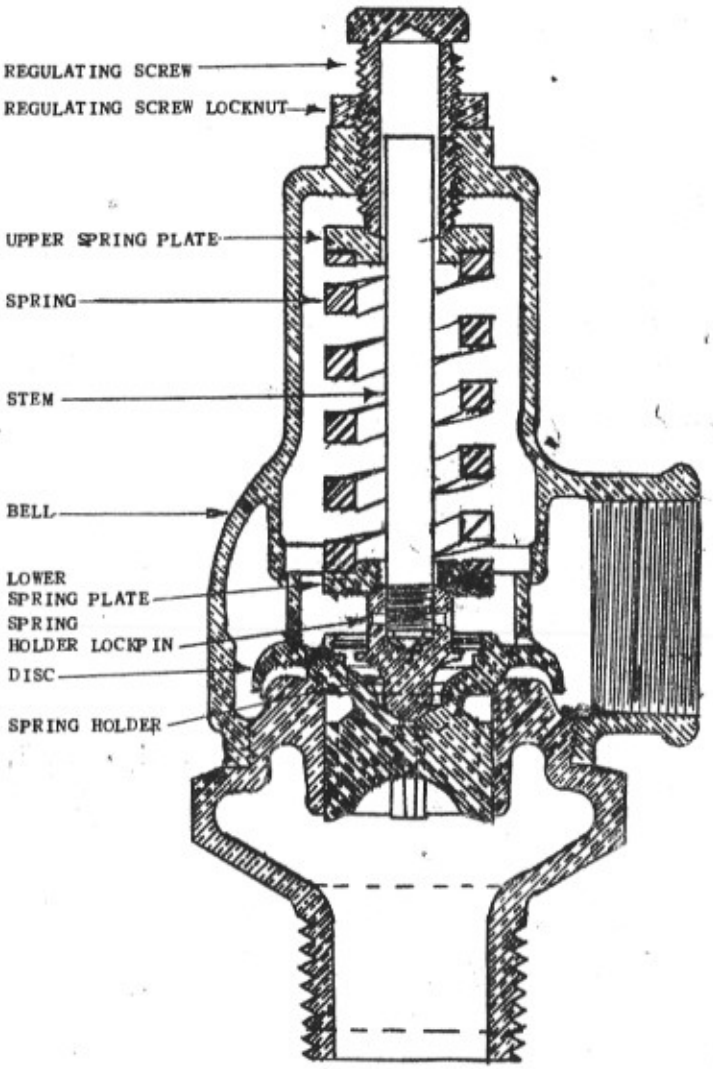


Figure 173

LUNKENHEIMER RELIEF VALVE

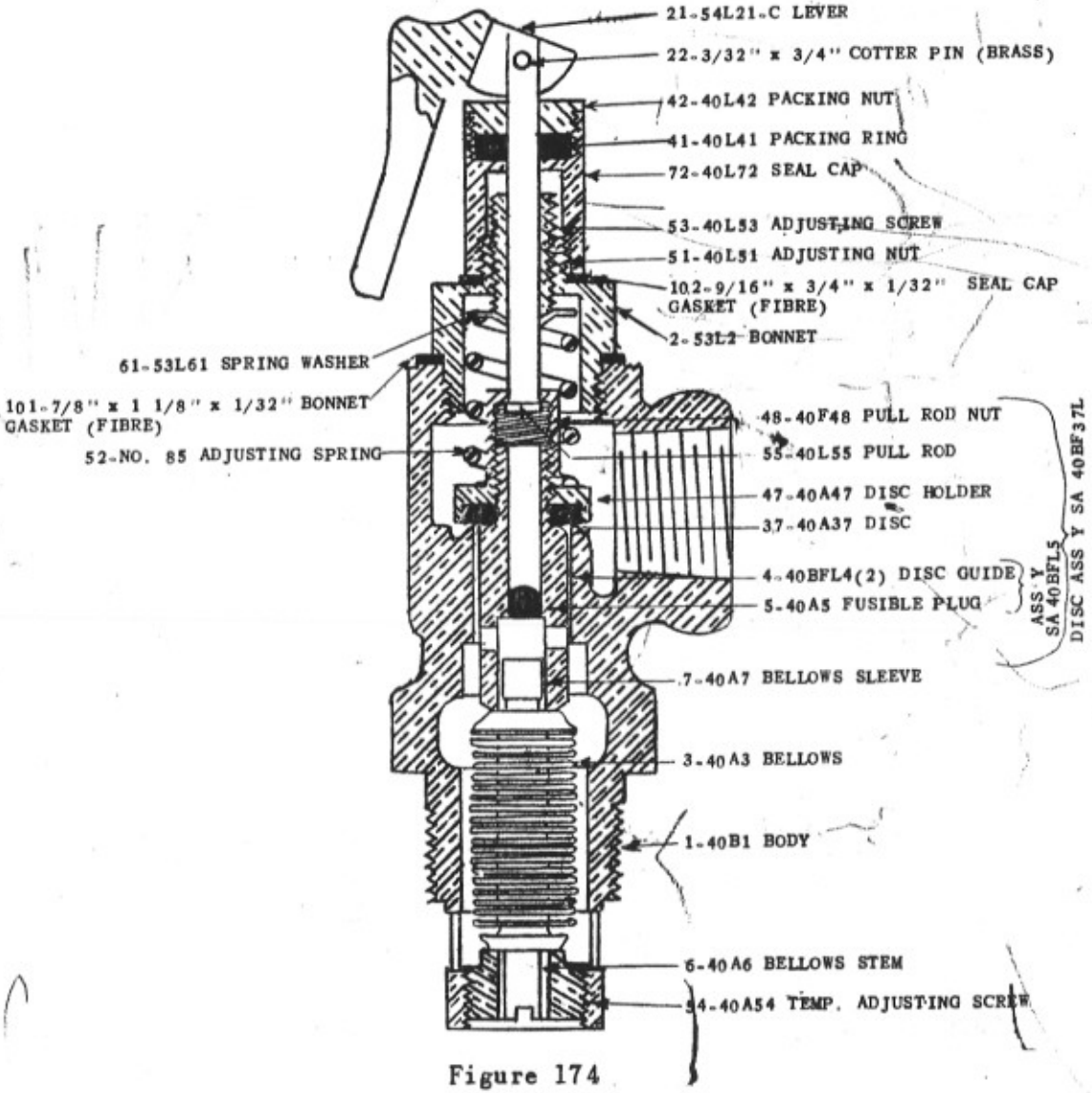


Figure 174

WATTS RELIEF VALVE

CIRCULATING PUMP AND MOTOR: Refer to Figures 175 and 176. The bearings of the circulating pump and motor are provided with oil cups, two on the motor bearing and one on the pump bearing. These should be filled with oil once a month.

If the circulating water pump has been out of service for some time, the sealing washer which prevents leakage from the pump around the drive shaft, and which is maintained in position by a coil spring, may freeze to its seat. If this occurs, excessive friction will be developed between the spring and the housing cup. This friction may be sufficient to stall the motor and cause the thermal overload protective unit to open. Should this happen, it will be necessary to dis-assemble the pump and free the rubber washer by prying it away from the seat. When this is done the impeller of the pump should rotate freely in its bearing. Service instructions will be found on pages 238 to 244.

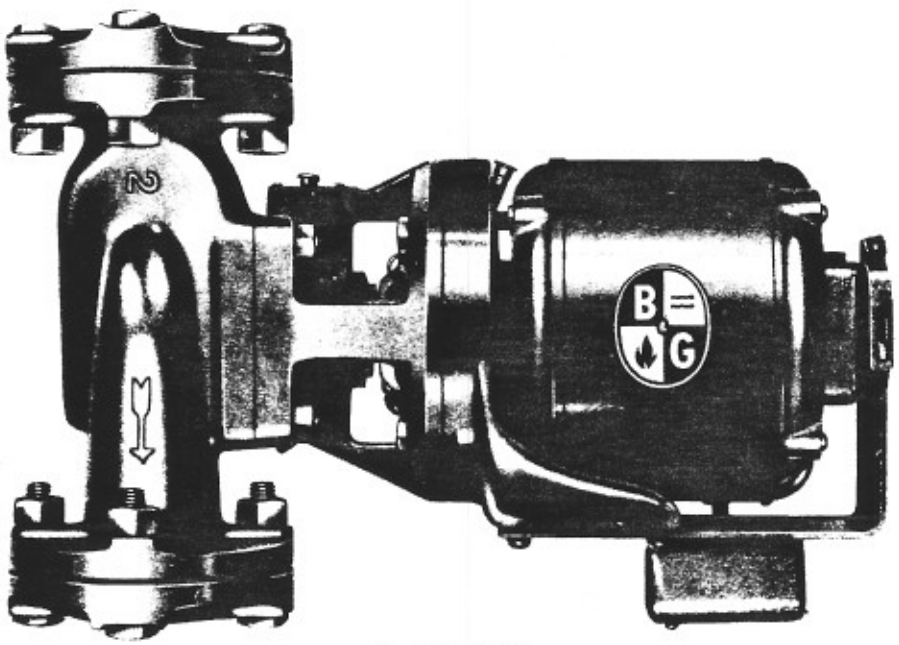
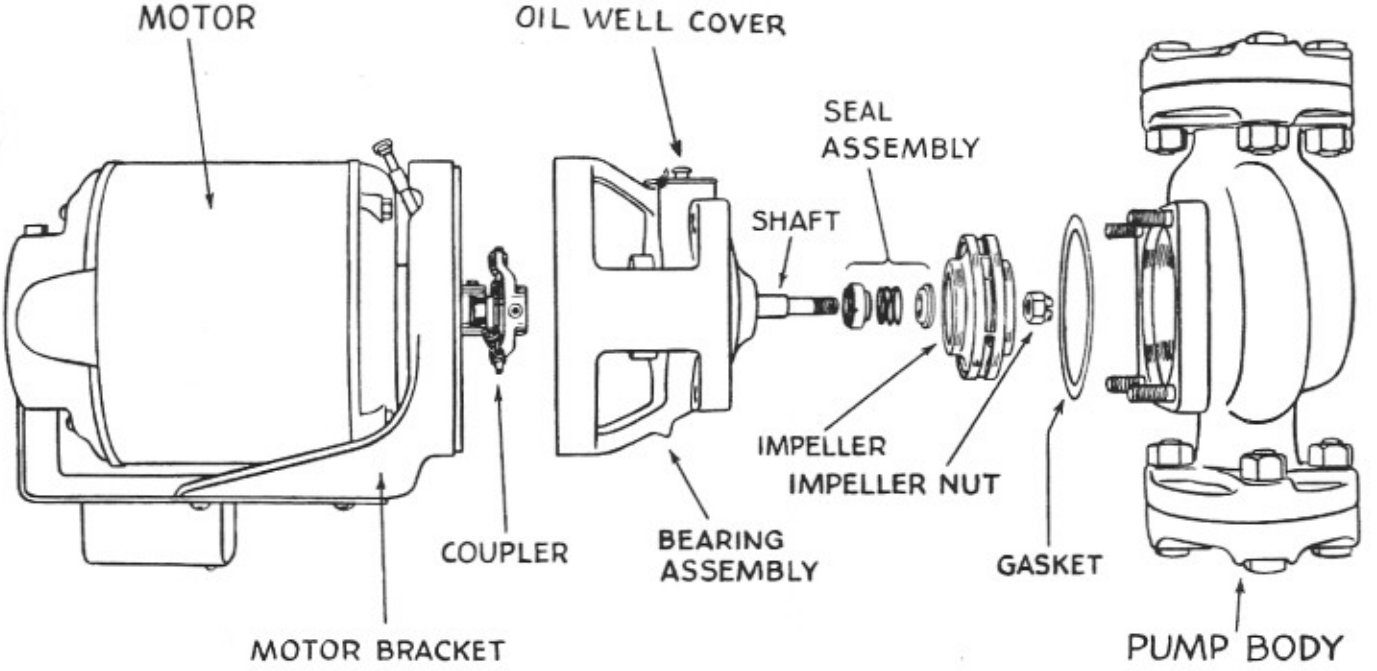


Figure 175

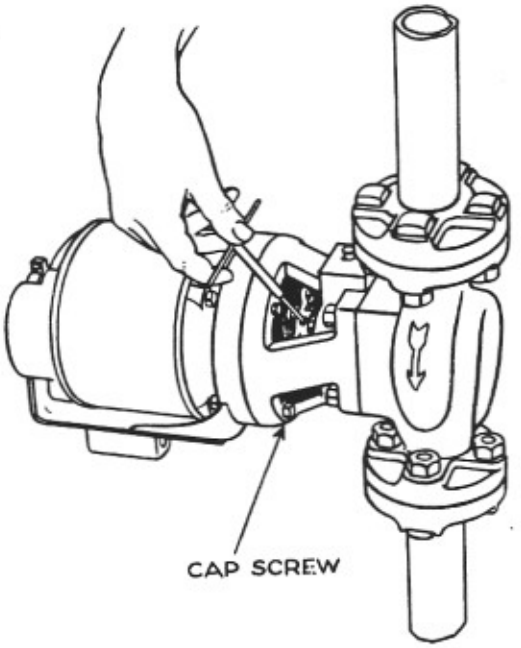


HI-HV PUMP

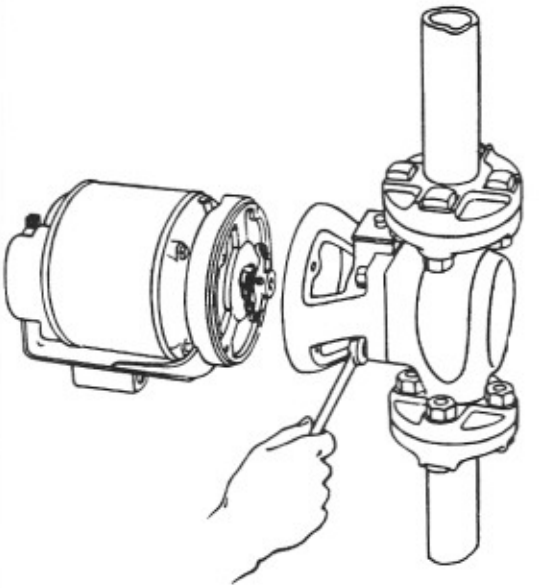
Figure 176

SERVICE INSTRUCTIONS

TO REPLACE THE WATER-TIGHT SEAL



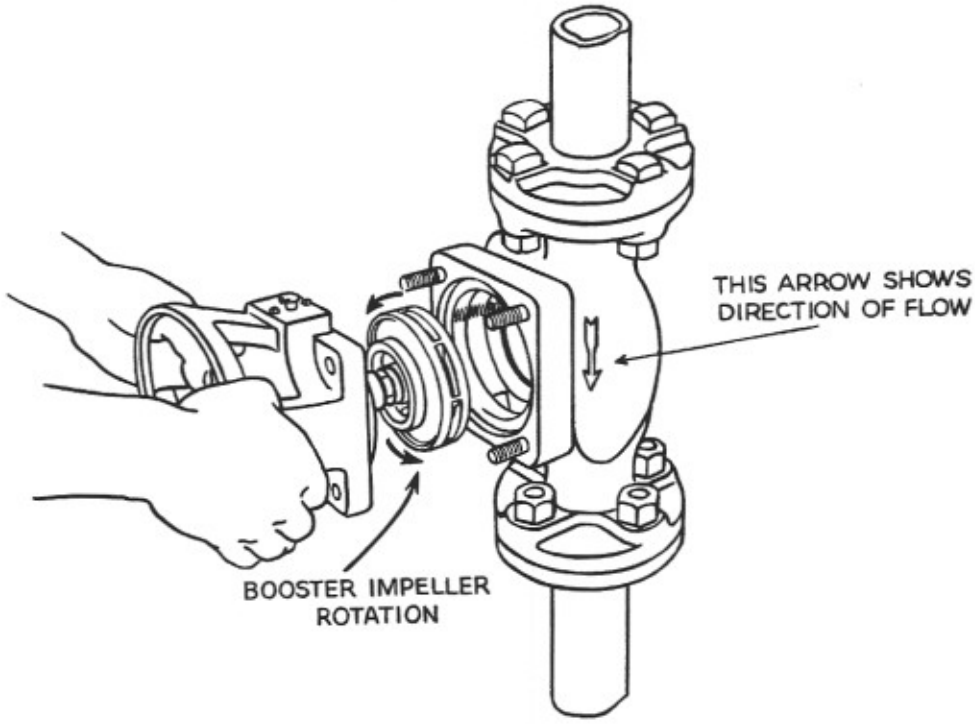
FOLLOW THESE SIMPLE STEPS



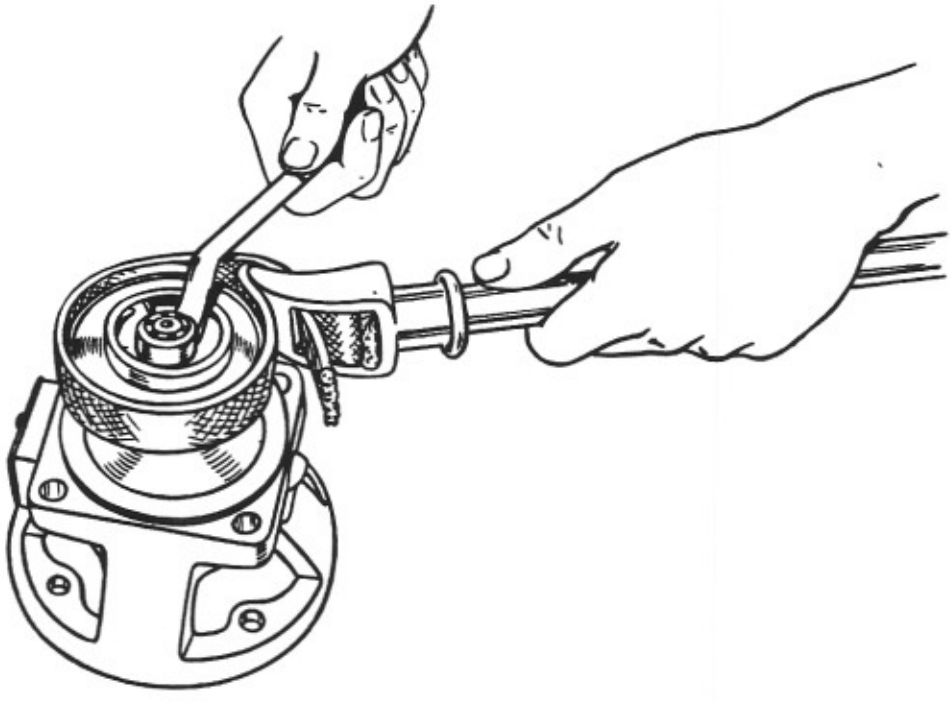
1 Loosen coupling from pump shaft. Remove 4 motor cap screws holding motor to bearing bracket.

2 Lift motor away leaving coupler attached to motor shaft. Then remove body stud nuts.

TO REPLACE WATER-TIGHT SEAL *(Continued)*



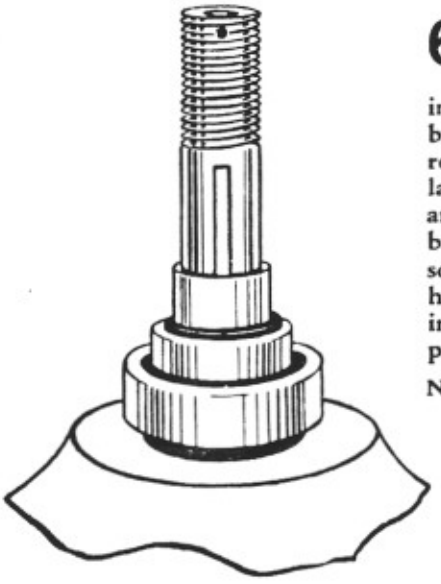
3 Now remove seal bearing bracket by pulling *straight out.* CAUTION! Avoid twisting which might wedge impeller and bend shaft. Close clearance maintained by B & G makes for utmost pump efficiency and economy of operation.



4 In loosening impeller nut we suggest use of a strap wrench on impeller to avoid marring edge. Alternative:—Use half of an old coupler on end of shaft. Tighten set screw and use wrench to hold coupler-half while removing impeller nut.

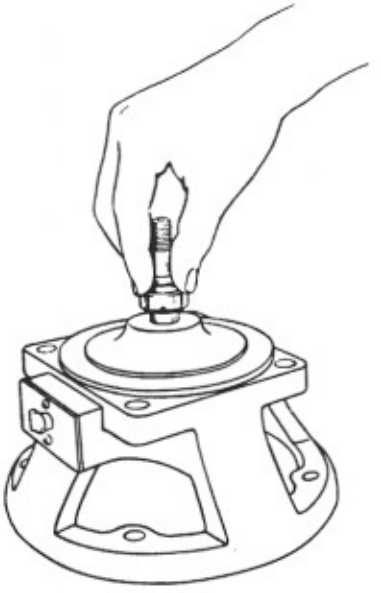
5 Hold bearing bracket slightly raised from table or bench with hand under impeller. Tap end of shaft with wooden mallet or hammer handle. The impeller should slip off. *Do not hit* end of shaft with hard object. (Impeller puller can be purchased from your supplier.).

TO REPLACE WATER-TIGHT SEAL *(Continued)*



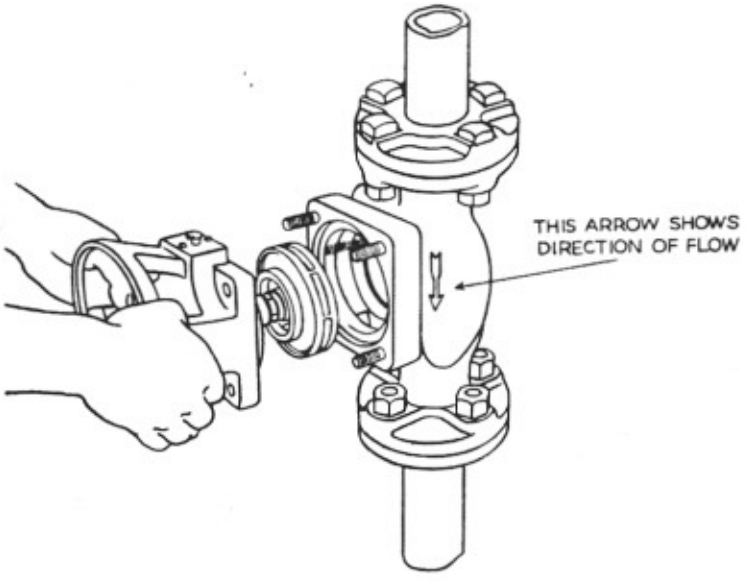
6 Seal washer and spring can be lifted off following the impeller. Small brass ring should be removed followed by larger ring. The seal and rubber can then be removed with a screwdriver. If water has leaked into bearings or wicking, see page 7.

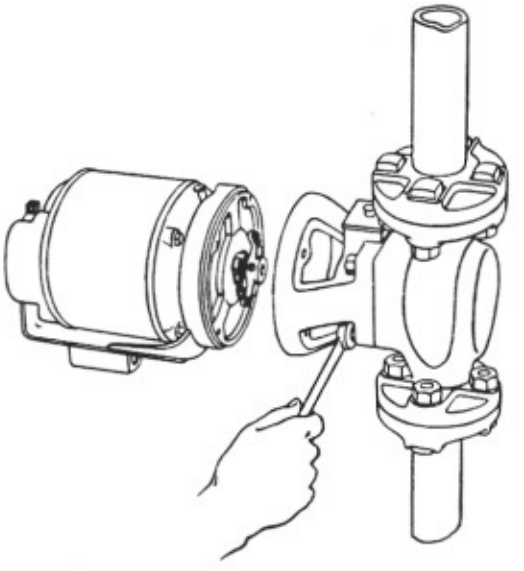
NOTE:—If face of casting is badly corroded or scored, a new seal may not fit tight enough to prevent leaking. In this case the entire bearing bracket should be replaced.



7 Clean shaft and face of bracket with a cloth. Push new seal on shaft (using a few drops of water as lubricant) until it fits snug against face of casting. Replace seal spring and washer followed by impeller and nut.

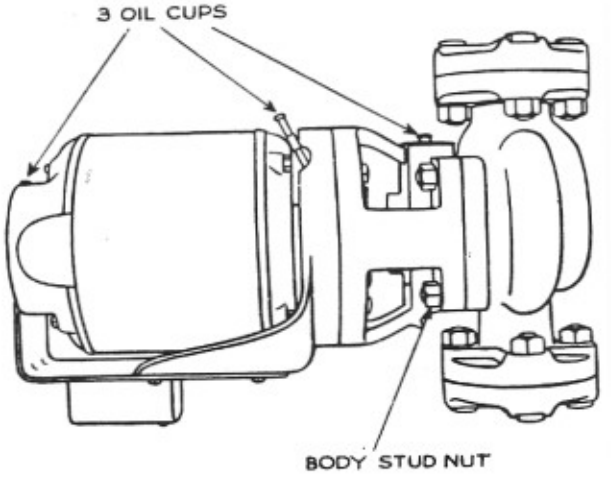
NOTE:—Be sure that the sharp edge of shaft hole in impeller is next to the nut and that the rounded edge of shaft hole is against shoulder of shaft.





8 Replace bearing bracket in body after placing new body gasket in body.

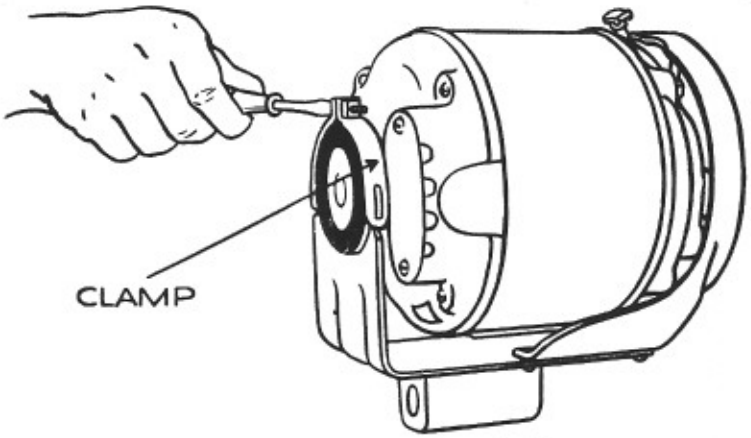
9 Tighten 4 body stud nuts *lightly and evenly*. Place motor up to bracket, pushing coupler-half on pump shaft with thumb. Replace motor cap screws and tighten set screw in coupler.



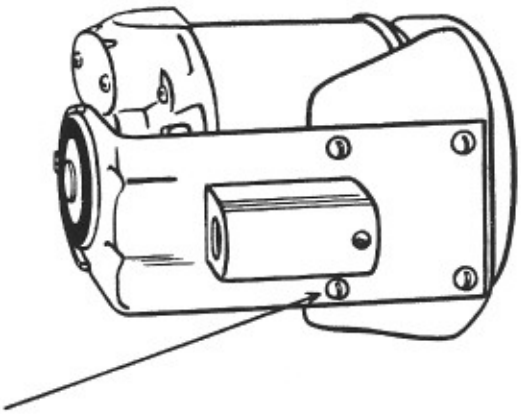
10 Tighten 4 body stud nuts alternately until snug, being sure that coupler can be turned with fingers at all times. If possible, run the motor during this operation.

11 To replace coupling, follow 1, 2 and 9 with reference to coupling only.

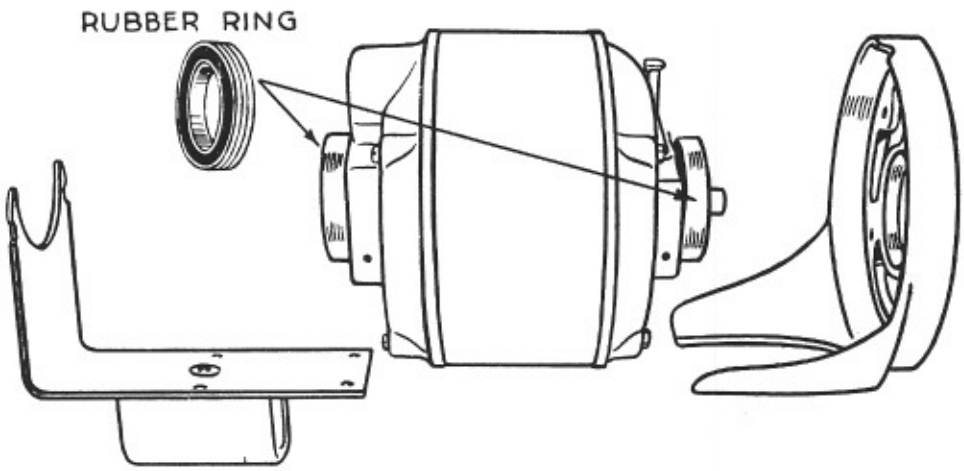
TO REPLACE RUBBER RING MOUNTINGS



1 Loosen screw and remove clamp holding rear of motor.



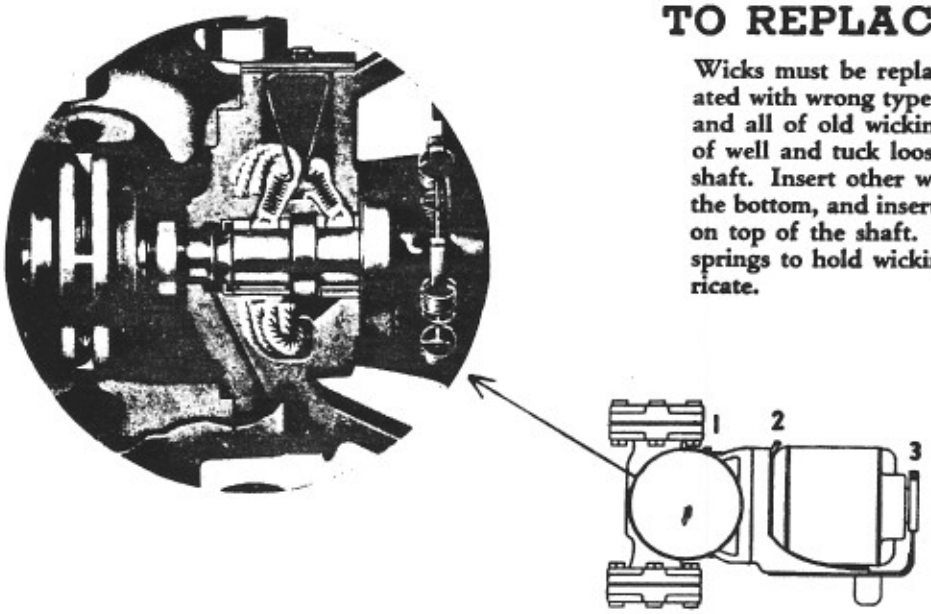
2 Remove 4 screws and slide brackets away as shown in fig. 3.



3 Pry off old rings with screwdriver; replace with new rings. Put brackets in place and insert screws removed in fig. 2. Tighten clamp on rear of motor and it is ready for operation.

TO REPLACE OIL WICKING

Wicks must be replaced if water soaked or saturated with wrong type of oil. Remove oil well cover and all of old wicking. Push new wick to bottom of well and tuck loose end into opening on top of shaft. Insert other wick on other side of well into the bottom, and insert loose end into other opening on top of the shaft. Replace oil well cover, using springs to hold wicking down against shaft. Lubricate.




Body Nut

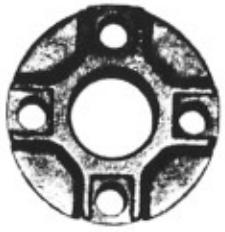

Body Stud


Bracket Cap Screw

Coupler Set Screw


Coupler

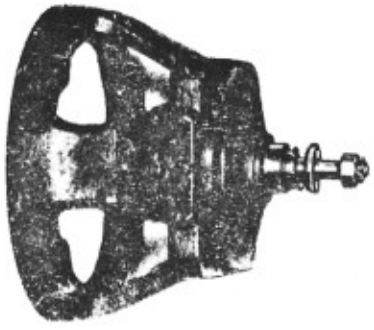

Body Gasket

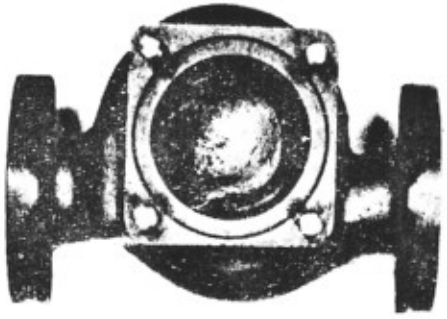

Flange

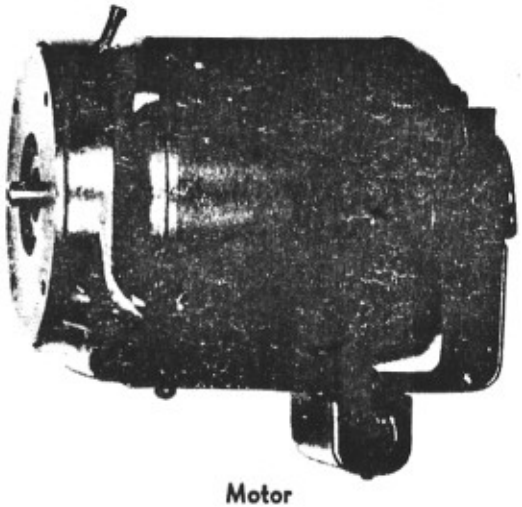

Flange Gasket


Flange Bolt


Flange Nut


Bearing Assembly


Booster Body


Motor


Impeller

Impeller Nut


Pump Shaft

Woodruff Key


Seal Ring Assembly


Bearing Bracket


Oil Well Cover

Oil Well Set Screw


Rear Bearing Gasket

Rear Bearing Cap Screw


Oil Wicks


Rear Bearing


Oil Well Gasket

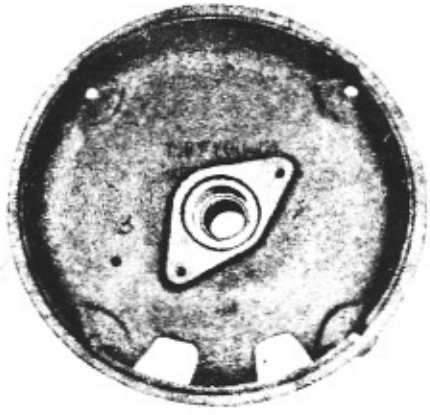
PUMP PART NUMBERS

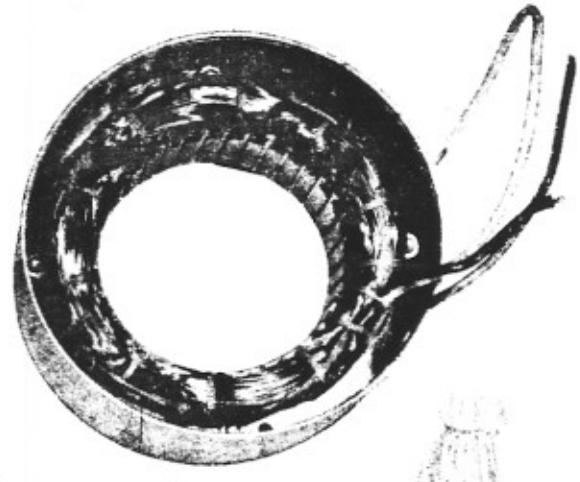
ITEM	DESCRIPTION	MFG. NO.
1	Bearing Bracket	P4Z-426
2	Bearing Assembly	PZ-4351
3	Booster Body-Cast Iron	P5Z-41
5	Body Gasket	P-4133
6	Body Nuts	P-413
7	Body Studs	P-419
8	Motor Cap Screws	PHBI-417A
9	Coupler Assembly	PZ-4291
10	Coupler Set Screw	P-453
11	Flanges - Cast Iron	P-427
13	Flange Bolts	F-417
14	Flange Nuts	P-413
15	Flange Gasket	F-418
16	Impeller	PIZ-635
17	Impeller Nut	P-4123
18	Lock Washer	P-4122
19	Motor	PZ-4
20	Oil Well Cover Screw	P1-4137
21	Oil Well Cover	PZ-4124
22	Oil Well Cover Gasket	
23	Oil Wick	P-4130
24	Pump Shaft	PZ-440C
25	Rear Bearing	P2Z-4115B
26	Rear Bearing Gasket	P-455
27	Rear Bearing Cap Screw	P-2416
28	Motor Mountings - Front	MOT101-614
29	Motor Mountings - Rear	MOT102-614
30	Seal Ring Assembly	PZ-4118B
31	Shaft Key	P-4138
32	Body Cap Screw	
33	Bearing Bracket Cover	

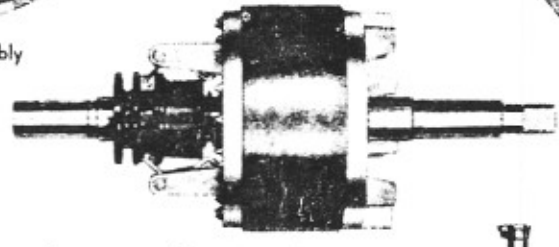
N.H.

B&G MOTOR MOT100-6
1/6 HP 115 Volt 60 Cycle Single Phase

ITEM	PART NUMBER	DESCRIPTION	NO. PCS
1	MOT100-667	Bearing Packing - Wool Wicking	2
2	MOT100-635	Cupped Washer	2
3	MOT100-627	Cupped Washer insert rubber	2
4	MOT100Z-611	End Plate Assembly	2
5	MOT100-643	Motor Bolt	4
6	MOT100-644	Motor Nut	4
7	MOT100Z-645	Oil Well Cover Assembly (Shaft End)	1
8	MOT100Z-641	Oil Well Cover Assembly (Switch End)	1
9	MOT100-695	Oil Well Cover Screw	4
10	MOT106-647	Protector	1
11	MOT100-626	Protector Retainer Clamp	1
12	MOT100Z-63	Rotor Assembly Complete	1
13	MOT100Z-631	Spring & Switch Body & Bracket Assembly	1
14	MOT100Z-616	Switch Plate Assembly	1
15	MOT100-664	Switch Plate Assembly Screw	2
16	MOT100-636	Shaft Washer Phenolic	2
17	MOT100-637	Shaft Washer Steel	2
18	MOT100Z-649	Wound Stator Assembly	1


End Plate Assembly


Wound Stator Assembly

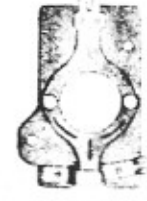

Rotor Assembly - Complete


Spring and Switch Body and Bracket Assembly


Motor Bolt and Nut


Oil Well Cover Assembly (Switch End)


Oil Well Cover Assembly (Shaft End)


Switch Plate Assembly

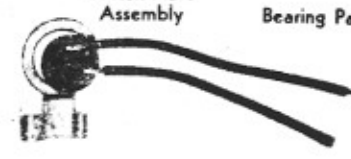

Bearing Packing


Screw


Shaft Phenolic Washer


Shaft Steel Washer


Cupped and Rubber Washer


Protector and Protector Retainer Clamp

REDUCING VALVE LESLIE TYPE L 3-1 1/4". Refer to Figure 177.

OPERATION: The hand wheel compresses adjusting spring against the metallic diaphragm opening controlling valve. This valve admits high pressure from inlet body port to top of piston, opening main valve and admitting reduced pressure to outlet piping. The reduced pressure acting through the outlet body port on the under side of the diaphragm balances the compression of the spring. This action throttles the controlling valve and controls the reduced pressure at the set value.

Any load change reacts with a pressure change immediately on the diaphragm instantly re-positioning the main valve and maintaining constant reduced pressure setting. Only a change in reduced pressure affects valve action.

To change reduced pressure setting turn hand wheel downward to increase and upward to decrease pressure.

DIS-ASSEMBLE: Refer to Figure 178.

1. Release all compression on the adjusting spring (1) by turning the hand wheel counter-clockwise.

2. Unscrew adjusting spring case (4) and take out spring (3) and diaphragm (6).

3. Unscrew controlling valve seat (7) with socket wrench and remove controlling valve (8) and spring (9).

After dis-assembly, the parts are to be cleaned with solvent and inspected.

1. Examine main and controlling valve to be sure they move freely in their guides and seat properly.

2. If valve seating surfaces are scored or cut, re-grind with fine grinding compound, allowing the piston to remain in the cylinder liner when grinding the main valve to insure perfect centering. Remove all traces of grinding compound before re-assembling.

If resilient insert seating surface is scored or cut slightly, put oil on controlling valve press firmly against insert and turn several times, removing defect. Replace part if resilient insert is heavily scored or cut.

3. Make certain the piston rings are free in their grooves and expand into the cylinder liner.

4. Have all working parts moving freely.

RE-ASSEMBLE:

1. Place main valve, spring and gasket in position on bottom cap and screw into valve body.

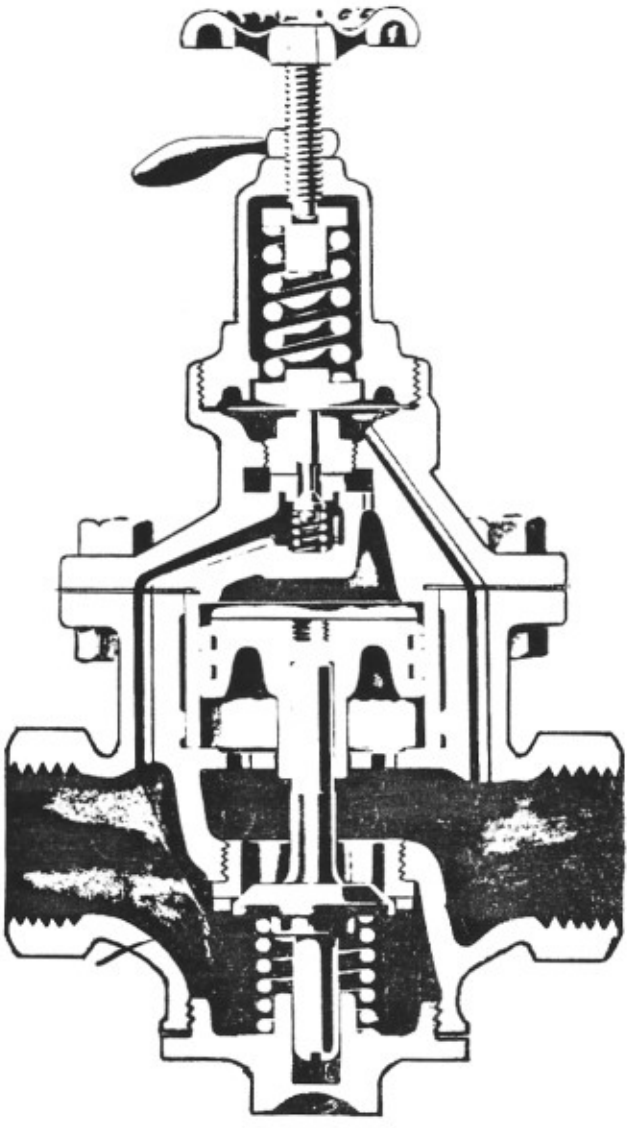
2. Press piston into cylinder (be sure movement is smooth and free). The top of liner must be flush with top of body flange.

3. Bolt top cap to body using new gasket.

4. Assemble controlling valve seat and spring in top cap. Tighten controlling valve seat with socket wrench. With the valve assembled thus far, place a straight edge across diaphragm seat as shown in Figure 177. Using a feeler gauge check clearance between seat and valve stem. The clearance must be .001 to .005 inch. If necessary file or grind stem to obtain clearance.

5. Check flatness of diaphragm with a straight edge. If " dished " more than .005 from level replace with new diaphragm.

6. Replace diaphragm, adjusting spring, spring seats and spring case.



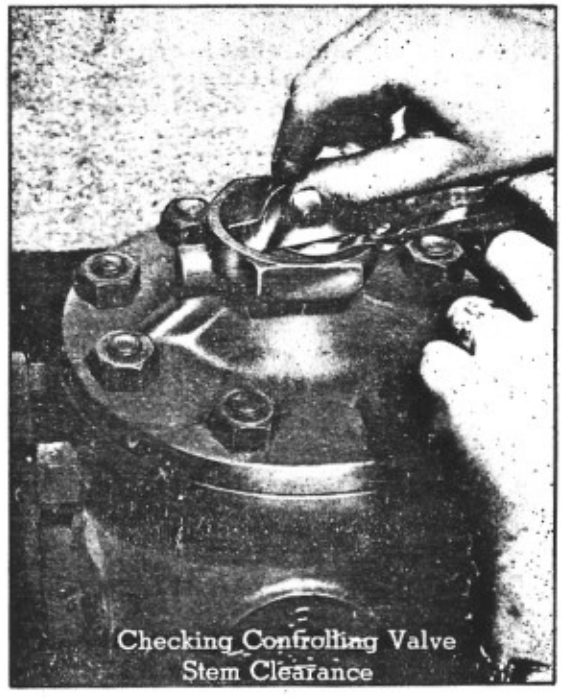
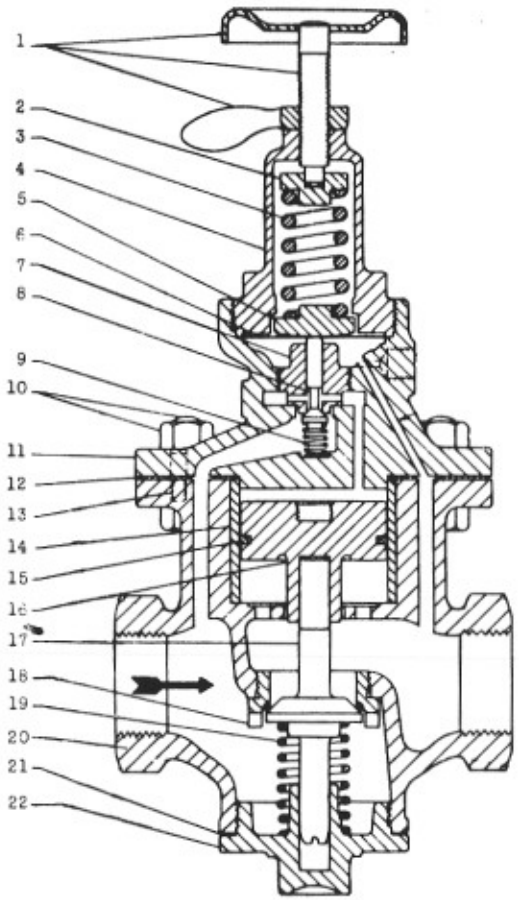


Figure 177



ITEM NO.	DESCRIPTION		CAT. NO.
1	ADJUSTING SCREW, COMPLETE	(NOTE 1)	9136
2	TOP SPRING SEAT		4869
3	ADJUSTING SPRING		3582
4	ADJUSTING SPRING CASE		9366
5	BOTTOM SPRING SEAT		4959
6	DIAPHRAGM		3684
7	CONTROLLING VALVE SEAT		9433
8	CONTROLLING VALVE		4938
9	CONTROLLING VALVE SPRING		4930
10	BOLT AND NUT		9008
11	TOP CAP		9488
12	TOP CAP GASKET		4945
13	DOWEL PIN		3702
14	CYLINDER LINER		11172
15	PISTON RING	(NOTE 2)	3358
16	PISTON	(NOTE 3)	9379
17	MAIN VALVE		13284
18	SEAT RING		9544
19	MAIN VALVE SPRING		10201
20	MAIN BODY, SCREWED	(NOTE 4)	9413
21	BOTTOM CAP GASKET (BRONZE)	(NOTE 5)	3499
22	BOTTOM CAP (BRONZE)		4241

NOTE 1 - CONSISTS OF ADJUSTING SCREW (STAINLESS STEEL), HANDWHEEL (STEEL), AND LOCK NUT (CAST BRONZE).

NOTE 2 - ONE PISTON RING PER VALVE.

NOTE 3 - PISTON IS FURNISHED COMPLETE WITH PISTON RING(S).

NOTE 4 - MAIN BODY IS FURNISHED COMPLETE WITH SEAT RING AND DOWEL PIN.

NOTE 5 - BOTTOM CAP GASKET IS SHEET COPPER.

Figure 178

THERMOSTATIC VALVE: Figure 178A operates as follows: A change in temperature is measured by the difference in length between the Sensitive Tube (No. 27), which has a high co-efficient of expansion, and the Invar Rod (No. 26), which has a very low co-efficient of expansion.

The Temperature Adjustment Dial Knob (No. 4) is fastened securely to Stem (No. 5), which is threaded into the Invar Rod (No. 26). The stem passes through the Throttling Spring Assembly (No. 7), the Exhaust Valve Nut (No. 19), the Valve Assembly (No. 10), Seal Washer (No. 11), Spring Seat (No. 22), and Supply Valve Spring (No. 23). The Throttling Spring Assembly (No. 7), is in contact with the dial knob and the exhaust valve nut. With a temperature increase, the Sensitive Tube (No. 27) increases in length and the Invar rod and dial knob move to the right, thus opposing the throttling spring, closing the exhaust valve, and opening the supply valve. Air pressure will build up against Diaphragm (No. 21) sufficiently to compensate for the force exerted by Knob (No. 4) through the medium of the Throttling Spring (No. 7). By turning the dial knob counter-clockwise, it moves outward because it is threaded into Invar Rod (No. 26). Such an adjustment opens the exhaust valve, closes the supply valve, and requires an increased temperature to lengthen the Sensitive Tube (No. 27). This increased temperature draws the Invar rod and dial knob to the right to contact the exhaust and supply valves through the medium of the throttling spring and exhaust valve nut. This closes the exhaust valve and opens the supply valve. Note that the supply pressure is sealed within the bulb. The air pressure in the return line wastes through the exhaust valve orifice and out through the exhaust valve nut. Part (No. 11) is a soft Neoprene washer which fits snugly against the operating stem, seals the hole going through the combination supply and exhaust valve body, and prevents air supply leakage through the exhaust valve nut. This washer maintains a constant seal through the pressure exerted by Supply Valve Spring (No. 23) through Spring Seat (No. 22).

SETTING POWERS TYPE NO. 356 THERMOSTAT: Before any testing or setting of controls are attempted a fifteen minute warm-up period is required to permit thermostats to level off.

During this warm-up period check for the following: Water tank full, 40 P.S.I. water, 40 P.S.I. steam, 40 P.S.I. air. Check setting of air reducer valve.

Check admission valves for passing steam by shutting off air and steam and loosen the union on the outlet side of the valve, turn on steam. No steam should be passing.

The temperature of the 190 degree water is read by holding a thermometer under the drain valve for the 190 degree water loop. The temperature may vary from 180 degrees to 185 degrees. In general, when setting the 190 degree thermostat, the initial setting should be at or slightly below 180 degrees, as the tendency is to level out at a higher temperature under service conditions.

If the reading obtained is above 185 degrees or below 180, remove the cap, loosen the flat head screw on top of dial assembly approximately half turn, then rotate the knurled temperature adjusting dial toward "WARM" or "COLD" to raise or lower the temperature of the water. Each division on dial equals approximately five degrees. See Figure 178A.

When adjustment is completed, tighten the flat head screw, while holding the dial assembly to prevent it from turning.

The 140 degree thermostat is adjusted in the same manner.

The temperature of the 140 degree water may vary from 130 degrees to 140 degrees and the initial setting of the thermostat should be approximately 135 degrees, when checked at the drawing room basin.

REPAIRS TO POWERS TYPE NO. 356 THERMOSTAT:

1. Remove assembly cover. (Snap on)
2. Remove dial assembly by removing flat head screw.
3. Remove dial bushing by removing set screw inside, then gently pry off bushing being careful not to bend shaft.
4. Remove throttling spring assembly.
5. Remove adjusting screw, diaphragm and dial indicator.
6. Unscrew operating stem from Invar rod.

N.H.

REPAIRS TO POWERS TYPE NO. 356 THERMOSTAT: (cont'd)

7. Remove exhaust valve nut, being careful not to loose small parts.

8. Unsolder sensitive tube from mounting base, also unsolder rod from tube.

9. Clean all corrosion from Invar rod and apply thin coat of L-378 primer.

10. Clean all parts, renew defective ones, re-assemble and test. Set to control at 140 degrees. Adjustment to 190 degrees should be made on the car.

NOTE: When re-assembling, be sure that set screw in dial bushing contacts upper lip on operating stem before tightening home. Set throttling spring assembly at the center of the slot for proper throttling of the air valve.

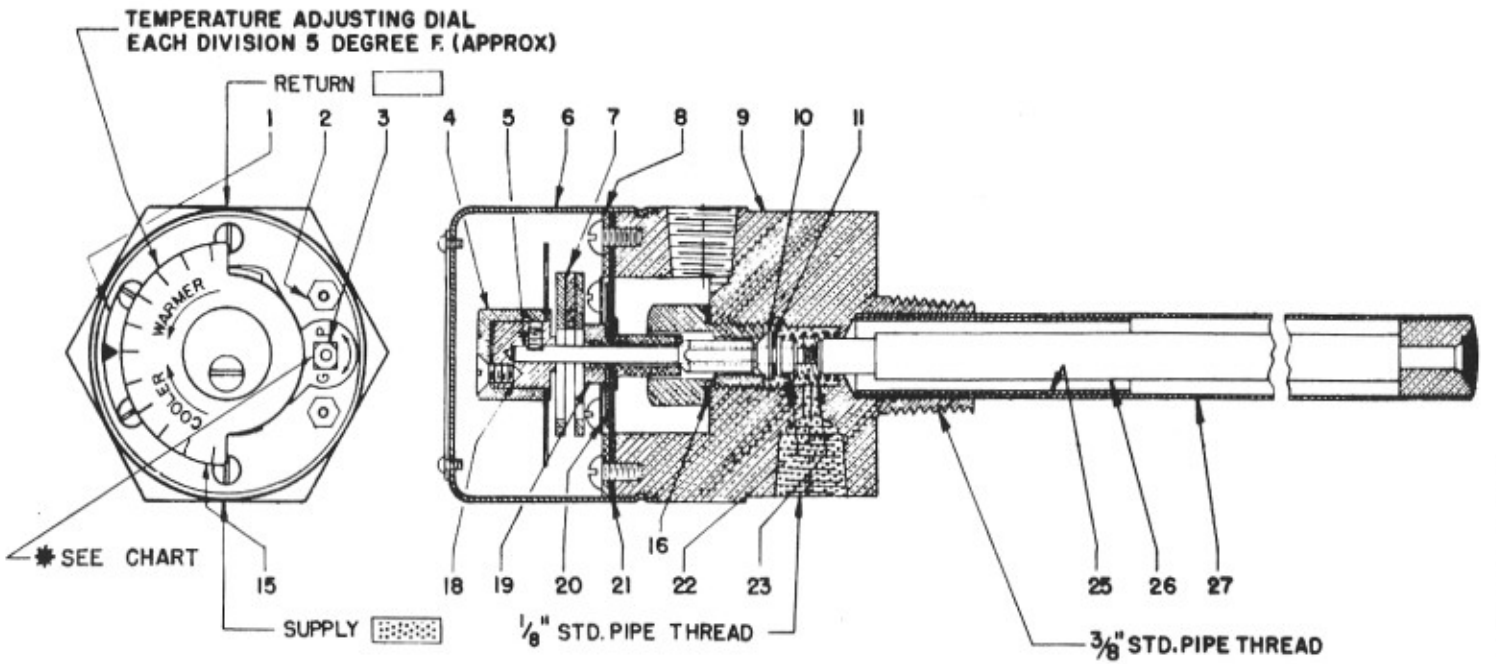
REVERSE ACTING GRADUAL RELAY: Shown in Figure 179. This relay is designed to reverse the action of the thermostat so that as the pressure from the thermostat increases, the pressure to the admission valve decreases. Small air pressure gauges are provided on each side of each of the reverse acting air relays. These gauges indicate just what is taking place in the air valve portion of the thermostats and the pressure of the air leaving reverse acting gradual relays to the admission valves.

THERMOSTAT PRESSURE	RELAY CONTROL PRESSURE
0 pounds	15 pounds
3 pounds	12 pounds
6 pounds	9 pounds
9 pounds	6 pounds
12 pounds	3 pounds
15 pounds and above	0 pounds

The relay operates as above and it will be noted that the sum of the "Thermostat Pressure" and the "Relay Control Pressure" is always 15 pounds. This relationship cannot be changed in the field.

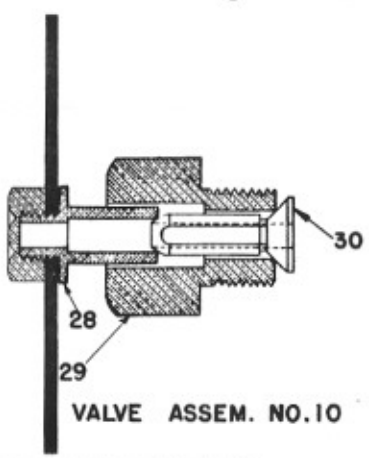
An increase in pressure from the thermostat is transmitted to the Return Port (No. 6) causing the valve assembly to move to the right. This action opens the exhaust valve assembly allowing the air to bleed off. This will continue until the force on the Supply Spring (No. 26) is cancelled by an equal and opposite force due to the action of the Exhaust Spring (No. 31) and the Thermostatic Pressure Diaphragm (No. 17). When balance is obtained, both the supply valve and exhaust valve assembly will be closed and the control pressure to the diaphragm valve is passed through Port (No. 4).

An opposite action is true for a decrease in pressure from the thermostat. A decrease in pressure will move the valve assembly to the left, keeping the exhaust assembly closed and allowing the supply valve to pass air, thereby increasing the control pressure. Again, as soon as balance is obtained, the supply valve will close preventing any waste of air.



	NAMES OF PARTS
1	INDICATOR
2	STOP SCREW
3	ADJUSTING SCREW
4	DIAL ASSEM.
5	OPERATING STEM
6	COVER ASSEM.
7	THROTTLING SPRING ASSEM.
8	DIAPHRAGM RING
9	BASE MOUNTING
10	VALVE ASSEM.
11	SEAL WASHER
15	DIAL
16	WASHER
18	DIAL BUSHING
19	EXHAUST VALVE NUT
20	DIAPHRAGM PLATE
21	DIAPHRAGM
22	SPRING SEAT
23	SUPPLY VALVE SPRING
25	REINFORCEMENT TUBE
26	INVAR ROD ASSEM.
27	SENSITIVE TUBE
28	EXHAUST VALVE BODY
29	SUPPLY VALVE BODY
30	SINGLE STEM VALVE

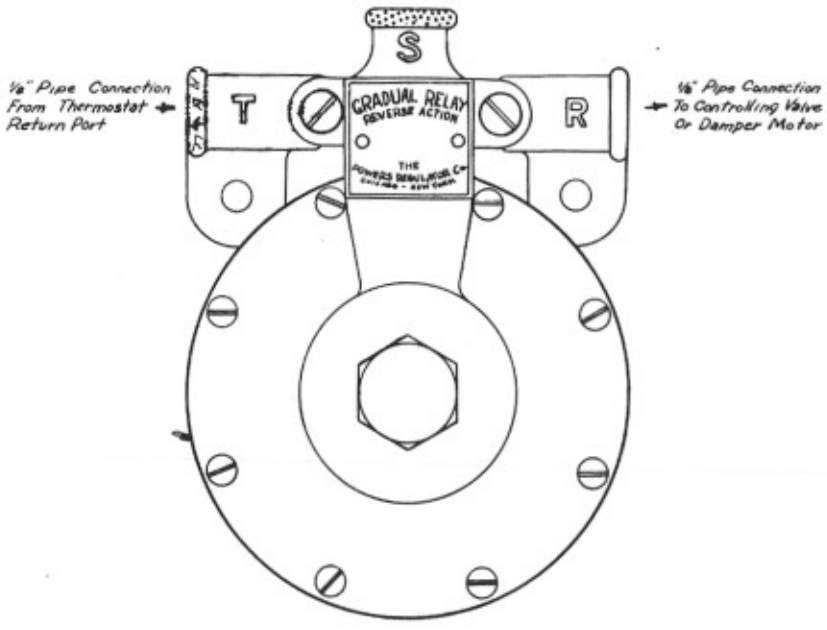
* CONTINUOUS THROTTLING RANGE ADJUSTMENT	
ROTATION	ACTION
CLOCKWISE TOWARD "G"	BECOMES GRADUAL DOWN TO 3/16 LB. PER DEGREE F.
COUNTERCLOCKWISE TOWARD "P"	BECOMES POSITIVE UP TO 2 LB. PER DEGREE F.

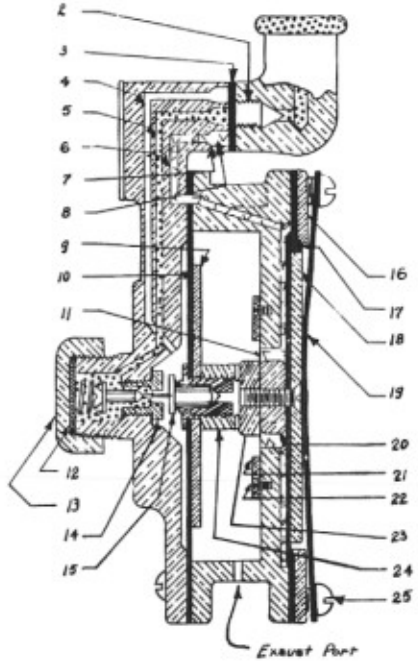


VALVE ASSEM. NO.10

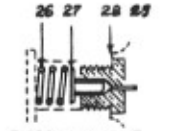
TYPE 356 THERMOSTAT

FIGURE 178-A

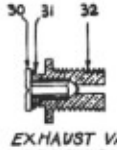




	NAMES OF PARTS
1.	
2.	SHUT-OFF SCREW
3.	TERMINAL GASKET
4.	PORT TO CONTROLLING DIAPHRAGM
5.	AIR SUPPLY PORT
6.	RETURN PORT FROM THERMOSTAT
7.	SCREEN FILTER
8.	FELT FILTER
9.	RETURN CHAMBER DIAPH. PLATE
10.	RETURN CHAMBER DIAPHRAGM
11.	PACKING DIAPHRAGM
12.	SUPPLY VALVE CAP GASKET
13.	SUPPLY VALVE CAP
14.	SUPPLY VALVE ASSEM.
15.	EXHAUST VALVE ASSEM.
16.	THER. PRESSURE DIAPHRAGM RING
17.	THER. PRESSURE DIAPHRAGM
18.	THER. PRESSURE DIAPH.
19.	THER. PRESSURE DIAPH. SPRING
20.	DIAPHRAGM SPACER
21.	PACKING DIAPHRAGM RING
22.	PACKING DIAPHRAGM RING SCR.
23.	PACKING DIAPHRAGM NUT
24.	EXHAUST VALVE NUT
25.	DIAPH. SPRING ADJUSTING SCREW
26.	SUPPLY VALVE SPRING
27.	SUPPLY VALVE
28.	SUPPLY VALVE GASKET
29.	SUPPLY VALVE HOUSING
30.	EXHAUST VALVE
31.	EXHAUST VALVE SPRING
32.	EXHAUST VALVE HOUSING
33.	SPACER



SUPPLY VALVE ASSEMBLY (14)



EXHAUST VALVE ASSEMBLY (15)

REVERSE ACTING
GRADUAL RELAY

FIGURE 179

POWERS DIAPHRAGM ADMISSION VALVE: Refer to Figure 180. These valves control the steam supply to the water heaters and operate in conjunction with the thermostats and air relays. When the air pressure to the diaphragm rises above 5 P.S.I., the valves start to open and are fully opened at approximately 15 P.S.I.

The air pressure on the valve is indicated on the small gauge located in the line between the valve and the air relay. If this air pressure does not increase when the pressure on the opposite side of the relay decreases, it indicates that the diaphragm may be ruptured or that there may be a leak in the air line.

To check this condition, disconnect the air piping from the valve, seal the end of the pipe which comes from the air relay and watch the gauge to see if the air pressure registers in a normal manner as outlined above. If it does, the relay is not at fault. If no leaks can be found in the air line, the rubber diaphragm in the steam admission valve is probably ruptured, and valve should be replaced.

REPAIRS TO POWER DIAPHRAGM ADMISSION VALVE: If the valve was removed because it was found to be passing steam dis-assemble as follows: (Do not remove top diaphragm).

1. Remove bottom nut (No. 37).
2. Loosen top lock nut (No. 24). Also loosen packing nut (No. 12). Working from the bottom opening, unscrew stem (No. 25) from diaphragm.
3. Inspect poppet and valve seat, if badly wire drawn, renew both seat and poppet. If damage is slight, poppet can be ground into seat.

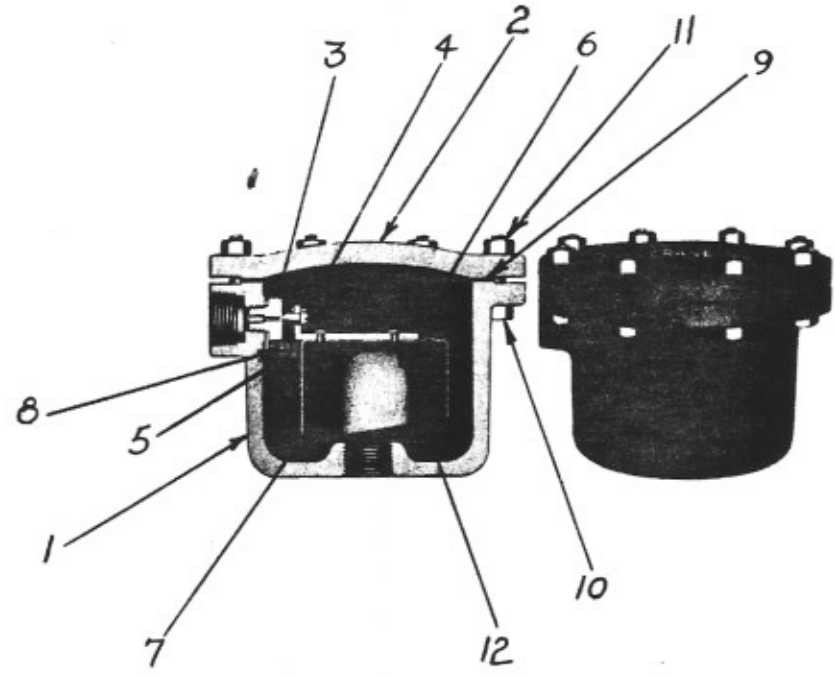
Re-assemble and test. Set stem length so that valve starts to open when air pressure in diaphragm chamber reaches five pounds.

RENEW DIAPHRAGM TOP ASSEMBLY:

1. Follow steps 1 and 2 above.
2. Secure valve body to prevent it from kicking out of position. Then apply sufficient pressure to the top of the diaphragm to hold it in position while removing the four bolts which hold the diaphragm to the spider.
3. Release pressure slowly so that spring pressure does not throw the diaphragm causing injury to operator.
4. Renew diaphragm assembly and test as outlined above.

BUCKET TRAP: Figure 181 is a cross section of steam bucket trap. This trap is fully described on Page 519 of the A.C. Manual.

N.H.



ITEM NO.	DESCRIPTION
1	BODY
2	CAP
3	SEAT BUSHING
4	ADJUSTING SCREW
5	FULCRUM SUPPORT
6	FLOAT LEVER
7	OPEN FLOAT
8	FULCRUM ROD
9	GASKET
10	BOLTS
11	NUTS
12	RIVIT

Figure 181

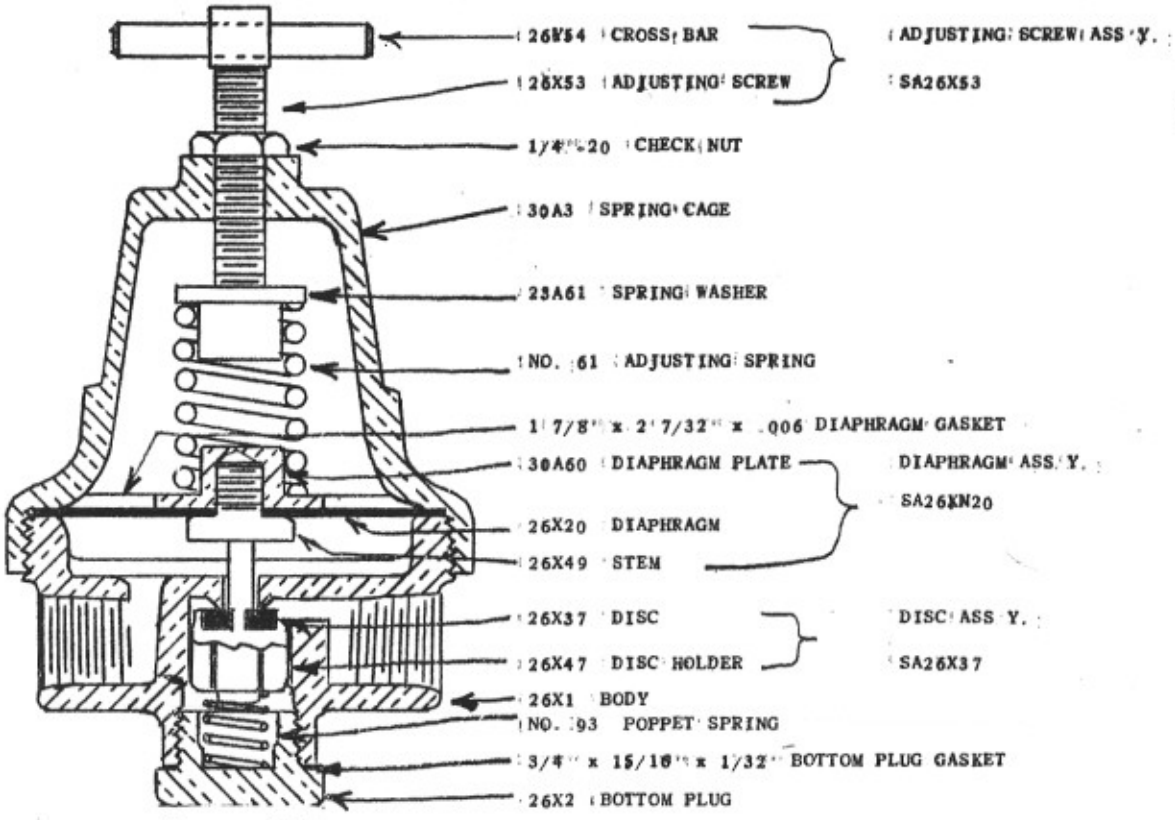


Figure 183

AIR REDUCING VALVE WATTS NO. 26: Refer to Figure 183. If the reduced pressure builds up, or if the valve fails to shut off tightly, the cause is probably an accumulation of dirt on the valve seat or deterioration of the seating disc.

TO CLEAN SEAT AND RENEW DISC. Remove bottom plug and gasket and take out disc holder. Wipe off seating surfaces with soft cloth. If disc is worn, replace it. Re-assemble disc holder and bottom plug.

TO RENEW DIAPHRAGM: Relieve compression on spring by turning adjusting screw counter-clockwise. Remove spring cage from valve body. Remove spring and spring washer. Take out stem and diaphragm assembly. Unscrew stem nut and dis-assemble stem, diaphragm, and diaphragm gasket. Clean parts thoroughly and re-assemble with new diaphragm. Be sure that stem nut is tight and that stem moves freely.

TO ADJUST: Turning adjusting stem clockwise increases spring pressure on diaphragm thereby increasing pressure of air delivered by valve. This valve is to be set to deliver 20 P.S.I.

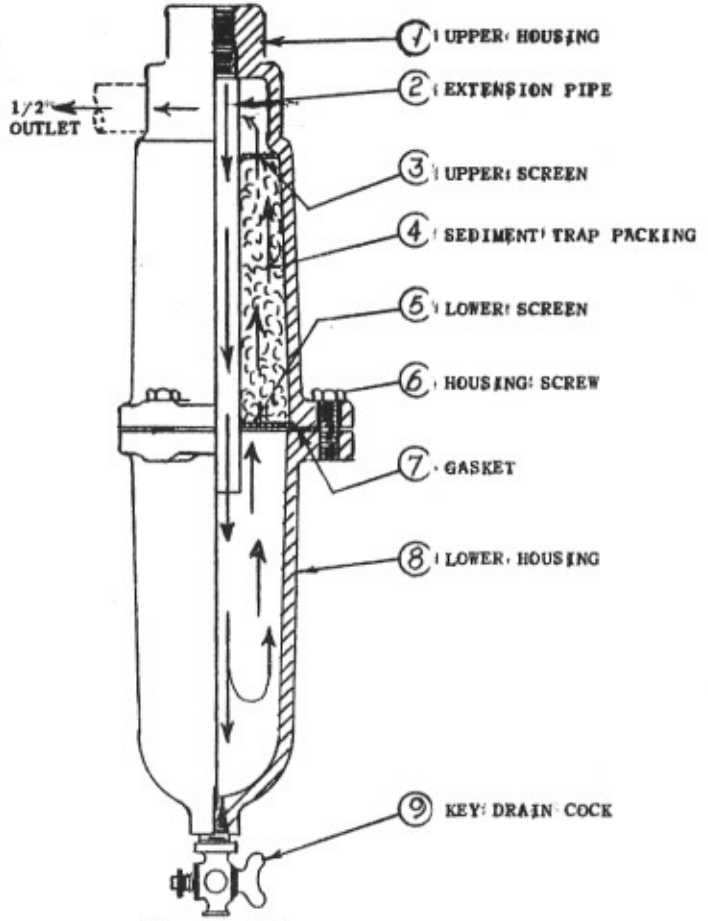


Figure 182

AIR SEDIMENT AND WATER TRAP: Refer to Figure 182. Air enters at top of trap and is piped through the sediment packing to the lower portion where water is trapped. At this point, pressure forces the air back up through the lower screen, through sediment packing, through upper screen to the outlet. The lower housing should be blown out by opening the pet cock provided at the time the water filter is handled. The sediment packing should be cleaned in solvent once a year. After cleaning inspect for defects and renew if necessary.

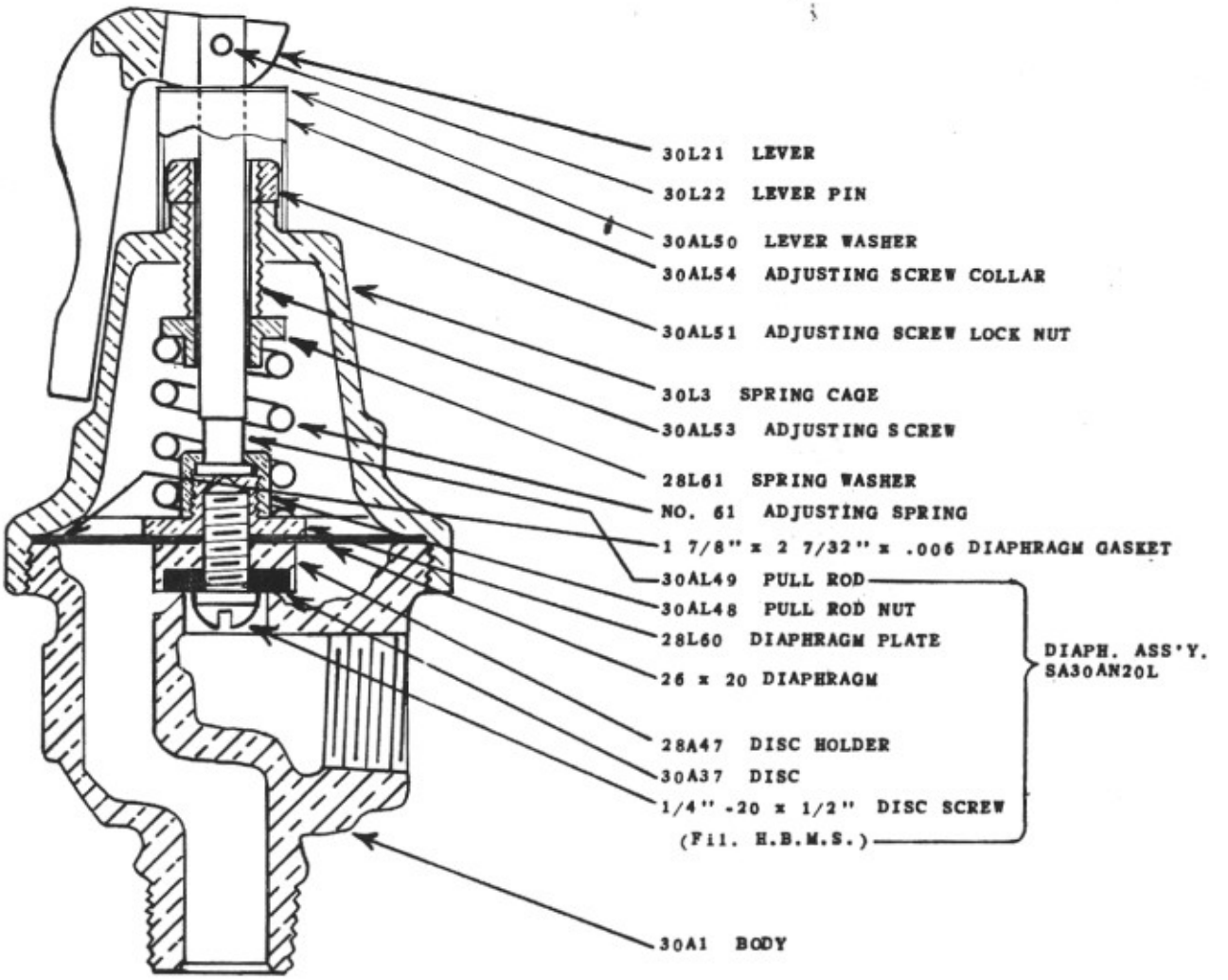
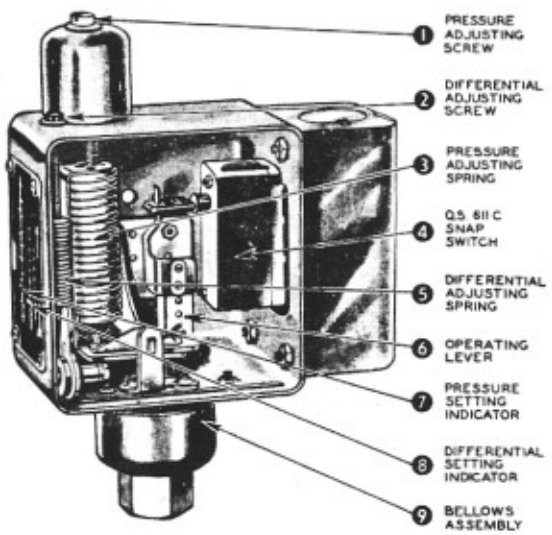


Figure 184



TYPE L404F PRESSURETROL

Figure 185

AIR BLOW-OFF VALVE WATTS NO. 30L: Refer to Figure 184. If the valve fails to shut off tightly, the cause is probably an accumulation of dirt on valve seat or deterioration of the disc.

To clean seat and renew disc, release spring tension by removing pin from lever at top of valve. Remove lever washer and collar, loosen adjusting screw locknut, then turn pull rod counter-clockwise until all pressure is released. Remove spring cage from valve body. Take out stem and diaphragm assembly, remove disc screw. Clean parts thoroughly, re-assemble using new disc and diaphragm if necessary.

TO ADJUST: Turning the adjusting screw clockwise increases the pressure on the diaphragm, thereby increasing the pressure necessary to cause valve to blow off.

This valve is set to blow off at 28 P.S.I. and can be checked on the car by increasing the setting of the Watts reducer and setting blow-off accordingly.

AIR AND STEAM PRESSURE SWITCHES: (Pressuretrols) Refer to Figure 185. Set the cut-in for air pressure switch at 10 P.S.I. and then set the differential at 21 P.S.I., the top end of the range. For steam set the cut-in at 15 P.S.I. and then set the differential at 21 P.S.I., the top end of the range.

DRAINING INSTRUCTIONS FOR CARS EQUIPPED WITH MCDONALD DUO-THERMAL WATER SYSTEM:

Refer to figure 186.

1. Lower water filling valve handle.
2. Open drain valve in face of water tank inside access door.
3. Remove side of McDonald unit enclosure.
4. Open drain valves C, D, H, I, J, K, L, N as shown in Figure 186.

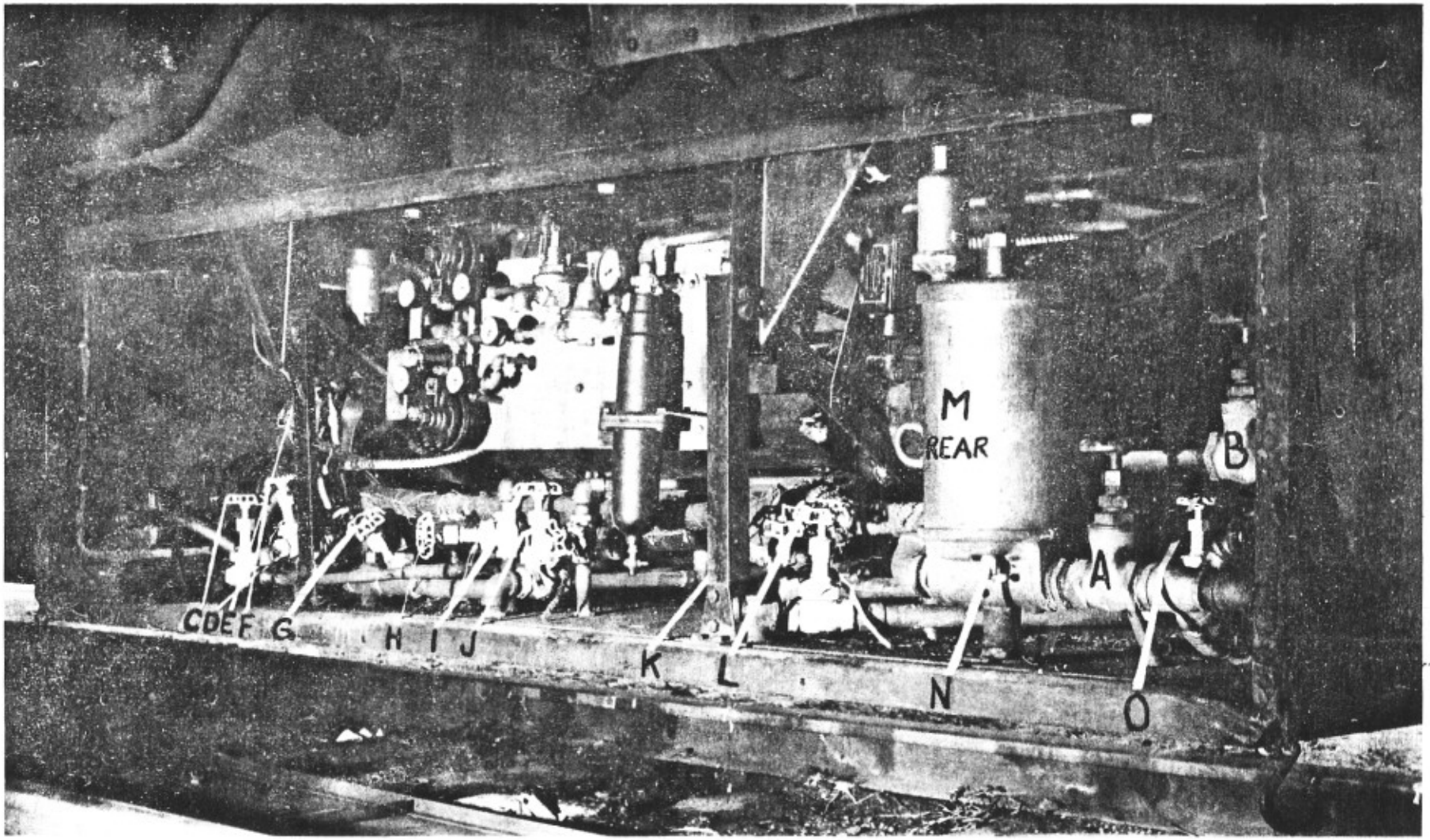
NOTE: If air is not available, either in the storage tank or yard supply, then as the tank is draining open each faucet for hot and cold water and operate all hopper valves sufficiently to permit through gravity draining. When air is available, continue as follows:

5. Close drain valve in water tank casing after tank is drained.
6. Raise handle on water filling valve allowing air to blow through open drain valves.
7. Close drain valves C, D, H, I, J, K, L, N.
8. Close off air to water raising system at Governor and Reducer.
9. Blow out all basin faucets in Buffet, faucets and hopper in Drawing Room.
10. Open drain valve in Buffet in locker under sink and exhaust all air from system.
11. Re-apply side of McDonald unit enclosure. Close access door on side of water tank casing.
12. Apply drain tags to water filling valve handles on both sides of car. Record on mechanical record card.

TO PREPARE A DRAINED CAR FOR SERVICE PROCEED AS FOLLOWS:

1. Close all drain valves.
2. Open air at governor and reducer.
3. Lower filling valve handle, remove drain tags.
4. Fill water tank and raise handle.
5. Operate all hoppers and faucets to purge air from piping.
6. Check for unusual flow of water under car.
7. Record on mechanical record card.

N.H.



A	Filtered Cold Water Shut Off Valve	F	Steam Line Strainer Blow Off Valve	K	Cold Water Line Drain Valve
B	Cold Water Supply Shut Off Valve	G	190° Water Line Drain Valve	L	Cold Water Line Drain Valve
C	140° Water Line Drain Valve	H	190° Surge Tank Drain Valve	M	190° Water Heater Steam Trap Drain Valve
D	140° Water Heater Steam Trap Drain Valve	I	190° Water Line Drain Valve	N	Fulflo Filter Tank Drain Valve
E	140° Water Strainer Blow Off Valve	J	140° Surge Tank Drain Valve	O	Steam Line Strainer Blow Off Valve

Figure 186

CUNNINGHAM GLASSWASHER

This machine consists of glass flush nozzle, drum type glass scrubbing unit with motor and control and glass rinsing compartment which includes revolving water spray, magnetic solenoid valve controlled by synchroneous electric motor. A drawer is provided for sterilizing and storage of the brushes.

GLASS FLUSH NOZZLE: See Page 261.

GLASS SCRUBBER: The glass scrubber is filled from the swing-spout faucet. The maintenance of the various parts is given below.

GREASING: The totally enclosed, ball bearing motor is packed with lubricant and will require no further lubrication for one year. At the end of that time it should be repacked with K-8875. The drive shafts in this machine are fitted with Alemite pressure grease gun fittings that should be greased semi-monthly with K-6362. It is important that this be done regularly as the upper bearing is slotted to supply grease to the packing gland. Regular lubrication prevents excessive bearing wear and leaking through the packing gland.

After greasing be sure that all excess grease is removed from the shafts and the hexagon packing gland nuts (under the brush drums). Accumulated grease eventually gets on the pulleys and belts if the excess is not removed each time the machine is greased.

REPACKING: If kept properly lubricated, the packing in this unit should not need replacement for two years. To repack, remove the brush drums and the hexagon nuts; remove the packing springs, and raise the packing followers to the top of the shafts. Using a sharp pointed instrument (knife or ice-pick) be sure that all the old packing is removed. Replace packing rings. Replacing packing follower, spring and hexagon nut. See Figure 188. Refer to Figure 189. The top of the drum shafts should be cleaned and lubricated as outlined on Figure 190.

BELT: The efficiency of V belt (1) drive depends, not on the belt tension, but on the changing contour of the belt's cross section as it passes through the motor pulley. The tension is determined by the position of the motor and can be increased by sliding the motor on its base. Belt life varies depending on use. At least twelve month service should be obtained. Excessive belt wear indicates that pulleys are out of alignment or that pulleys are worn, or that leakage through the packing gland is shortening belt life. Check the cause and correct.

GLASS RINSING COMPARTMENT:

SOLENOID VALVE: Refer to Figure 191. This is a magnetic valve and includes a strainer which should be checked and cleaned monthly. Servicing of the valve is outlined below:

TO RENEW COIL:

1. Disconnect coil leads.
2. Remove screw in top of terminal cover and lift up.
3. Coil is then removed by unscrewing nut as shown in Figure 192.
4. Replace new coil by reversing above.

N.H.

TO RENEW PLUNGER TUBE:

Repeat steps 1-2-3 above and

4. Shut-off water.

5. Using flat open end wrench remove plunger tube and replace.

TO REPAIR VALVE: Remove entire solenoid valve assembly (Figure 191) from piping, repeat steps 1-2-3 and 5 above.

6. Insert screw driver through back end of valve as shown in Figure 193. Tap with palm of hand to force valve cage assembly out. *DO NOT USE PLIERS TO PULL THIS ASSEMBLY OUT SINCE IT IS A MACHINED FIT AND SHOULD NOT BE DISTORTED.*

7. When valve cage assembly has been taken out as shown in Figure 194, raise lever arm to depress valve spring and raise needle off of seat. Clean out with small stiff brush using solvent.

8. Do not unscrew valve seat, but see that same is tight, valve will leak if this valve seat is not screwed up tight.

9. Hold unit up to light and if needle or seat appears pitted or otherwise damaged, replace with entire new valve cage assembly. Be sure that all valve gaskets are in good condition and properly replaced when re-assembling valve.

Refer to Figure 195. It shows exploded view of the revolving rinse assembly, which is located in the rinsing compartment. The rinse assembly is powered by car water line pressure. To compensate for wear in the bushing, loosen set screw in rinse base (153 A) and tighten rinse pin (152) until proper adjustment is made.

The water to the revolving rinse assembly is controlled by a synchronous A.C. motor. Refer to Figure 196. This motor is started by a momentary contact switch. Once the motor is started, the contacts on a jack are closed by the rotation of the timing cam and the motor continues to run until the jack contacts open again by the dropping of the operating arm into recess on the cam. The cam has four notches spaced 90 degrees apart around the periphery hence the 15 second operation.

BRUSH STORAGE DRAWER: This drawer is located at the right hand side of the cabinet. It is equipped with a 10-12 volt germicidal sterilamp. The transformer used to reduce the 120 volt current to the required voltage is located on the cabinet behind the drawer. To expose the transformer when inspection or service is necessary, remove the drawer and place on cabinet.

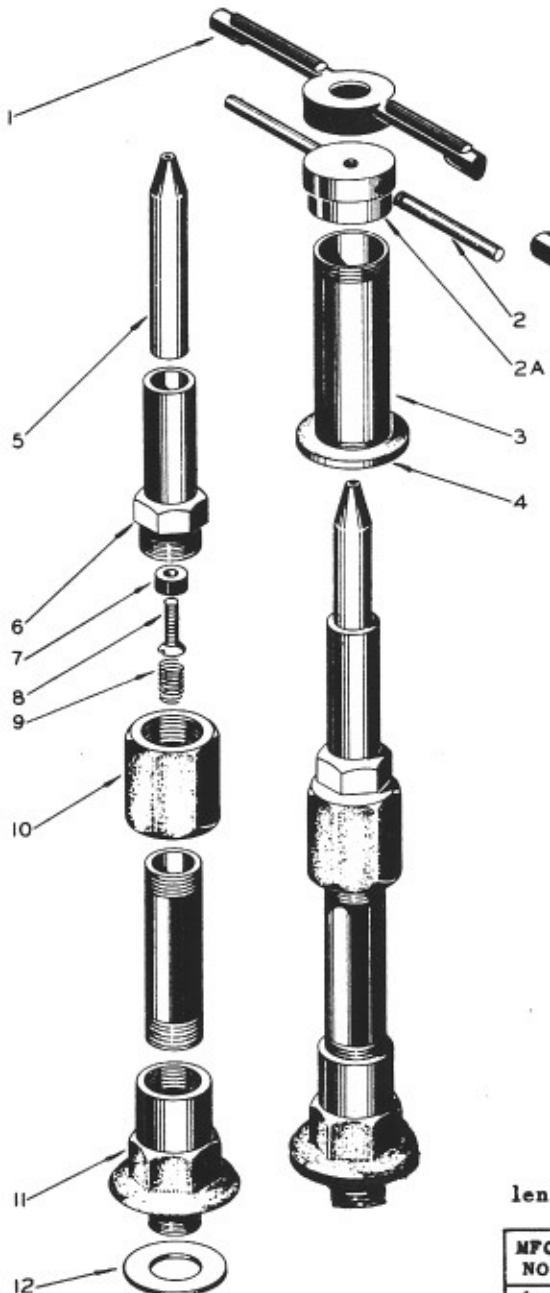
CAUTION: The feed wires for the sterilamp are attached to drawer.

After drawer is removed a patch plate held by four screws will be found at back of drawer recess. This patch plate is to be removed to expose transformer for servicing.

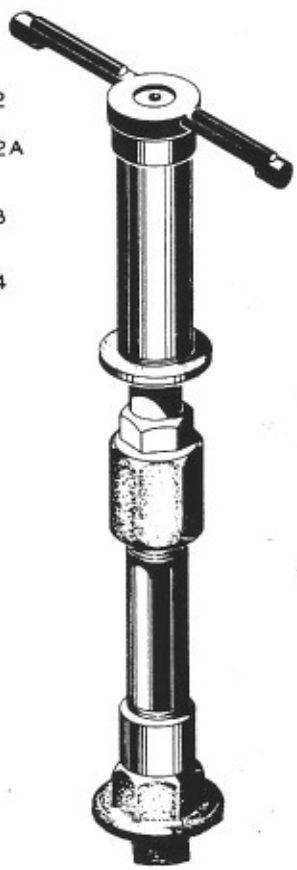
Since the rays of this lamp will irritate the skin and affect the eyes the drawer is equipped with an automatic switch which turns the lamp off when drawer is opened. A bulls eye is provided to check operation of the lamp when drawer is closed.

FLUSH NOZZLE ASSEMBLY

This self-closing water valve consists of the parts listed which fit into the complete assembly in numerical order starting with the rubber top bumper (1).



EXPLODED VIEW



ASSEMBLED VIEW

length 10 1/2" over-all

The rubber top bumper is fitted to the release sleeve arms (2) as follows: - remove either arm by unscrewing; insert the still attached arm through the hole in the center section of the top bumper, pushing the rubber bumper along the arm until the center section of the bumper can be fitted over the center section of the release sleeve. The end of the arm fits into the hole in the end section of the bumper. Next, insert the other metal arm (2) into the hole in the opposite side of the bumper and screw threaded part of arm into the center section of release sleeve. Insert end section of bumper over end of metal arm. Lock ring (4) attaches release sleeve to slop basket.

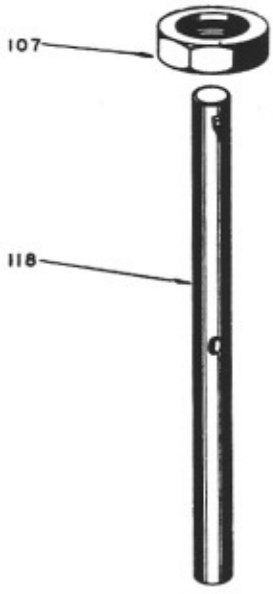
Valve plunger (5) fits into valve seat casting (6) and attaches to it by plunger-to-base screw (8). Seat washer (7) fits into bottom section of valve seat casting (6). When installing a new seat washer be sure it is completely bottomed and that plunger-to-base screw head is accurately centered.

Spring (9) fits into cup in center of valve bottom casting (10). Valve seat casting (6) screws into valve bottom casting (10) and spring (9) contacts plunger-to-base screw (8) head.

Valve bottom casting (10) and floor casting (11) are connected with galvanized iron nipple (not shown). Floor casting (11) extends through bottom of tank with lead washers (12)

MFG. NO.	DESCRIPTION	NO. REQD.	MFG. NO.	DESCRIPTION	NO. REQD.
1	Rubber top bumper	1	7	Rubber seat washer	1
2	Release sleeve arms	2	8	Plunger to base seat screws	1
2A	Release sleeve head	1	9	Valve closing spring	1
3	Release sleeve	1	10	Valve bottom casting	1
4	Release assembly lock ring	1	11	Floor casting	1
5	Valve plunger	1	12	Floor casting washer	1
6	Valve seat casting	1			

Figure 187



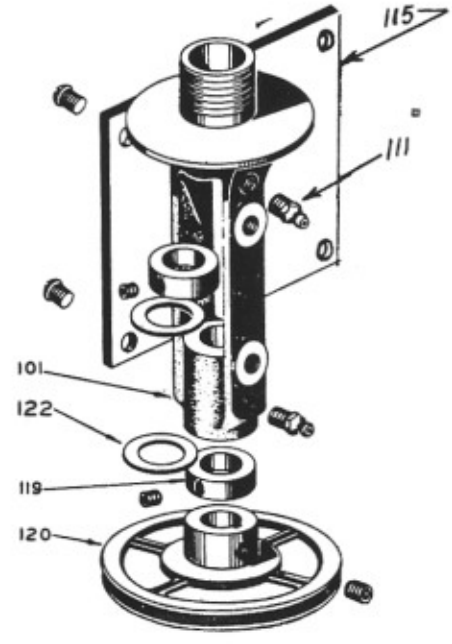


Figure 188

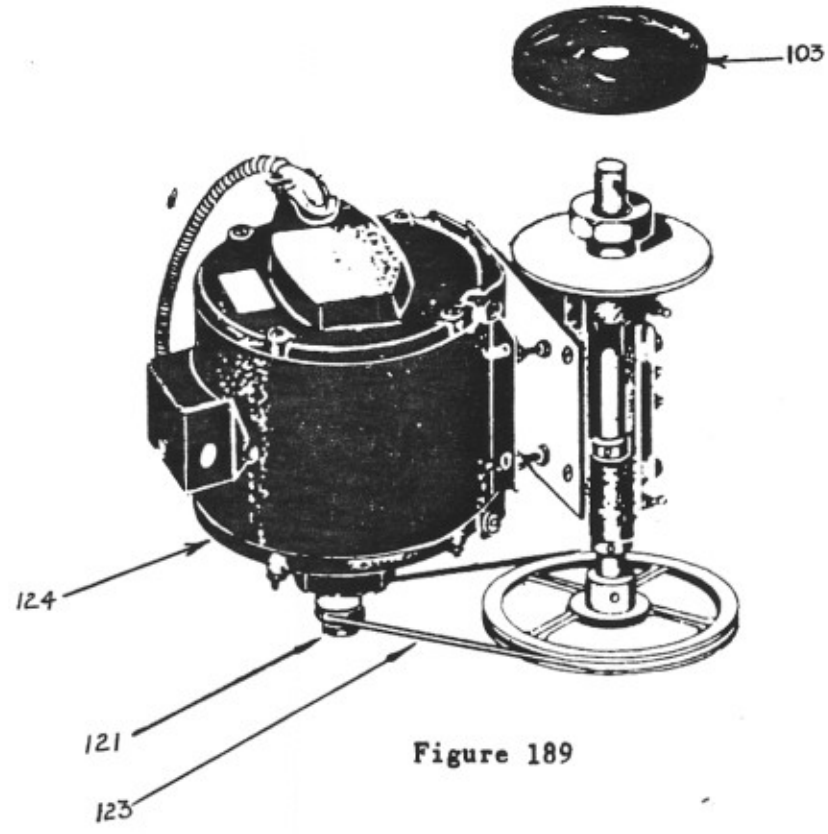
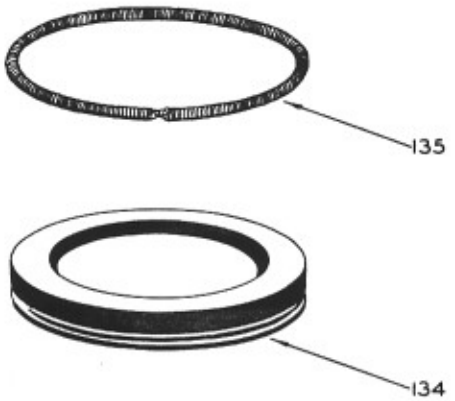


Figure 189

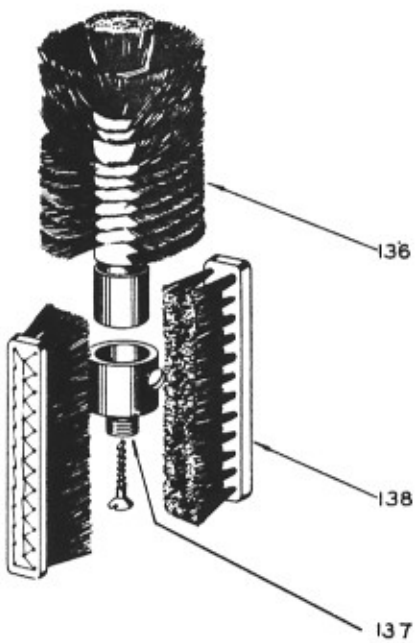
MFG. NO.	DESCRIPTION
101	Bearing Bracket
103	Clamp Gasket
107	Packing Gland Nut
108	Packing Gland Follower
109	Packing Gland Spring
110	Packing Ring
111	Alemite Fitting
115	Motor Mounting Plate
118	Stainless Drive Shaft
119	Thrust Collar
120	Drive Pulley (6")
121	Motor Pulley
122	Thrust Washer
123	V Drive Belt (1240)
124	Baldor Motor Frame No. 1510 1/8 H.P. 70 V.D.C. 1725 R.P.M. Ser. No. 5748

BEARING BRACKET & DRIVE ASSEMBLIES

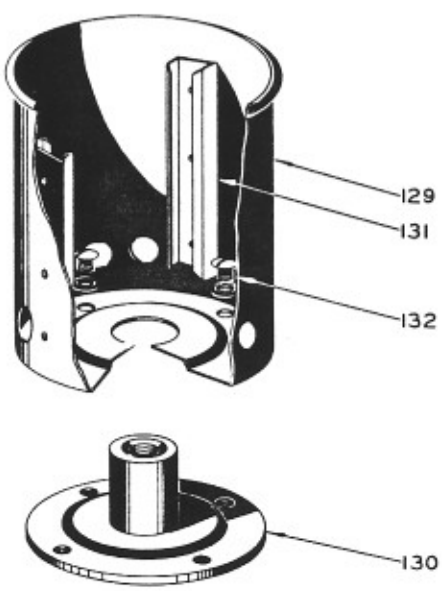
SCRUBBER UNIT - BRUSH DRUM ASSEMBLY



The brush drums should be removed from the shafts and the top of the shafts and drive pins should be cleaned and given a light coating of grease K-6362 semi-monthly. This prevents " freezing " of the drum flange to the shaft.



MFG. NO.	DESCRIPTION
129	Drum with side brush slots
131	Side brush holder slots
130	Drum flange
132	Drum-to-flange screws
134	Rubber guard ring
135	Rubber guard ring spring
136	Center brush (bristle)
137	Center brush coupling
138	Side brush (bristle)



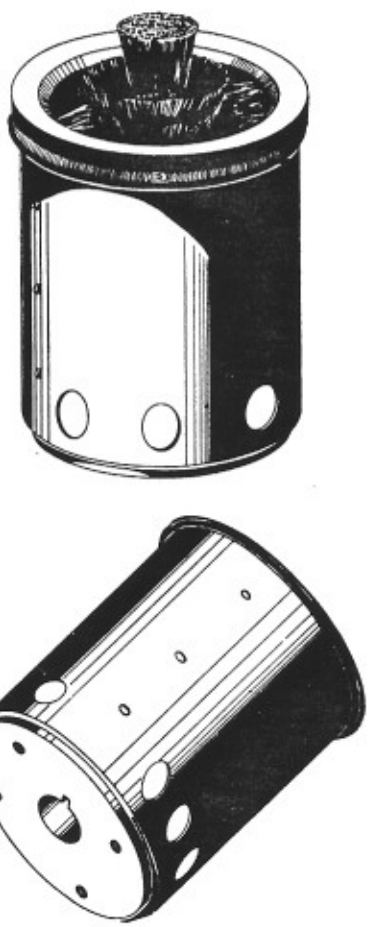
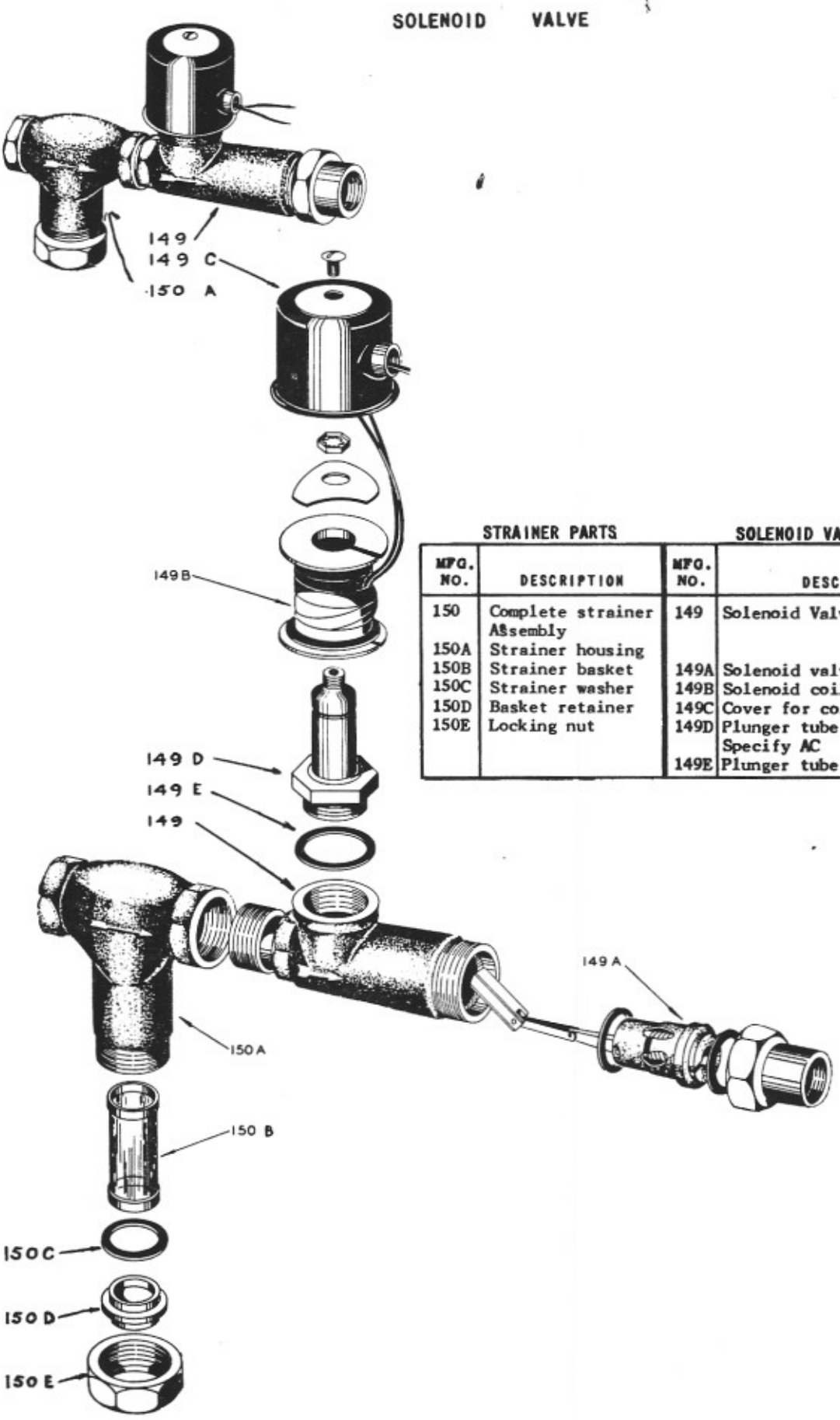


Figure 190

SOLENOID VALVE



STRAINER PARTS		SOLENOID VALVE PARTS	
MFG. NO.	DESCRIPTION	MFG. NO.	DESCRIPTION
150	Complete strainer Assembly	149	Solenoid Valve-hot water
150A	Strainer housing		
150B	Strainer basket	149A	Solenoid valve inside assem.
150C	Strainer washer	149B	Solenoid coil 110 V AC
150D	Basket retainer	149C	Cover for coil
150E	Locking nut	149D	Plunger tube Specify AC
		149E	Plunger tube washer

Figure 191

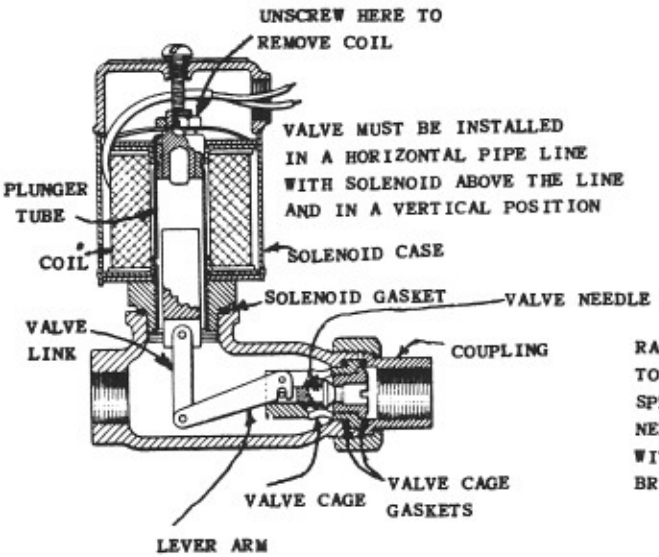


FIGURE 192

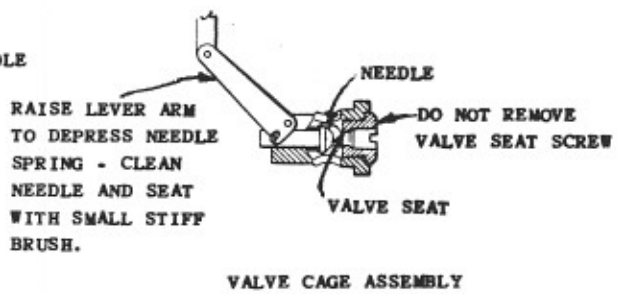


FIGURE 194

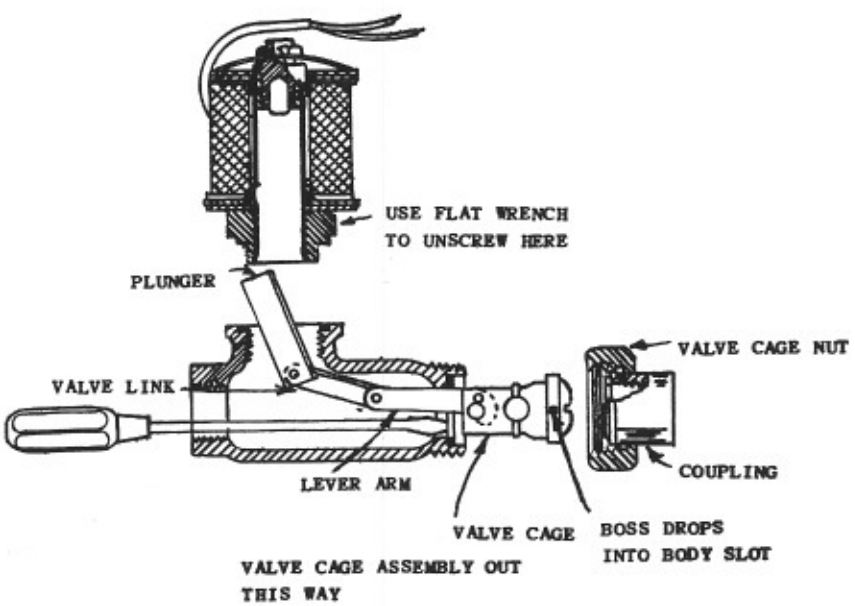


FIGURE 193

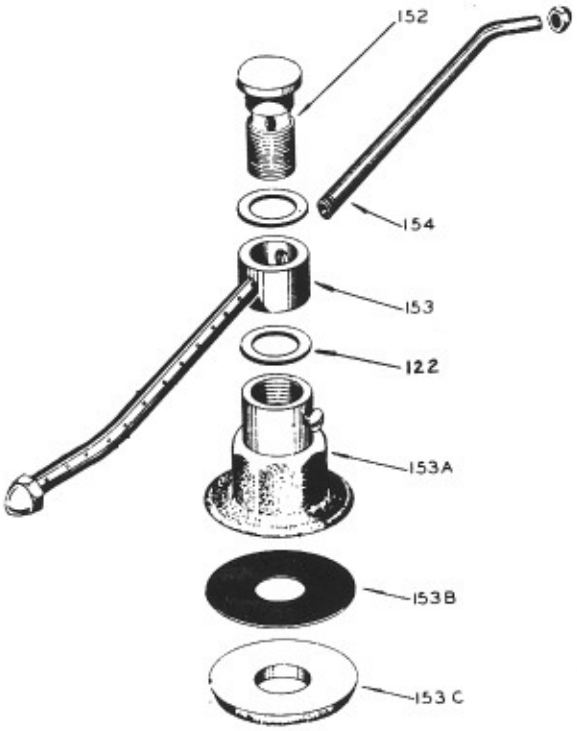


Figure 195

REVOLVING RINSE ASSEMBLY

To compensate for wear in the bushing, loosen set screw in Rinse Base (Part 153-A) and tighten Rinse Pin (Part 152) until proper adjustment is made.

Remove arms and cap nuts occasionally and clean out arms and discharge holes.
Length of arms 5 3/4"

MFG. NO.	DESCRIPTION
152	Rinse pin
153	Rinse bushing
154	Rinse arm
122	Thrust washers
153A	Rinse base
153B	Rinse gasket
153C	Clamp ring

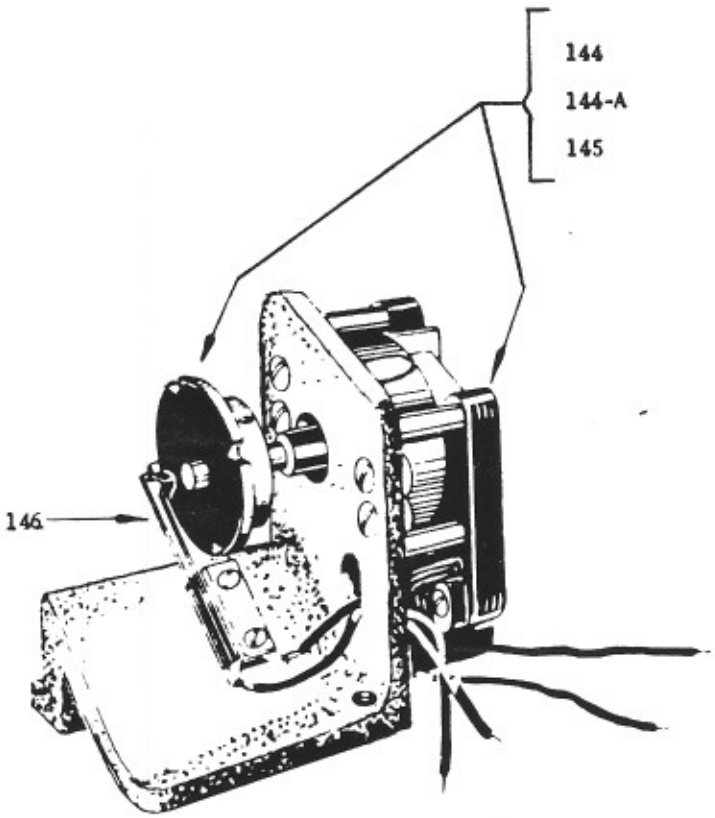


Figure 196

SYNCHRONOUS MOTOR

Timing motor R.W. Cramer Model V.F. 1 is for 15 second hot water rinse.

MFG. NO.	DESCRIPTION
144	Synchronous electric motor 119V AC
144A	Synchronous electric motor coil
145	Timing cam - 15 Second
146	Contact jack

THE MCDONALD DRINKING WATER STERILIZER

A McDonald ultra violet water sterilizer is connected in the cold water supply line in the Buffet which feeds the drinking faucet.

The water drawn from this faucet flows through a four-gallon stainless steel tank where it is subjected to the bactericidal rays of four ultra violet sterilamps. These rays sterilize the water in the tanks with an effectivity of 99.9%

The sterilamp sockets are held in sealed threaded adapters which project into the water and hold the lamps at the center of the tank, from which point the rays penetrate the water in all directions with maximum effectiveness.

Refer to Figure F-1 for schematic wiring diaphragm.

The sterilizer operates on 110 volts 60 cycle, A.C. The operating voltage of the lamps is 10 to 12 volts. This voltage is supplied by small step-down transformers, one for each of the four sterilamps. An isolation transformer of 1-1 ratio is also provided, the primary being connected across the 110 volt supply line and the secondary furnishing 110 volts to the four lamp transformers.

Before replacing sterilamps the tank must be drained. A drain valve is provided in the inlet line and a shut off between this drain valve and the car water tank. First, close the shut-off valve, then open the drain valve. The faucet should also be opened to permit the tank to drain.

Before removing the socket, pull the plug from the receptacle. Then unscrew the entire assembly from the threaded fitting on the tank. A flat bar may be used as a lever across the screw heads to remove the assembly.

The adapter projects into the tank about 4 inches, and should be pulled straight out until it and the sterilamp are free of the fitting.

The sterilamp may now be replaced and the adapter then screwed into the tank and tightened against the gasket. A thin coat of grease should be applied to the gasket before replacing adapter. *DO NOT* use shellac or Westinghouse cement on this gasket as it will harden between the gasket and seat.

CAUTION: DO NOT LOOSEN OR REMOVE THE SCREWS HOLDING THE ADAPTER TOGETHER, as they serve two purposes.

1. To provide a means of removing the adapter.
2. To hold the watertight cement between the unit.

The sterilamp will give satisfactory protection and with three lamps functioning therefore, lamps need not be replaced until two have burned out.

N.H.

10. Check visually, for leaks. Watch for air vent valves, vacuum breaker, and pressure relief valve closing off tight.
11. Check operation of thermostats, reverse acting relays and admission valves.

THREE MONTH

1. Check setting of pressure switches, air and steam.
2. Check setting of air relief valve.
3. Overhaul bucket type steam trap.
4. Overhaul bucket type air vent.

YEARLY

1. Lubricate brush drive motor.
2. Clean sediment and water trap. Renew cartridge packing.
3. Inspect and clean screens in all self-cleaning strainers. Renew those found defective.