GOVERNOR

(TRANSFORMER TYPE)

In order to simplify the description, this type of governor can conveniently be divided into three parts, each of which has a definite function. These parts are:

(1) Governing impeller which is mounted on the turbine shaft and when supplied with oil, discharges at a pressure which varies as the square of the speed, thus giving a positive governing medium.

(2) The governor transformer which magnifies the relatively small pressure changes delivered by the impeller into larger pressure changes which are utilized to actuate the relay of the servo-motor.

(3) The servo-motor which operates the governing (steam inlet) valves.

The governing impeller and also the main oil pump impeller are shown in Figure 1. The governor transformer and the servo-motor are combined in a single housing as shown in Figure 2. The transformer is shown in Section B-B-B-B-B, while the servo-motor is shown in Section A-A. Figures 3, 4 and 5 are added to show more clearly the detail construction of the various parts.

A gasket, 29-A, is used between the governor housing "8" and the thrust bearing housing cover.

Oil Impellers

Figure 1 shows the arrangement of the two impellers which are secured on the turbine shaft between the thrust bearing and the overspeed trip mechanism. The impeller on the left, item "5", serves as the main oil pump and supplies all the oil requirements while the turbine is operating at normal speed. It is of the conventional centrifugal type with efficient characteristics and discharges at a pressure of approximately 120 to 150 lbs/in^2 gauge at normal operating speed. This impeller is not self-priming. While operating at normal speed, its suction is supplied by an ejector which utilizes a part of the high pressure oil from the impeller discharge as the operating medium. During the starting period, this impeller suction is supplied by the auxiliary oil pump.

The ejector is designed to handle all oil required for lubrication and the normal leakage. The servo-motor operating piston discharges directly into the impeller suction line and, therefore, does not add load to the ejector. The size of the ejector nozzle and the quantity of oil handled by it are the factors which determine its discharge pressure. Consequently, after the turbine is installed and running under normal operating conditions, this pressure should remain constant. Any decrease in the suction pressure indicates an increase in leakage in the system and if it should drop to 4 lbs. gauge or less, the impeller oil seal rings should be inspected and replaced if worn.

The governing impeller is made integrally with the overspeed trip body. It consists of a hollow cylindrical body with a series of tubes, inserted radially as shown, connecting the chamber "X" with the impeller chamber. The impeller chamber is also connected to the drain chamber by a series of holes.

An orifice admits a small quantity of high pressure oil from the main pump discharge into the annular chamber "X" and maintains a small flow through the impeller holes to the drain chamber. With the impeller "11" rotating, the centrifugal force of the oil in the radial tubes, opposes the flow of oil through the holes and maintains in the chamber "X" a pressure which varies as the square of the turbine speed (at 3600 rpm this pressure is about 30 lbs/in^2). In other words, this impeller acts as a relief valve, maintaining a pressure corresponding to the centrifugal force of the column of oil in the impeller holes and bypassing to the drain any excess oil supplied thru the orifice above that required to maintain the pressure in chamber "X".

The chamber "X" is connected to the governor transformer and the pressure changes in this chamber produced by speed changes constitute the governing forces which control the valve servo-motor. If the turbine speed increases, this pressure in chamber "X" increases, and if it decreases the pressure decreases.

If a gradual drop in this pressure is noticed at normal speed it is an indication of either excessive wear in the sleeve "12" or gradual plugging of the supply orifice.

Governor Transformer

As stated above, this mechanism (shown in Fig. 2, Section B-B-B-B-B) is in reality a pressure transformer which magnifies the relatively weak pressure changes which are received from the governing impeller into pressure changes sufficiently strong to actuate the relay of the valve servo-motor.

Its principal parts are: the flexible metal bellows "75", the load spring "79", and the cup valve "92". Governing oil at the pressure delivered by the governing impeller enters the chamber around and below the bellows "75", thus exerting an upward force on the annular area of the plate which forms its lower support. This force is opposed by the tension spring "79" which exerts a downward force on the bellows.

The cup valve "92" mounted on the spring bolt "77" controls the secondary governing or regulating oil pressure. High pressure oil is admitted to the central chamber of the cup valve seat "93" thru an orifice. The force exerted on the cup valve varies the flow of oil from this chamber to the drain and thus determines the secondary governing or regulating pressure "Z" existing in the central chamber of the seat. This secondary governing or regulating oil pressure is also connected to the upper side of the servo-motor relay piston and cup valve "60".

From the above it can readily be seen that upward movement of the cup valve decreases the amount of high pressure oil passing to the drain thereby increasing the secondary governing (or regulating) pressure "Z". Conversely, downward movement of the cup valve increases the amount of high pressure oil passing to drain thereby decreasing the secondary governing (or regulating) pressure "Z". In following the operation of this mechansim it is important to bear in mind that whatever pressure "Z" exists in the central chamber of the cup valve seat "93" is transmitted also to the upper side of the servo-motor relay piston and cup valve "60" and any change in this pressure results in a change in the force acting downward on the top of the relay.

As shown in the illustration, the cup valve merely rests upon the upper spring seat bolt. If the governing oil pressure under the bellows "75" decreases, the spring moves the bellows plate downward and the cup valve "92" follows downward due to the pressure "Z" acting above it. If the governing oil pressure under the bellows becomes great enough to overcome the spring, the bellows plate and cup valve move upward. The upward force of the governing oil below the bellows "75" must balance the downward force of the spring "79", plus the downward force "Z" of the oil acting downward on the cup valve, and any movement of the cup valve changes the oil pressure "Z" above it so as to re-establish this balance.

It should be noted that the change in secondary governing or regulating oil pressure "Z" is dependent upon the ration of the effective areas of the annulus at the bottom of the bellows and that at the top of the cup valve. For example, if the annular area at the bottom of the bellows is taken as 5 sq. in. and the annular area at the top of the cup valve as 1 sq. in. an increase of 1 lb. oil pressure below the bellows will produce a 5 lbs. increase in pressure "Z" in order to maintain the cup valve in a balanced state. This is the principle by means of which the comparatively small pressure changes produced by the governing impeller are magnified so as to obtain large pressure changes to actuate the servo motor.

An oil filter is used in the H.P. oil supply to the transformer cup valve (shown in Fig. 2, Section B-B-B-B-B). The filter body is an integral part of the transformer body. The filter element "97" consists of a stack of round, thin, perforated discs, each one separated from the other by a very thin spacer, the thickness of the spacer determining the fineness of filtration. Oil enters the cartridge from the outside, passes through the spaces, goes up through the interior of the discs and out to the discharge. These discs are assembled with stationary cleaning fingers so that revolving the handle "34" scrapes the cartridge clean. The solid matter drops and settles to the bottom of the body. A relief valve is incorporated in the filter unit to prevent failure of the oil supply if the filter cartridge should become fouled. To keep the filter clean the handle should be turned frequently, when the unit is first put in service and following any major overhaul. Thereafter, once a week should be sufficient.

Governing Valve Servo-Motor

The governing valve servo-motor (shown most clearly is Section A-A, Fig. 2) consists of the operating piston "3" which is controlled by a double relay mechanism. The upper end of the operating piston rod is connected to the governing valves by means of a lever which is fulcrumed so that downward movement of the piston opens the valves and upward movement closes them.

The principal parts of the relay mechanism are: The main relay "27", the relay piston and cup valve "60" and the spring "62". As shown in Figure 2, a small hole drilled in the top of the main relay connects the high pressure oil inlet to the chamber above the relay. Also the central hole through the entire length of the main relay connects this chamber above it to the drain. The cup valve seats on top of the relay around the hole which leads to the drain. The small orifice from the high pressure oil supply builds up a pressure in the chamber above the relay. The cup valve controls the flow of oil from this chamber to the drain, thereby controlling the pressure so as to just balance the upward force of the spring "28", and causes the main relay to move instantly as the cup valve is moved by the regulating pressure changes on the piston "60". Since there is a continuous flow of oil through the orifice in the relay bushing to the chamber above the relay, there will also be a continuous flow through the cup valve to the drain in order to maintain a balanced relay. Therefore, it is evident that upward movement of the cup valve increases the flow through it to the drain, thereby decreasing the pressure above the relay. Conversely, downward movement of the cup valve decreases the flow through it to drain thereby increasing the pressure above the relay. These pressure changes above the relay, together with the spring force below it, cause the relay to follow all movements of the cup valve (within a few thousandths of an inch), thus giving practically the same results as though they were connected to each other.

The secondary governing or regulating oil pressure "Z" delivered by the transformer is admitted to the chamber above the piston "60" and exerts a force tending to move the piston downward. This force is opposed by the compression spring "62" which tends to move the piston and cup valve upward. Therefore, any change in the regulating pressure above the piston results in movement of the cup valve which, in turn, controls the pressure above the main relay.

The spring "62" acting through the sleeve "63" flexibly connects the piston "60" to the operating piston follow up lever "15" which is fulcrumed so that following any change in speed and pressure "Z" the resulting operating piston movement increases or decreases the compression of spring "62" until it balances the change in pressure "Z" thereby returning the piston and cup valve and hence the relay to its neutral position.

With the turbine carrying a constant load, the relay will be in a neutral position. In this position, the downward force of the oil pressure acting above the piston "60" is just balanced by the upward force of the spring "62", and there will be no movement of the cup valve. Likewise, the main relay "27" will be just balanced by the downward force of the oil on top of it and the upward force of the compression spring "28" at the bottom.

Assuming that the mechanism is in operation the following outlines a complete cycle of control:

If the load increases, the turbine speed decreases and the governing oil pressure below the transformer bellows "75" decreases, thus allowing the tension spring "79" to move the transformer cup valve downward. Downward movement of this cup valve passes more oil to the drain chamber, thus decreasing the secondary governing oil pressure "Z". With the pressure "Z" decreased, the existing force of the oil pressure below the bellows again balances the pressure above the cup valve.

The decreased secondary governing or regulating pressure "Z" thus established by the transformer cup valve has, at the same time, decreased the downward force on the piston "60", thus allowing the spring "62" to move the piston and cup valve upward. This upward movement of the cup valve increases the flow of oil from the chamber above the main relay to the drain. This decreases the pressure above the relay "27", thereby allowing the spring "28" to move it upward. Upward movement of this relay admits high pressure oil above the operating piston and connects the space below to suction. The operating piston, therefore, moves downward, thus opening the governing valves. This downward movement of the piston, acting through the follow-up lever "15" moves the sleeve "63" downward, decreasing the compression of spring "62" until the decreased spring force balances the decreased pressure "Z" above the piston "60", thereby returning the piston cup valve and relay "27" to their neutral positions.

If the load decreases, the turbine speed increases and the governing oil pressure acting below the transformer bellows "75" increases, thus compressing the bellows and moving the cup valve "92" upward. Upward movement of this cup valve increases the secondary governing or regulating pressure "Z" until its force at the top of the cup valve again balances the increased force due to the change of oil pressure below the bellows. At the same time, this increased pressure "Z" acting above the piston "60" moves the piston and cup valve downward thus decreasing the flow of oil from the chamber above the main relay "27" to the drain. This increases the pressure above the relay, thereby moving it downward. Downward movement of this relay admits high pressure oil below the operating piston and connects the space above to the suction. The piston, therefore, moves upward, thus closing the governing valves. This upward movement of the piston, acting through the follow-up lever "15", allows the sleeve "63" and piston cup valve to move upward thereby returning the piston cup valve and relay "27" to their neutral positions.

From the above, it is seen that following any movement of the relay, the operating piston moves in the opposite direction. The follow-up lever, item "15", which connects the piston rod and the cup valve mechanism, is fulcrumed on the bracket "23" so that, following any relay movement, the resulting piston movement changes the position of the cup valve so as to return the relay to its neutral position until another change in speed (or load) occurs.

Speed Changer

The hand or motor operated speed changer, by means of which the speed (or load) can be varied, is shown in Figure 2, Section B-B-B-B-B, and in detail in Figure 5. The desired changes are accomplished by changing the tension of the transformer spring "79". From the description given above, it is obvious that increasing the tension of this spring increases the turbine speed (or load) and decreasing the tension of this spring decreases the turbine speed (or load). Referring to Figure 5, the principal parts of the speed changer are: the hand wheel "18", sleeve "15", worm wheel "14" and stem "4". The stem "4" is threaded in the sleeve "15". The sleeve, however, is held against axial movement by the housing and the stem is held against rotation by the key "5". Therefore, when the handwheel "18", which is attached to the sleeve, is rotated the sleeve rotates, thereby moving the stem axially. When the mechanism is motor operated, the wormwheel "14" drives the sleeve "15" through a friction clutch formed by the plate "13" and compression spring "10".

The end of the stem "4" carries a roller which rides against the rocker arm "85" (shown in view "M" of Figure 3). This rocker arm is fulcrumed in the housing and carries two fingers "86" which ride upon shoulders on the transformer spring adjusting screw "81". Therefore, movement of the speed changer stem to the left (as viewed in the illustration) lowers the spring adjusting screw, thereby increasing the tension of the spring and hence the speed of the turbine. Conversely, movement of the speed changer stem to the right allows the adjusting screw to rise, thereby decreasing the tension in the spring and decreasing the turbine speed.

For comparatively large speed range adjustments, a supplementary mechanism can be provided as shown in view "N", Figure 3. The shaft "58" forms a worm gear which meshes with a similar gear "59" carried on the lower end of the transformer spring adjusting screw. Therefore, rotating the shaft "58", which can be done manually by means of handwheel "55", rotates the adjusting screw within the spring nut "82", thereby increasing or decreasing the tension of the spring "79" as desired. On the large machines, this mechanism is used as a convenient means of overspeeding the turbine for the purpose of checking the adjustment of the overspeed trip mechanism. On those machines which require only a normal speed changer range and on which this supplementary speed changer is not required for the overspeed tests, the parts shown in the view "N" are omitted.

Adjustments

The governor is thoroughly tested and adjusted at the factory and should operate satisfactorily as received. However, when reassembling the parts after an inspection or if it should become necessary to check the accuracy of the adjustments, the following points should be noted:

Before starting these adjustments, the supplementary speed changer stops (items "80" and "84") should be assembled at the top and bottom of the screw "81" as shown in full lines.

Follow-up Lever Mechanism (Refer to Figure 2)

1. If the follow-up lever "15" is dismantled, it is important to reassemble the fulcrum pin "17" in the same hole as found originally, in order to maintain the same regulation. Changing the fulcrum pin so as to increase the sleeve "63" (or relay) movement per unit of piston movement will increase the regulation and vice versa.

2. Adjust the adjusting bolt "69" so that the pressure acting downward on the piston is not less than 10 lbs. gauge at any time. This can be done as follows: If an exhaust regulator is used cut it out of service before making the following adjustments.

   Hold the turbine speed at normal by means of the throttle valve and adjust the speed changer until all valves are wide open. This gives a minimum secondary governing pressure above the piston. Then adjust adjusting bolt "69" to make this minimum about 10 lbs., adjusting the speed changer if necessary to keep all valves wide open. The maximum secondary governing pressure is then the pressure required to close the valves to the no load steam flow point. When an exhaust regulator is used, the regulator must be adjusted to give the same pressure range as the secondary governing pressure "Z" range determined above.

Main Speed Changer (Refer to Figure 5)

3. Turn the speed changer handwheel in the "Decrease" direction until it strikes its stop.

4. Adjust the supplementary speed changer handwheel "55" (Fig. 3) to maintain a speed of 8% below normal.

5. Turn the main speed changer handwheel in the "Increase" direction and (holding the speed at normal rpm by means of the throttle valve) continue movement of the speed changer until all valves are wide open.

6. This is the full load position of the speed changer. Set the stop "19" (Fig. 5) against the handwheel hub and lock it in place.

7. Shut down the unit.

Supplementary Speed Changer (Refer to Figure 3)

8. The low speed limit of the supplementary speed changer is now established by setting the stop "80" against the top of nut "82". The only method of determining the distance stop "80" must be moved down is to count the number of turns required to bring it against the nut in its present location. Therefore, turn the supplementary hand wheel "55" in the "Decrease" direction, counting the turns, until stop "80" strikes the nut. Then the number of hand wheel turns multiplied by 3/8 gives the number of turns stop "80" must be moved downward on the screw "81". Dismantle the mechanism and make this change. Then reassemble.

9. Put the unit in operation with no load.

   Adjust the supplementary speed changer to its low speed limit.

   Adjust the main speed changer to maintain normal speed.

10. By means of the supplementary speed changer, increase the speed to 12% above normal. (It is necessary to hold the overspeed trip valve shut in order to reach 12% above). Then shut down, and set the high speed limit stop "84" against the bottom of nut "82".

    <u>Note:</u>

    If these adjustments do not give the desired range, change stops "80" and "84" accordingly. One turn of the stop on screw "81" changes the speed range approximately 2%.

One turn of handwheel "55" changes the speed approximately 3/4 of 1%.

The above adjustments give a 12% overspeed on the supplementary speed changer plus an additional 6 or 7% on the main speed changer. Since 12% is the maximum overspeed that should be used, it is of utmost importance to have the main speed changer in its mid (or no load) position whenever using the supplementary changer for checking overspeed.

Likewise, it is necessary to have the supplementary speed changer in its low speed limit of travel whenever the unit is in normal operation. Otherwise, the main speed changer will not give its normal range of load control.

If it is necessary to govern at speeds less than 8% below normal, the stop "80" should be moved upward on the screw "81", bearing in mind that one turn changes the speed range approximately 2%.

If the governor is not equipped with a supplementary speed changer, the adjustment under step 5 is obtained by turning the screw "81" directly. Then steps 8 to 10 inclusive do not apply.

The following list has been compiled to facilitate ordering spare or renewal parts by item number and name, together with the serial number of the turbine.

Item No.	NAME (FIGURE 1)
1	Main Pump Impeller Discharge Guide (In halves)
2	Main Pump Impeller Suction Guide (In halves)
3	Oil Seal Ring (Large)
4	Main Pump Impeller Wearing Ring
5	Main Pump Impeller
6	Oil Seal Ring (Small)
7	Main Pump Impeller Key
8	Oil Seal Packing Ring
9	Governor Impeller Casing (In halves)
10	Governor Impeller Casing Baffle (In halves)
11	Governor Impeller and Overspeed Trip Body
12	Governor Impeller Seal Sleeve
13	Oil Seal Packing Ring
14	Governor Impeller Inlet Control Orifice Body
15	Governor Impeller Inlet Control Orifice Body Cap
16	Governor Impeller Inlet Control Orifice Stem
17	Governor Impeller Inlet Control Orifice Stem Locknut
18	Governor Impeller Inlet Control Orifice Stem

Item No.	NAME (FIGURE 2)
1	Servo Motor Piston Rod Nut
2	Servo Motor Piston Ring
3	Servo Motor Piston
5	Servo Motor Piston Rod
6	Servo Motor Piston Rod Bushing (Lower)
7	Servo Motor Piston Stop
8	Governor Cylinder
9	Gasket (1/32 Thick)
10	Governor Cylinder Cover
11	Servo Motor Piston Rod Bushing (Upper)
12	Servo Motor Piston Rod Oilite Bushing
13	Governor Cylinder Cover Dowel
14	Governor Cylinder Cover Tap Bolt

Item No.	NAME (FIGURE 2 - Cont'd.)
15	Servo Motor Relay Follow-up Lever (In pairs)
16	Servo Motor Relay Follow-up Lever Spacer Bolt
17	Servo Motor Relay Follow-up Lever Fulcrum Pin
18	Oil Tube and Connection
23	Servo Motor Relay Follow-up Lever Bracket
25	Servo Motor Relay Cup Valve Seat
26	Servo Motor Relay Bushing
27	Servo Motor Relay
28	Servo Motor Relay Spring
29	Servo Motor Relay Spring Seat
29-A	Gasket (1/32 Thick)
30	Oil Cleaner Extension Spring Washer
31	Oil Cleaner Extension Spring
32	Oil Cleaner Extension Felt Washer
33	Oil Cleaner Extension
34	Oil Cleaner Extension Pin
35	Servo Motor Relay Follow-up Lever Roller
36	Servo Motor Relay Follow-up Lever Ball Bearing
37	Servo Motor Relay Follow-up Lever Link Spacer
38	Servo Motor Relay Follow-up Lever Link Pin
39	Servo Motor Relay Follow-up Lever Link (In pairs)
40	Servo Motor Relay Follow-up Lever Pin
41	Oil Tube
42	Oil Tube Connection
43	Gasket (1/32 Thick)
44	Gasket (1/32 Thick)
45	Gasket (1/32 Thick)
46	Oil Guard
47	Air Bell

(FIGUER 3)

55	Auxiliary Speed Changer Bevel Gear Knob
56	Auxiliary Speed Changer Bevel Gear Lock Nut
57	Auxiliary Speed Changer Bevel Gear Sleeve
57-A	Gasket (1/32 Thick)
58	Auxiliary Speed Changer Bevel Gear (Driver)
59	Auxiliary Speed Changer Bevel Gear (Driven)
60	Servo Motor Relay Piston and Cup Valve
61	Spring
62	Servo Motor Relay Piston and Cup Valve Spring
63	Servo Motor Relay Piston and Cup Valve Sleeve
64	Servo Motor Relay Piston and Cup Valve Sleeve Ring
65	Ball
66	Ball Seat
67	Gasket (1/32 Thick)
68	Locknut
69	Adjusting Bolt
70	Piston Sleeve Cover
71	Bushing
72	Servo Motor Relay Piston and Cup Valve Housing
73	Gasket (1/32 Thick)
74	Servo Motor Relay Stop
75	Transformer Bellows
76	Transformer Bellows Housing
77	Transformer Bellows Spring Nut Bolt
78	Transformer Bellows Spring Nut (Upper)
79	Transformer Bellows Spring
80	Auxiliary Speed Changer Adjusting Screw Stop (Upper)
81	Transformer Bellows Spring Adjusting Screw

Item No.	NAME	(FIGURE 3 - Cont'd.)
82	Auxiliary Speed Changer Adjusting Screw Bushing	
83	Transformer Bellows Spring Nut (Lower)	
84	Auxiliary Speed Changer Adjusting Screw Stop (Lower)	
85	Speed Changer Rocker Arm	
86	Speed Changer Rocker Arm Fingers	
87	Auxiliary Speed Changer Bevel Gear Retainer	

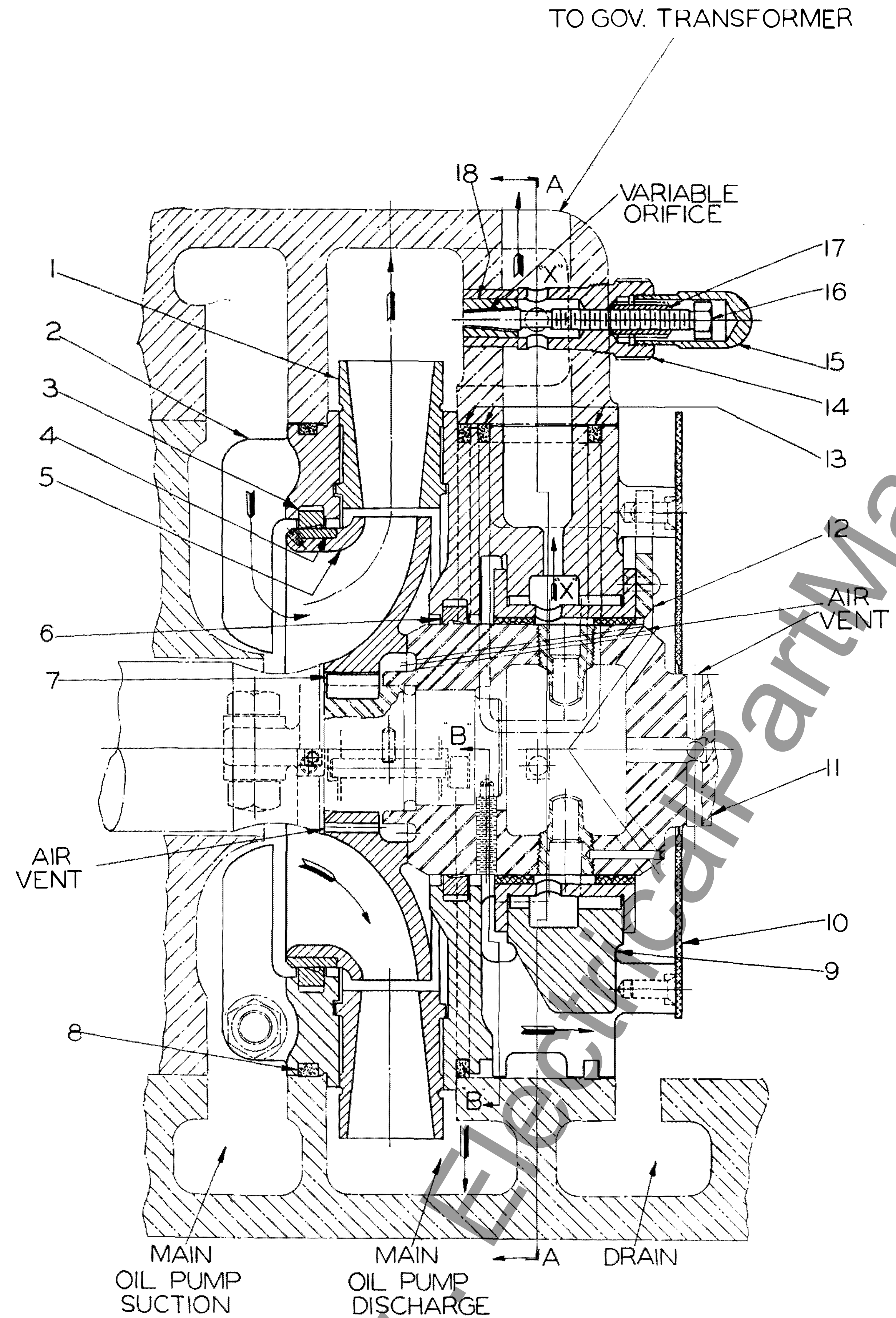
(FIGURE 4)

90	Cup Valve Adjusting Screw
91	Cup Valve Adjusting Screw Spring
92	Cup Valve
93	Cup Valve Seat
94	Transformer Body
95	Plug
95-A	Gasket
96	Plug
97	Cuno Filter (Complete)
98	Gasket (1/32 Thick)
99	Copper Washer
100	Plug
101	Plug
102	Copper Gasket

(FIGURE 5)

1	Speed Changer Stem Roller
2	Speed Changer Stem Roller Pin
3	Speed Changer Stem Clevis
4	Speed Changer Stem
5	Speed Changer Stem Key
6	Speed Changer Body Guide Flange
7	Gasket (1/32 Thick)
8	Gasket (1/32 Thick)
9	Speed Changer Friction Clutch Adjusting Nut
10	Speed Changer Friction Clutch Spring
10-A	Speed Changer Sleeve Washer
11	Speed Changer Friction Clutch Spring Nut Set Screw
12	Speed Changer Friction Clutch Spring Plate Key
13	Speed Changer Friction Clutch Spring Plate
14	Speed Changer Worm Wheel
15	Speed Changer Stem Sleeve
16	Speed Changer Body
17	Speed Changer Handwheel Set Screw
18	Speed Changer Handwheel
19	Speed Changer Handwheel Stop Plate
20	Speed Changer Worm Set Screw
21	Speed Changer Worm Bushing (Outer)
21-A	Speed Changer Motor Shaft Extension
22	Speed Changer Worm
23	Speed Changer Worm Bushing (Inner)
23-A	Speed Changer Motor Shaft
24	Speed Changer Motor
25	Pipe Plug
26	Pipe Plug

Printed in U.S.A. (4-40)


TO GOV. TRANSFORMER
18
A
VARIABLE ORIFICE
"X"
17
16
15
14
13
12
1
2
3
4
5
6
7
AIR VENT
B
X
11
AIR VENT
10
9
8
B
MAIN OIL PUMP SUCTION
MAIN OIL PUMP DISCHARGE
A
DRAIN

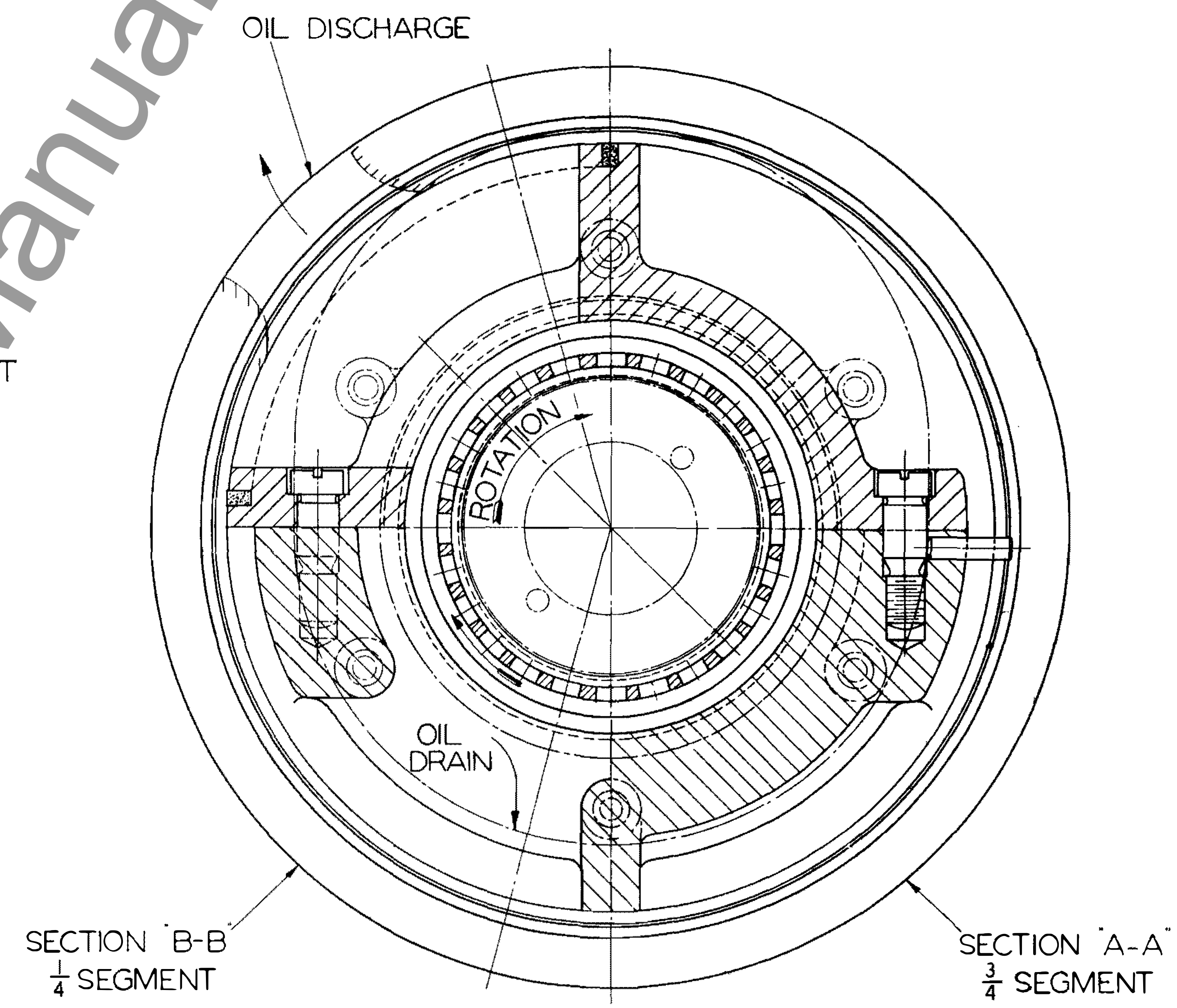

OIL DISCHARGE
ROTATION
OIL DRAIN
SECTION "B-B" $\frac{1}{4}$ SEGMENT
SECTION "A-A" $\frac{3}{4}$ SEGMENT

Figure 1

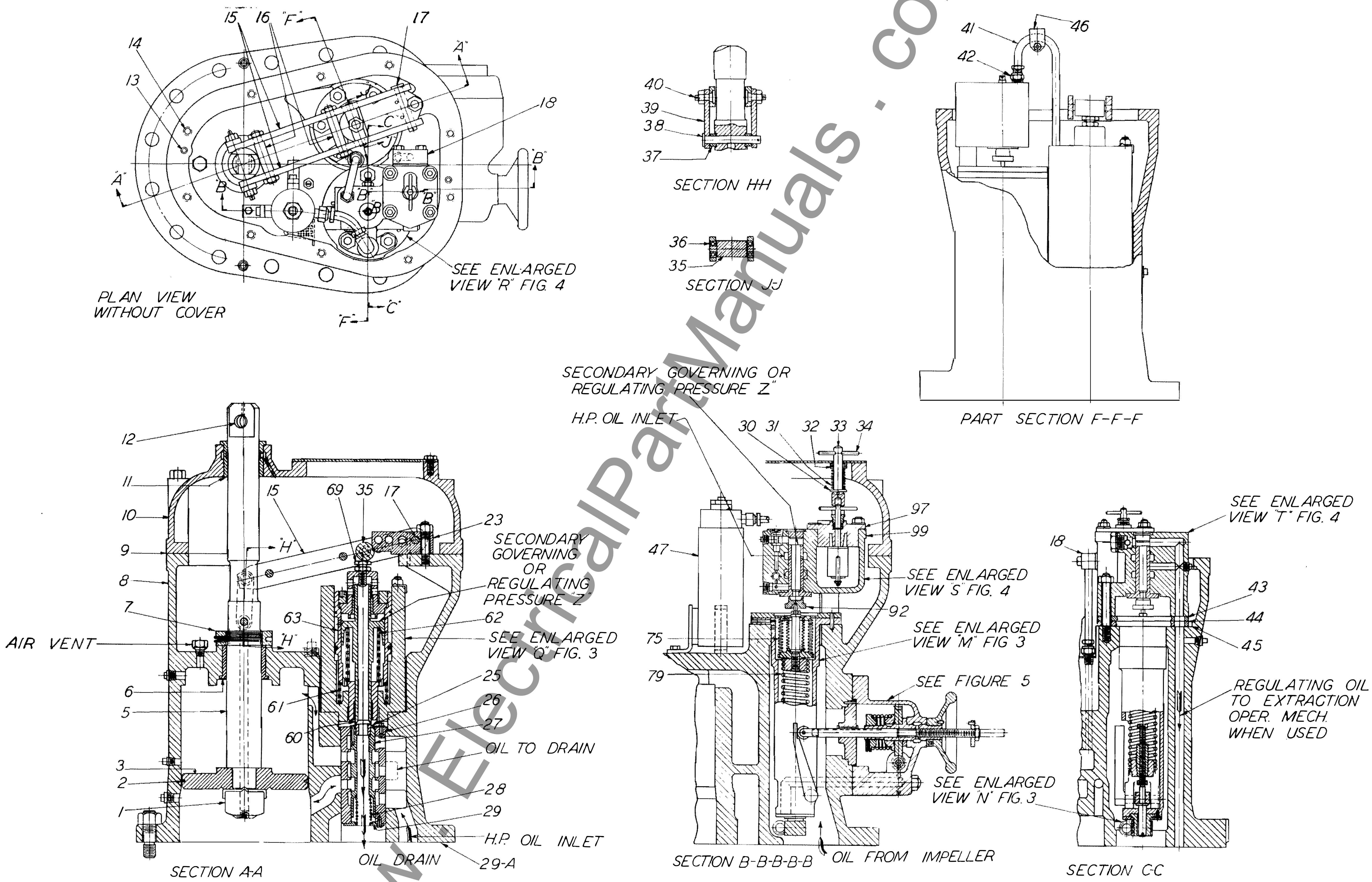

PLAN VIEW
WITHOUT COVER
SEE ENLARGED
VIEW "R" FIG. 4
SECTION HH
SECTION J-J
PART SECTION F-F-F
SECTION A-A
AIR VENT
SECONDARY
GOVERNING
OR
REGULATING
PRESSURE "Z"
SEE ENLARGED
VIEW "Q" FIG. 3
OIL TO DRAIN
H.P. OIL INLET
OIL DRAIN
SECONDARY GOVERNING OR
REGULATING PRESSURE "Z"
H.P. OIL INLET
SEE ENLARGED
VIEW "S" FIG. 4
SEE ENLARGED
VIEW "M" FIG 3
SEE FIGURE 5
SEE ENLARGED
VIEW "N" FIG. 3
SECTION B-B-B-B-B
OIL FROM IMPELLER
SEE ENLARGED
VIEW "T" FIG. 4
REGULATING OIL
TO EXTRACTION
OPER. MECH.
WHEN USED
SECTION C-C

Figure 2

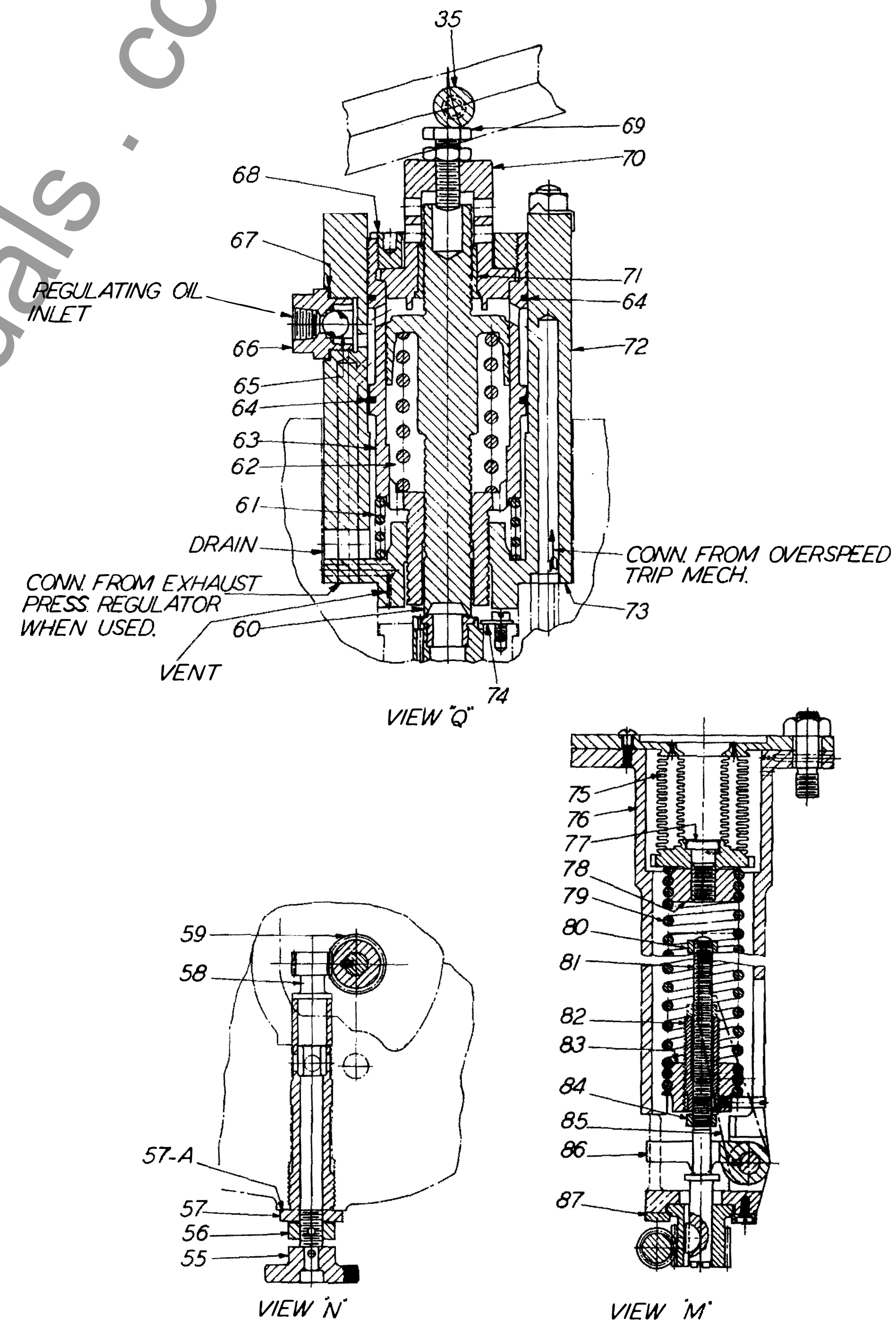
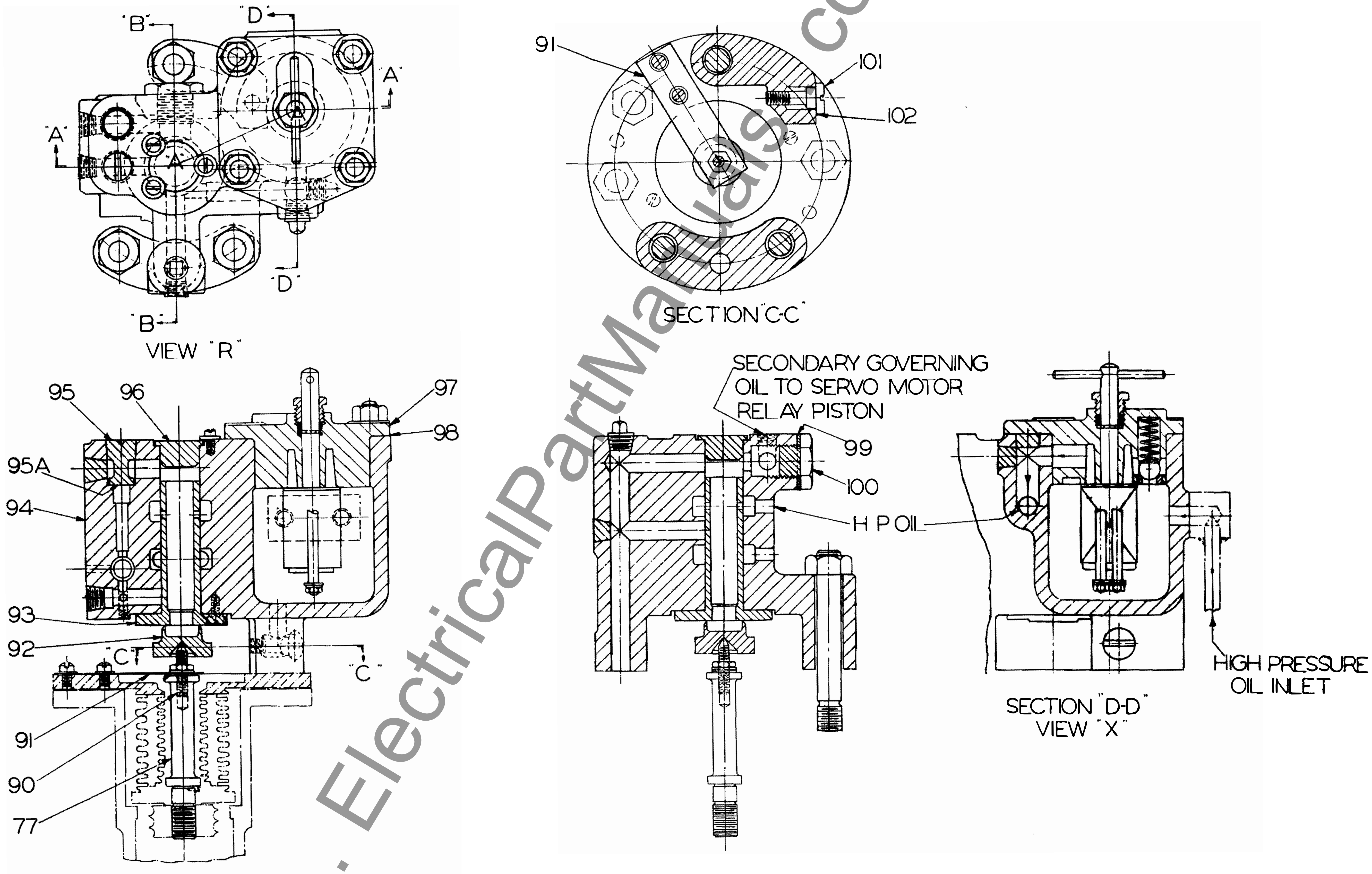

35
69
70
68
67
71
64
REGULATING OIL INLET
66
72
65
64
63
62
61
DRAIN
CONN. FROM OVERSPEED TRIP MECH.
CONN. FROM EXHAUST PRESS. REGULATOR WHEN USED.
73
60
VENT
74
VIEW "Q"
75
76
77
78
79
80
81
82
83
84
85
86
87
59
58
57-A
57
56
55
VIEW "N"
VIEW "M"

Figure 3



SECTION "A-A-A-A"
VIEW "S"

SECTION "B B"
VIEW "T"

Figure 4

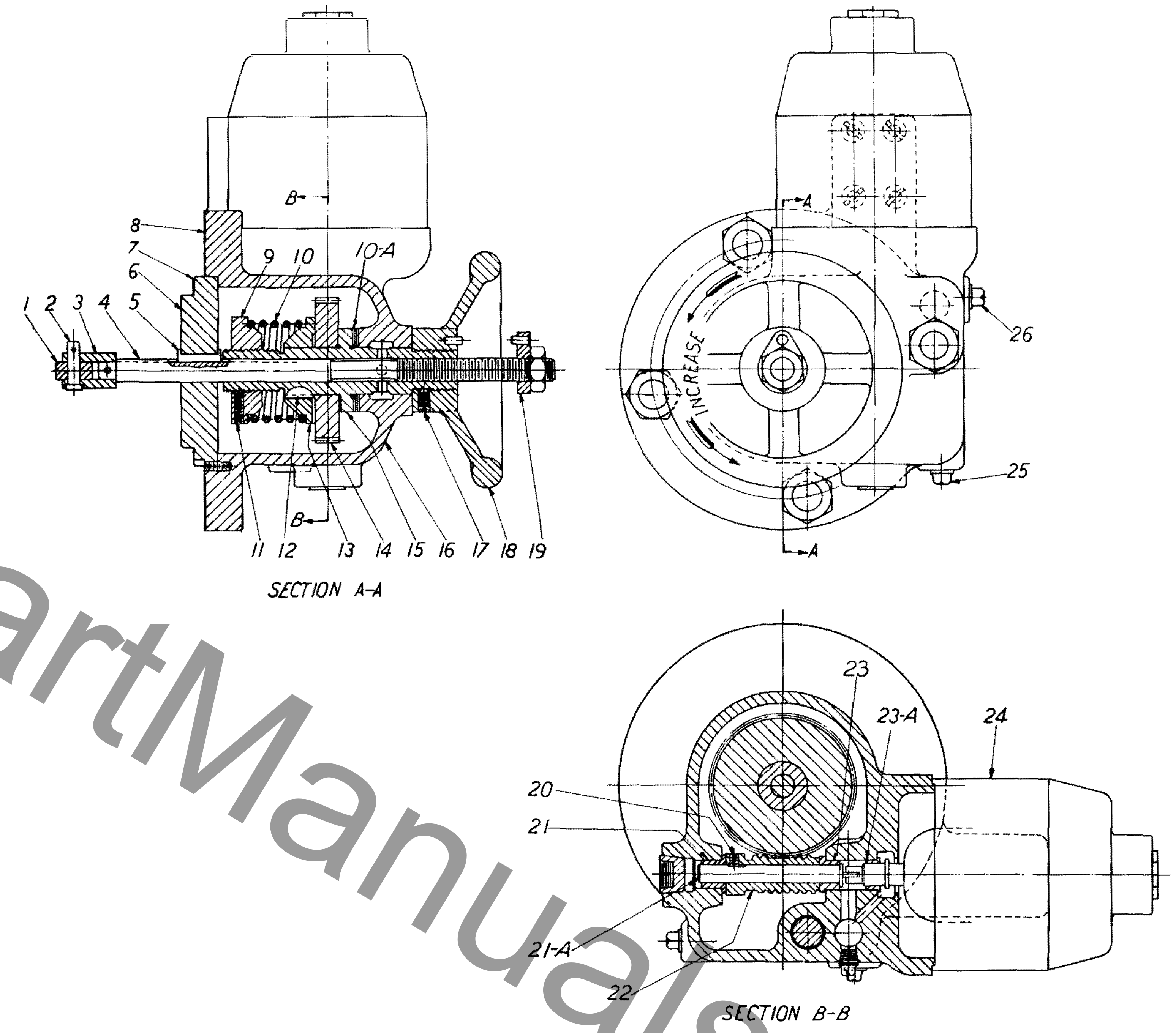

1 2 3 4 5 6 7 8 9 10 10-A 11 12 13 14 15 16 17 18 19
B
SECTION A-A
A
INCREASE
25
26
20
21
21-A
22
23
23-A
24
SECTION B-B

Figure 5