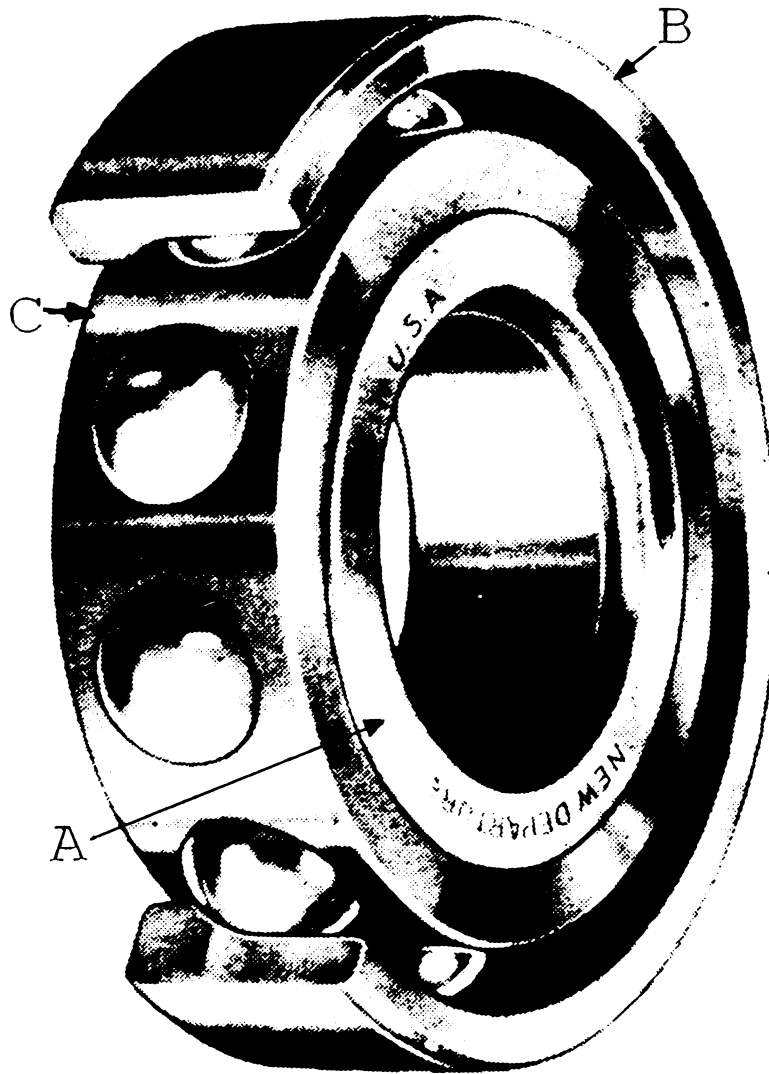
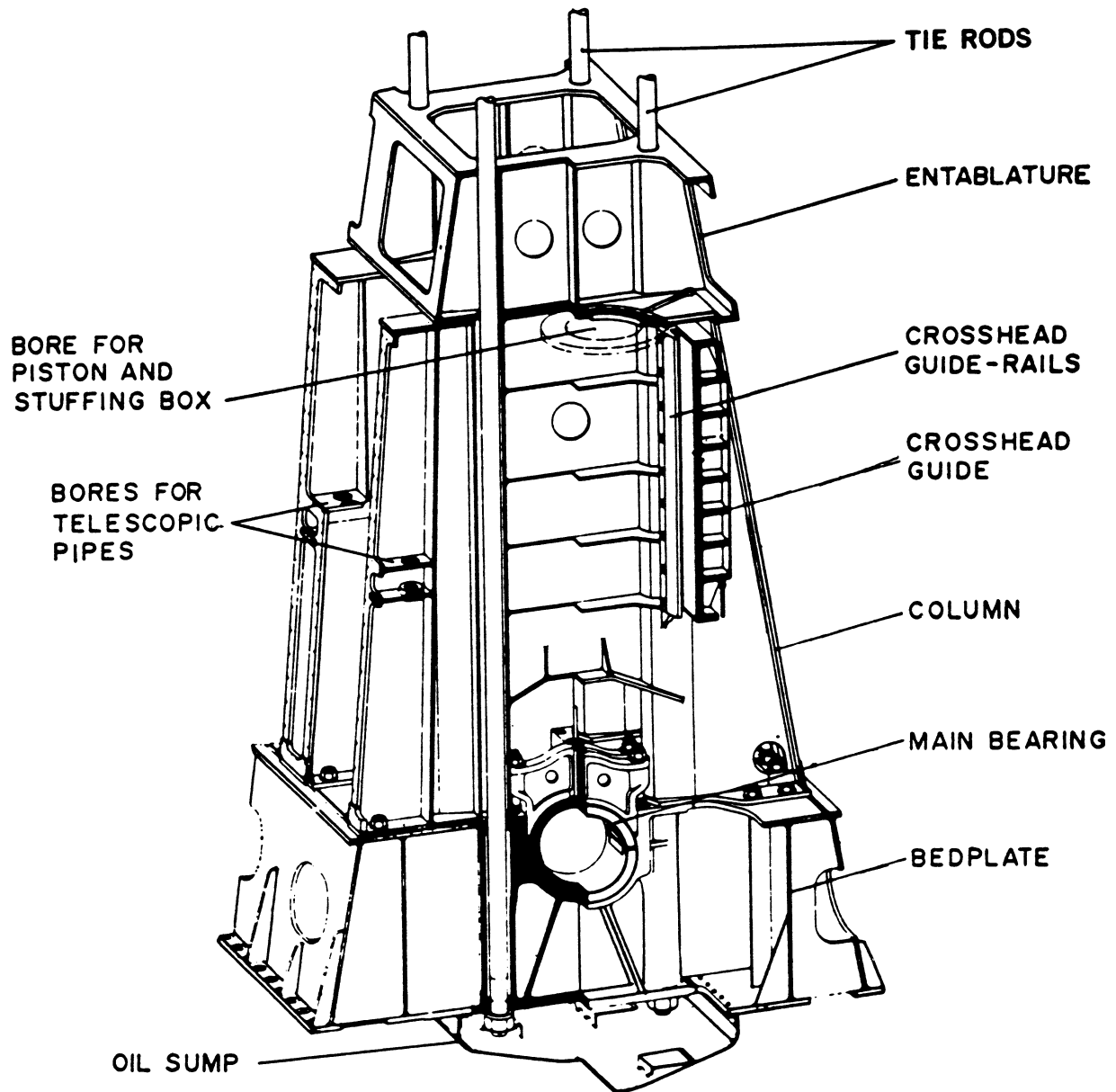


**CHAPTER 3 MOTOR**

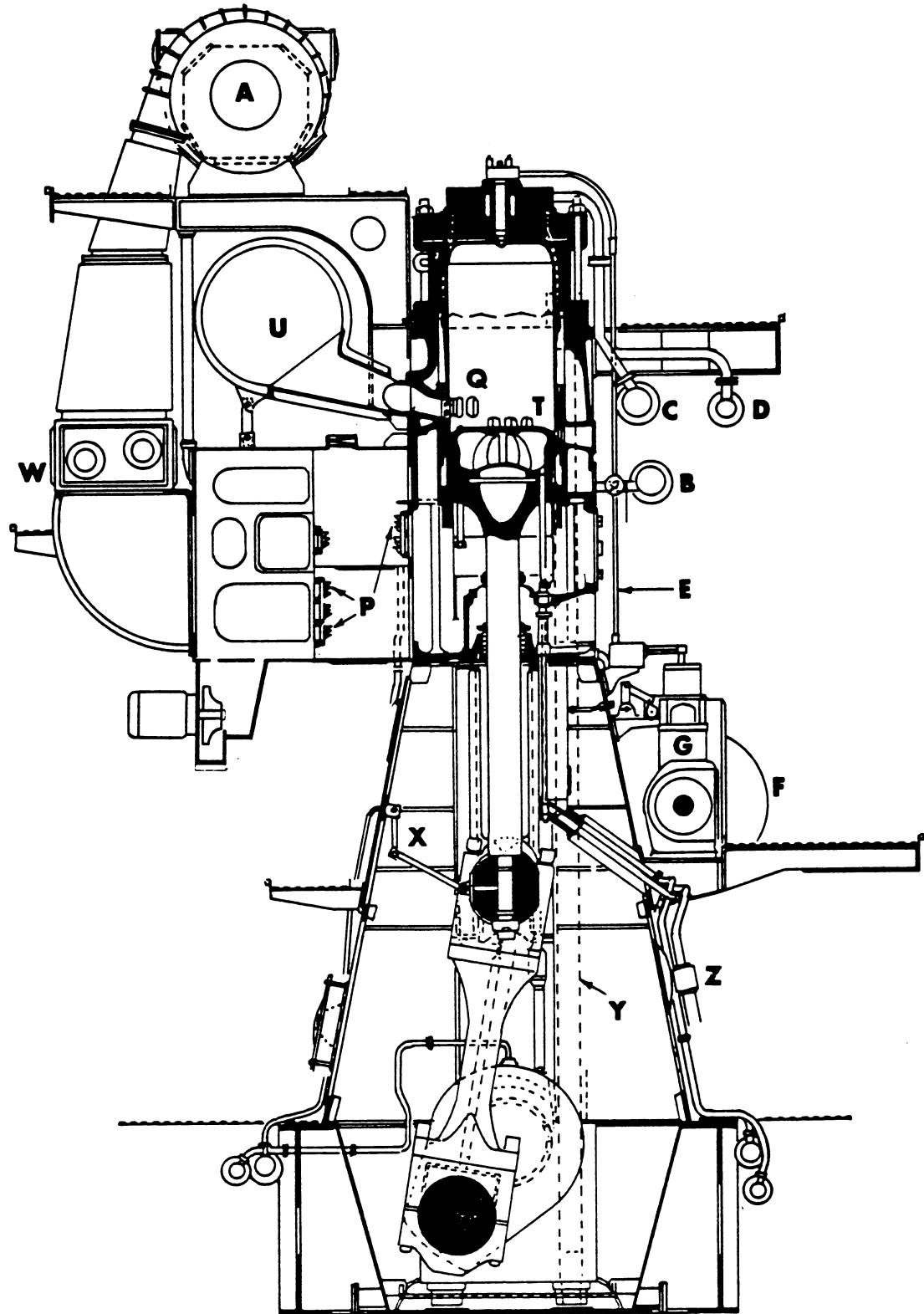
MO-0001



MO-0002



MO-0003



**MO-0004****DIESEL – NON REVERSIBLE MARINE ENGINE**

**MODEL**    DMRV-16-4    **ENGINE SERIAL NUMBER**    72001 to 72010 Inclusive

**B.M.E.P.**            182                            **PSI**

**NO. CYCLES**        4                    **NO. CYLINDERS**        16

**BORE**                17"                    **STROKE**                21"

**H.P.**                7000            **AT**    400            **R.P.M.**

**TOTAL DISPLACEMENT**    76,266            **CUBIC INCHES**

\***FUEL INJECTION TIMING**     $22^{\circ}$  Left Bank  
 $20^{\circ}$  Right Bank    **BEFORE TOP CENTER**

**SET**     $\frac{1}{8}$  inch Left Bank  
 $\frac{7}{8}$  inch Right Bank    **BEFORE TOP CENTER ON**  
**51 IN. DIAMETER FLYWHEEL**

**FIRING ORDER**        1L-8R-4L-5R-7L-2R-3L-6R-8L-1R-5L-4R-2L-7R-6L-3R

**FUEL INJECTION PUMP RACK AT FULL LOAD**        31.5MM No. 2 Diesel Fuel Oil  
30.0 MM 3500 SSU Heavy Fuel

**STARTING SYSTEM**        Pilot Air – Gear Driven Distributor

**CRANKSHAFT ROTATION**        Clockwise                    **(VIEWED FROM FLYWHEEL END)**

\***AVERAGE FULL LOAD SHOP DATA**

\*\*\* **EXHAUST TEMPERATURE**                    870°F

**AIR MANIFOLD PRESSURE**                    31 in.-hg

**AIR MANIFOLD TEMPERATURE**                110°F

**AMBIENT TEMPERATURE**                    72°F

**BAROMETRIC PRESSURE**                    30.11 in.-hg

   \*\* **FULL LOAD FIRING PRESSURE**            1225 PSI    No. 2 Diesel Fuel  
1200 PSI    3500 SSU Heavy Fuel

**VALVE CLEARANCE WITH COLD ENGINE**

**INTAKE**        .040"        **EXHAUST**        .040"

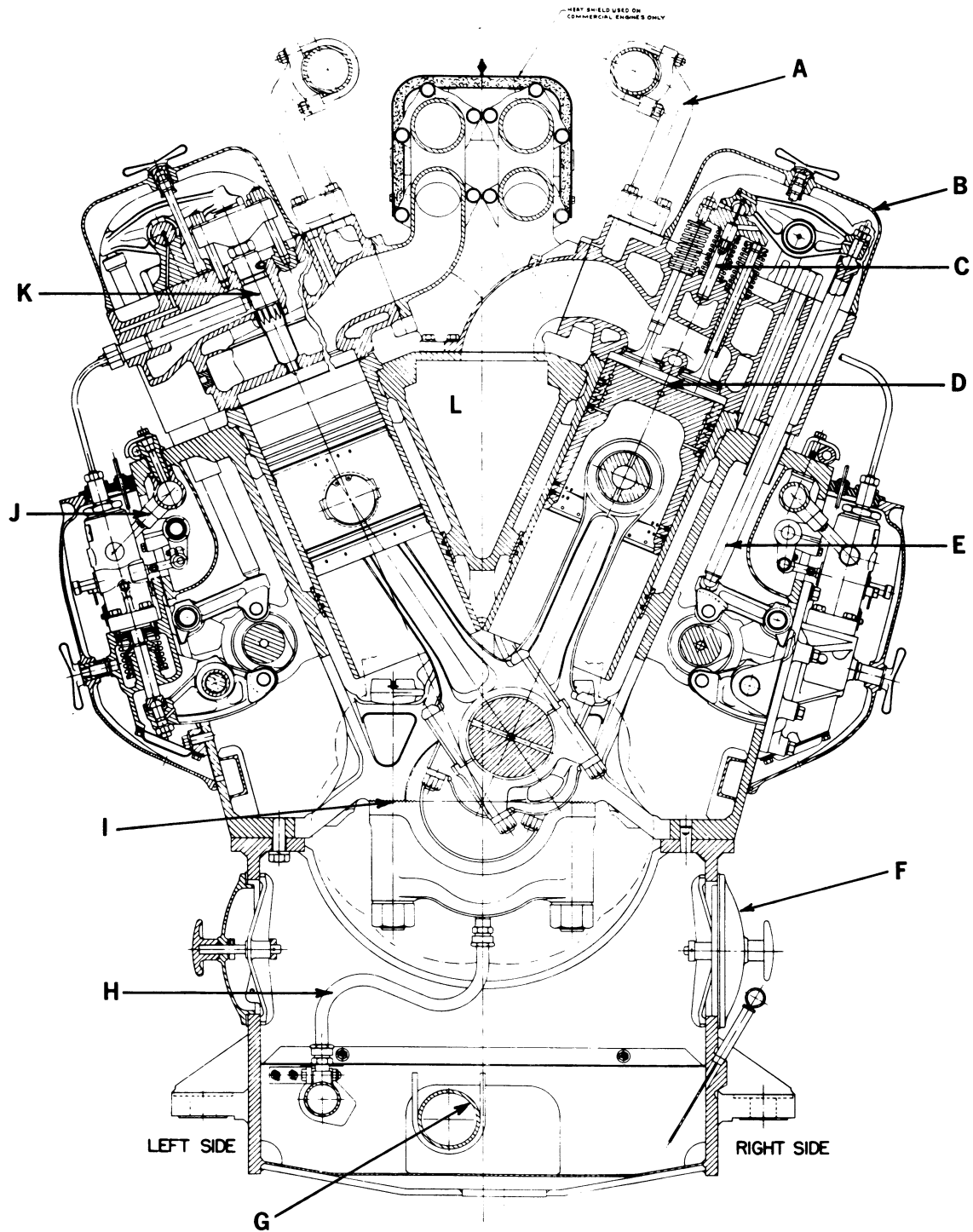
\*Values based on No. 2 Diesel Fuel Oil

\*\*ABS Allowable Firing Pressure 1400 PSI

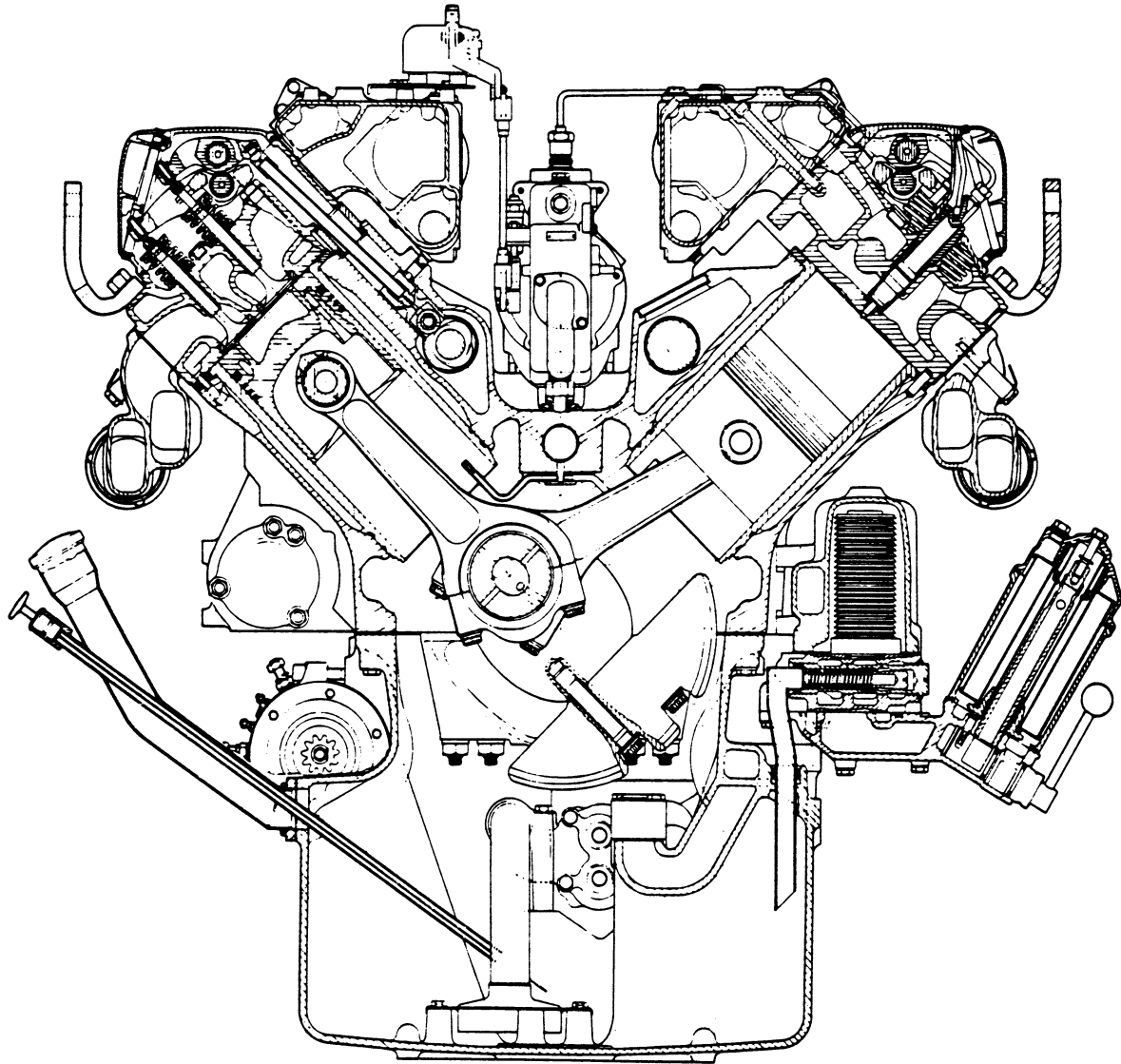
Maximum allowable Differential Firing Pressure  $\pm 50$  PSI from mean.

\*\*\*Maximum allowable Exhaust Gas Temperature 950°F.

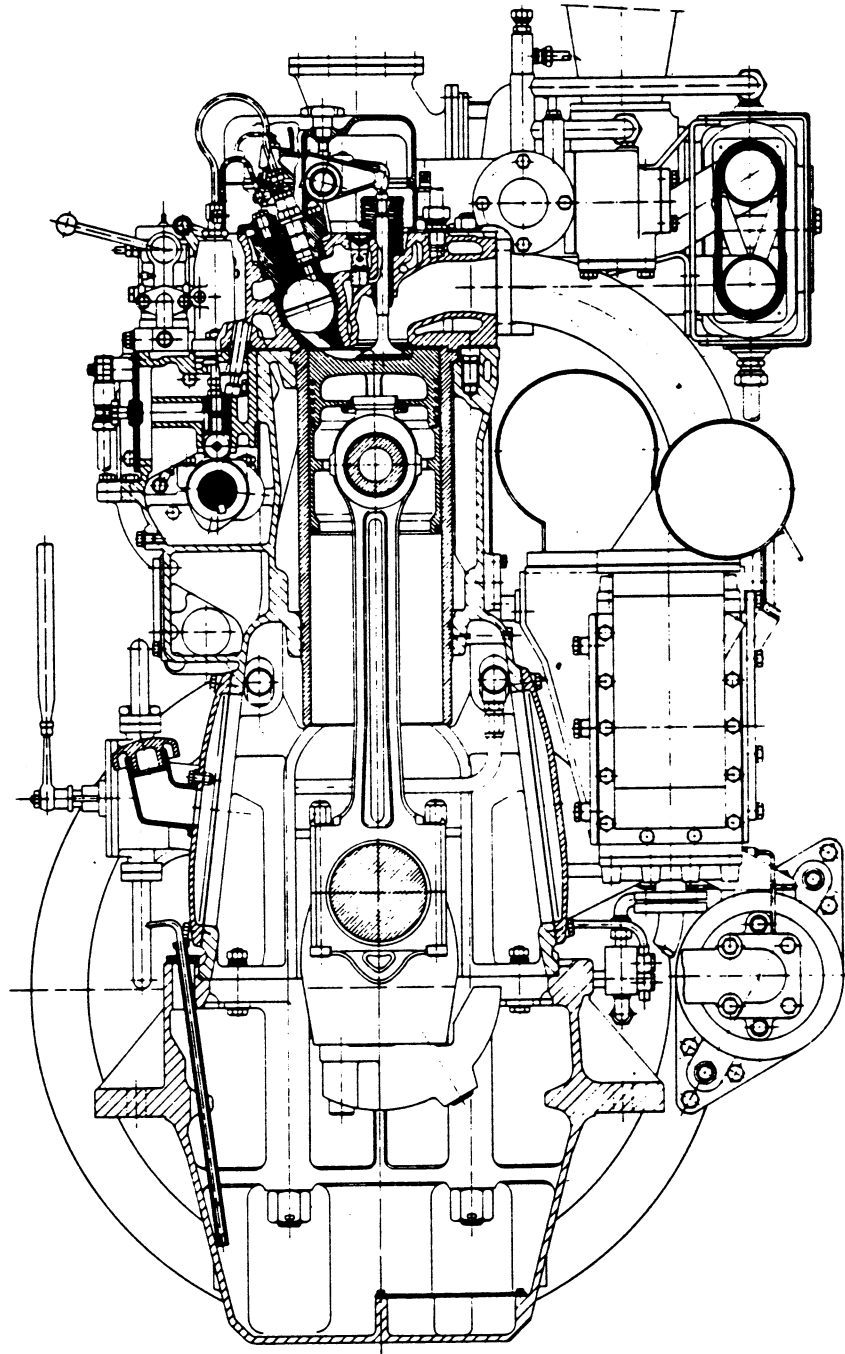
MO-0005



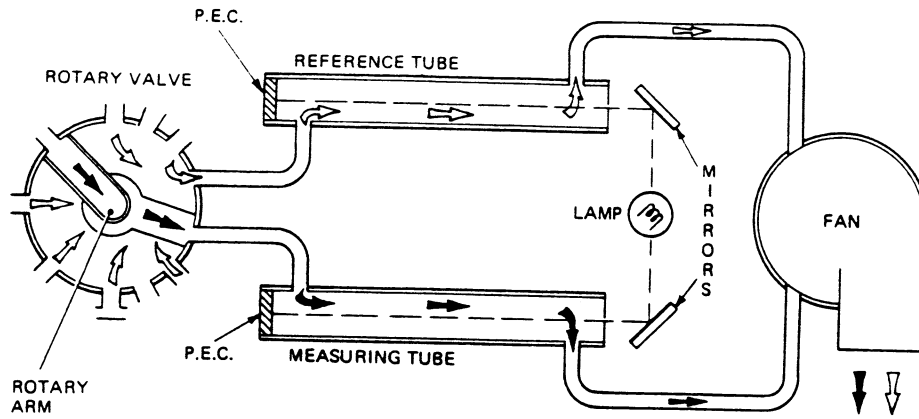
**MO-0006**



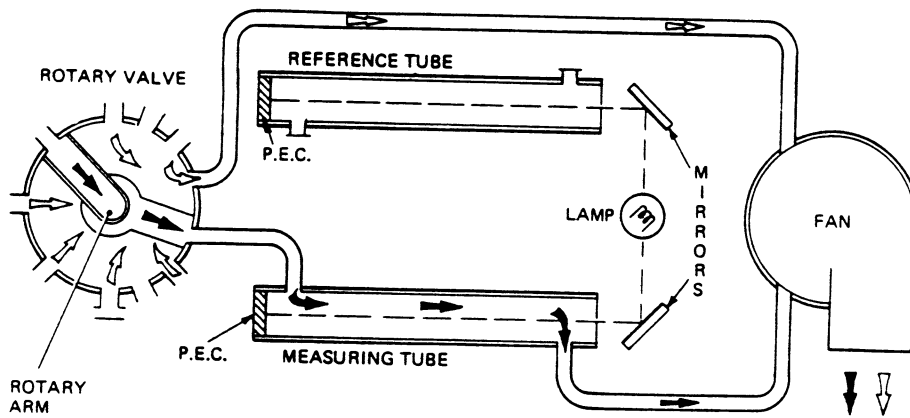
MO-0007



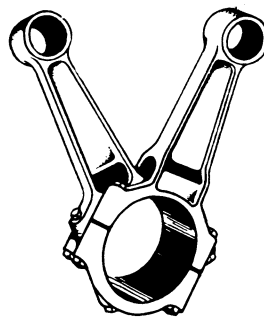
**MO-0008**



**MO-0009**

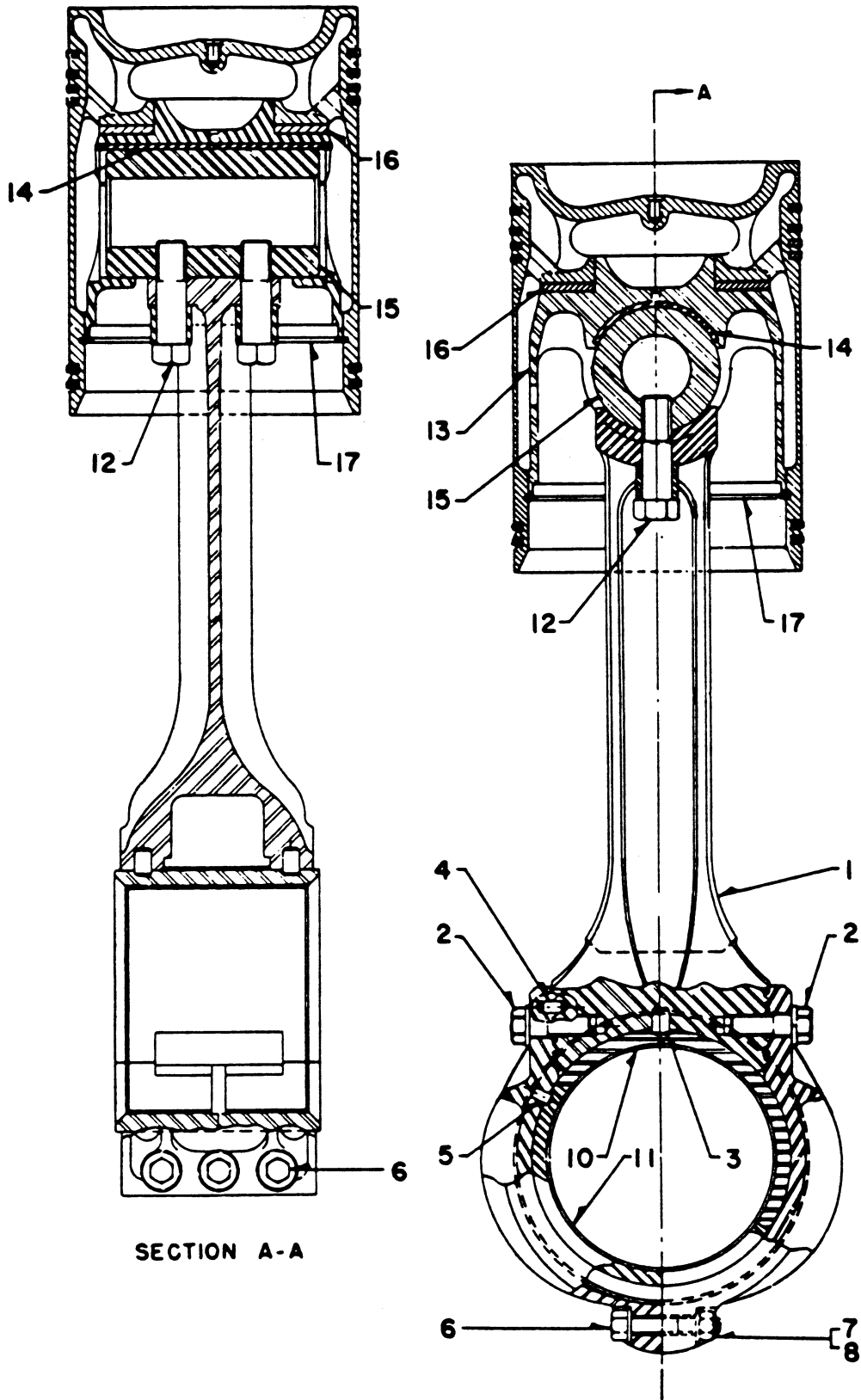


**MO-0010**



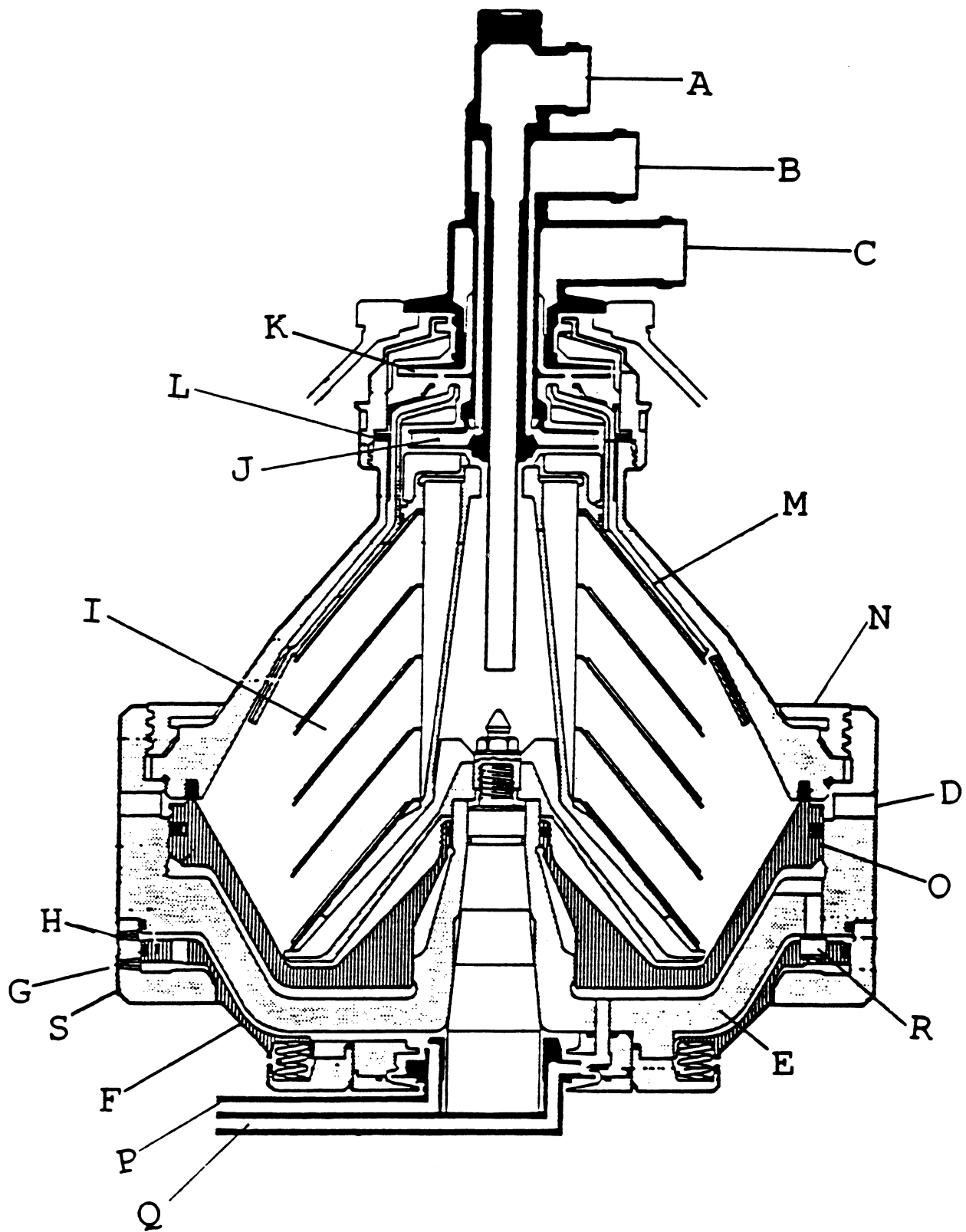


MO-0011

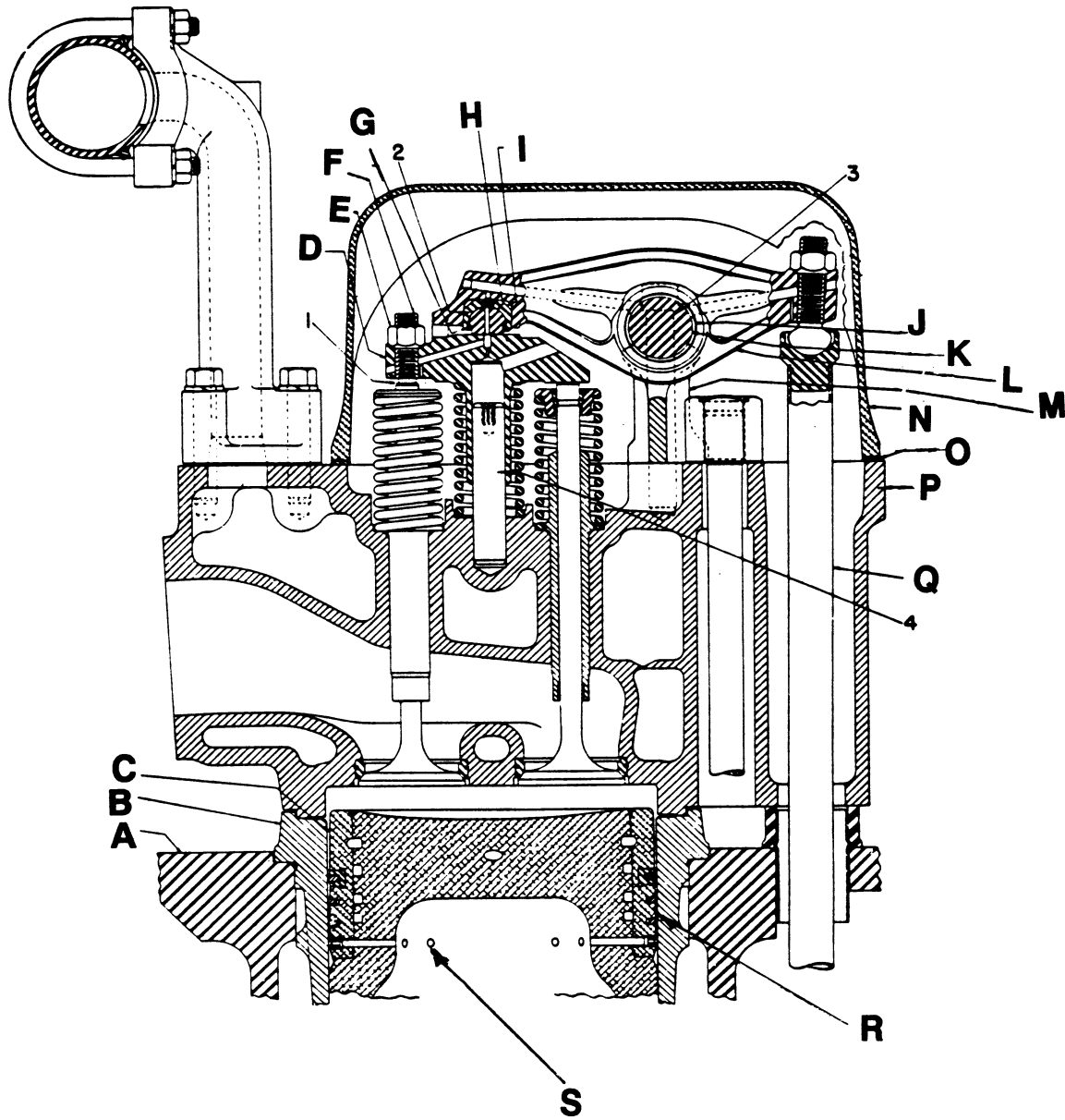


SECTION A-A

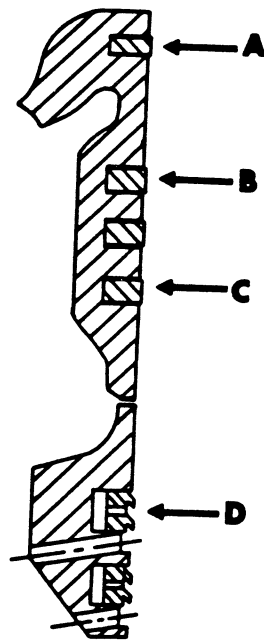
MO-0012



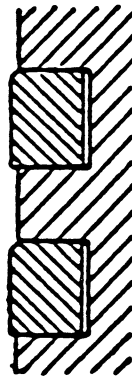
MO-0013



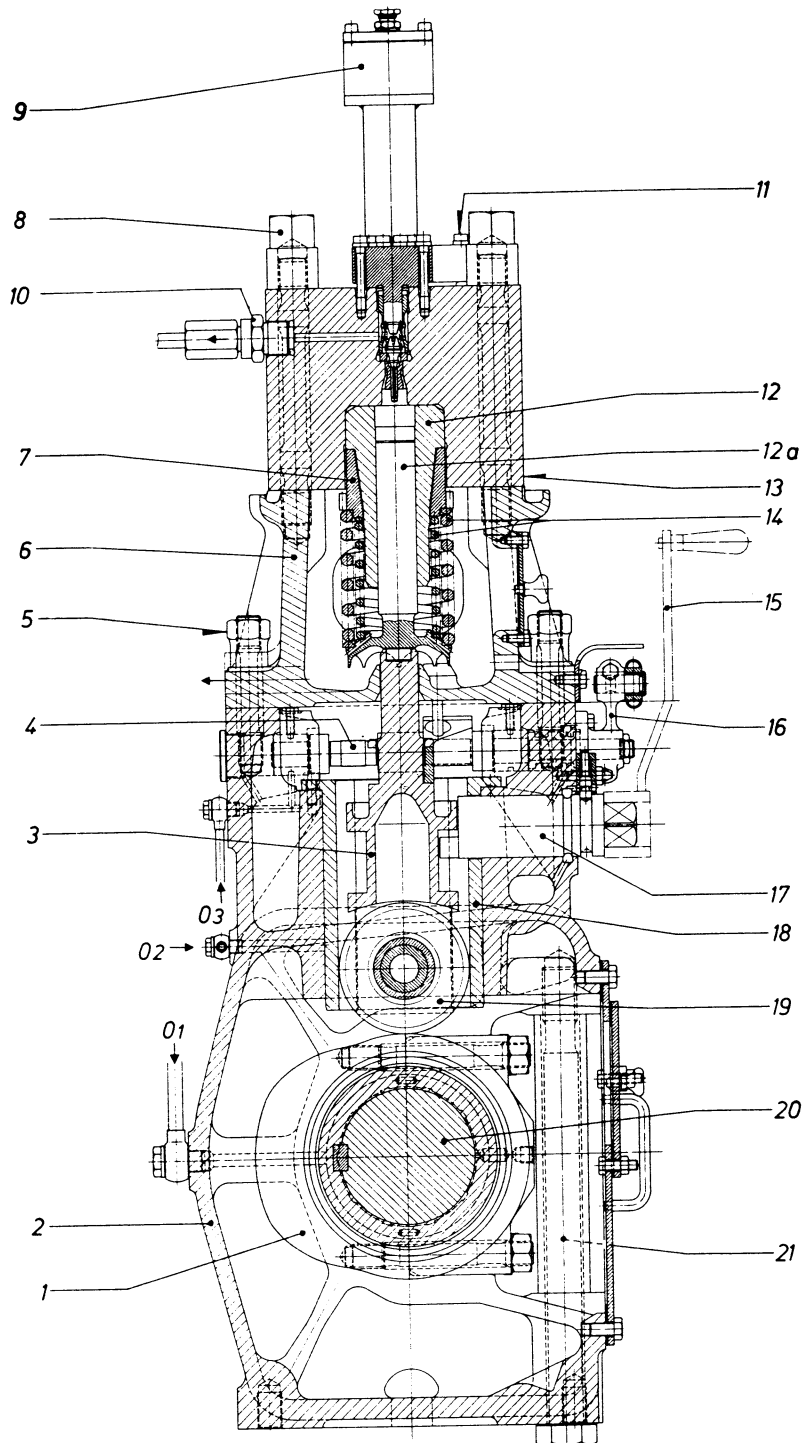
**MO-0014**



**MO-0015**

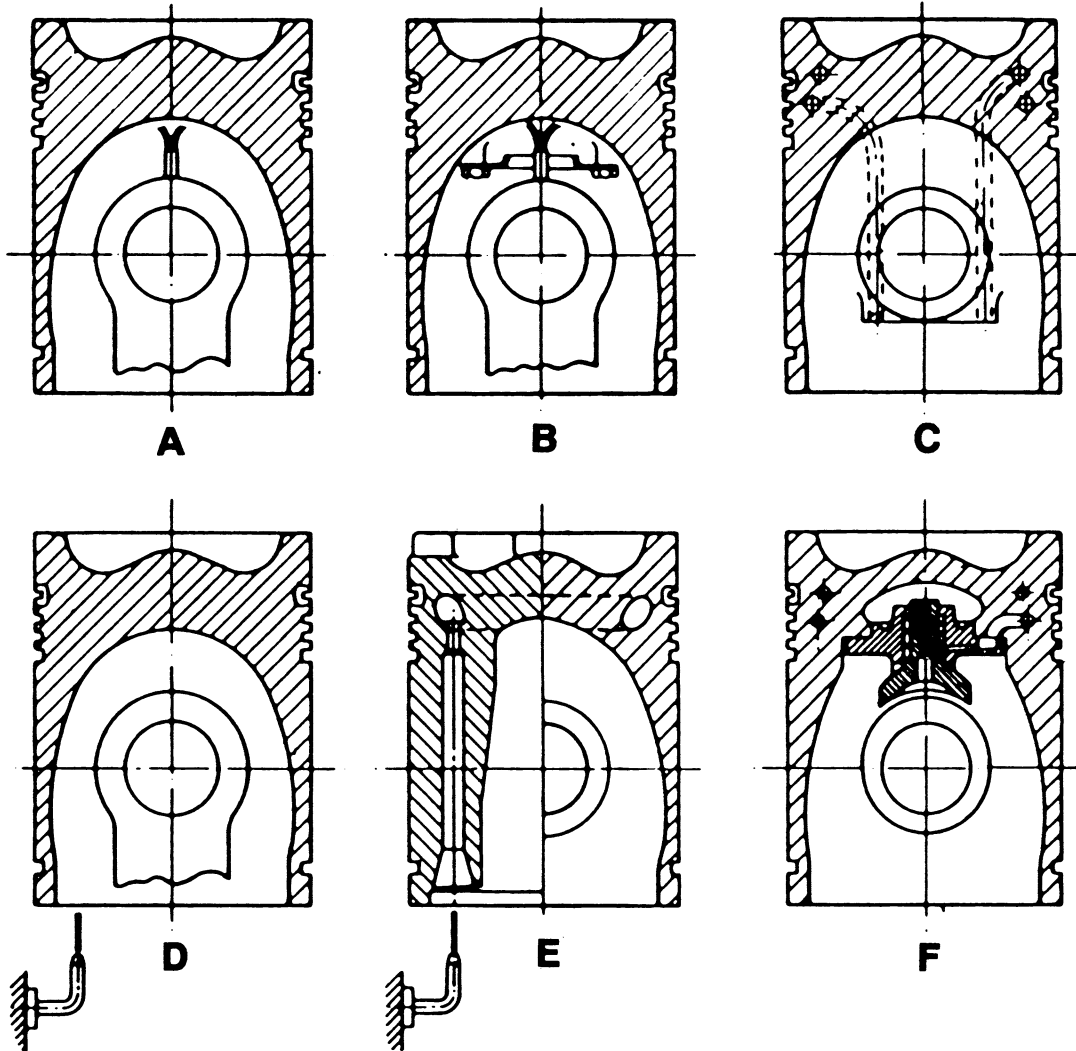


MO-0016

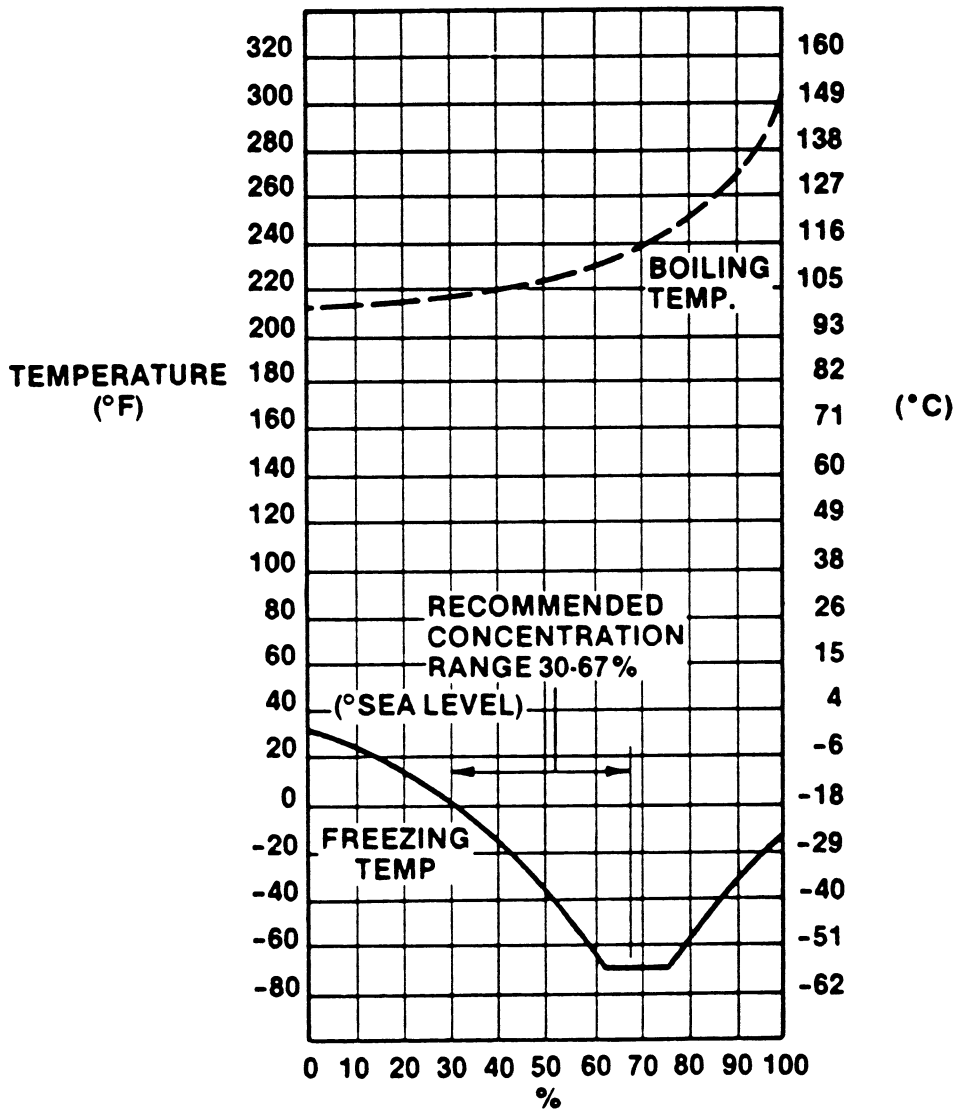


(Courtesy of New Sulzer Diesel)

MO-0017

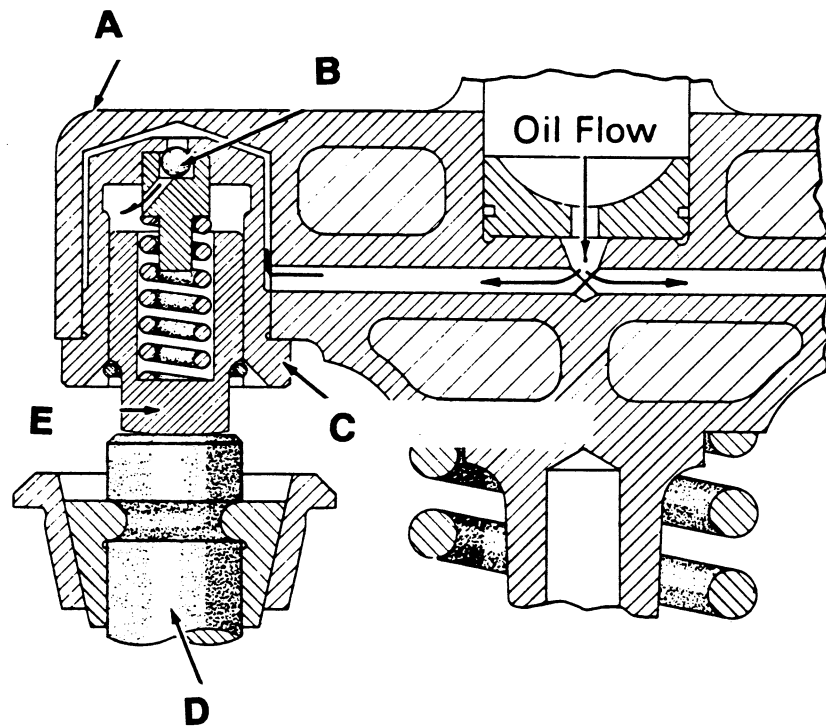
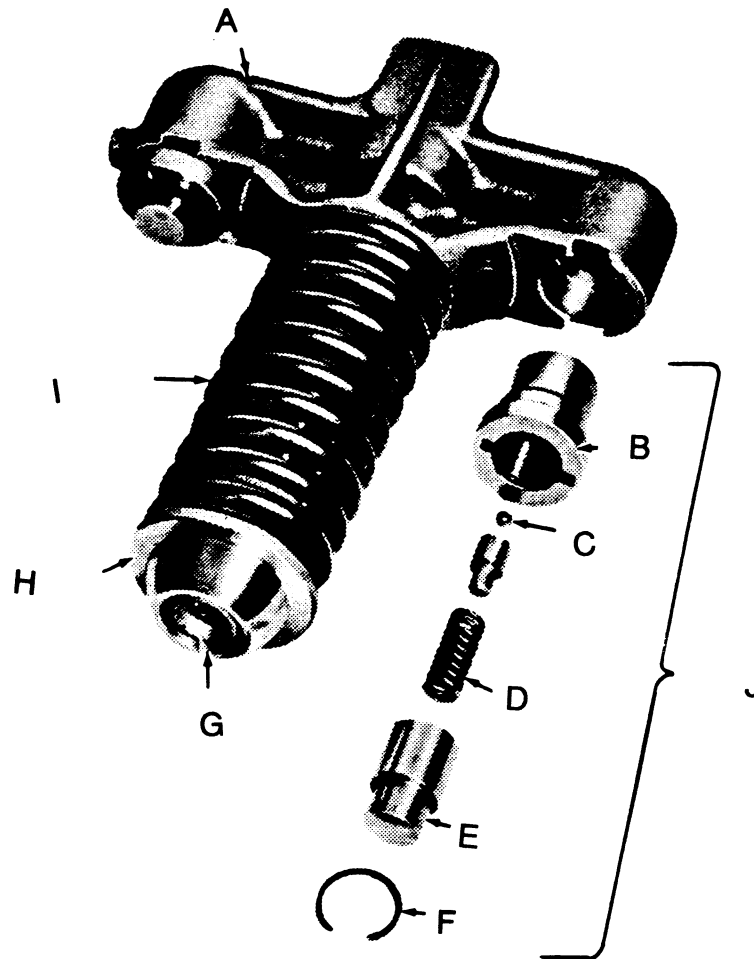


MO-0018



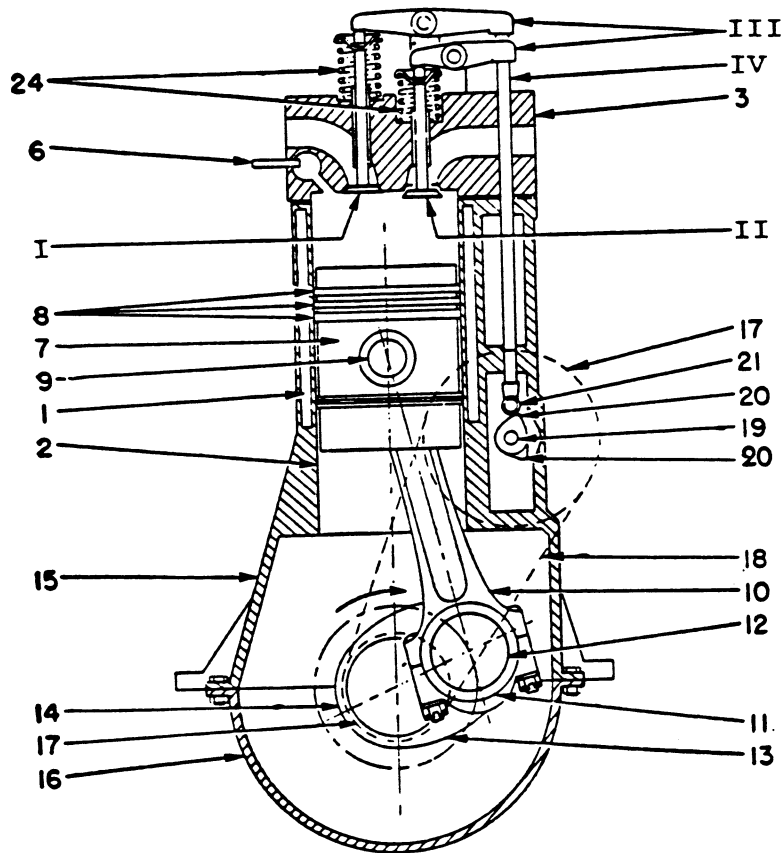
COOLANT FREEZING AND BOILING TEMPERATURES VS. ETHYLENE GLYCOL CONCENTRATION

MO-0019

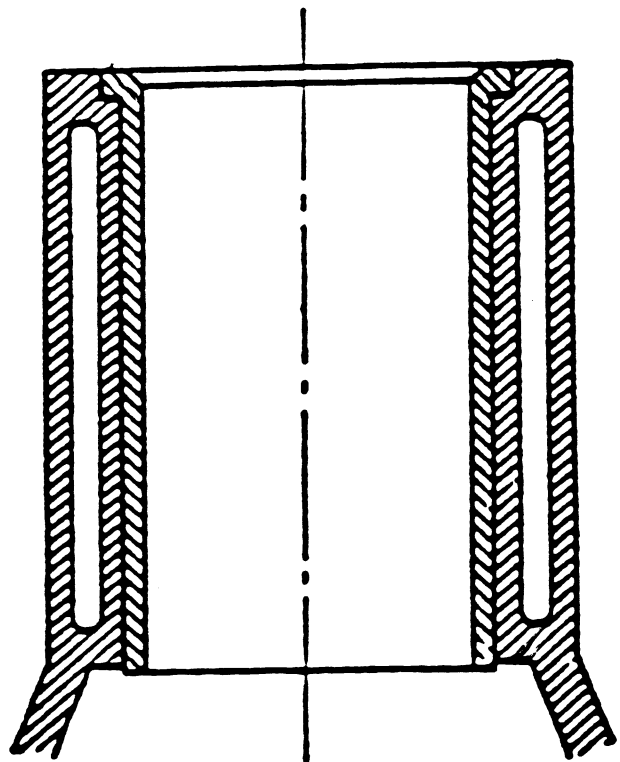




MO-0020

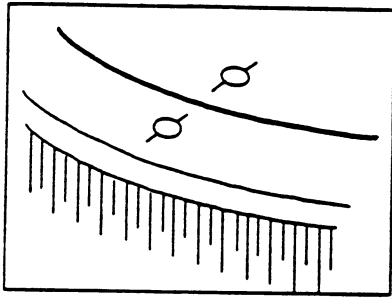


MO-0021

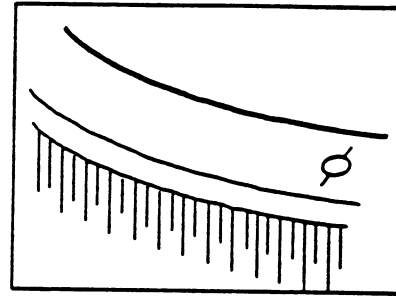


3-17

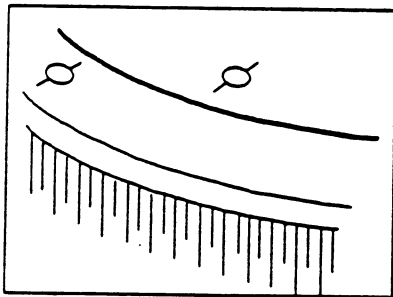
**MO-0022**



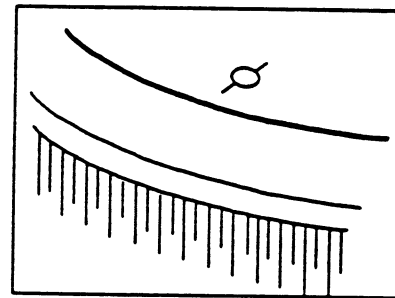
A



B

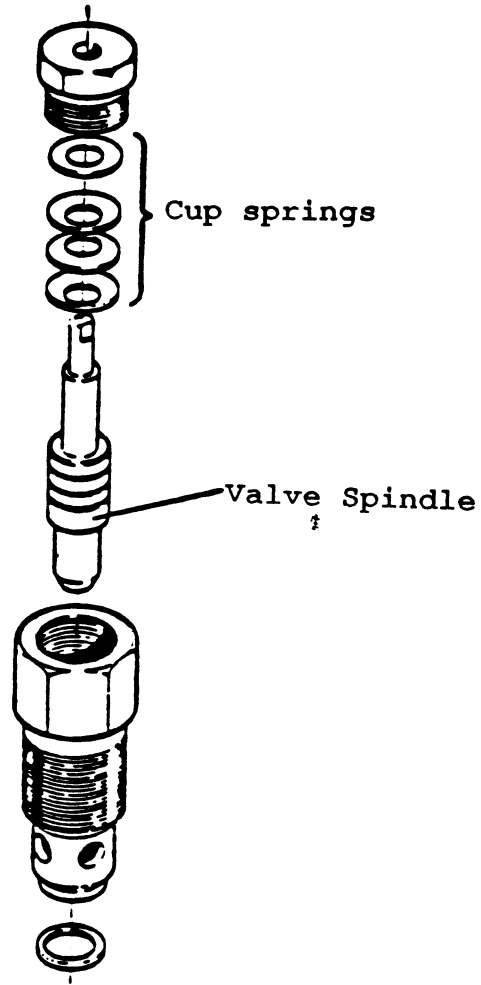


C

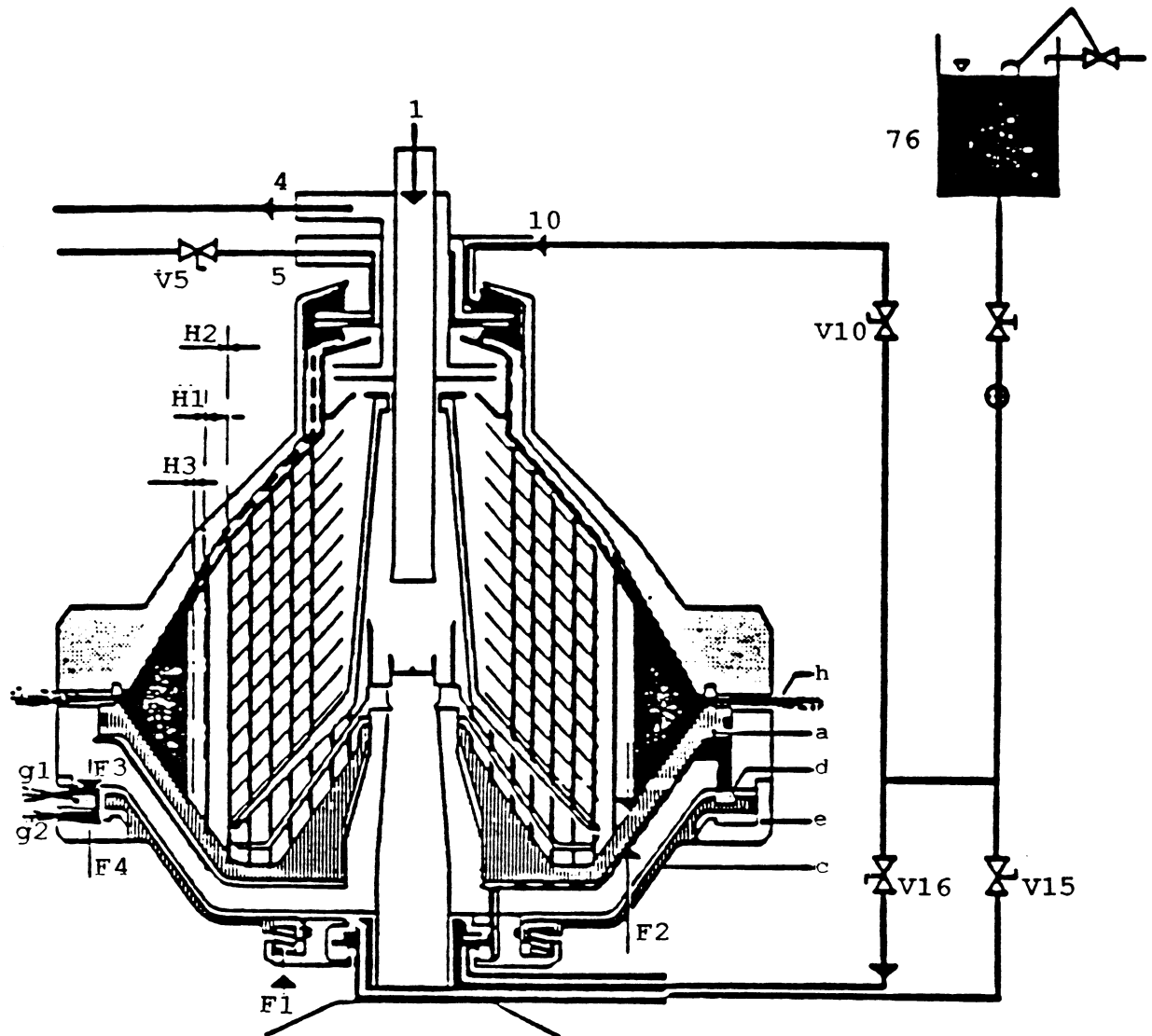


D

**MO-0023**

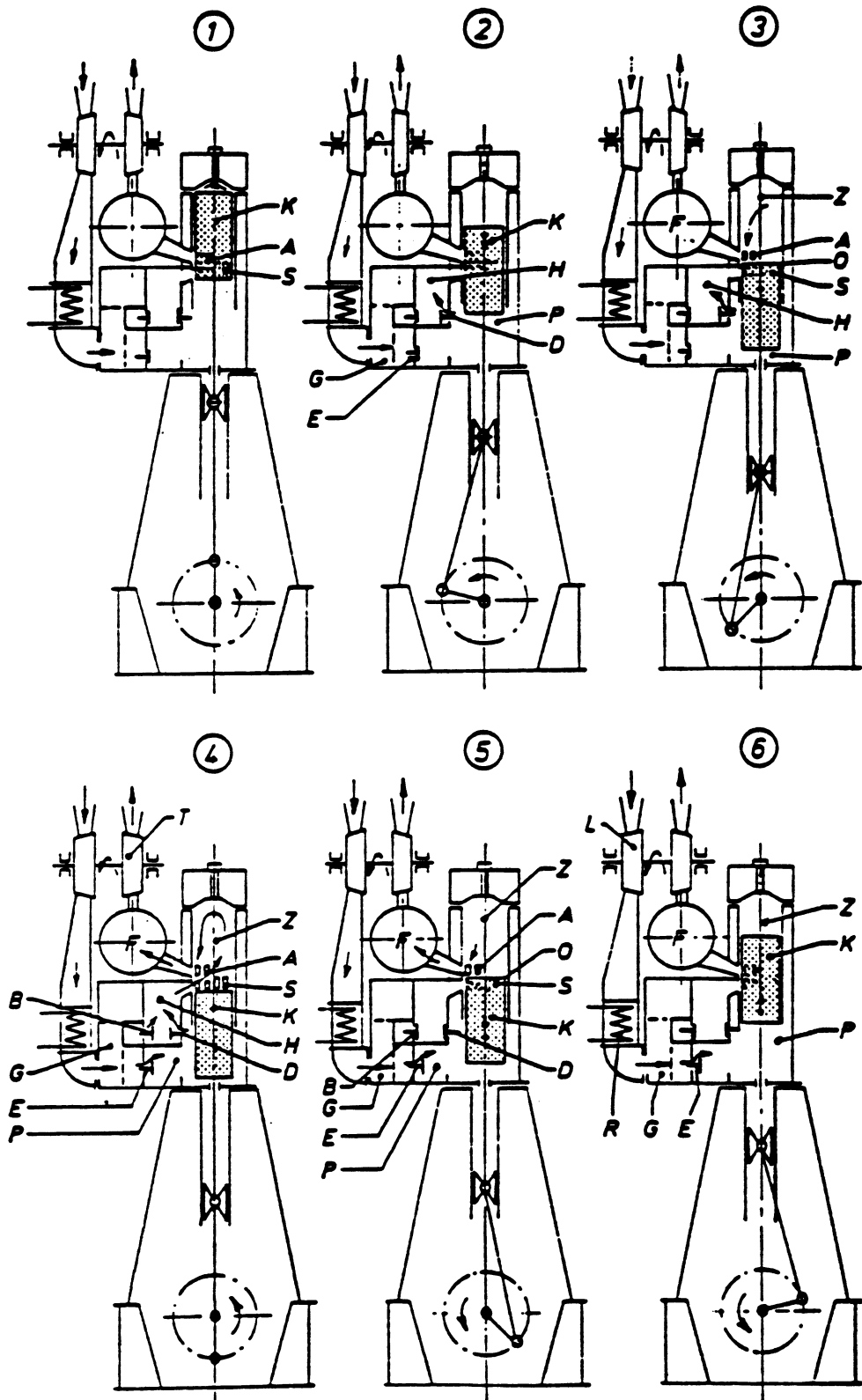


MO-0024



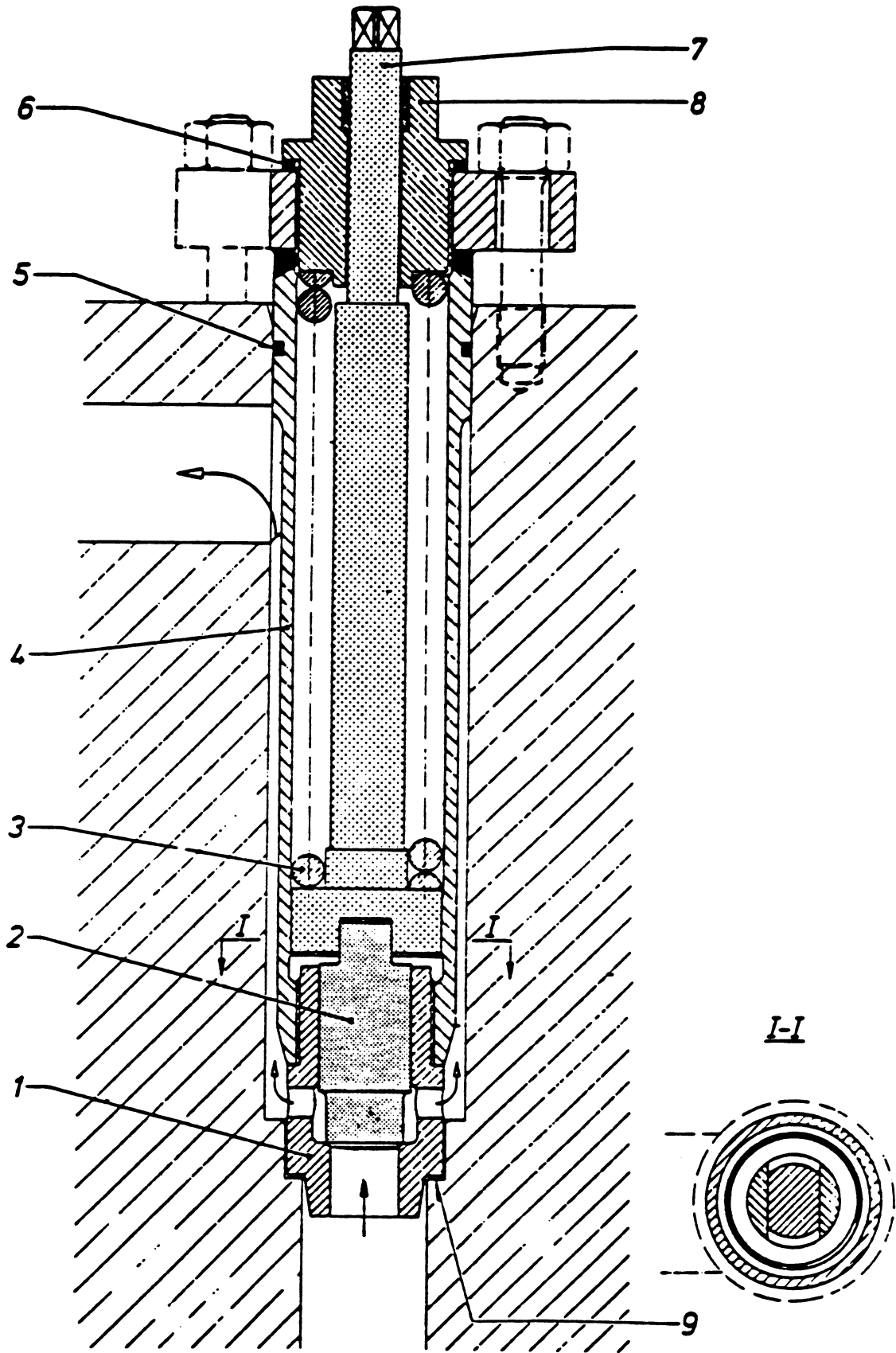
(COURTESY OF ALFA-LAVAL [MARINE AND POWER DIVISION])

MO-0025



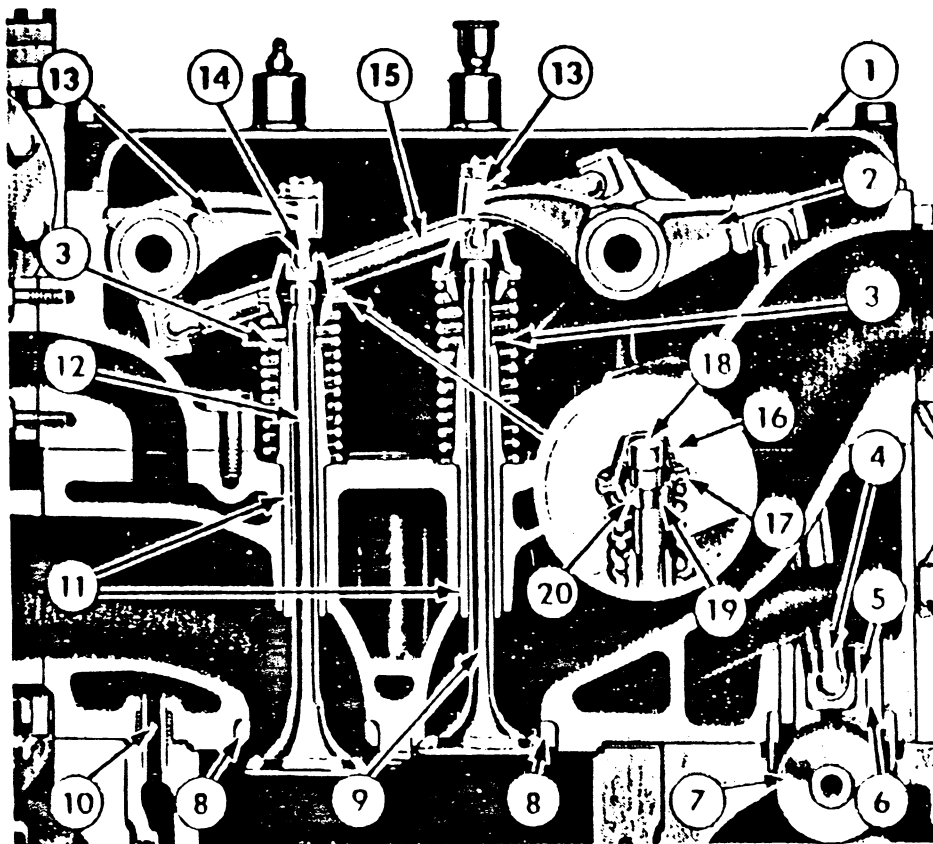
(Courtesy of New Sulzer Diesel)

MO-0026

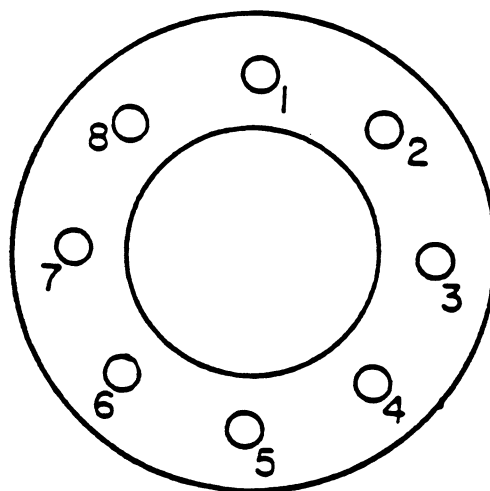


3-22

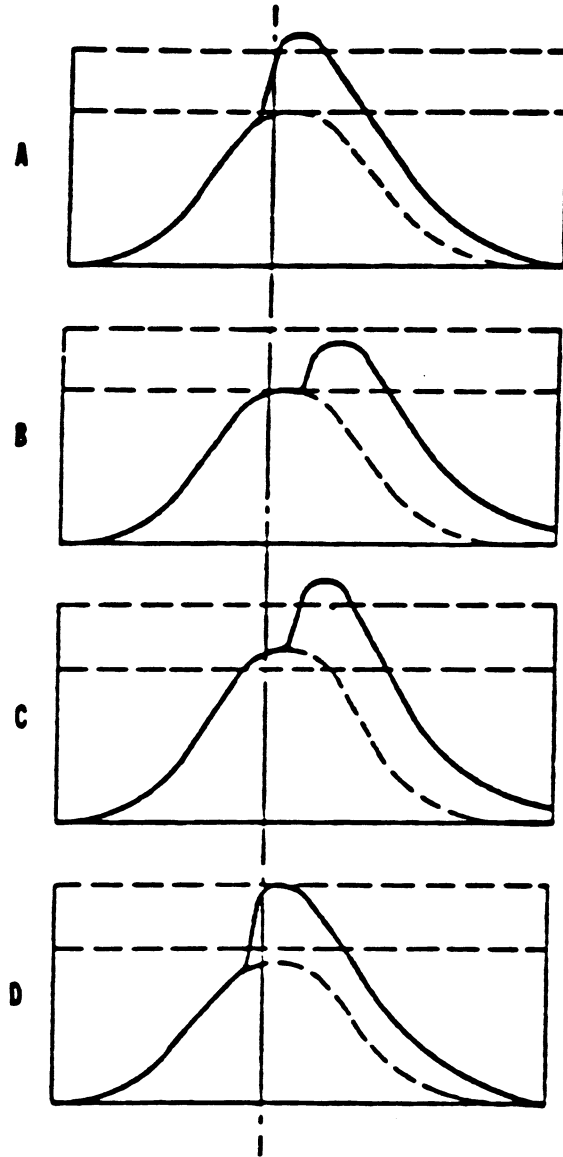
MO-0027



MO-0028

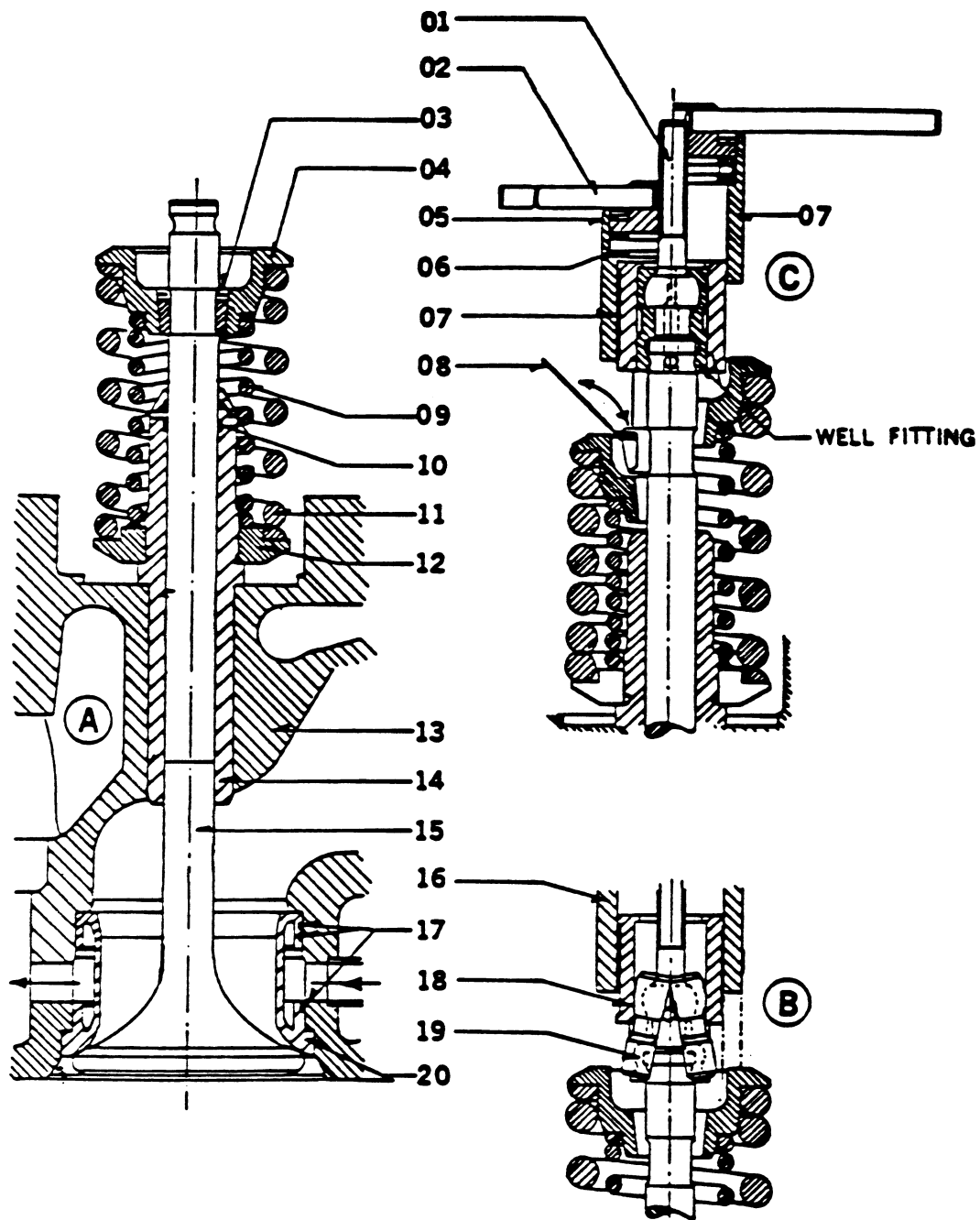


MO-0029

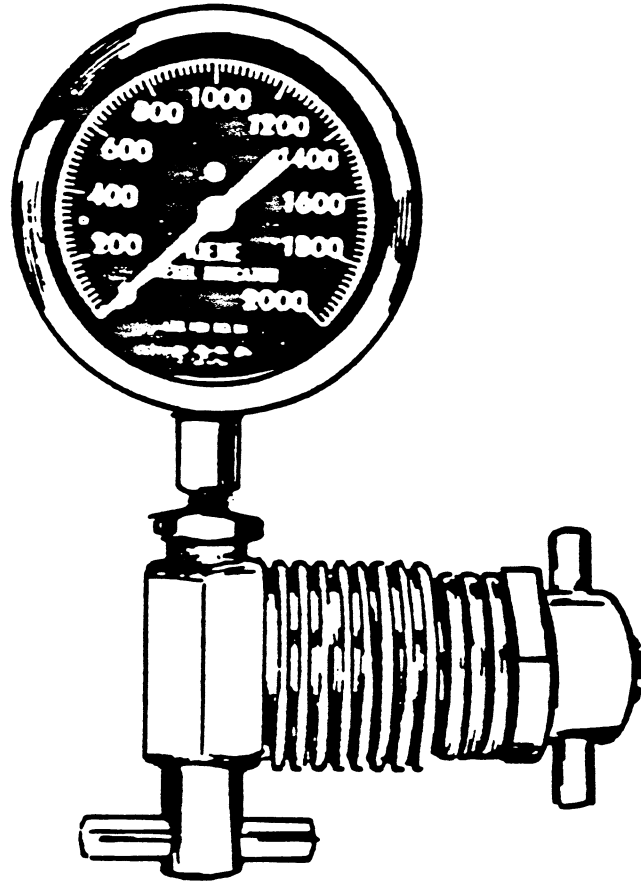




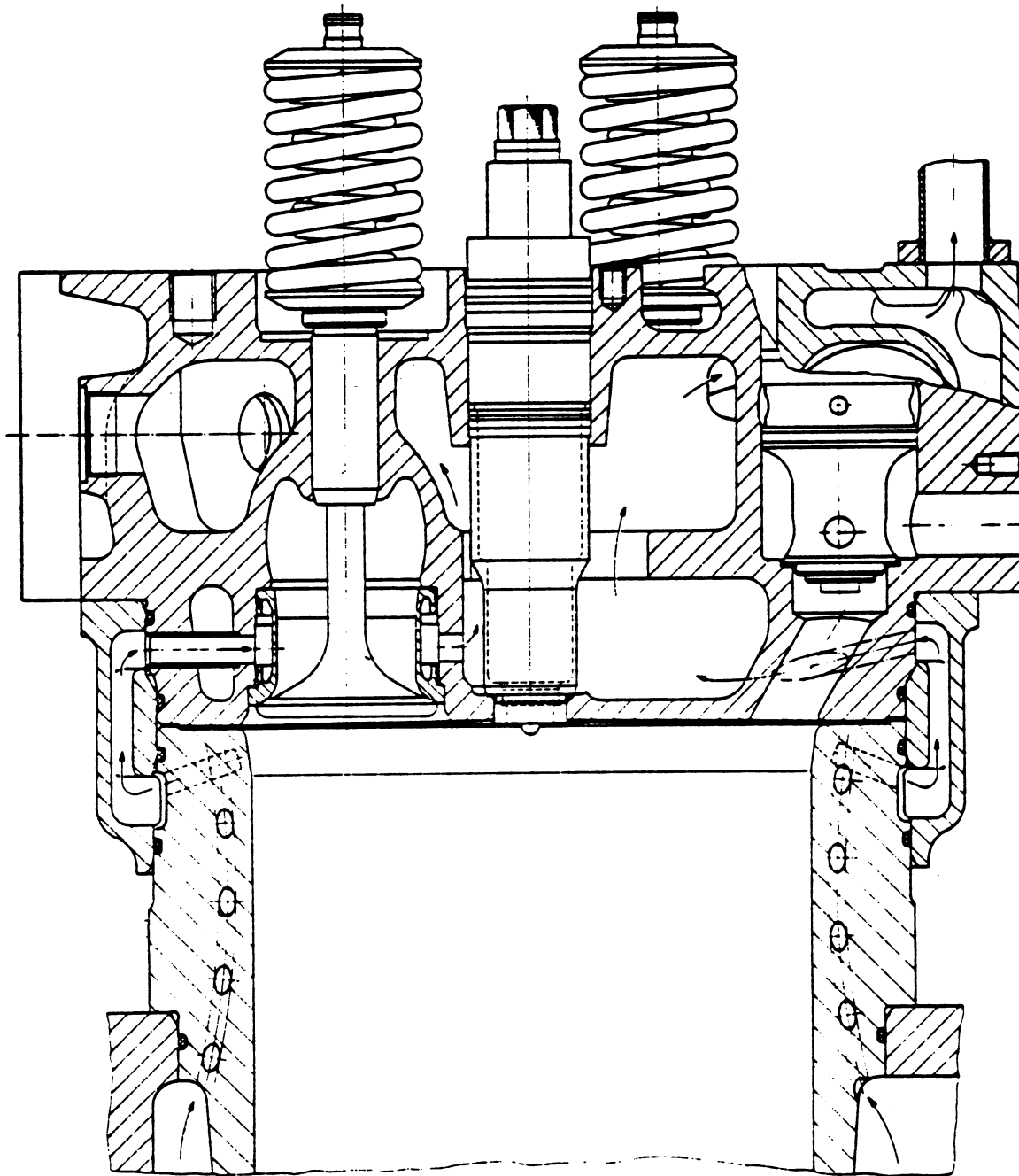
MO-0030



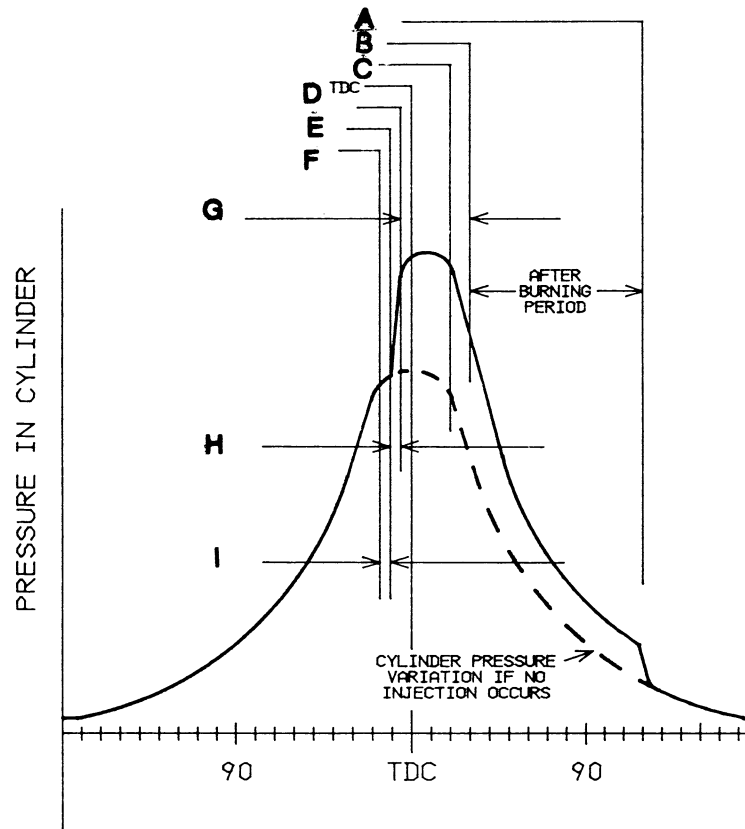
MO-0031



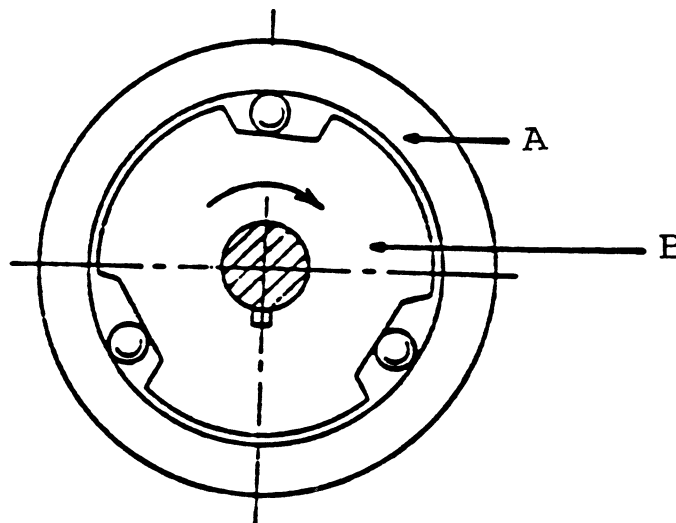
MO-0032



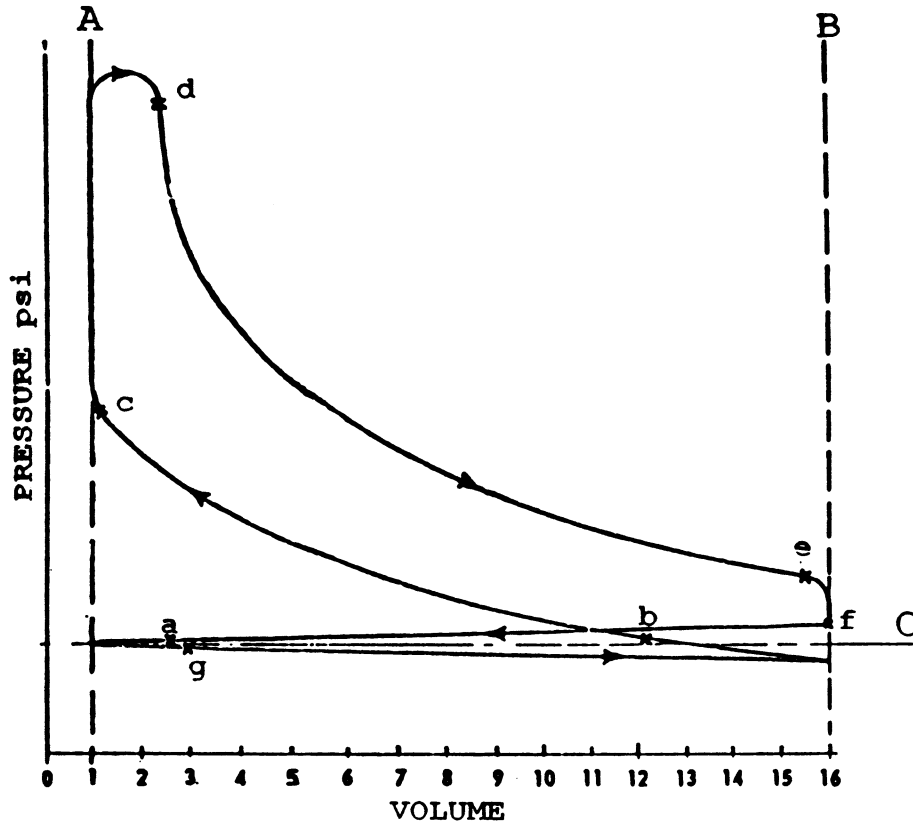
**MO-0033**



**MO-0034**

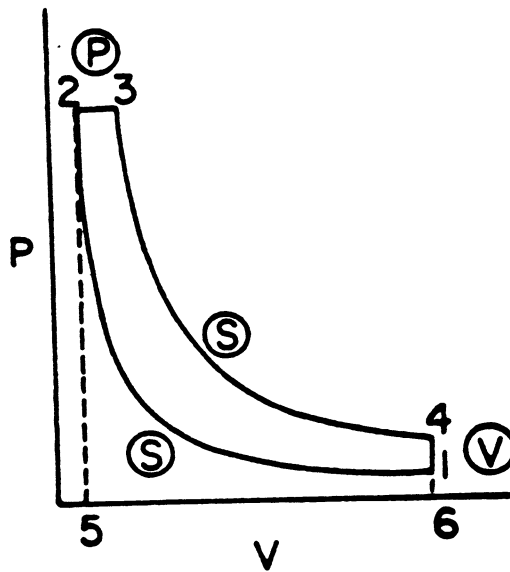


MO-0035

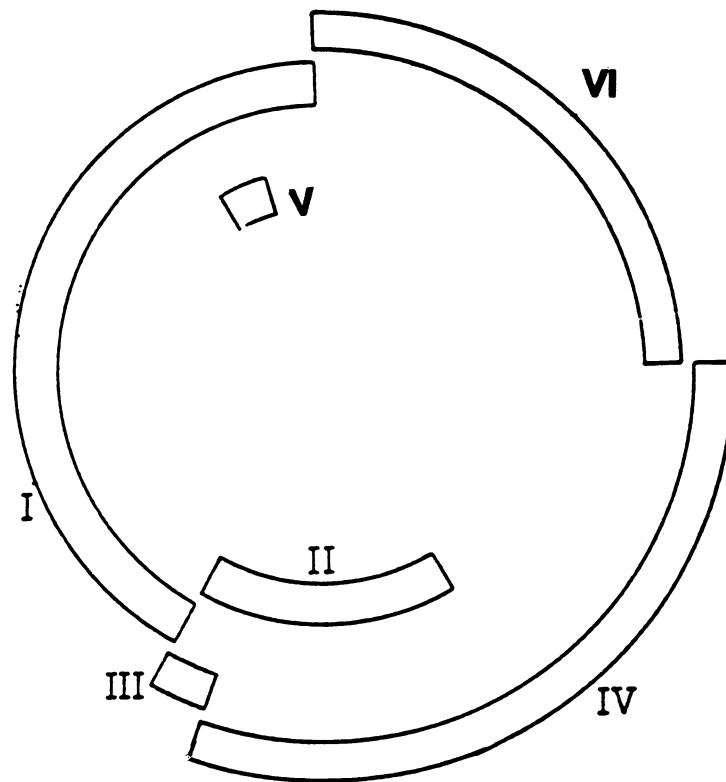


Pressure-volume diagram, diesel 4-stroke cycle.

MO-0036



**MO-0037**



**MO-0038**

1	2	3	4	5	6
0	120	240	60	300	180

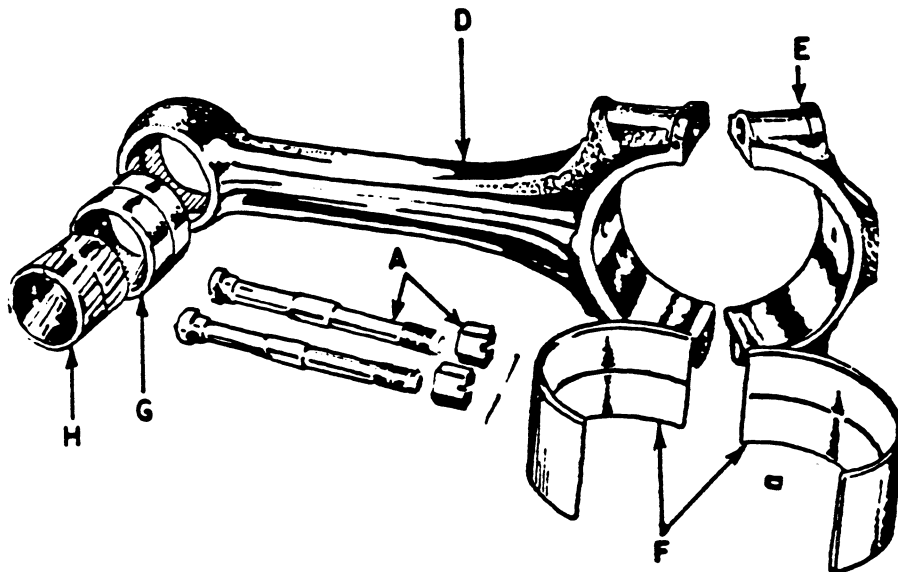
This chart gives the relative positions of fuel injection cam noses on a six-cylinder four-stroke cycle auxiliary diesel engine with a right hand rotation. At the moment indicated, #1 cylinder is at top dead center and combustion is taking place.

MO-0039

This information is for a two-stroke cycle marine engine and the flywheel is marked with reference to number one cylinder.

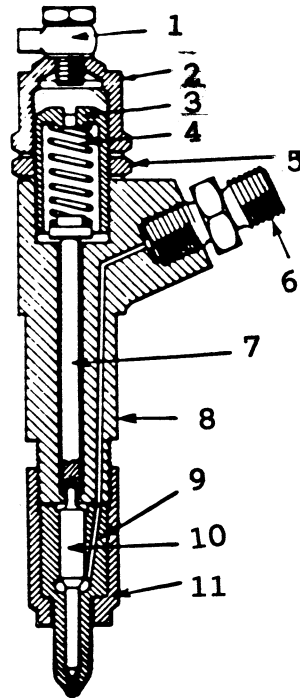
20-Cylinder		
Firing Order	Top	Dead Center
1	0	DEGREES
14	27	"
9	36	"
16	63	"
4	72	"
13	99	"
6	108	"
20	135	"
3	144	"
12	171	"
10	180	"
17	207	"
2	216	"
15	243	"
7	252	"
18	279	"
5	288	"
11	315	"
8	324	"
19	351	"

MO-0040



3-31

MO-0041



MO-0042

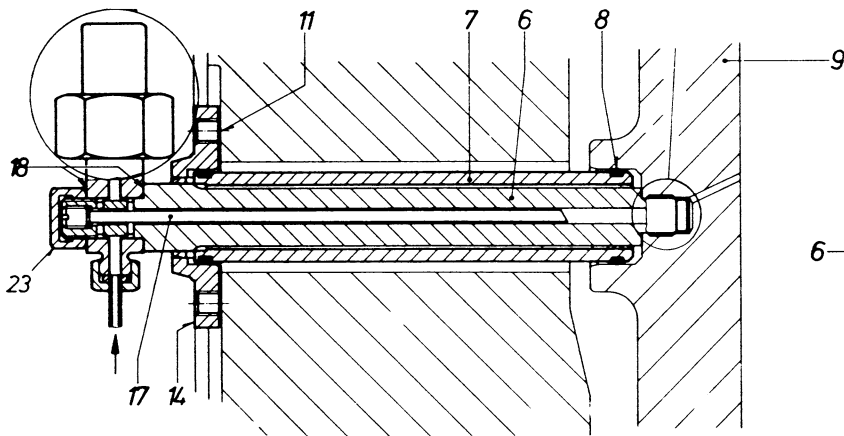


FIG. A

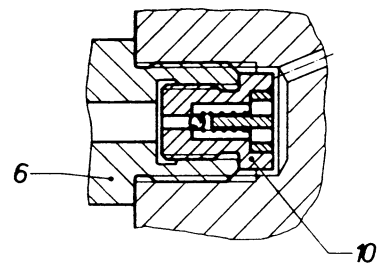


FIG. B

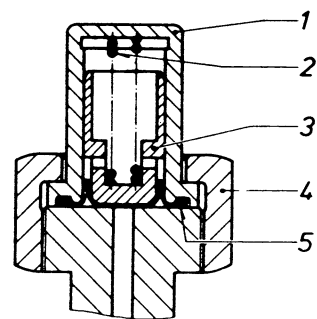
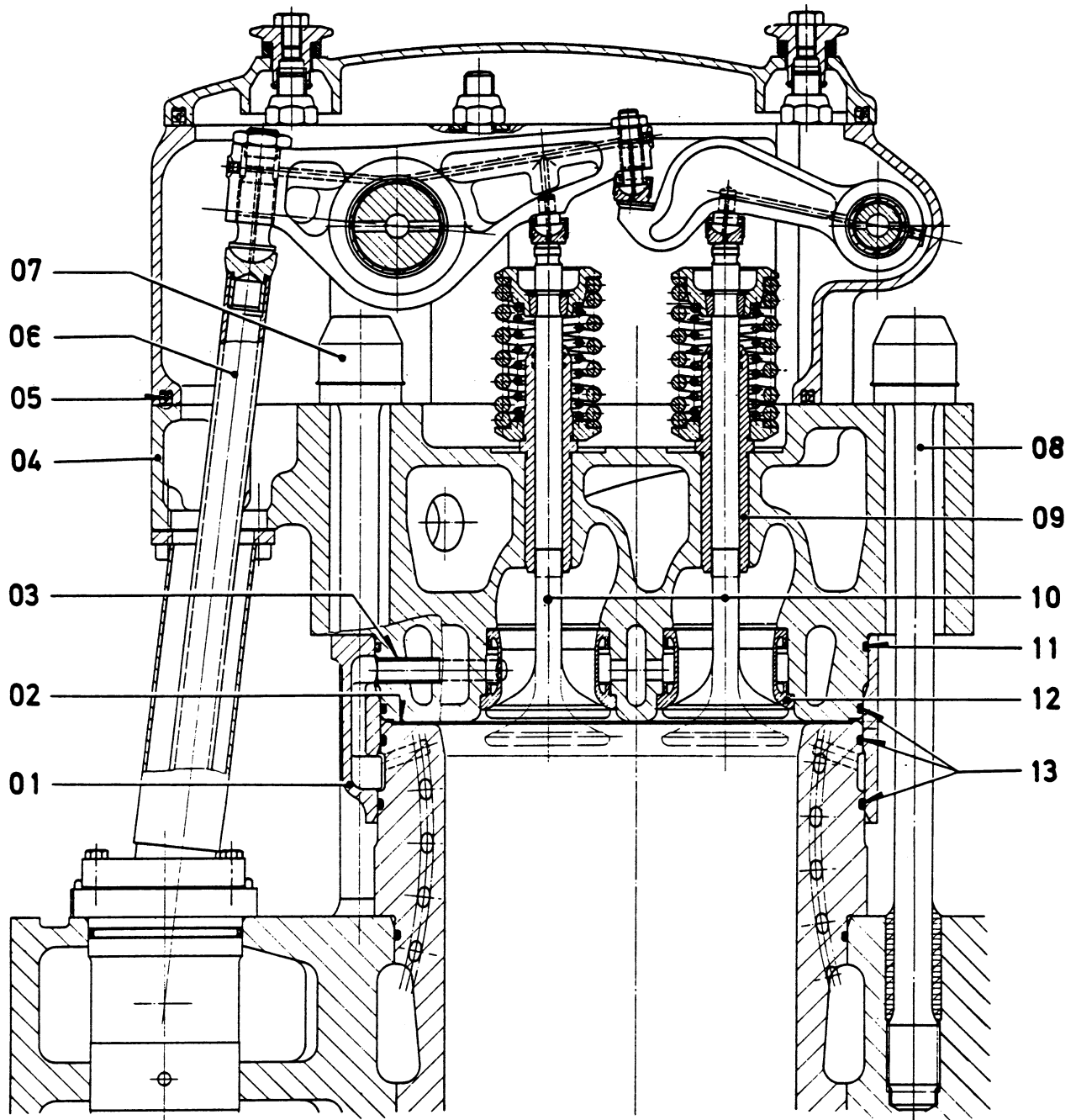


FIG. C

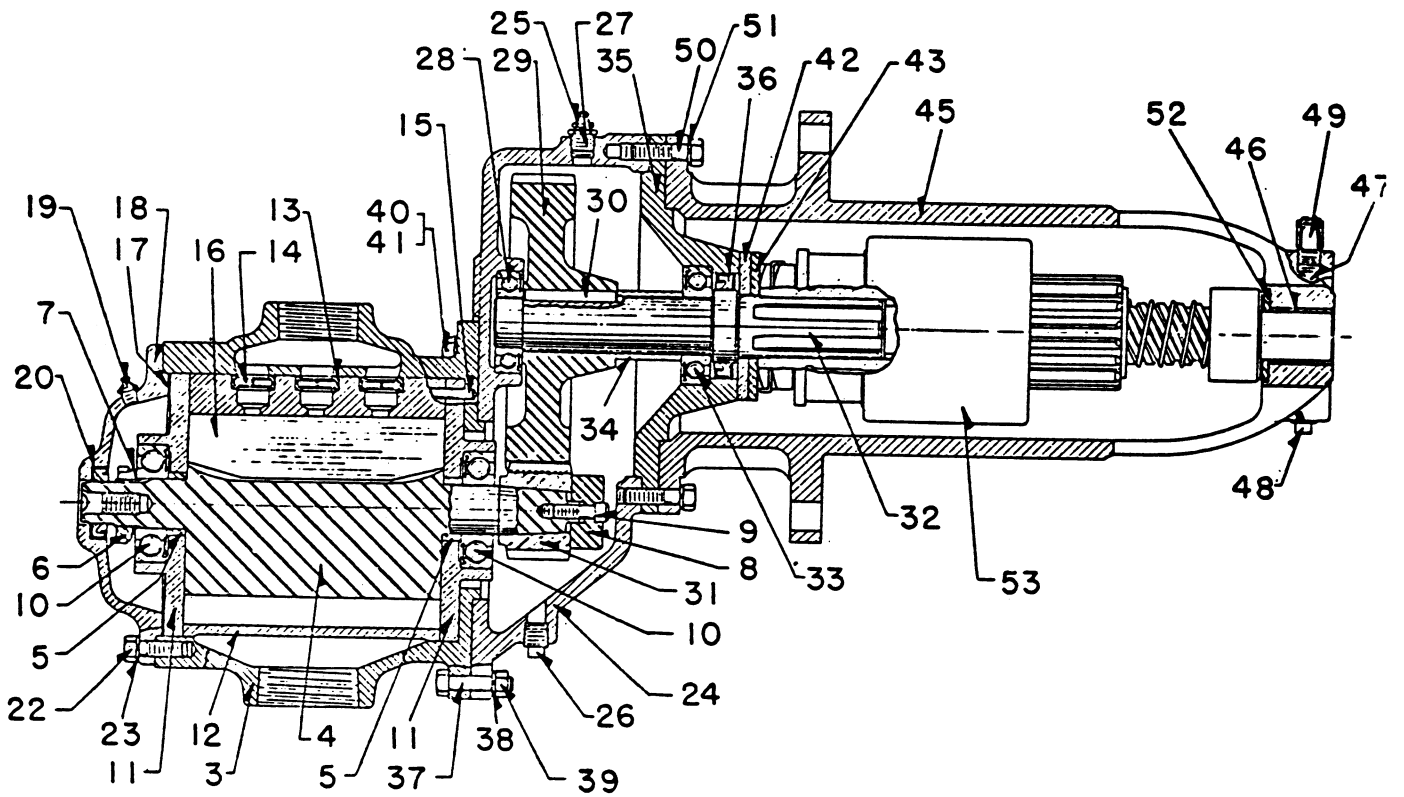
3-32



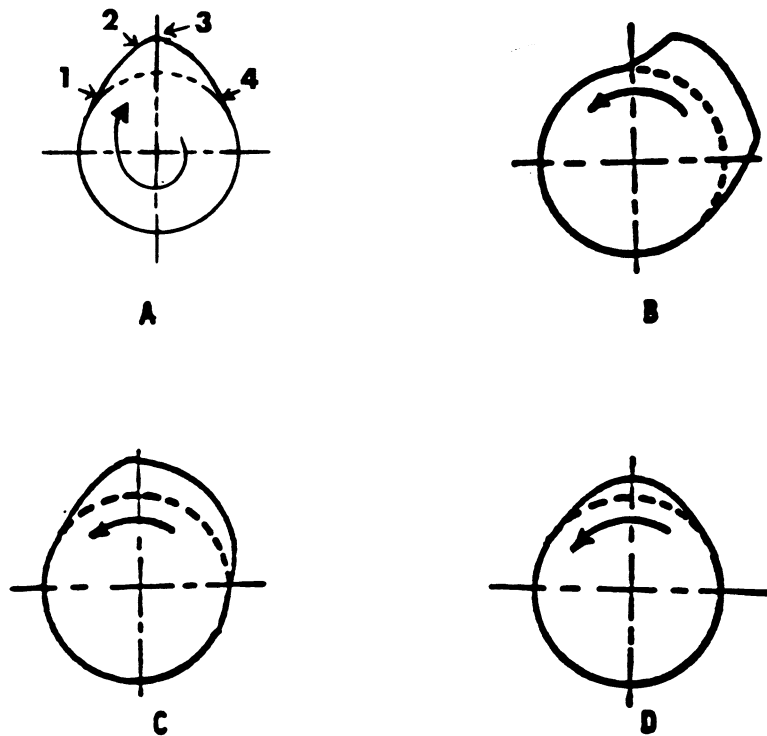
**MO-0043**



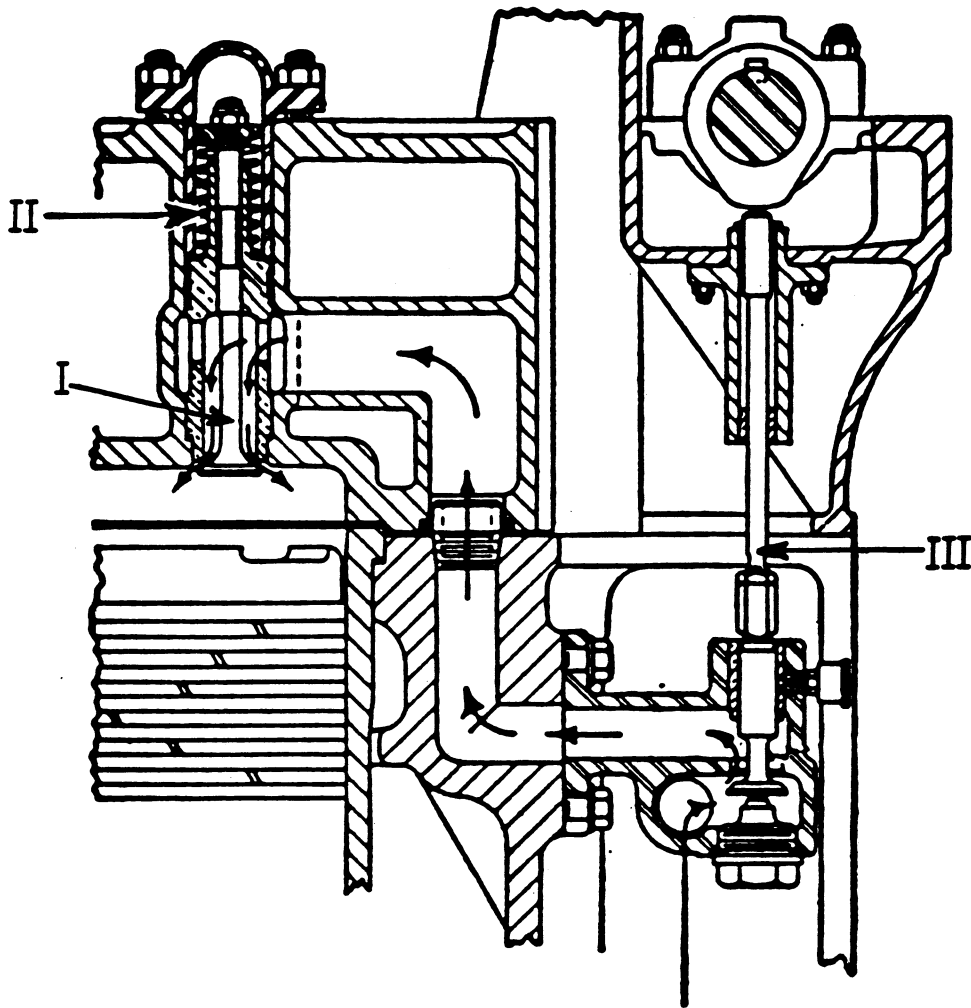
**MO-0044**



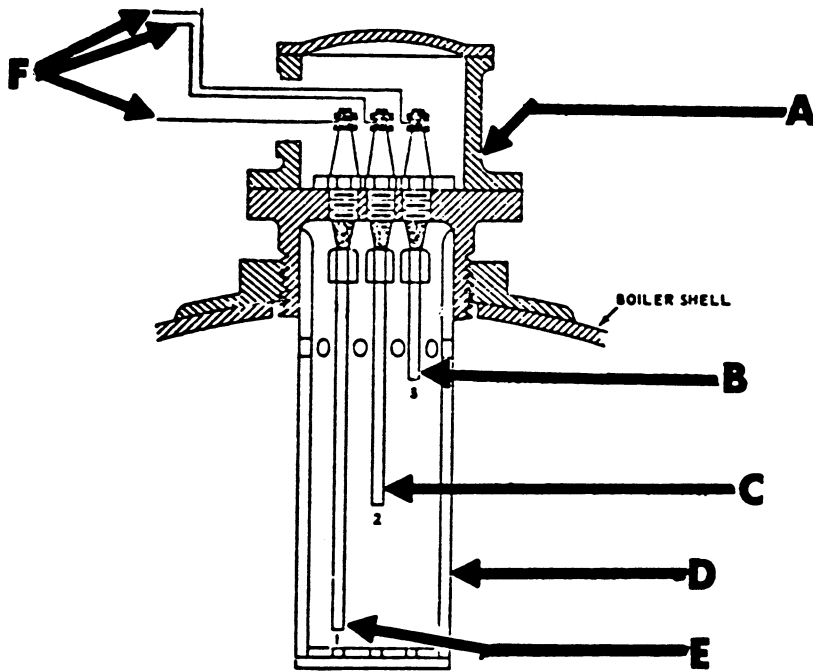
**MO-0045**



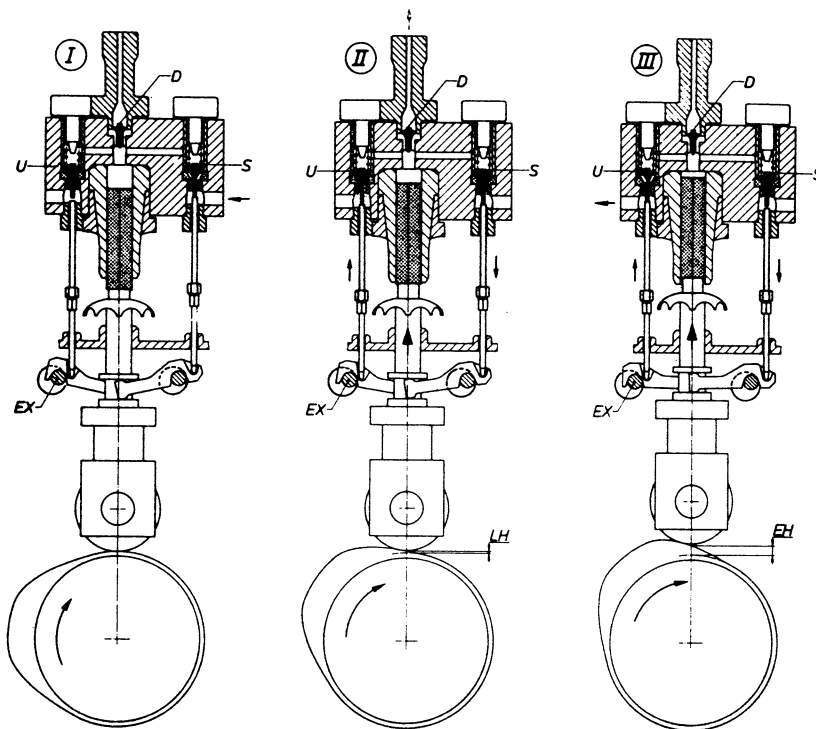
**MO-0046**



MO-0047



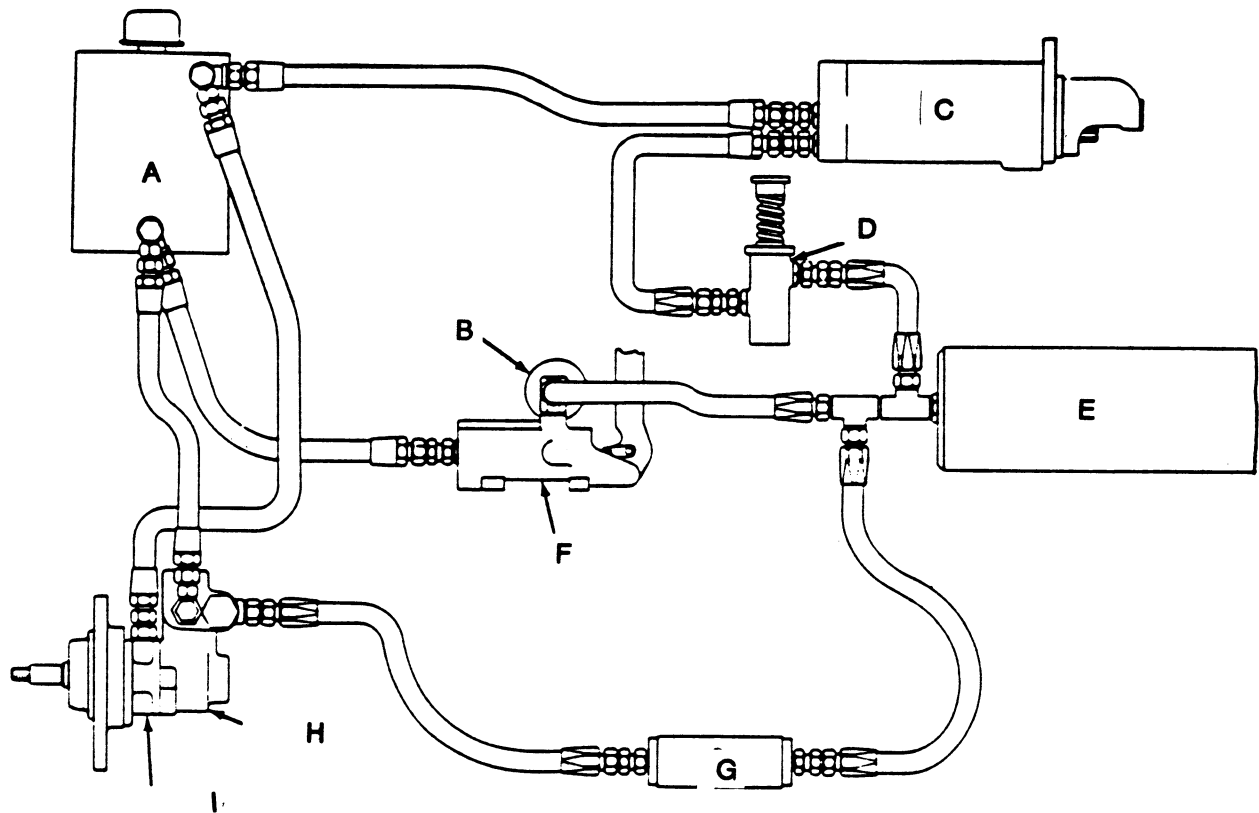
MO-0048



3-36

(Courtesy of New Sulzer Diesel)

MO-0049



MO-0050

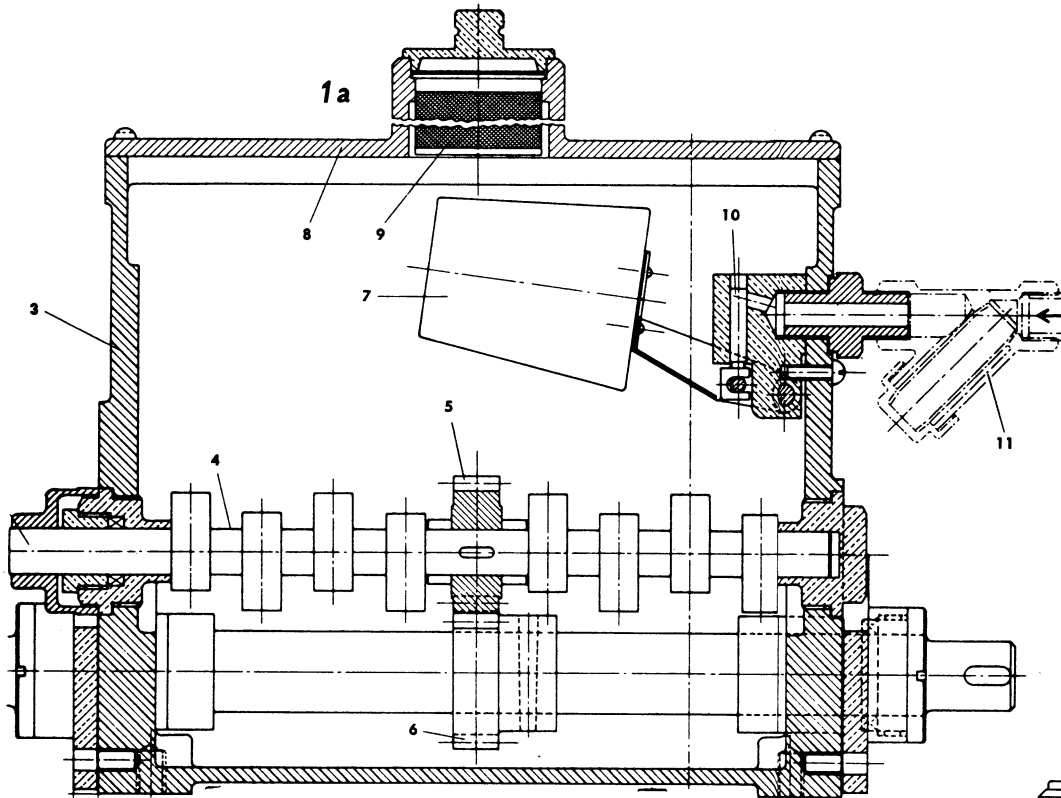


FIG. A

(Courtesy of New Sulzer Diesel)

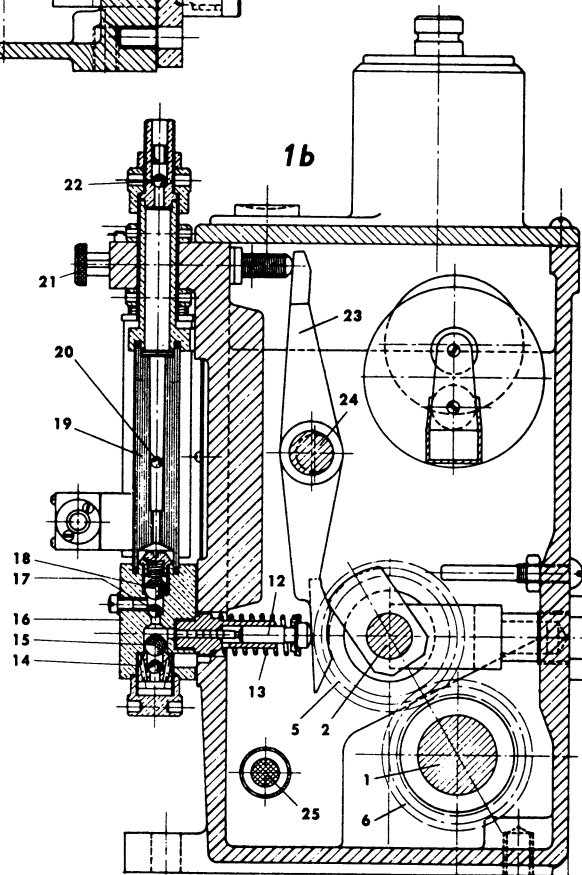
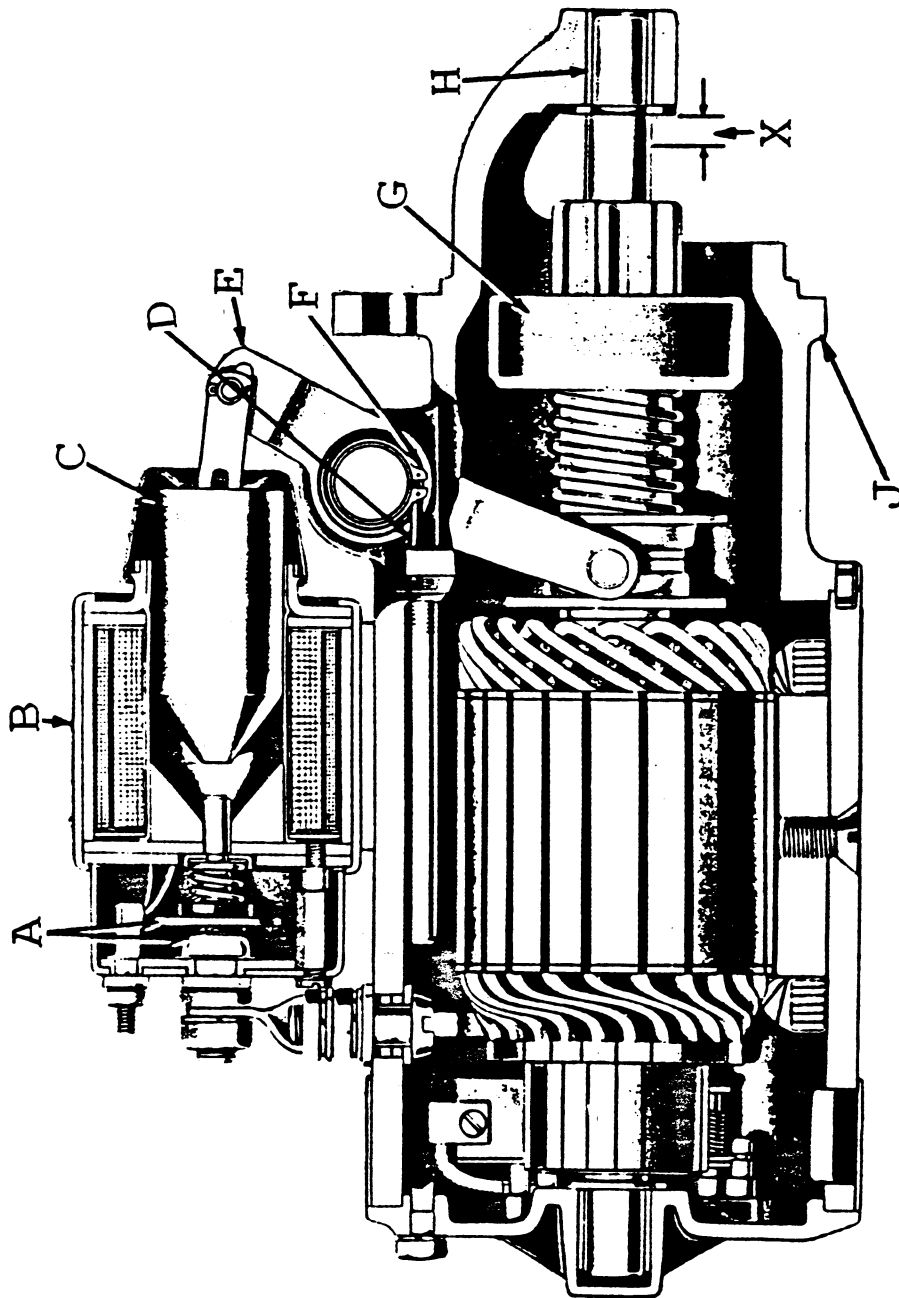
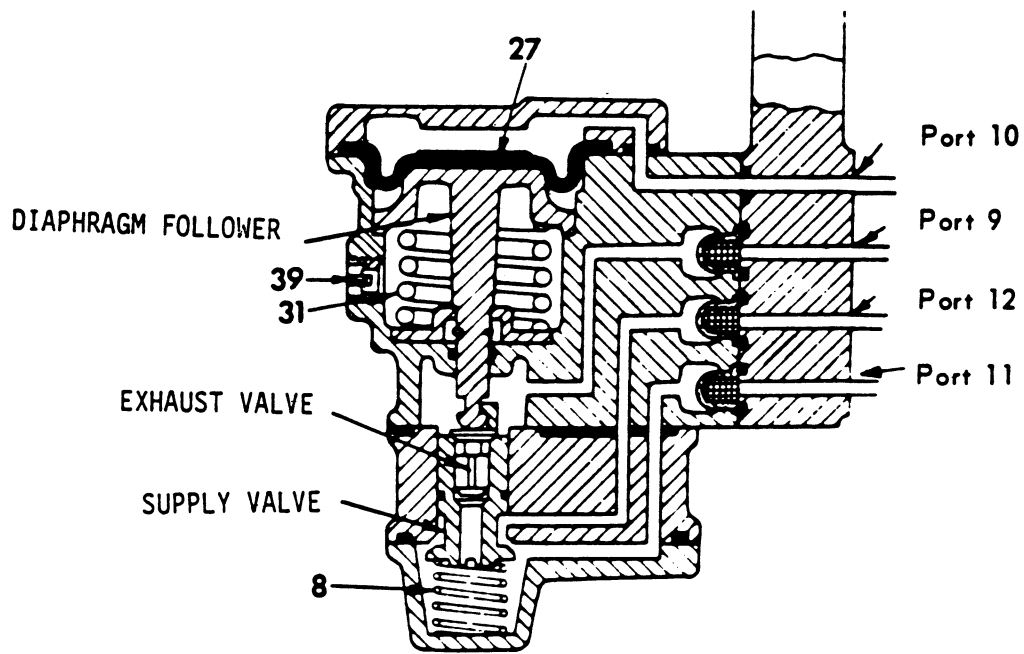


FIG. B

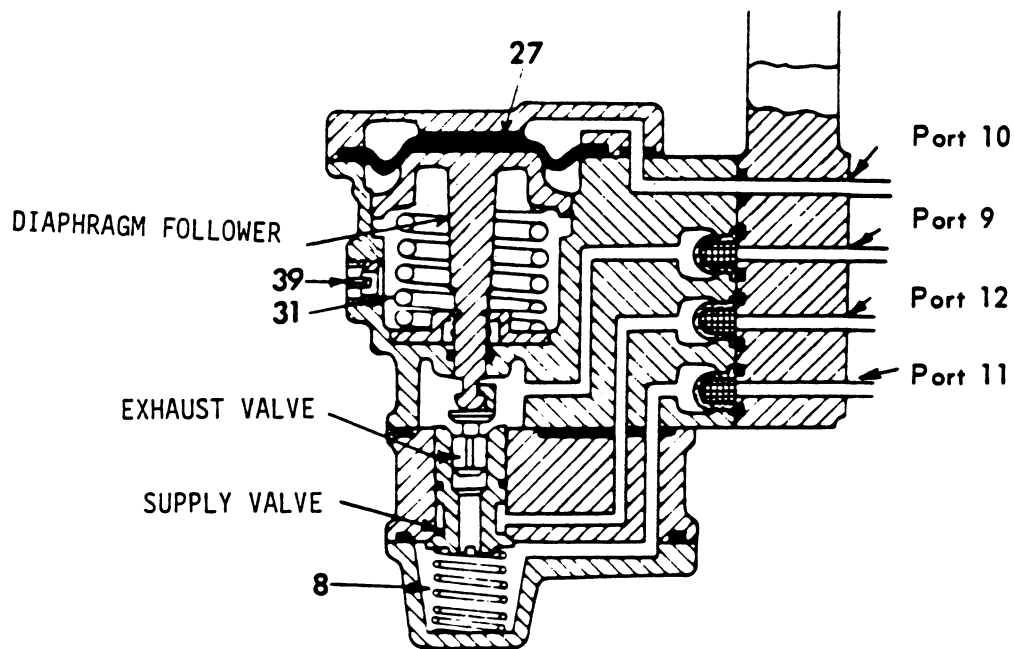
MO-0051



**MO-0052**



**APPLIED POSITION**



**RELEASED POSITION**



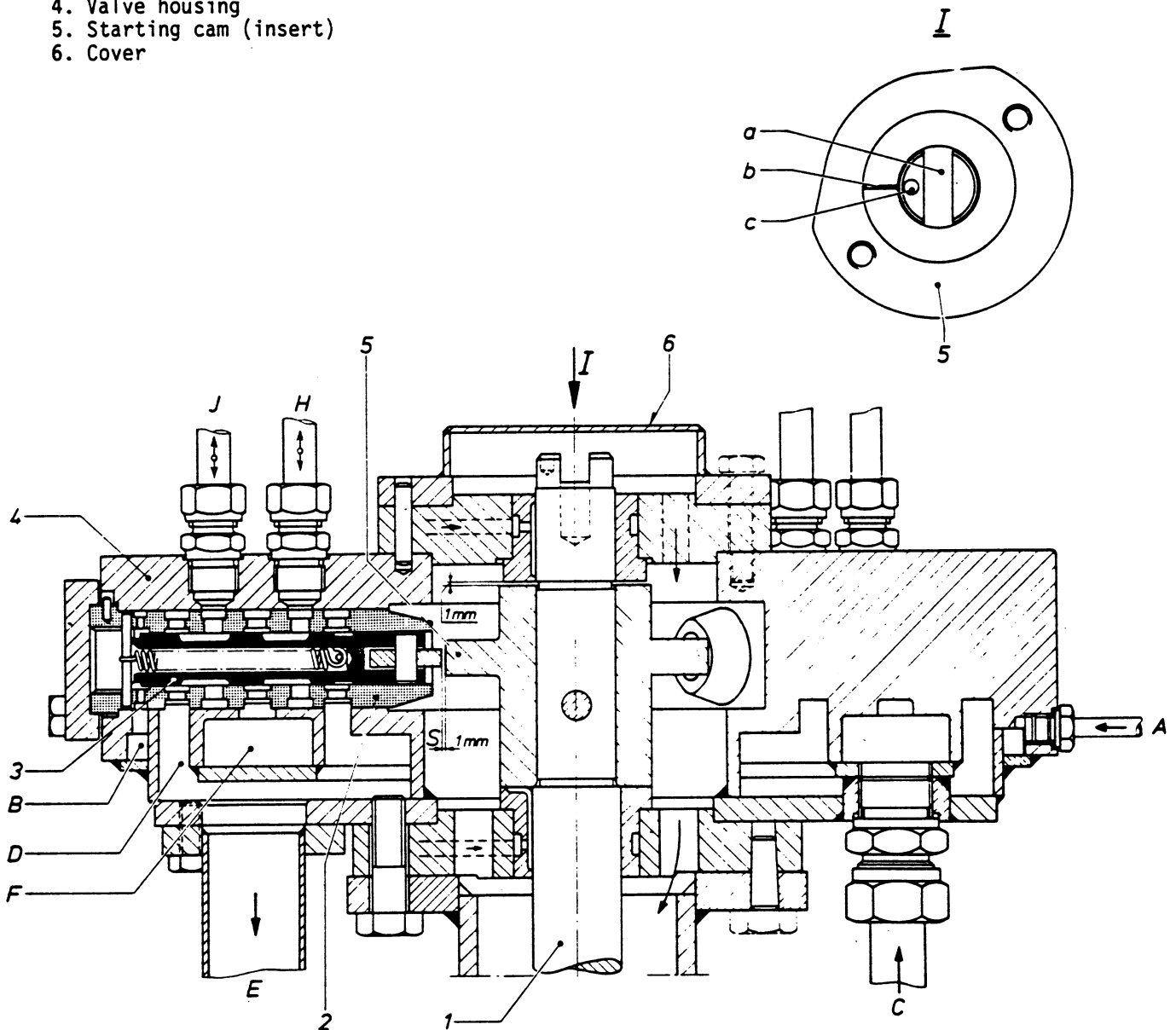
**MO-0053**

**STARTING CONTROL AIR DISTRIBUTOR**

- A. Control air pipe
- B. Annular space
- C. Air inlet
- D. Discharge space
- E. Discharge line
- F. Distribution space
- H. Closing pipe to starting air valve
- J. Opening pipe to starting air valve

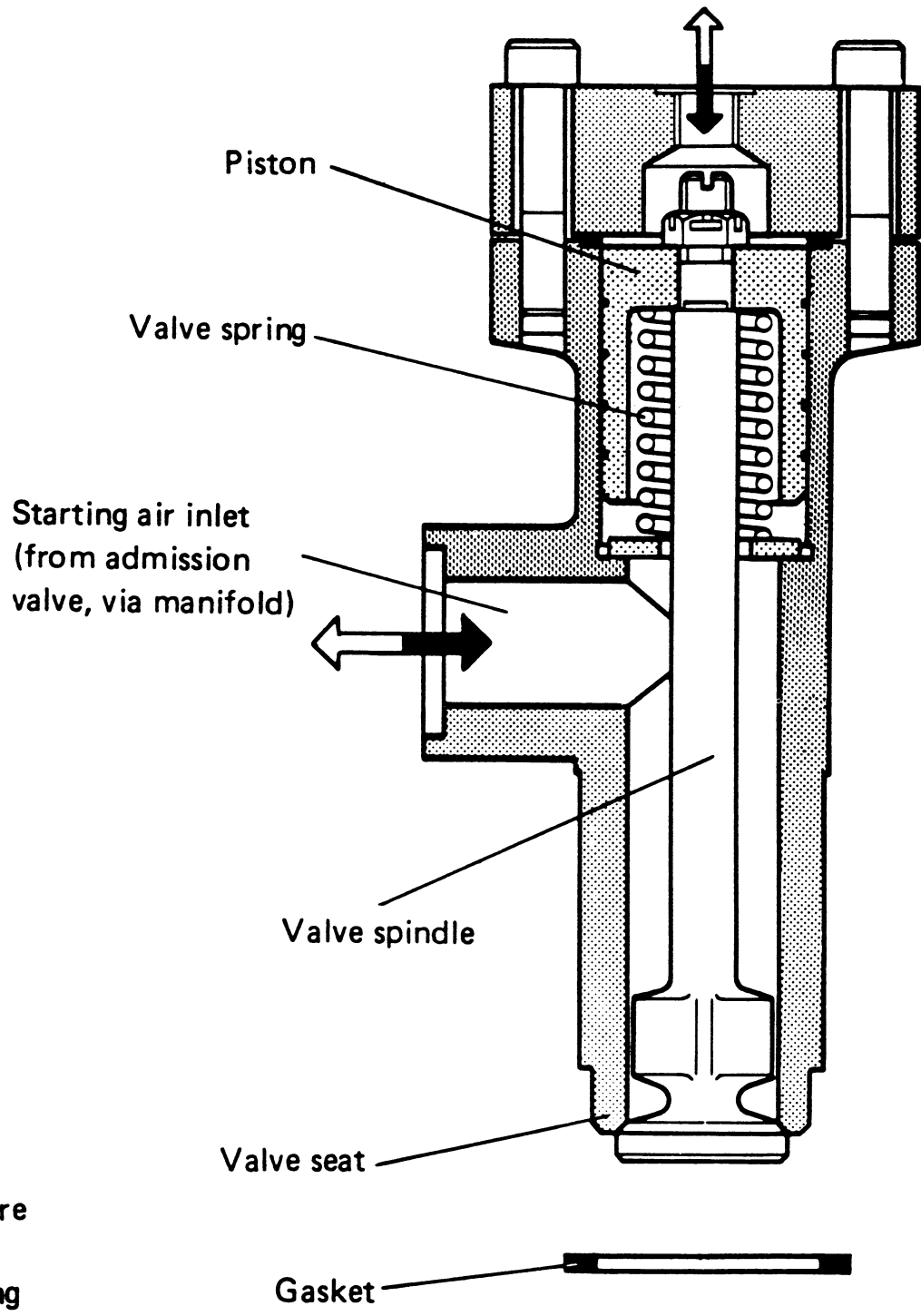
- 1. Upper shaft of vertical drive
- 2. Bush for starting control valve
- 3. Starting control valve
- 4. Valve housing
- 5. Starting cam (insert)
- 6. Cover


NOTES: The illustrated "starting control air distributor" is sectioned to show the operation of one starting control valve (3) of which there are several. These valves are arranged radially in a common plane and operated by a common starting cam (5). The air inlet (C), discharge line (E), and control air pipe (A), are common to the entire bank of starting control valves (3).



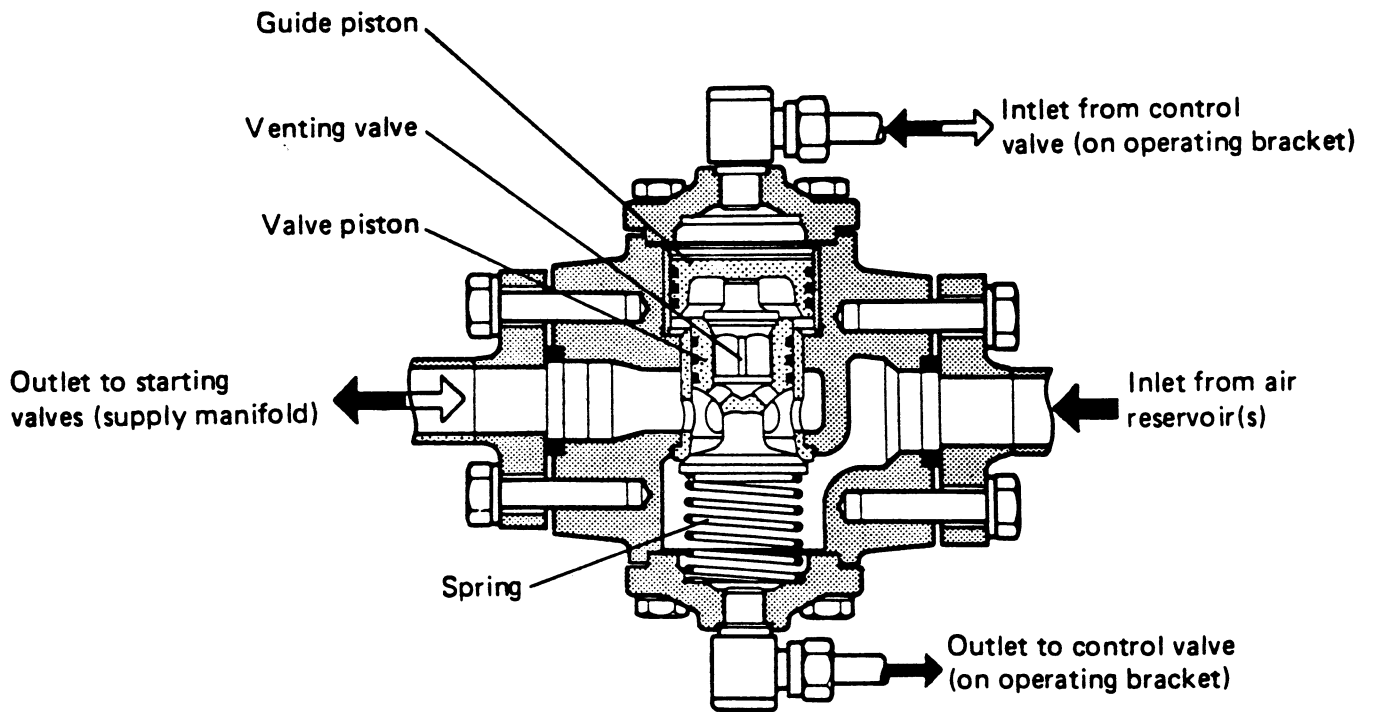
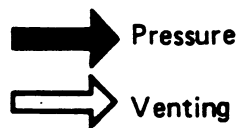
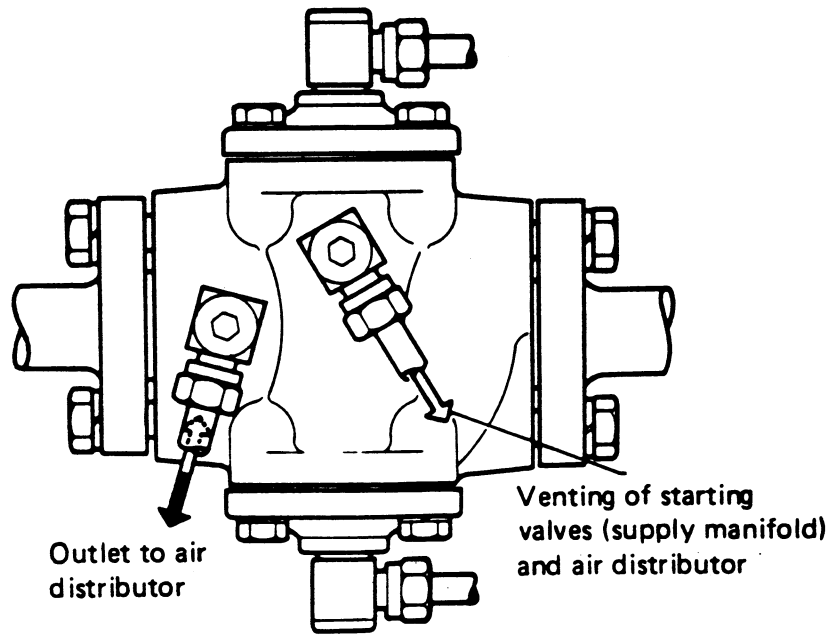
MO-0054

Control air inlet (from air distributor)



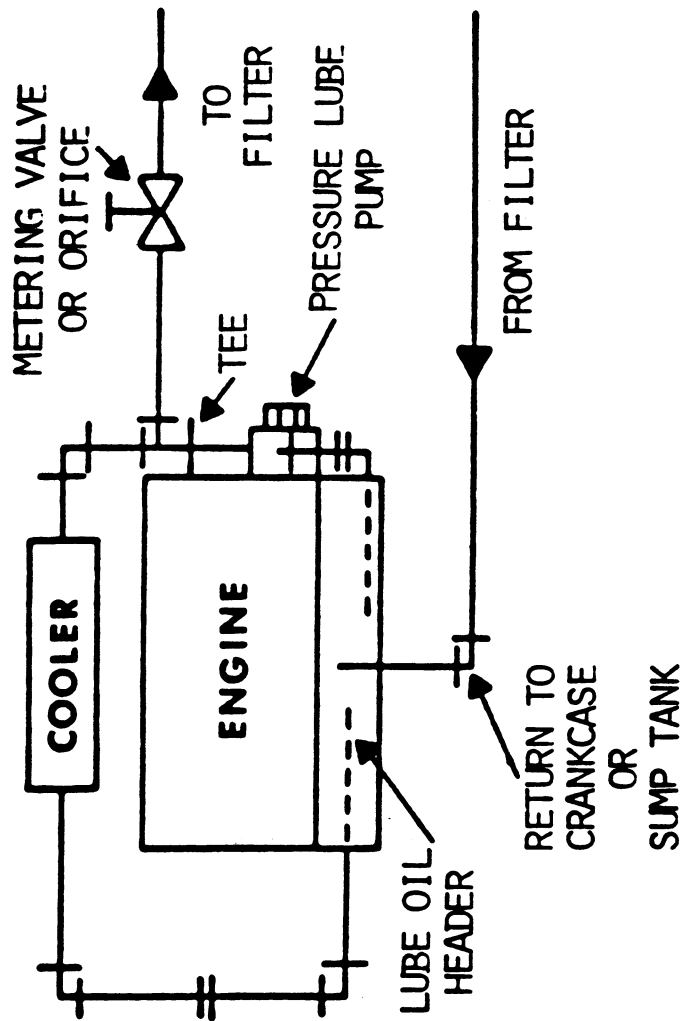
 Pressure  
 Venting

MO-0055

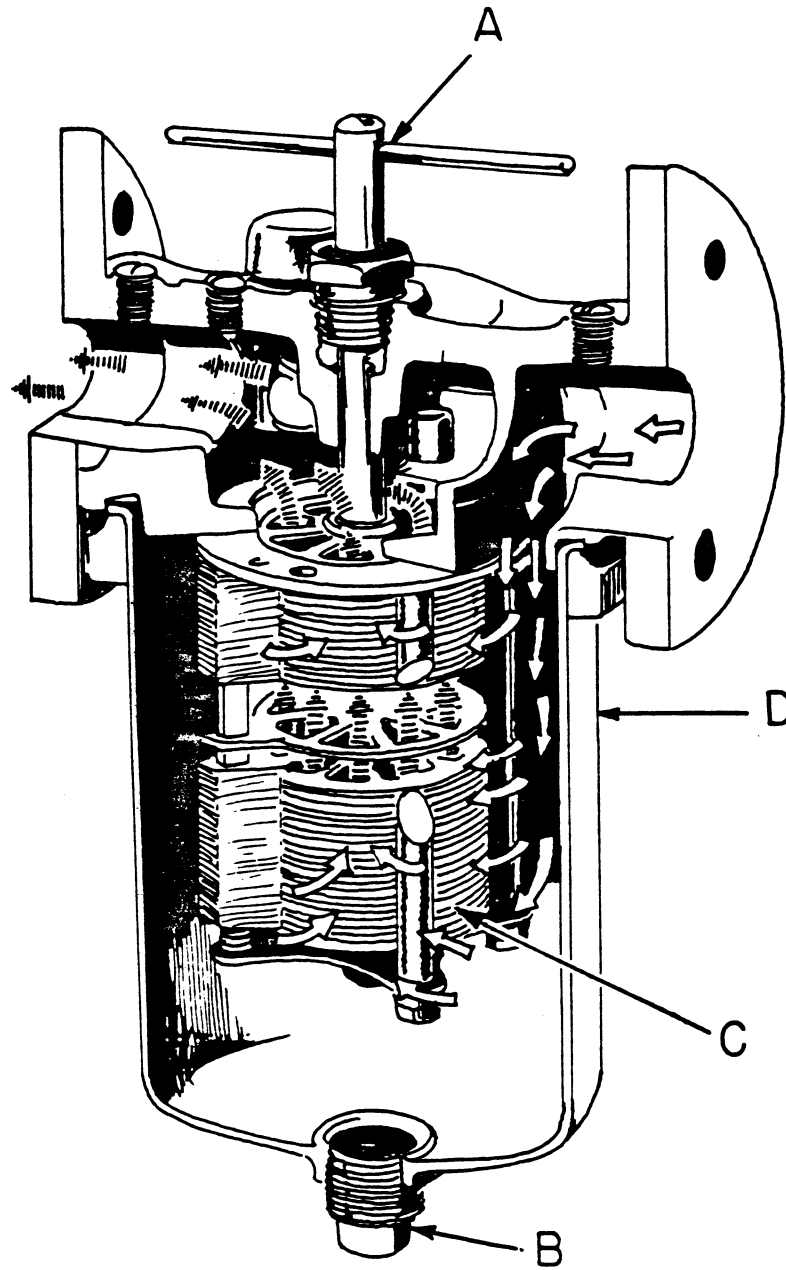


3-43

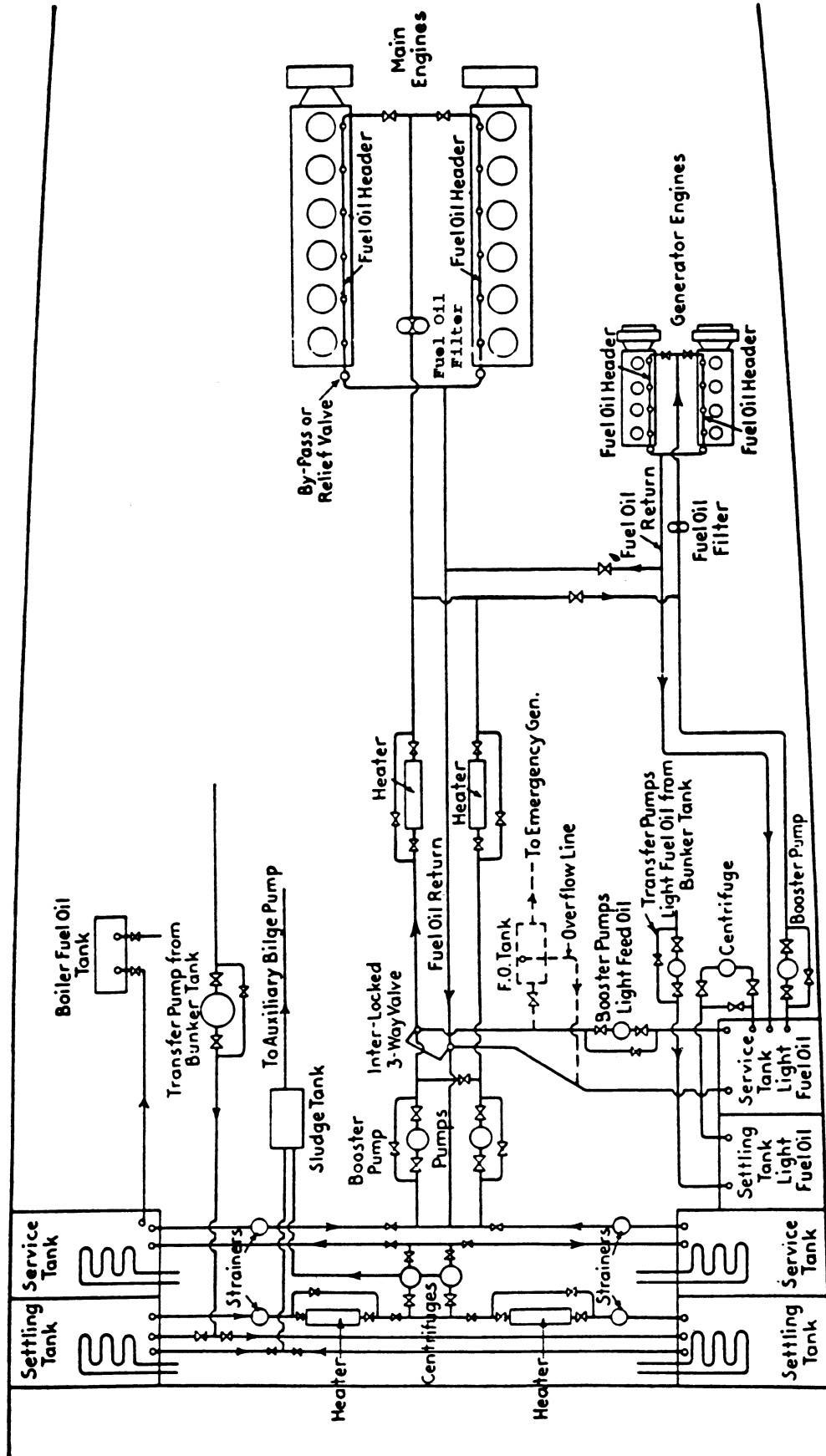
MO-0056



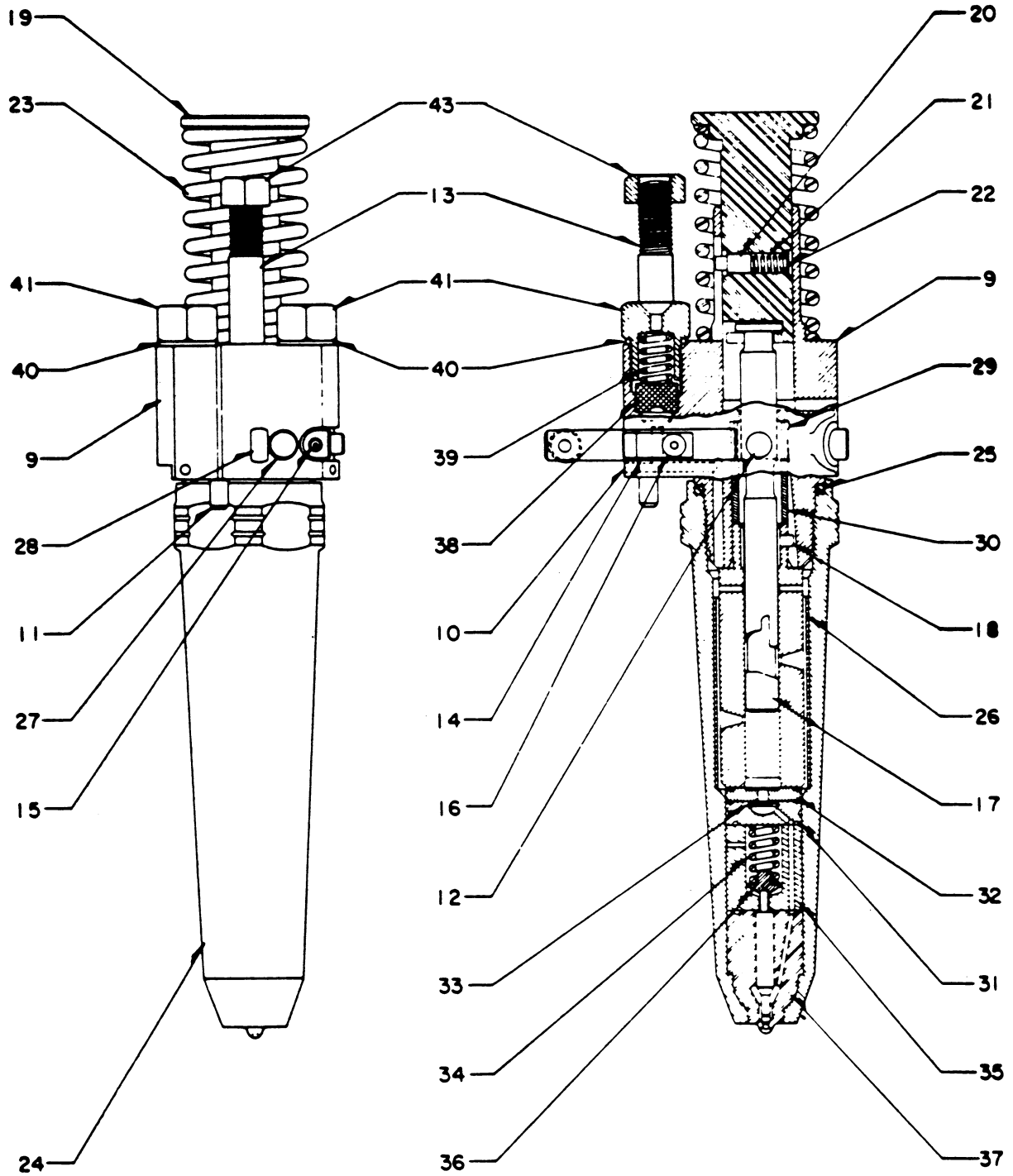
MO-0057



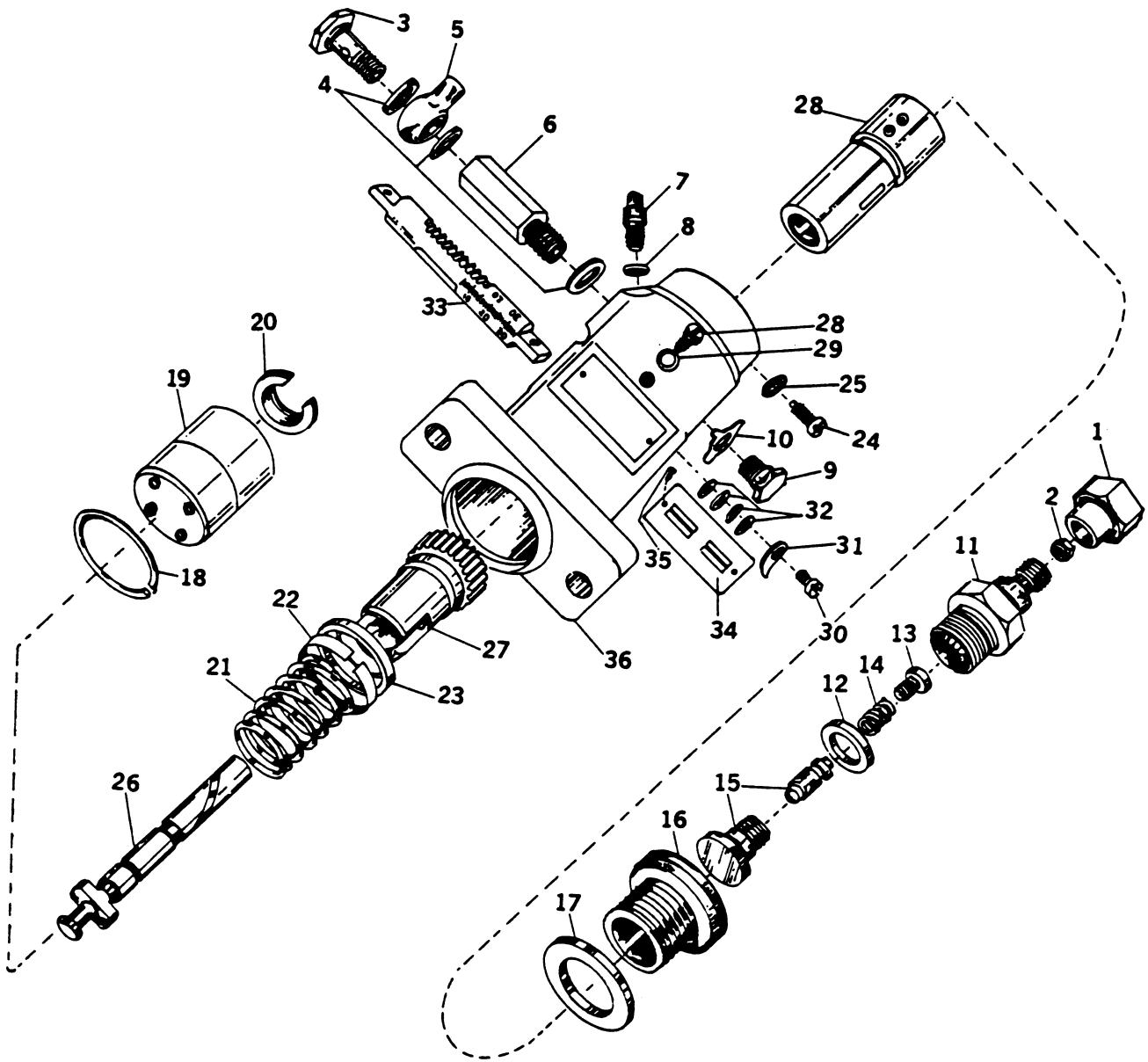
MO-0058



MO-0059

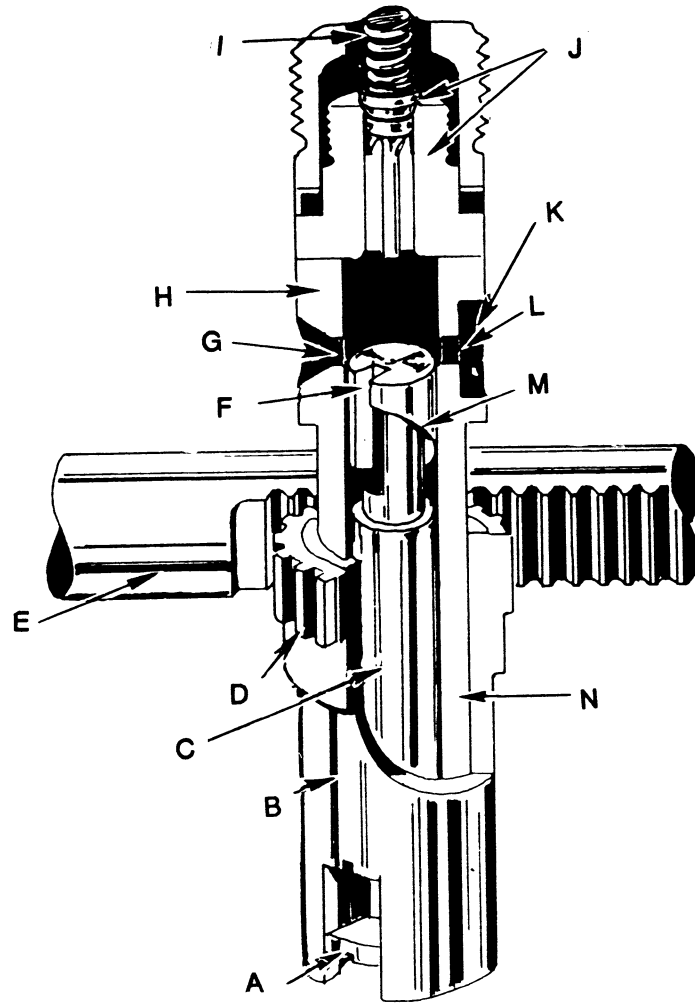


MO-0060

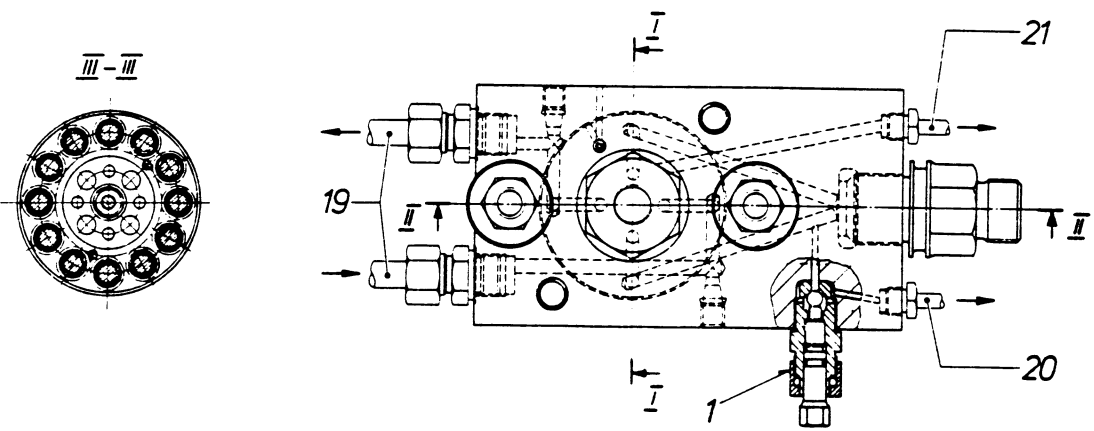
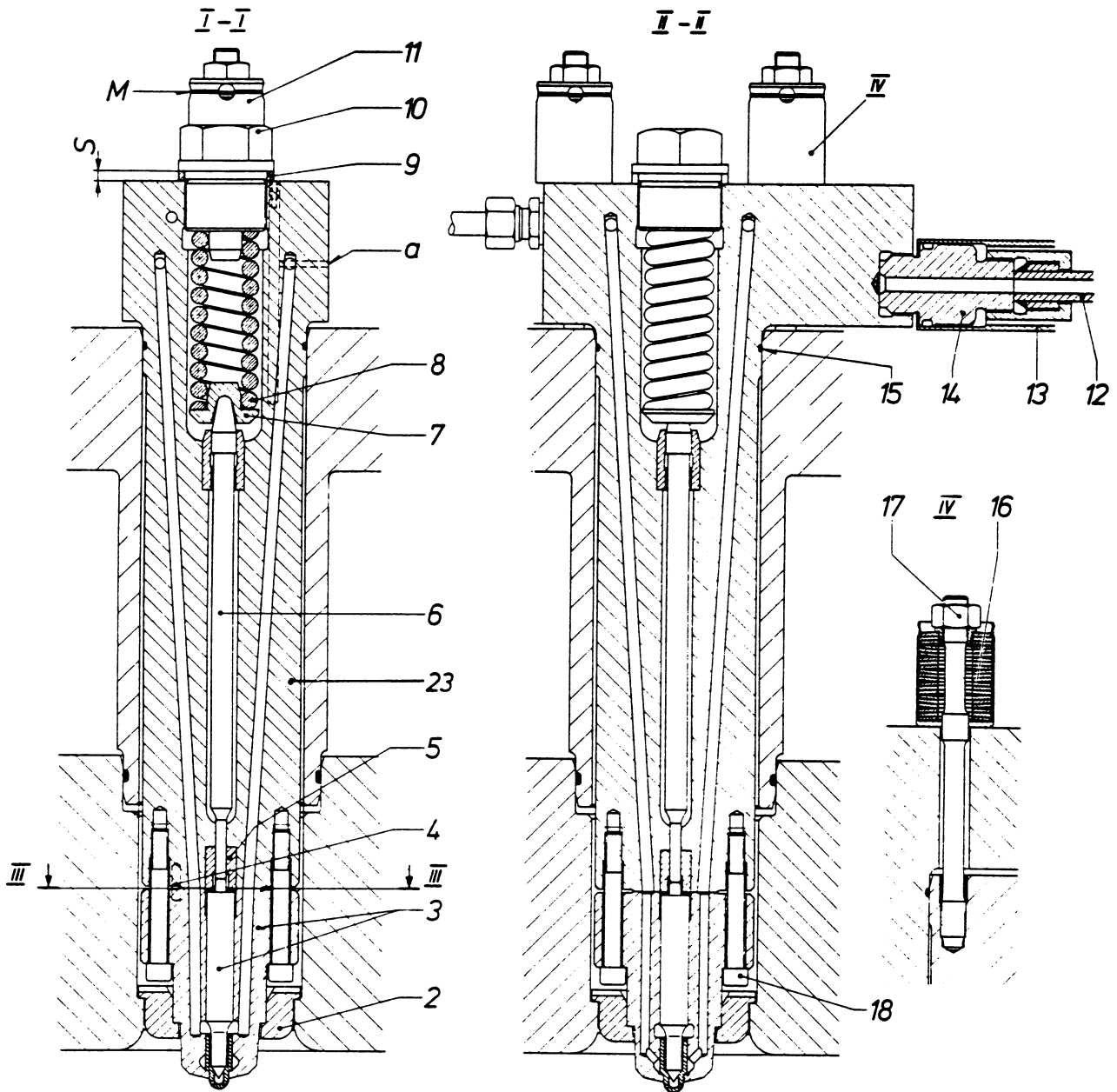




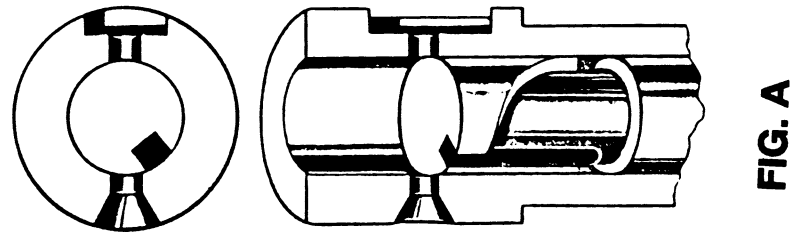
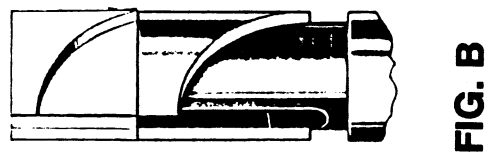
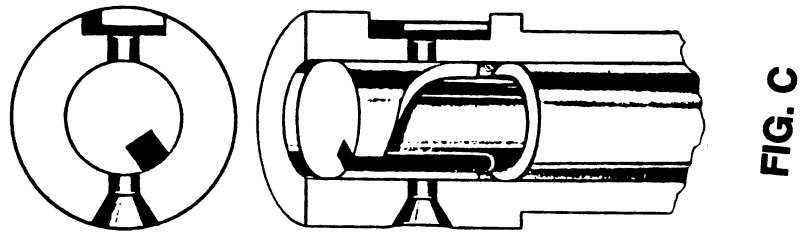
MO-0061



MO-0062

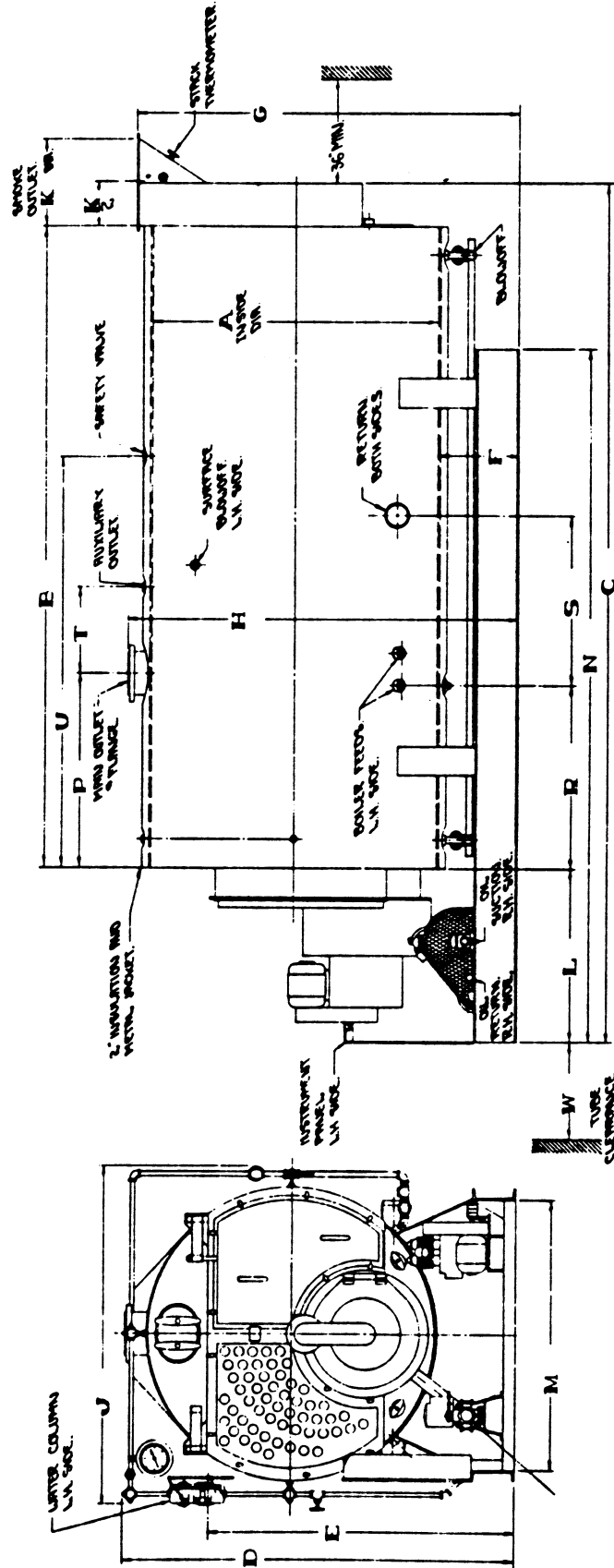


MO-0063



MO-0064

**LOW PRESSURE HIGH PRESSURE**  
 15 lbs. Steam - 30 lbs. Water 150 to 250 lbs. Steam

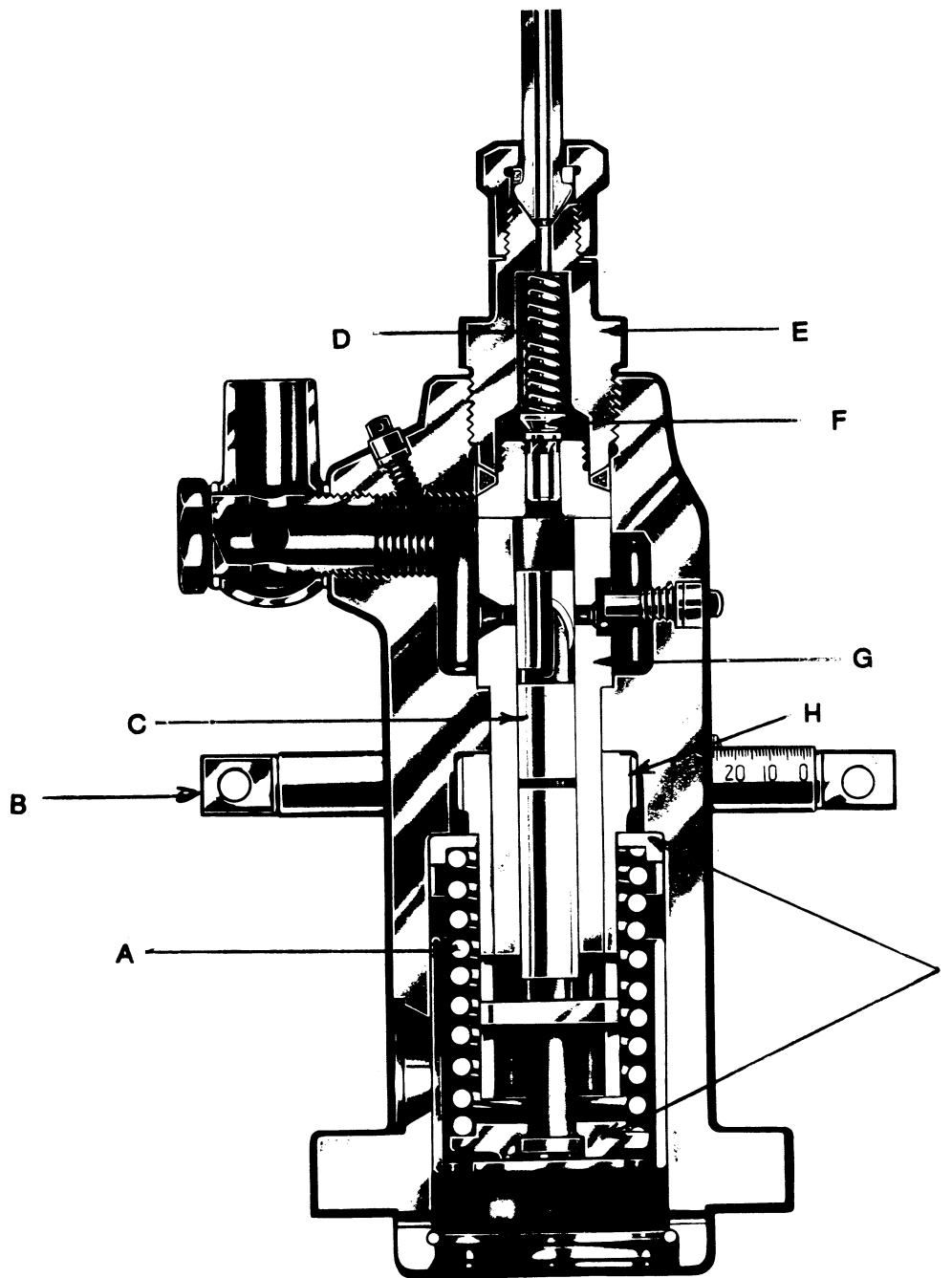


Note: Three transverse saddles, 530 thru 540.

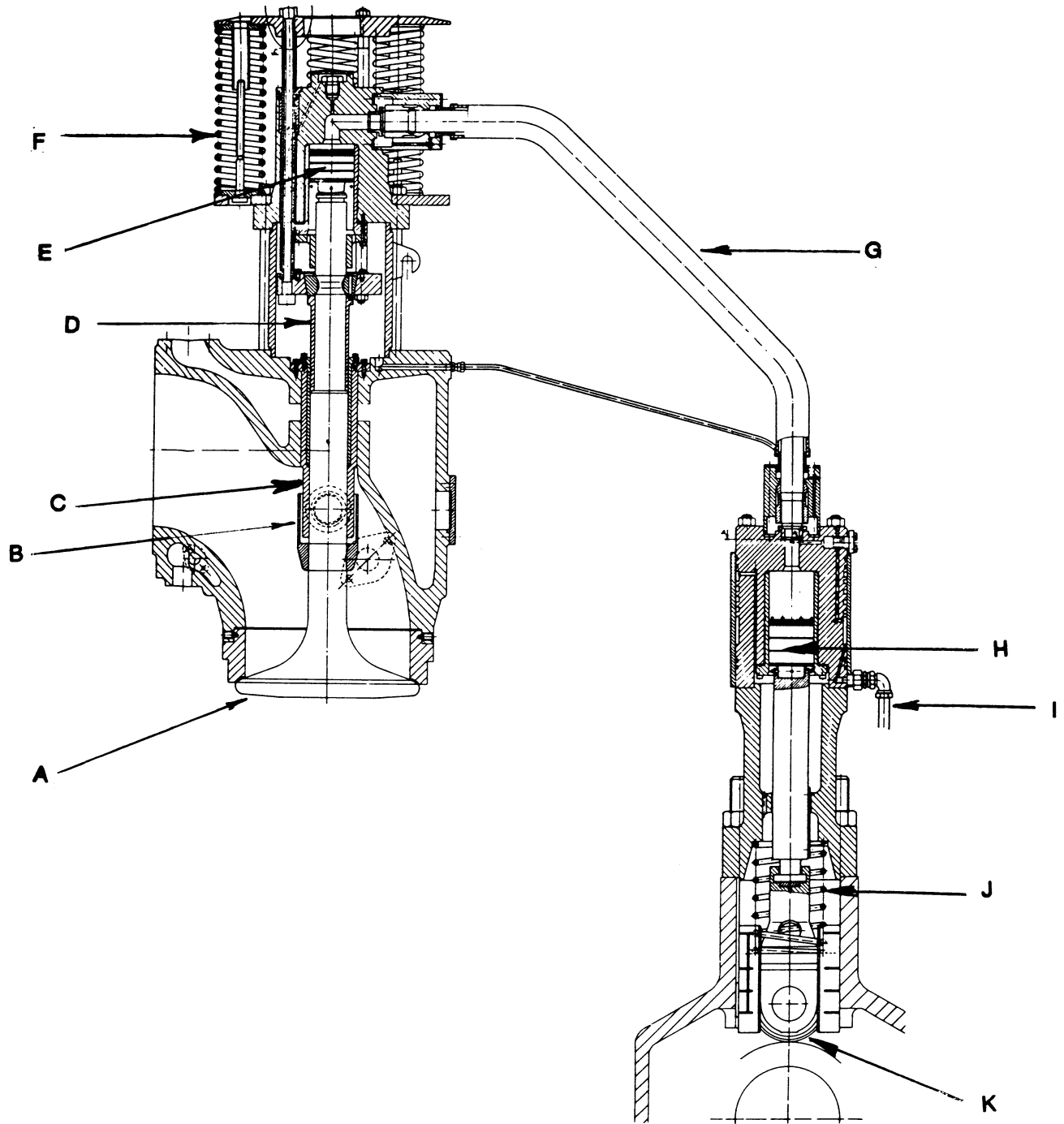
**SPECIFICATIONS AND DIMENSION DATA**

CATALOG NUMBER OF UNIT	S10	S12	S14	S16	S18	S22	S24	S28	S30	S34	S35	S36	S38	S40
Rating - Horsepower, Max.	75	100	125	150	200	250	300	400	500	600	750	900	1000	1200
- Steam Per Hour (Feed 212° F)	2585	3450	4310	5180	6900	8600	10350	13800	17250	20700	25875	31050	34500	41400
- Steam Radiation EDR	1046.5	13950	17440	20925	27900	34875	41850	55800	69750	83700	1046.5	125550	139500	167400
- Water Radiation EDR	16740	22320	27900	33480	44640	55800	66960	89280	111600	133920	167400	200880	223200	267840
- BTU Per Hour	2511	3350	4185	5025	6695	8370	10044	13392	16740	20088	25110	30132	33480	40176

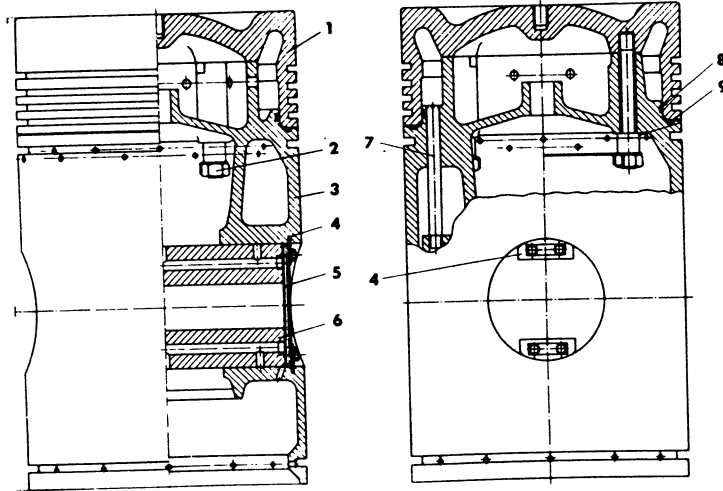
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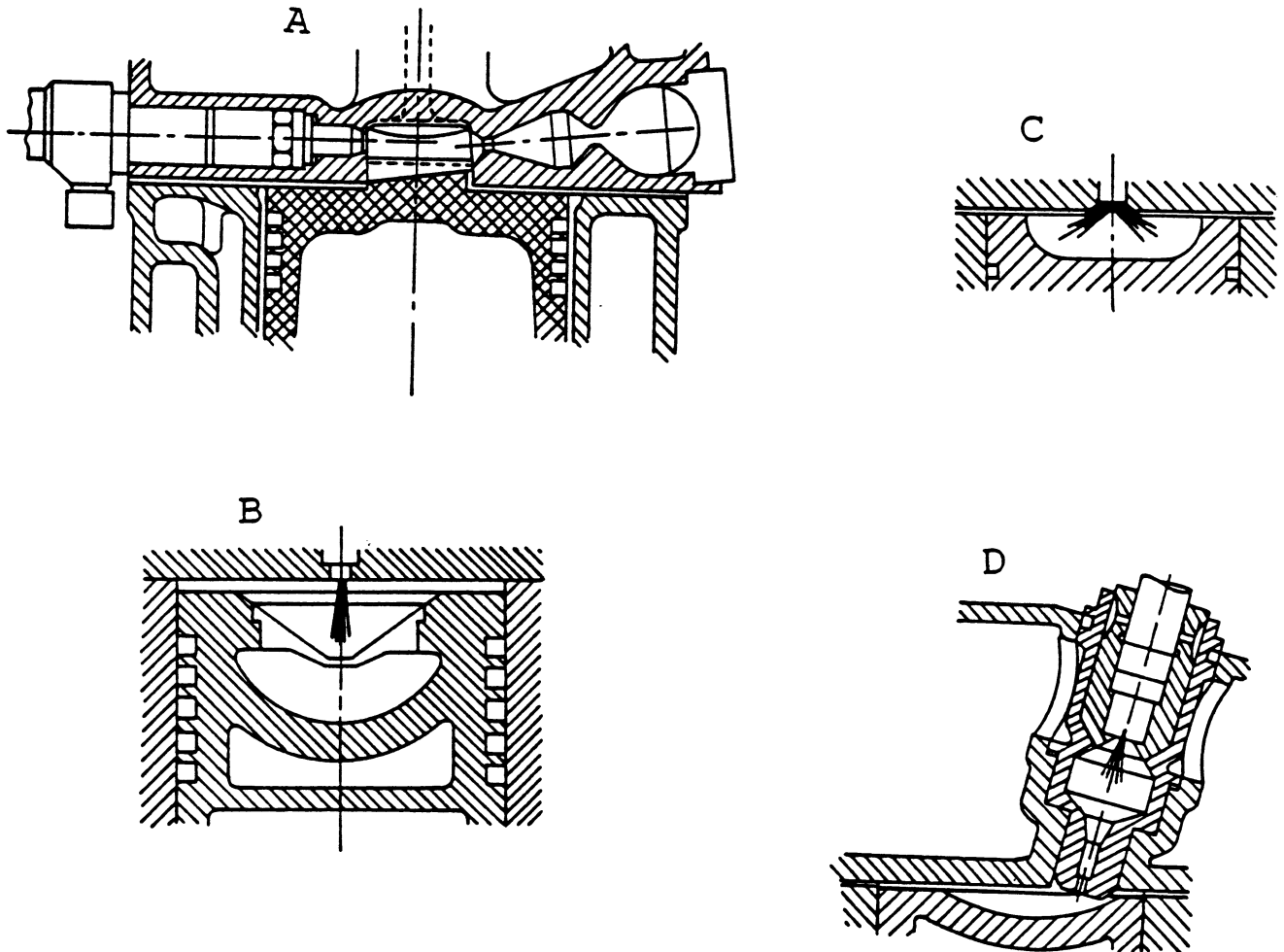
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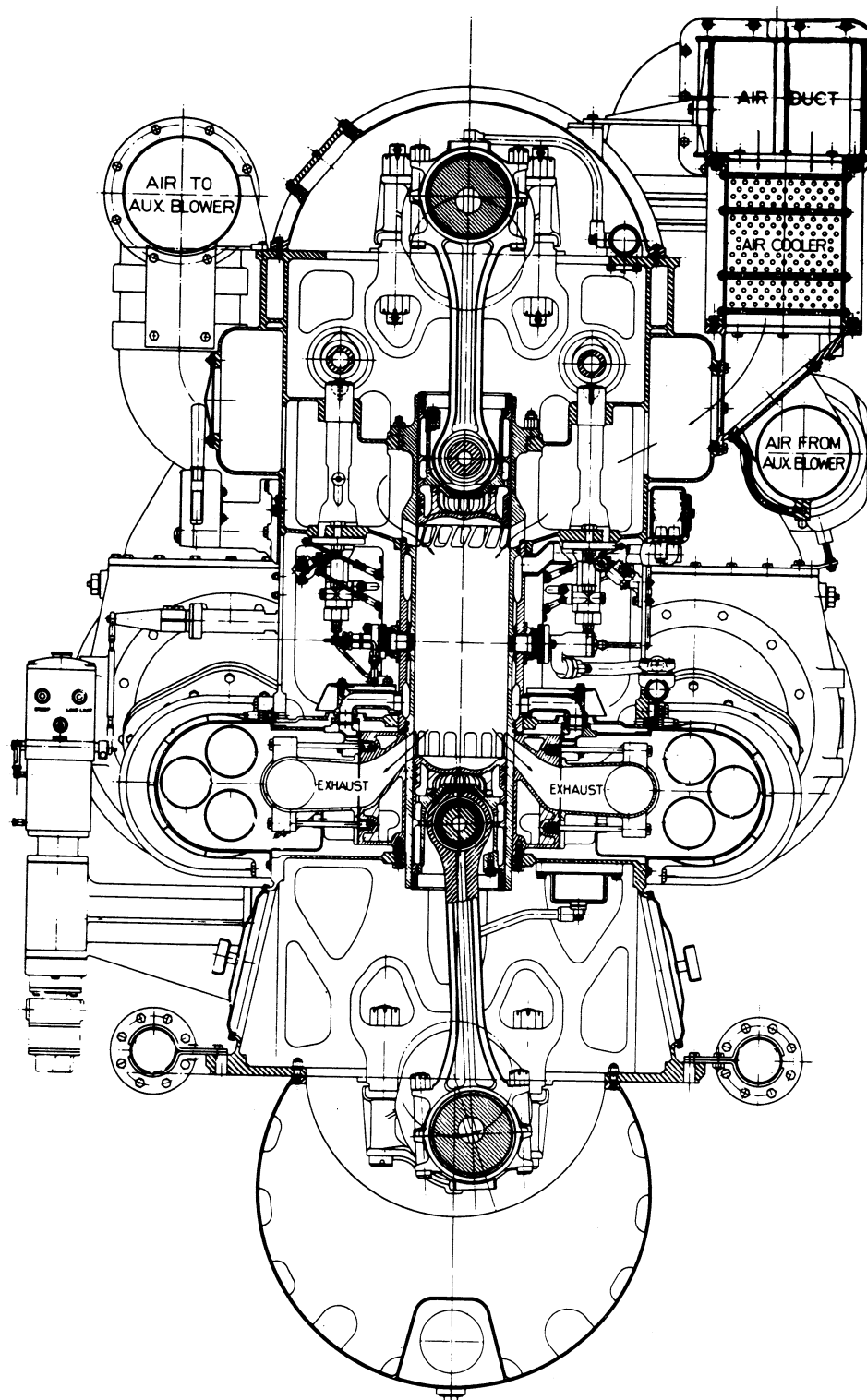
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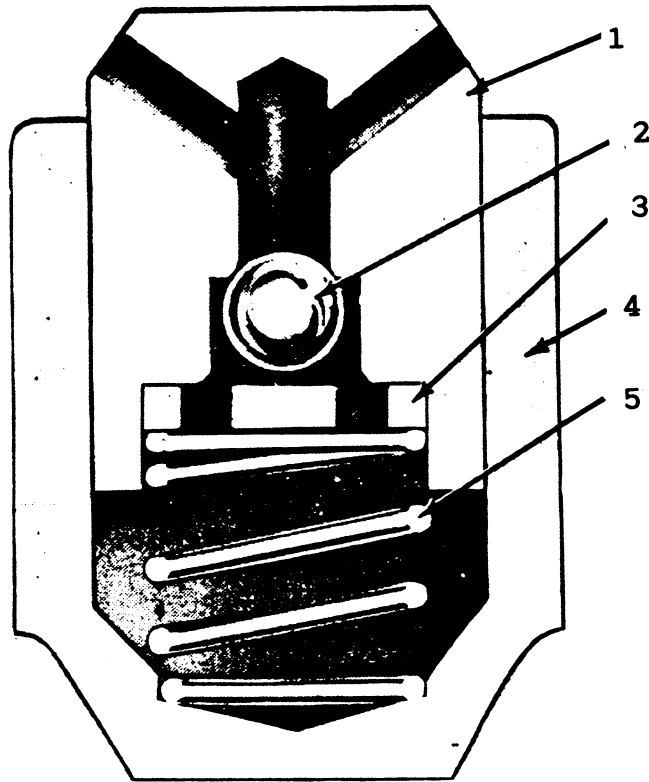


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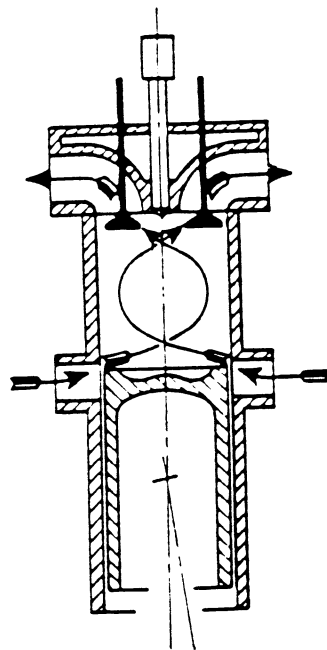




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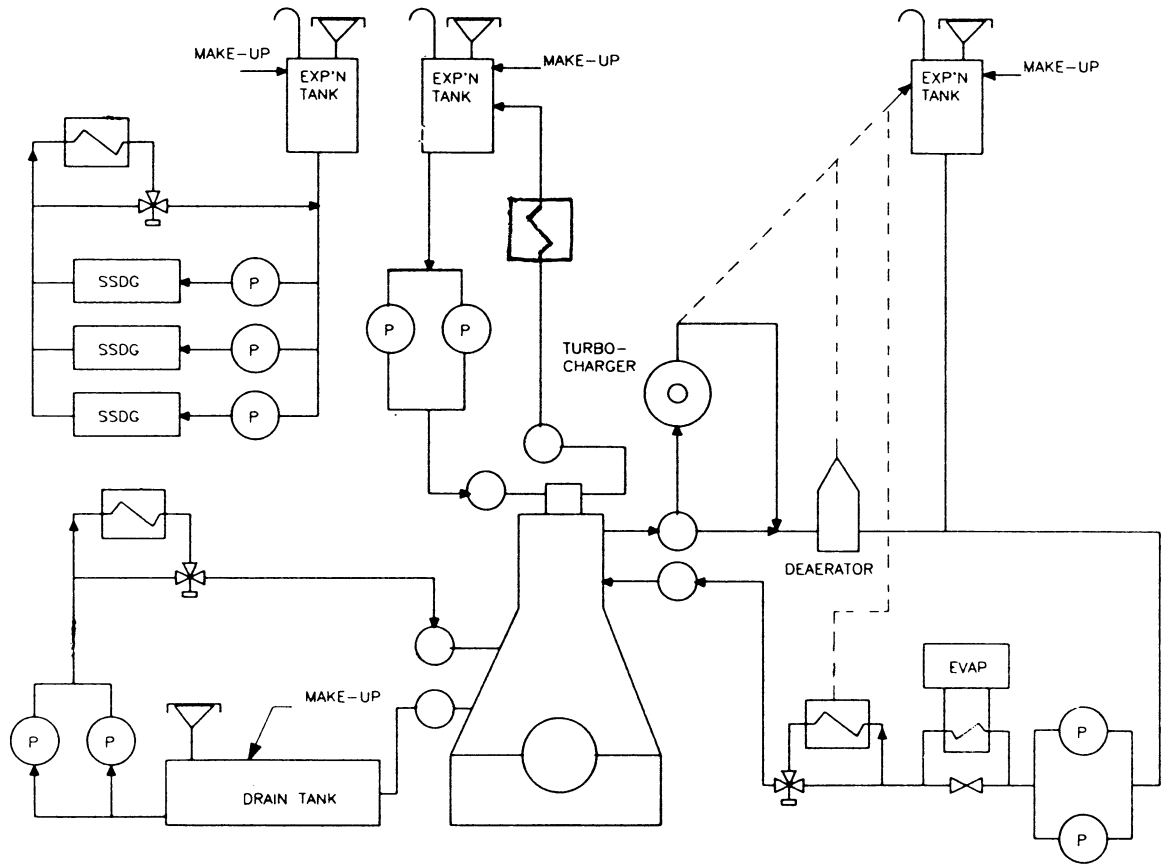


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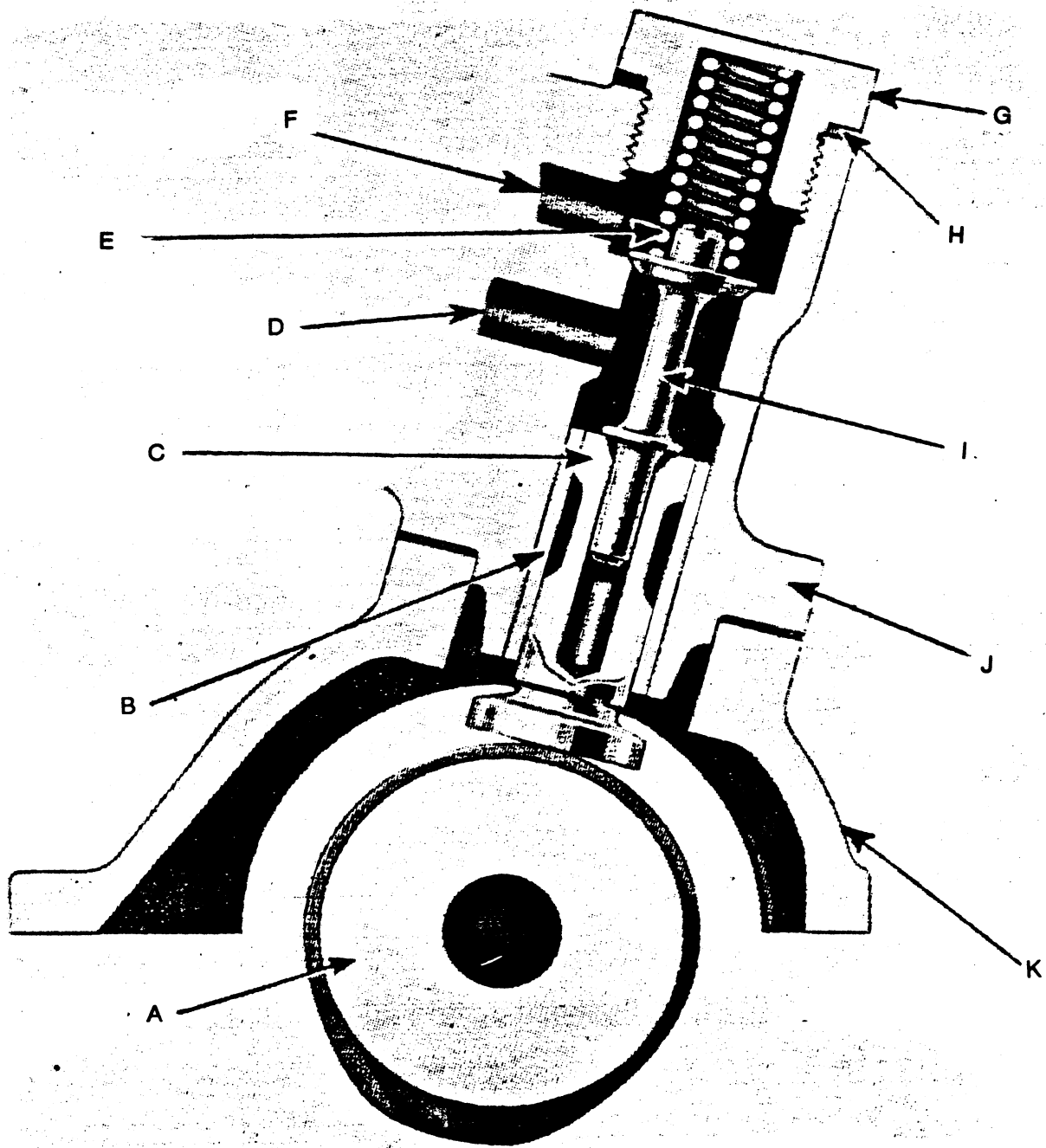


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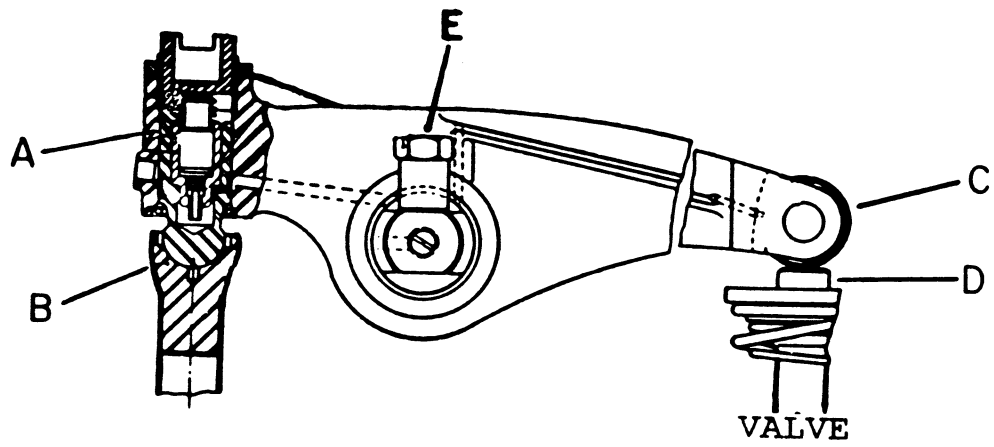
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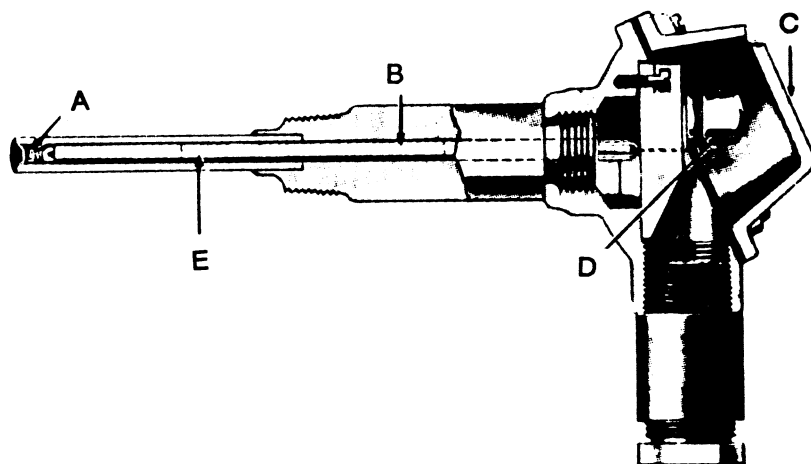
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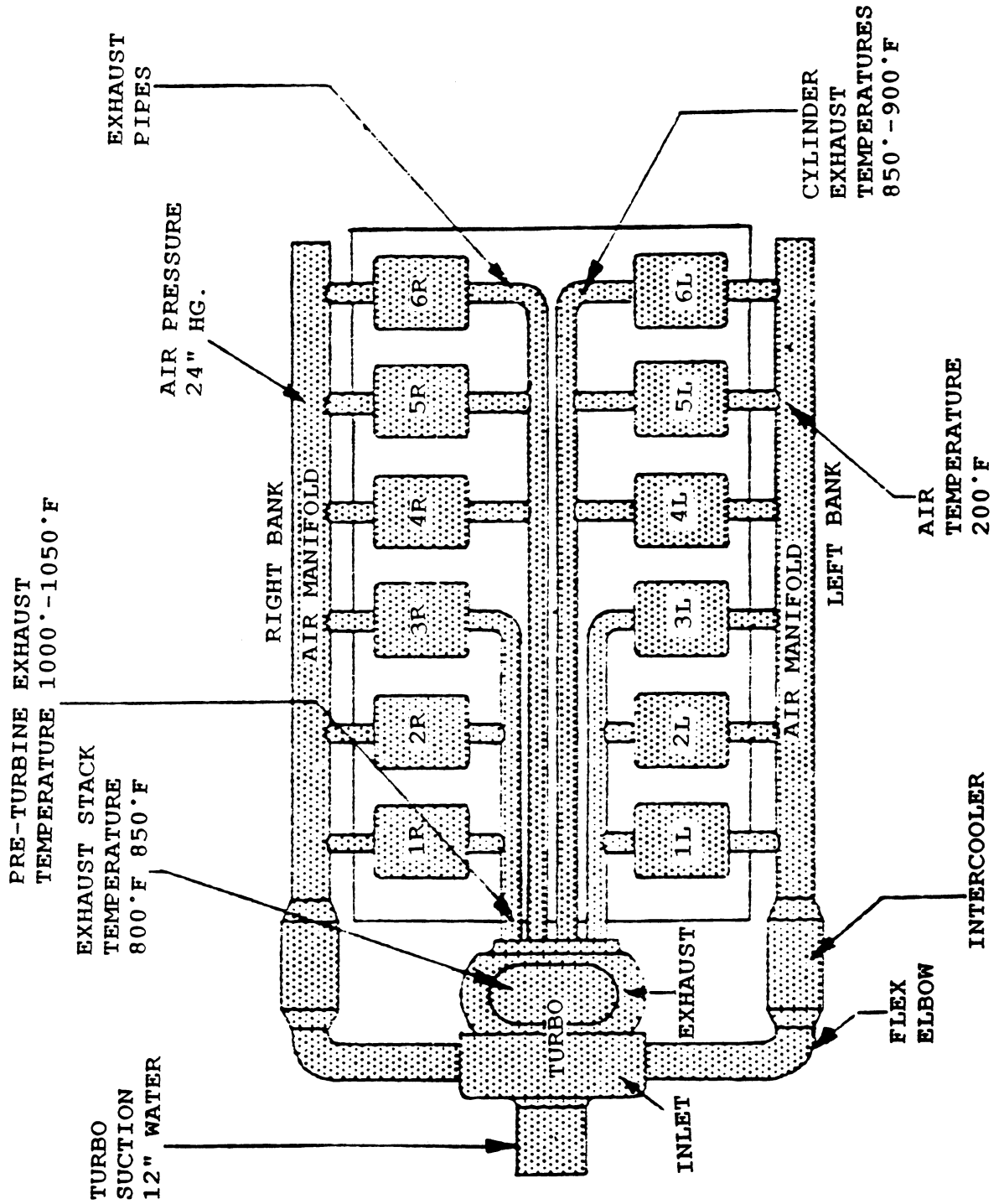
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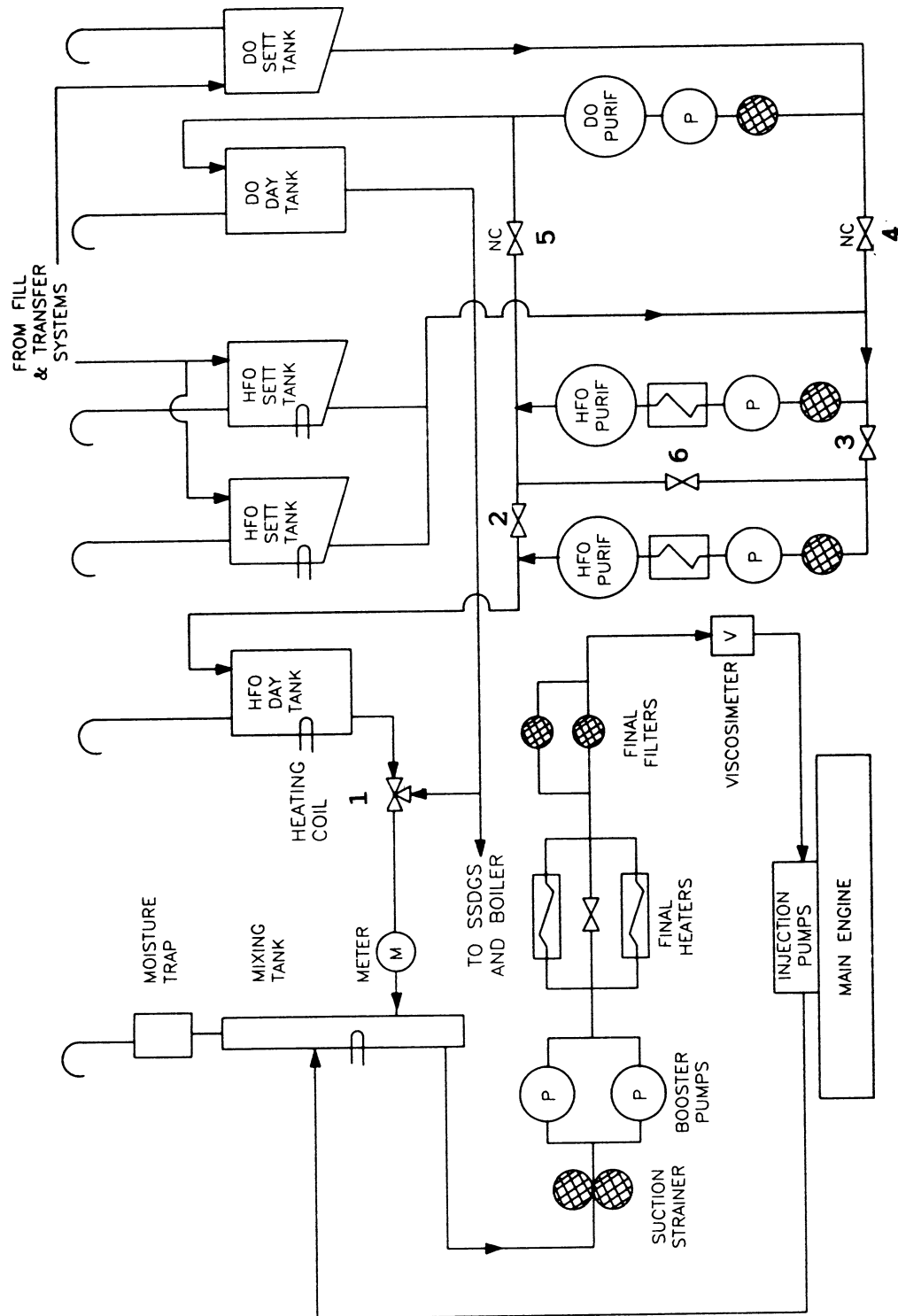
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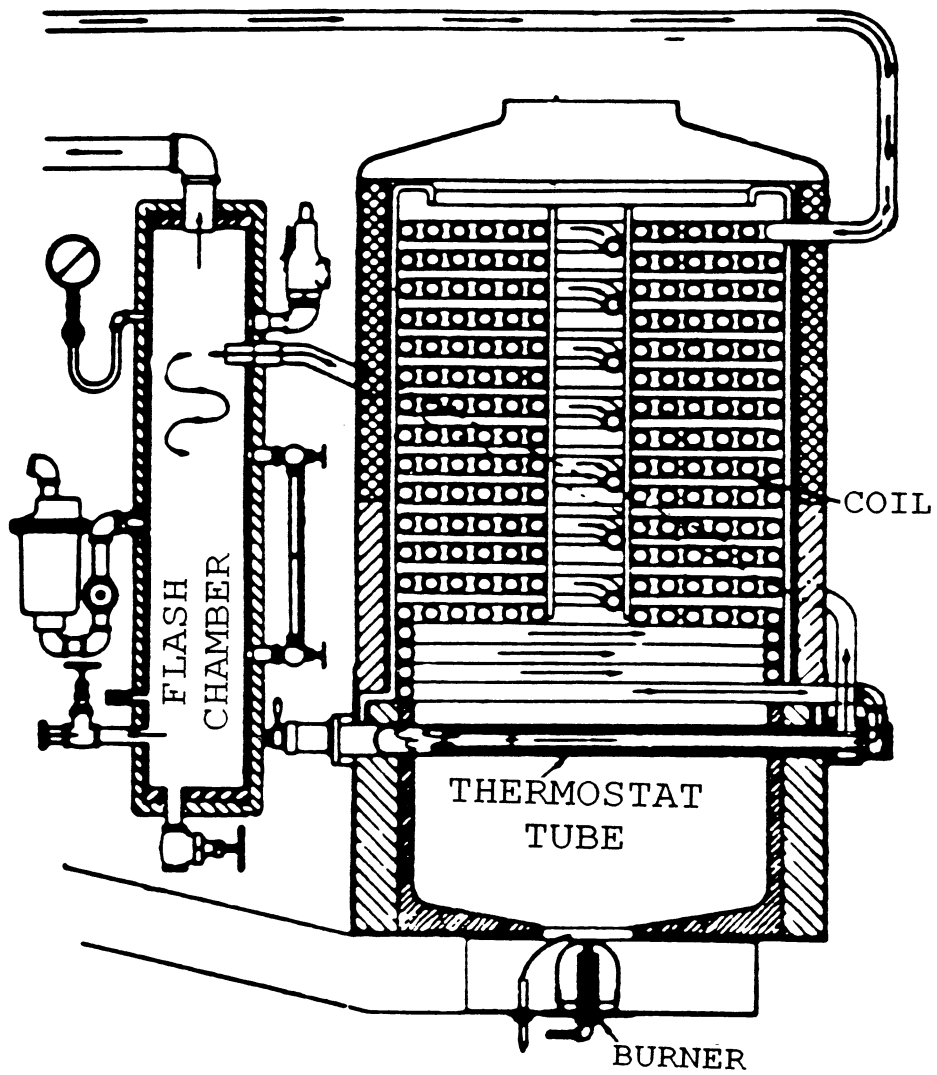
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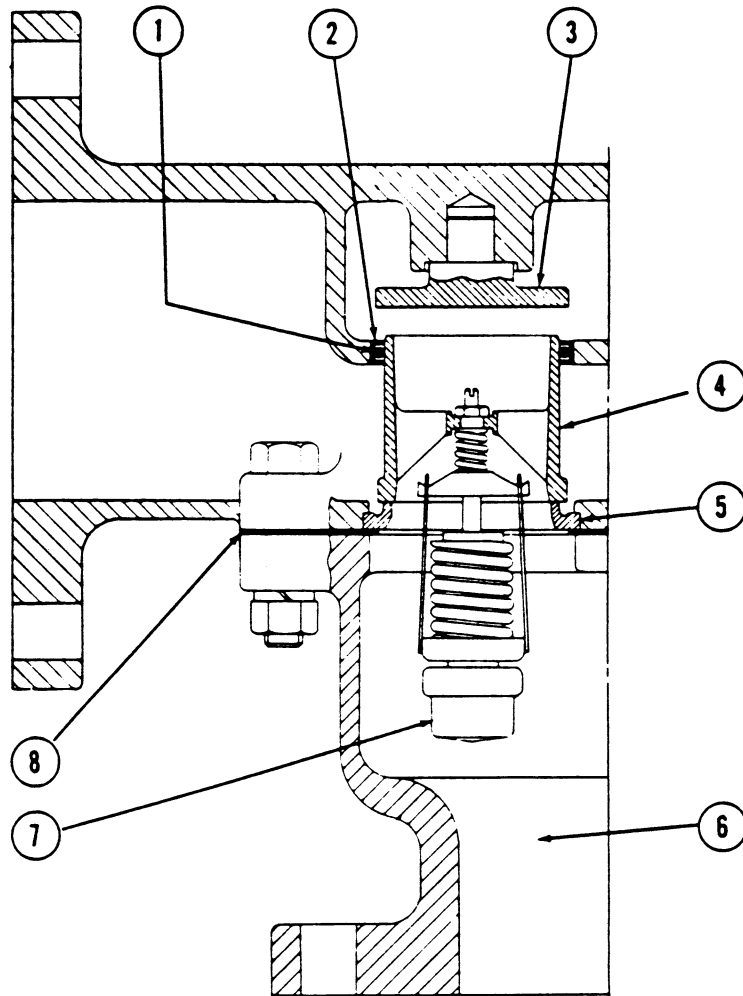
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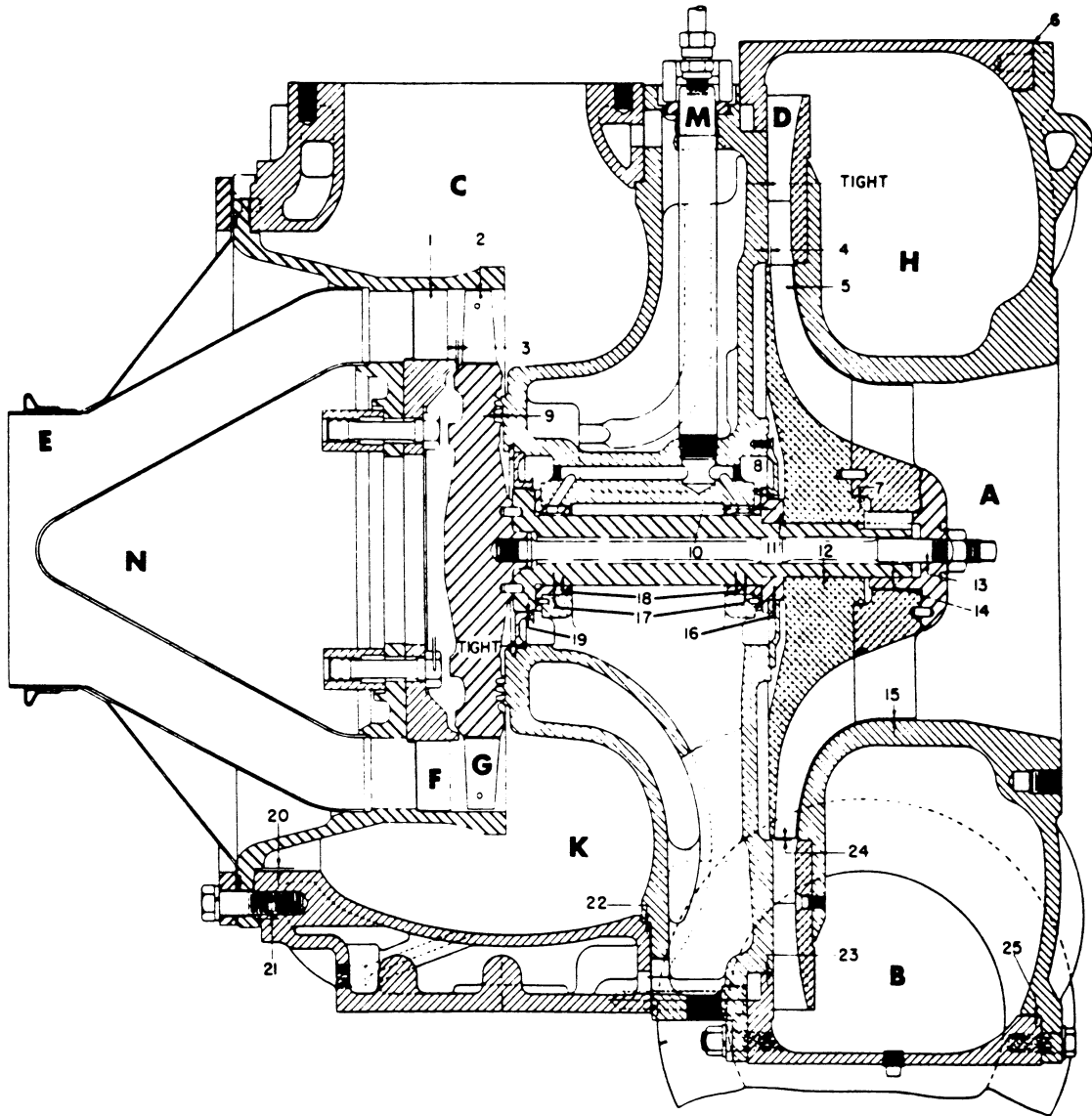


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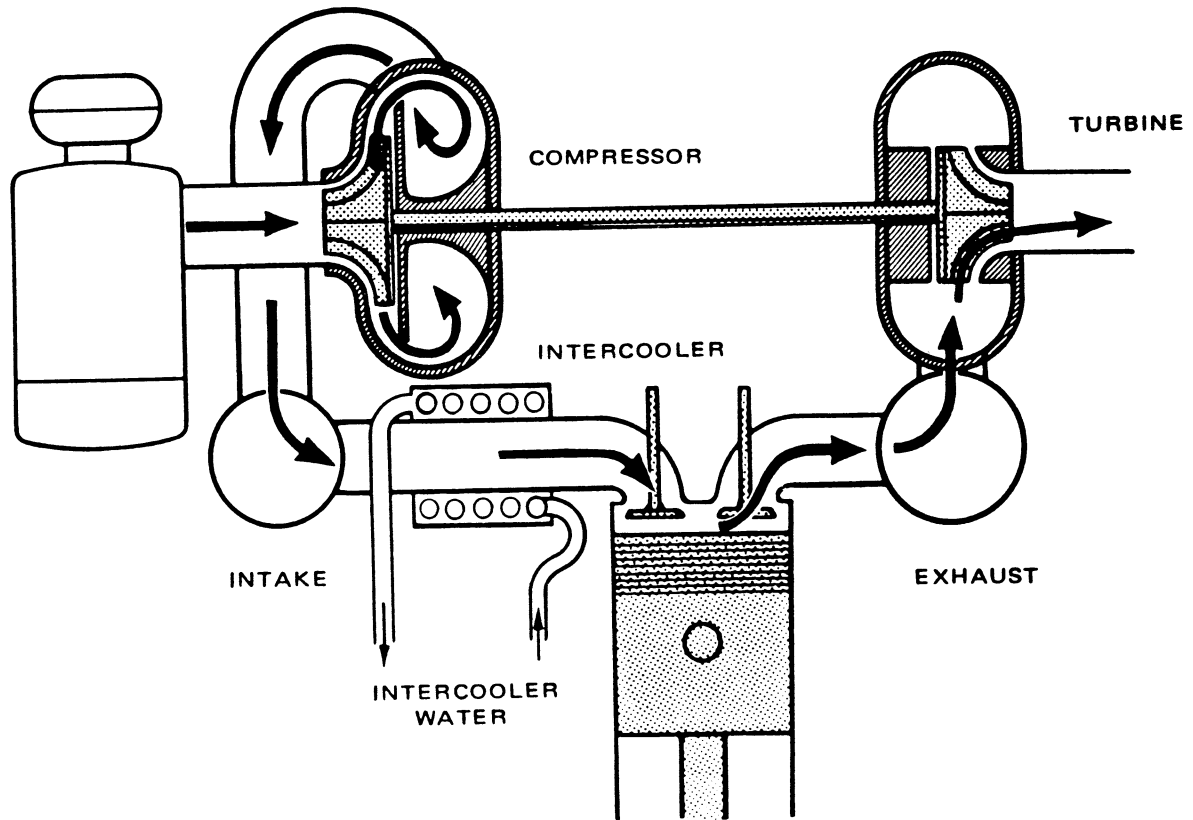




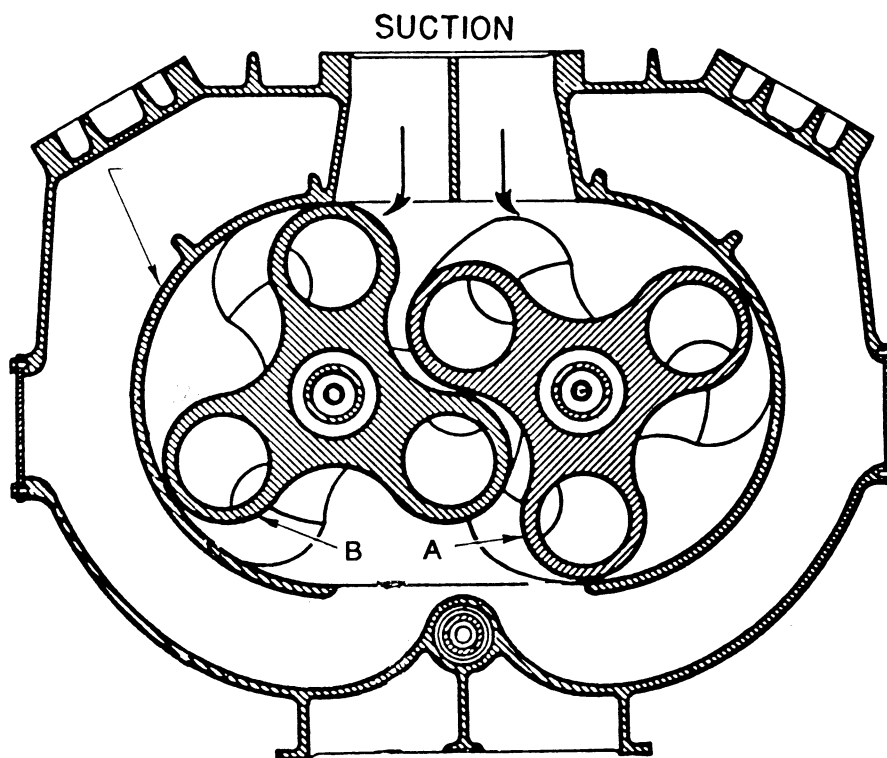
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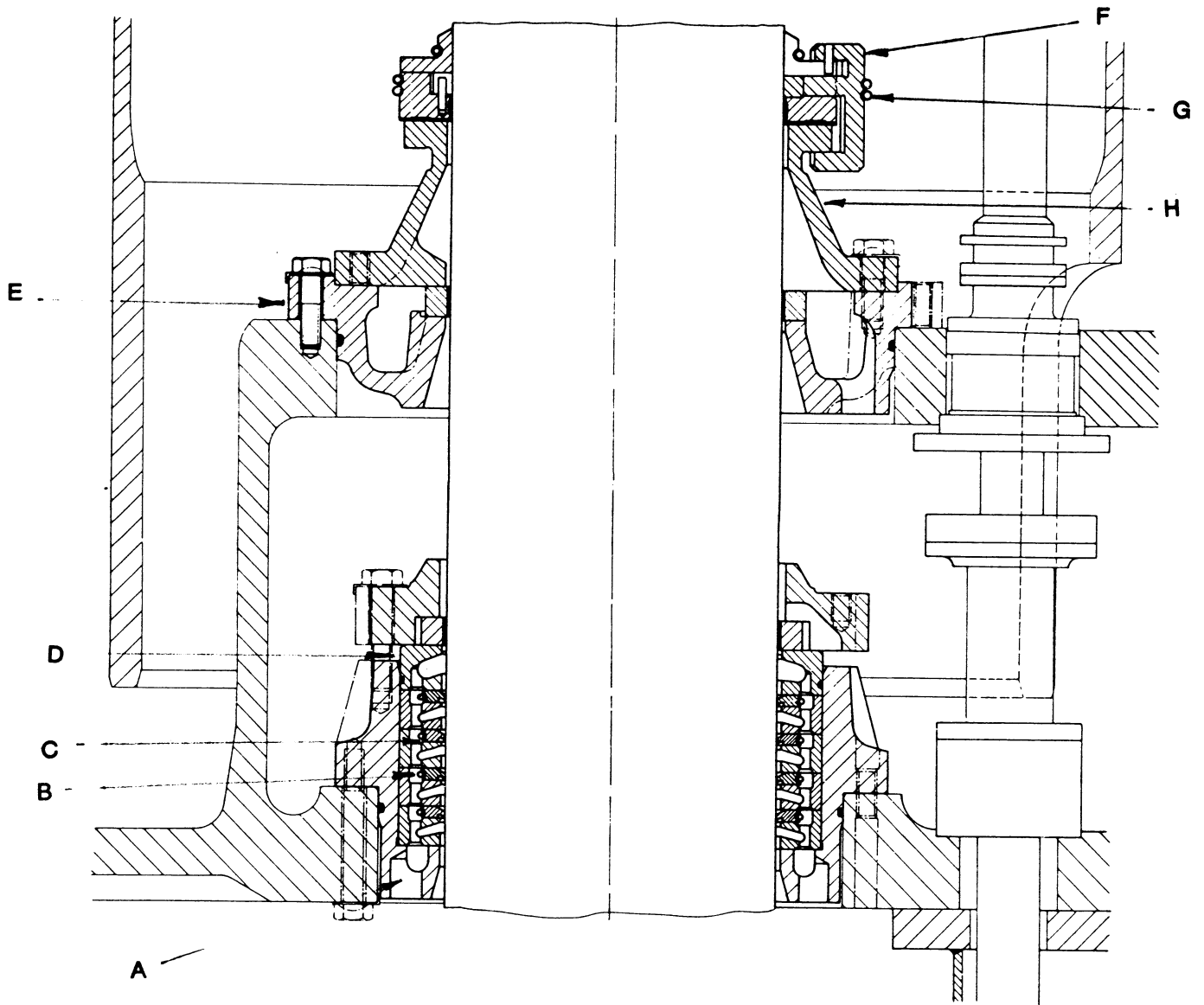
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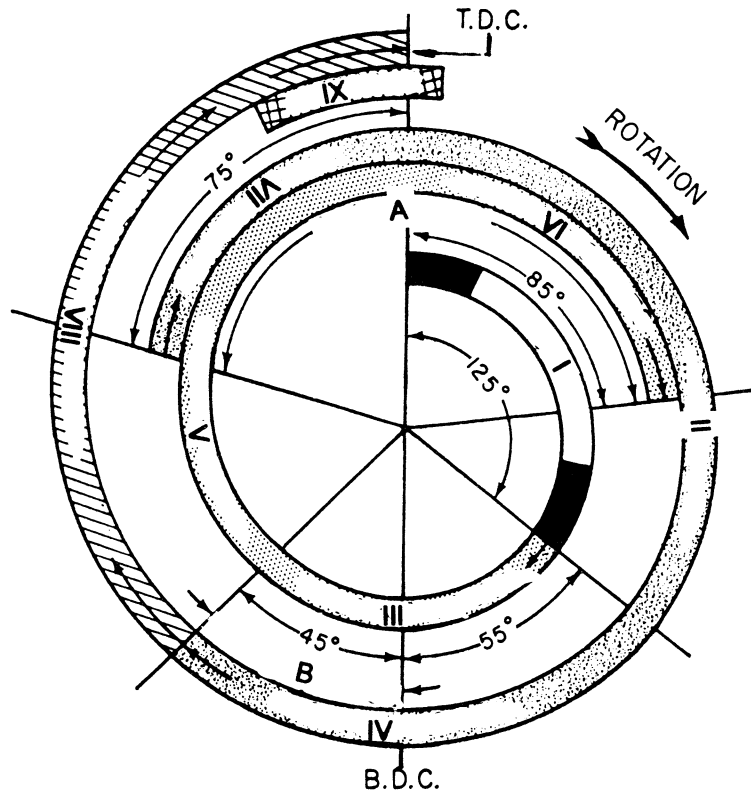
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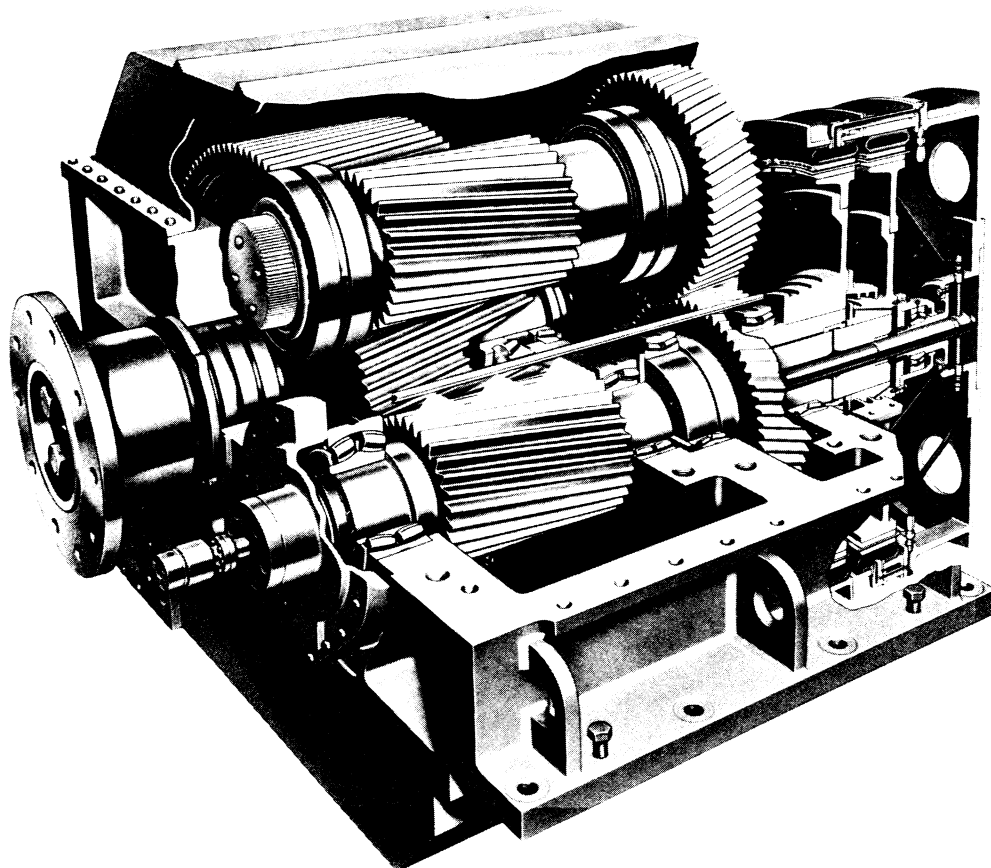
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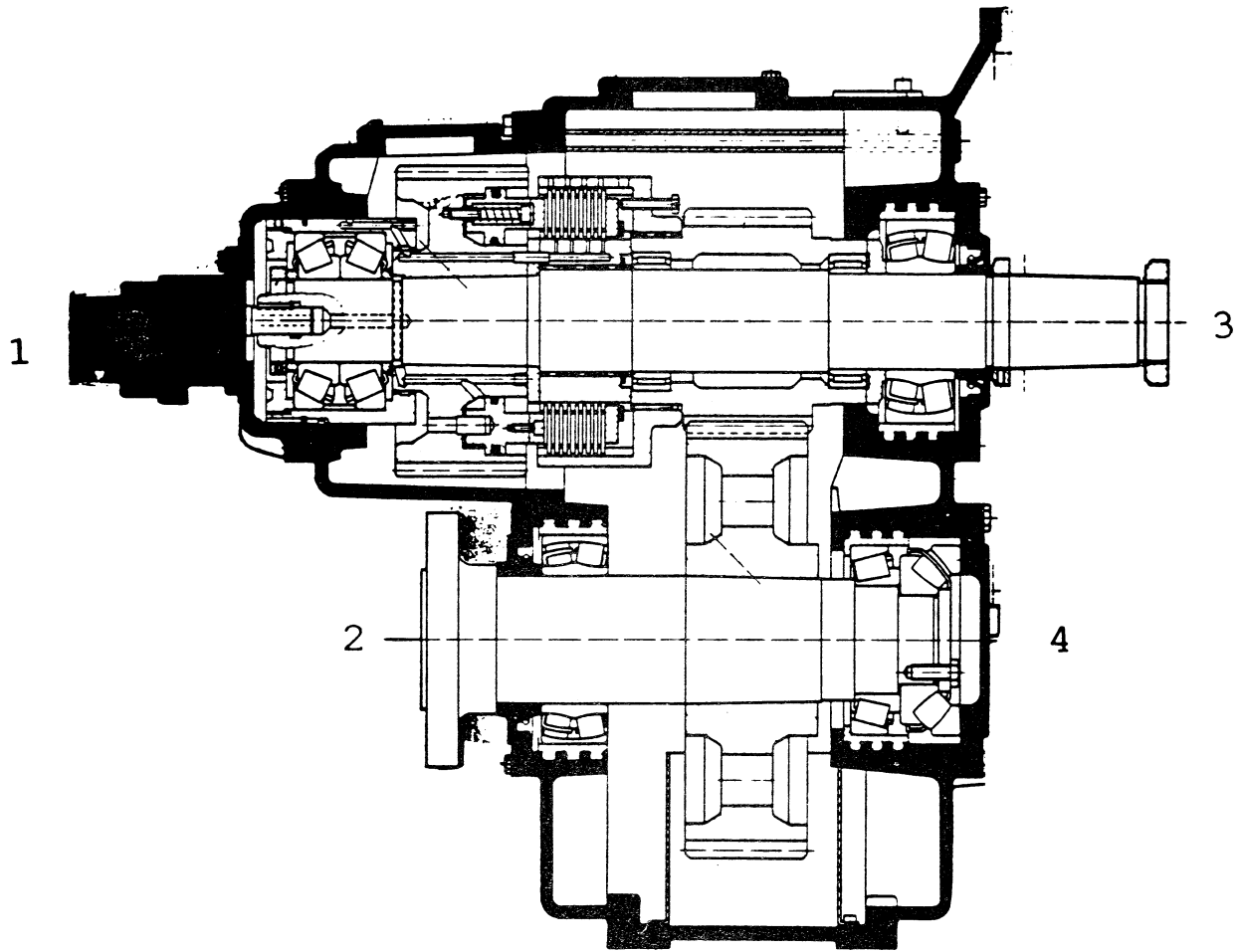
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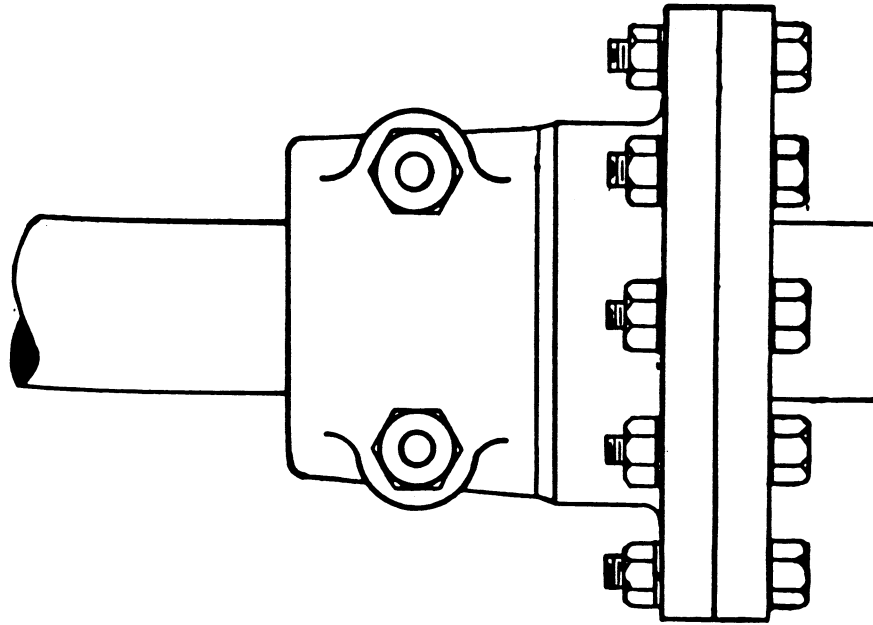
(COURTESY OF THE FALK CORPORATION)

3-68

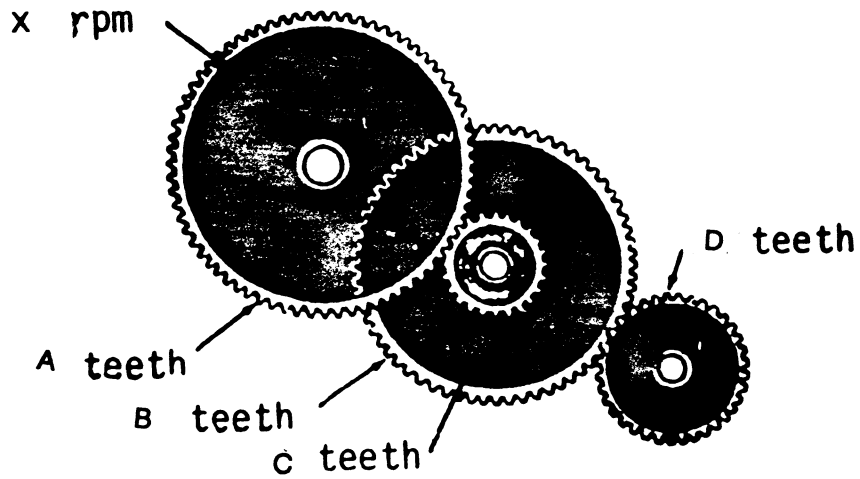
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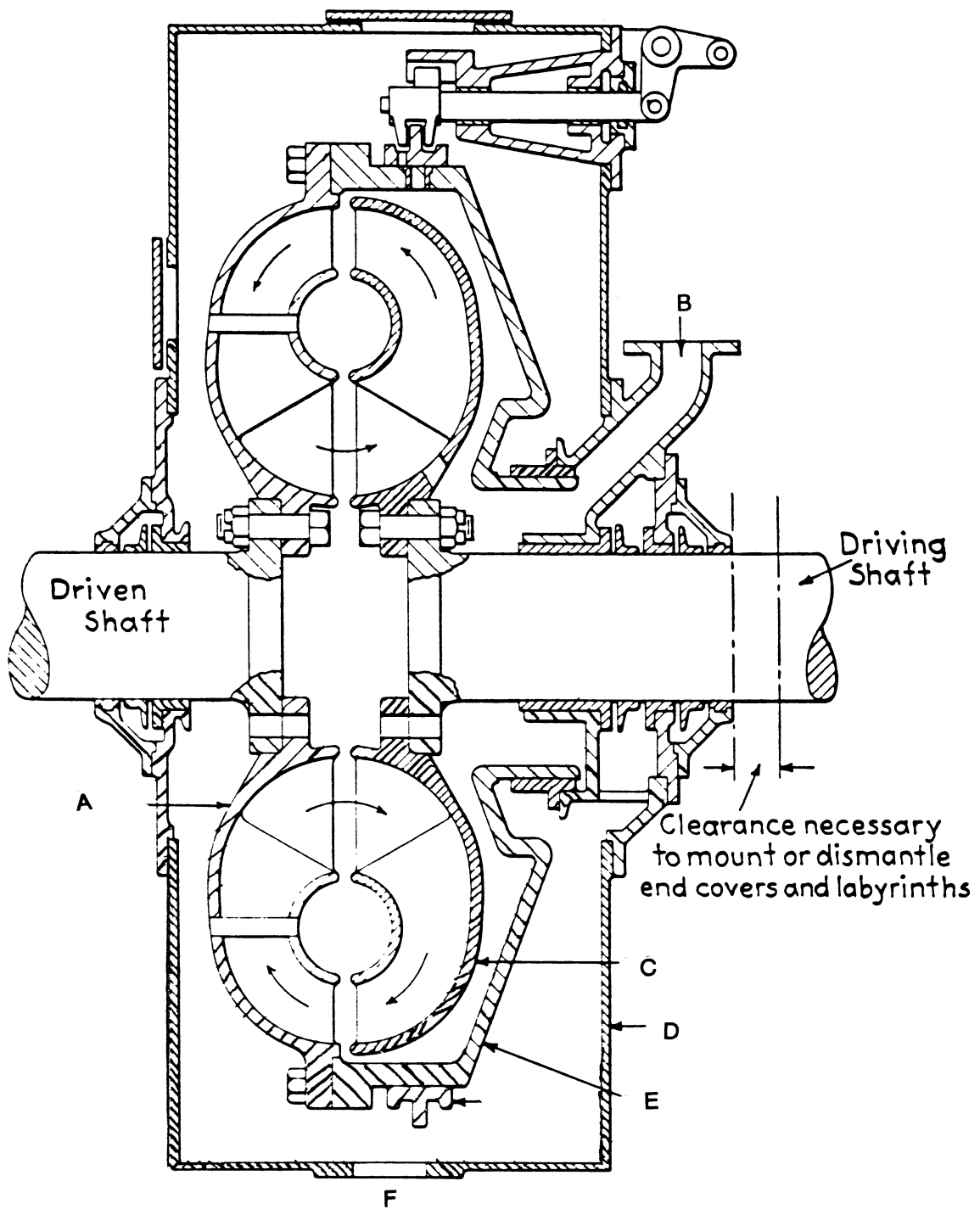
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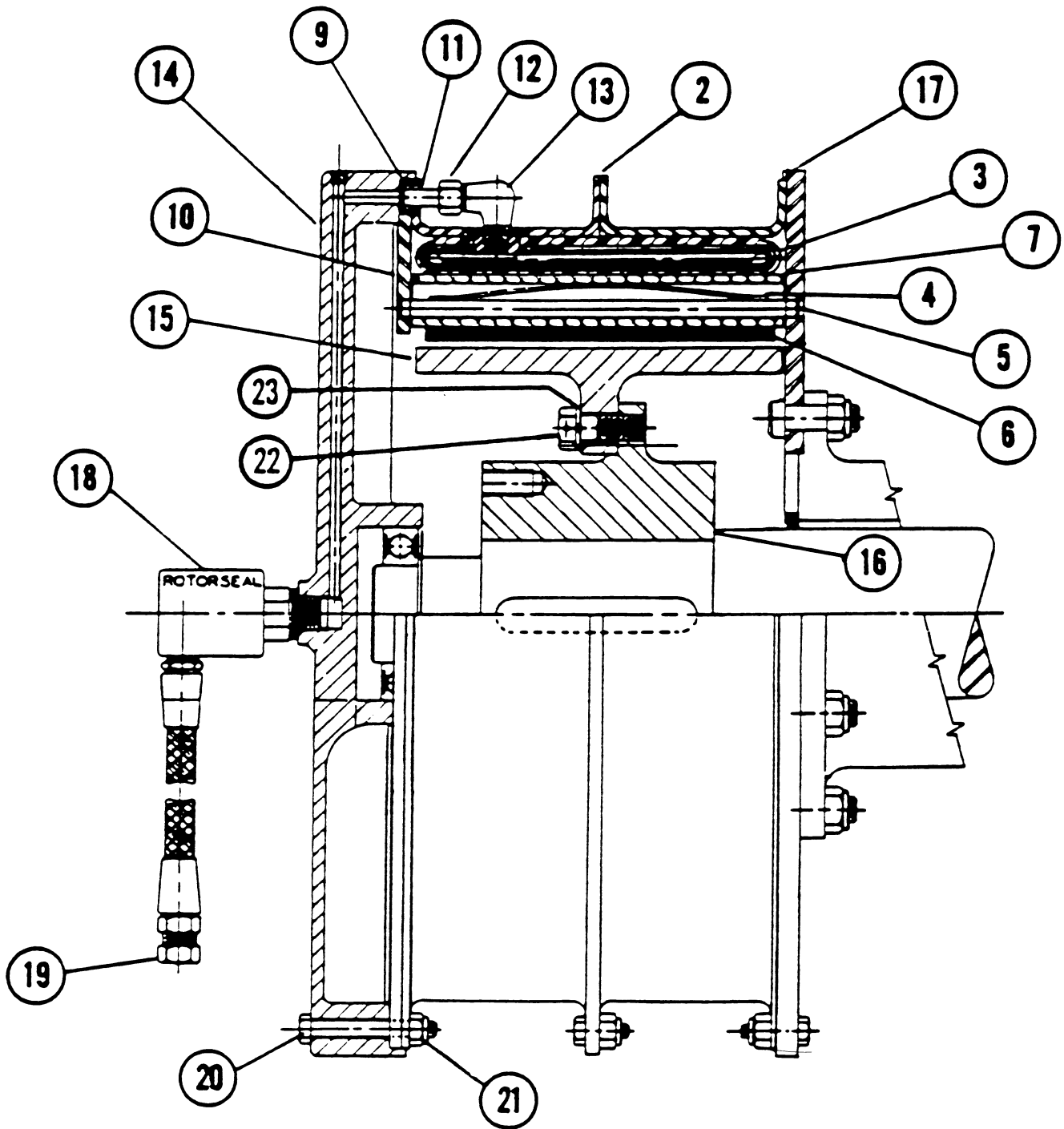
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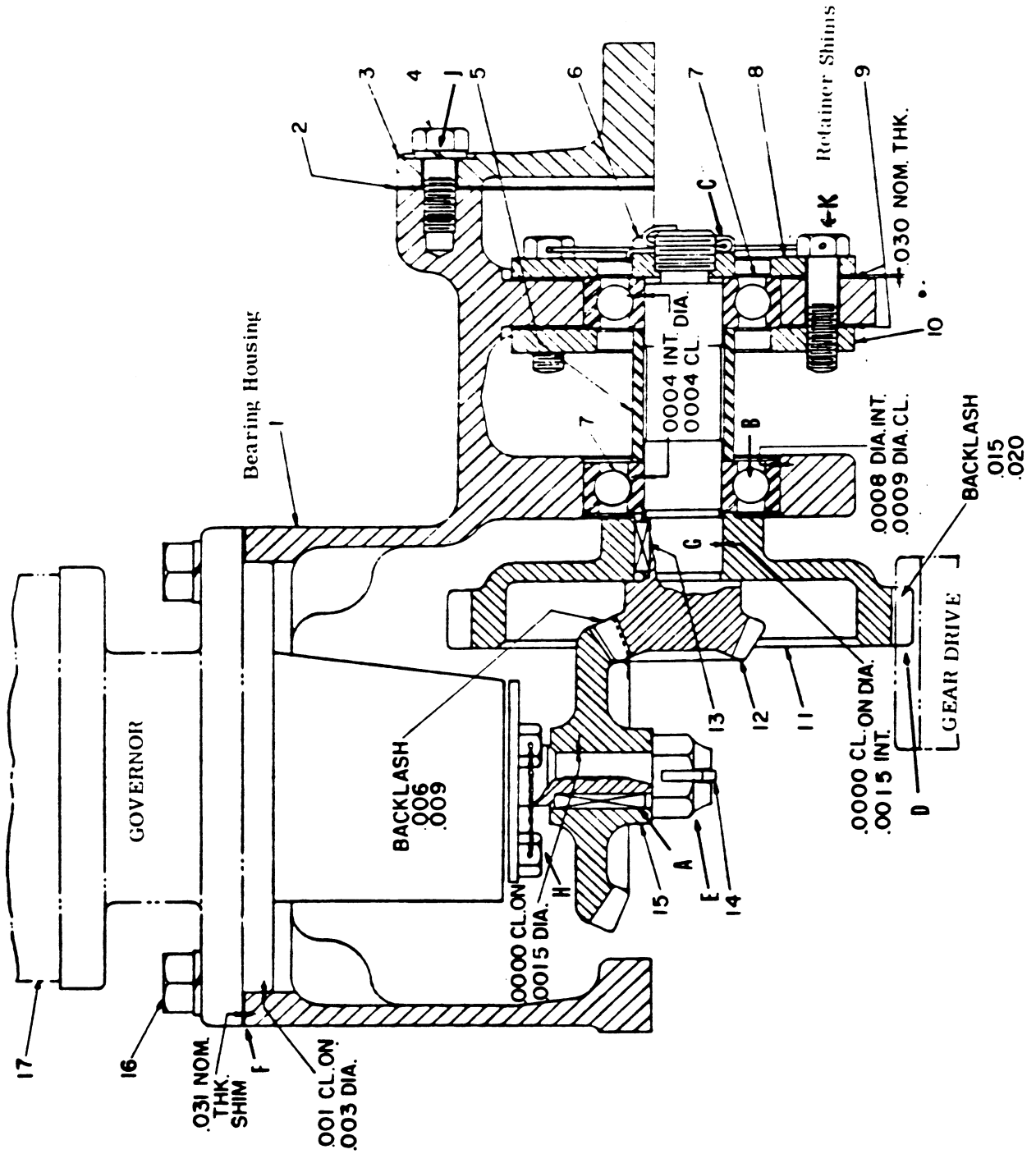


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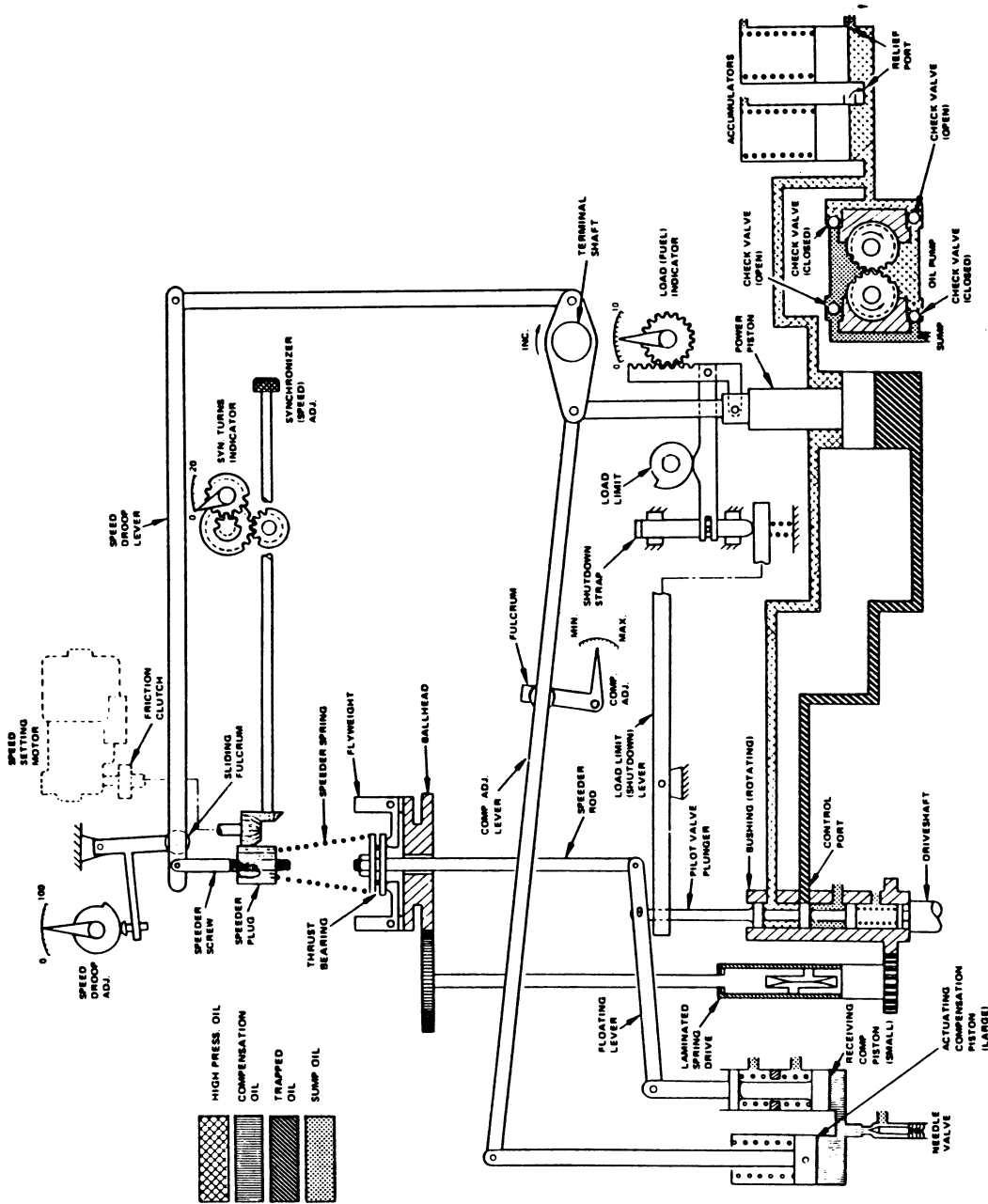




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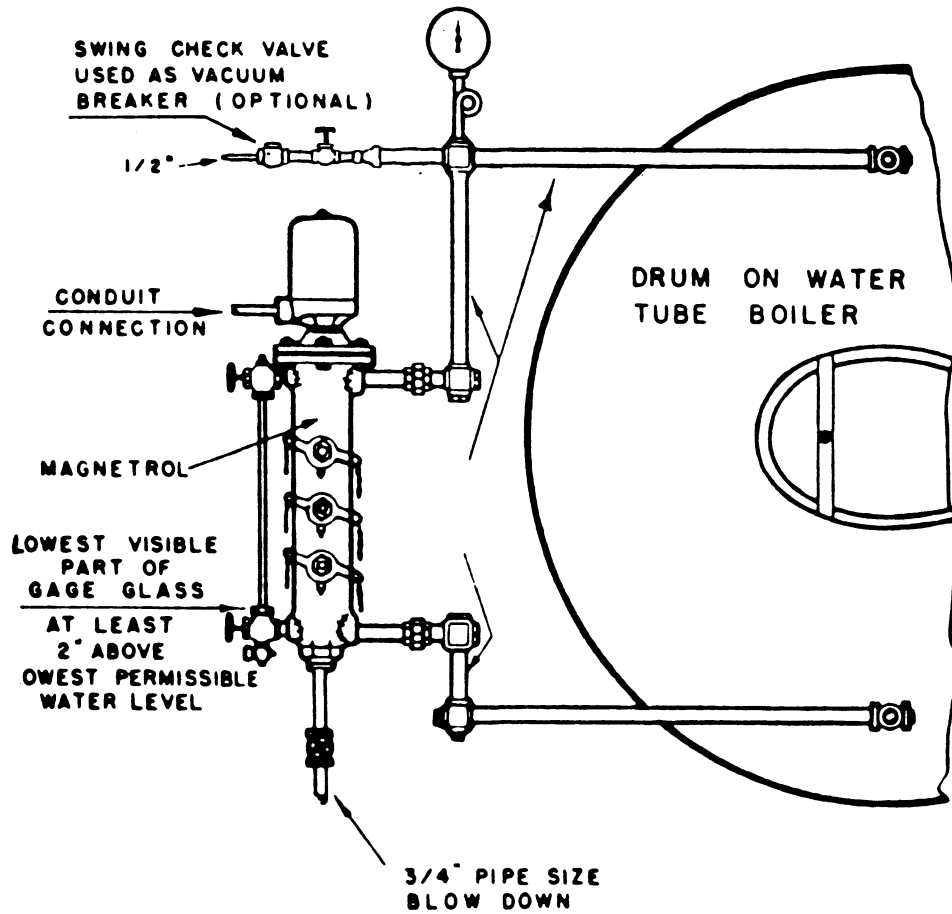


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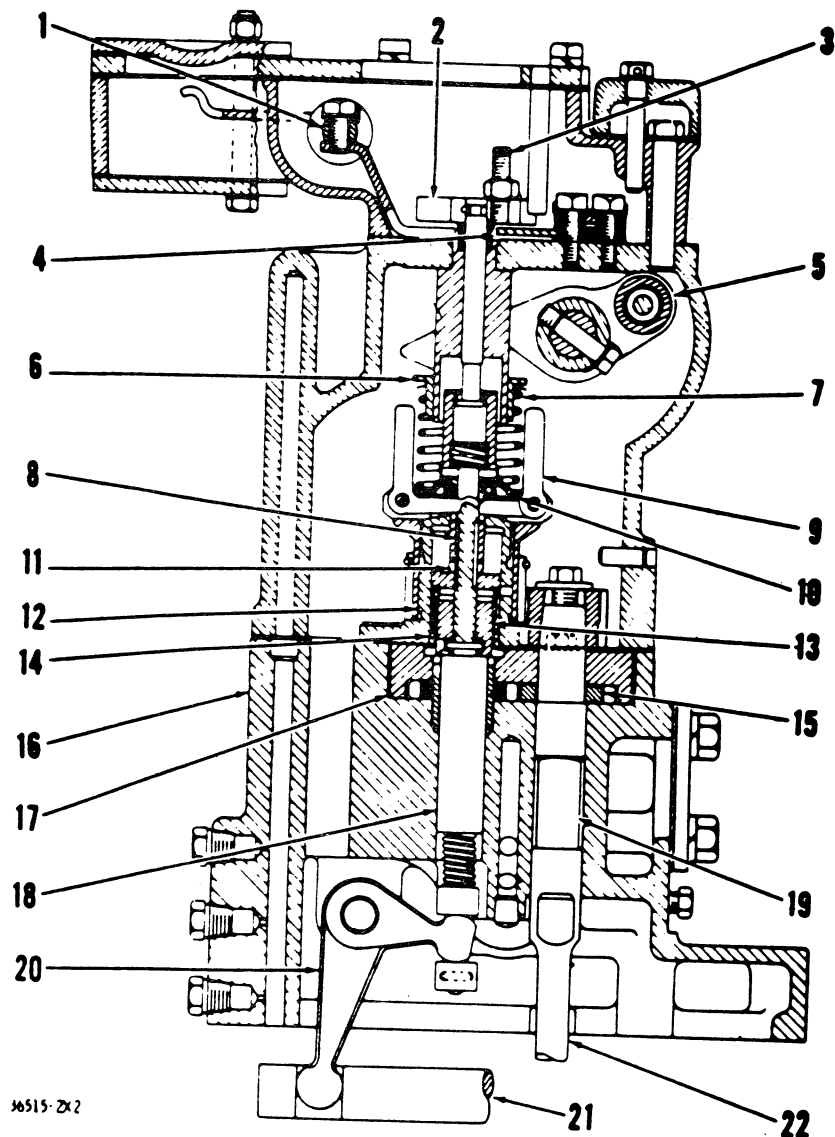


(COURTESY OF WOODWARD GOVERNOR COMPANY)

MO-0093



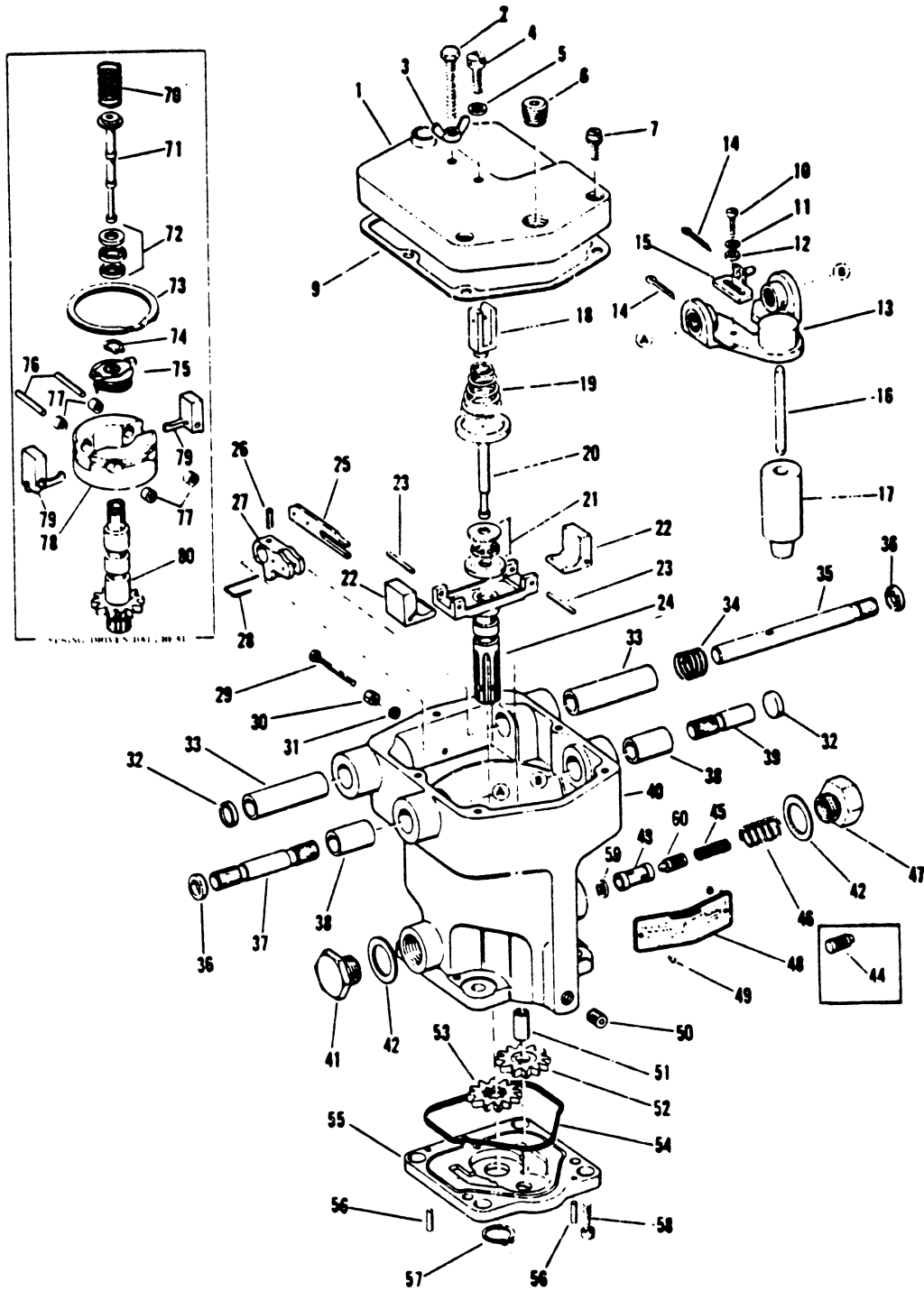
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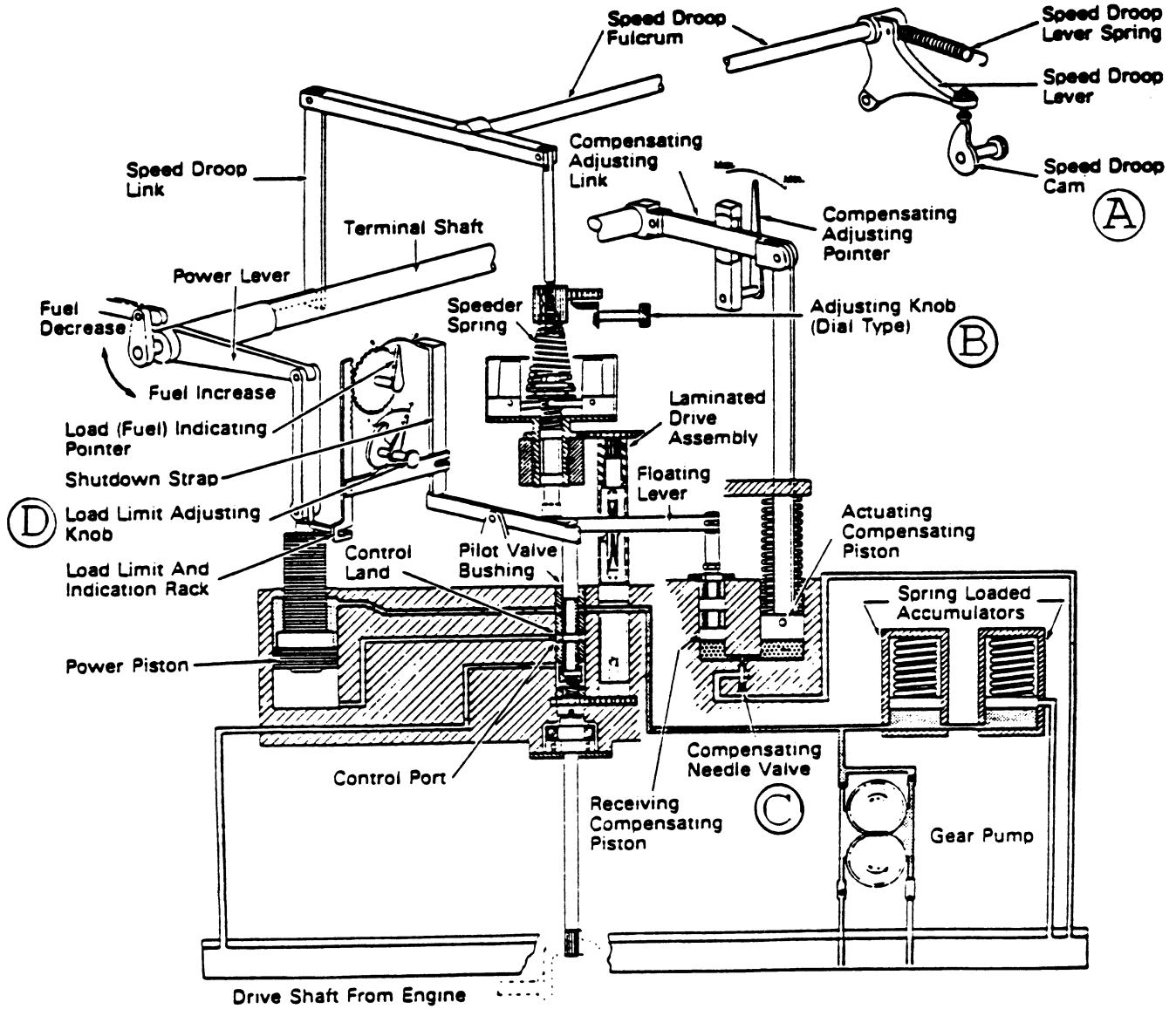
## GOVERNOR

1. Shutoff shaft. 2. Collar. 3. Adjusting screw. 4. Stop bar. 5. Lever assembly. 6. Seat assembly. 7. Governor spring. 8. Valve. 9. Weight assembly. 10. Seat. 11. Oil passage. 12. Cylinder. 13. Piston. 14. Sleeve. 15. Oil pump gear. 16. Governor drive housing. 17. Oil pump cover. 18. Pin assembly. 19. Shaft assembly. 20. Lever. 21. Fuel rack. 22. Drive pinion.

MO-0095

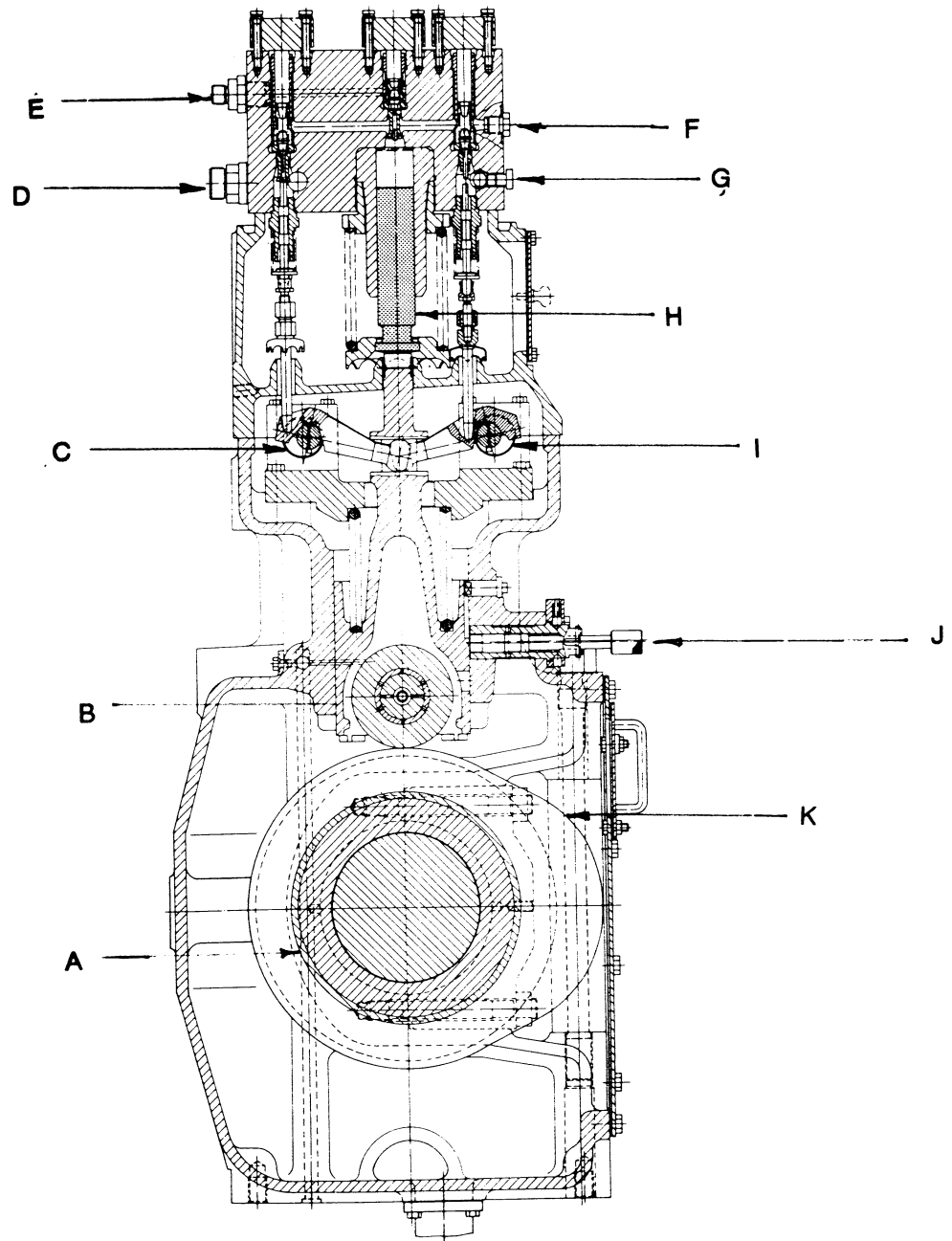


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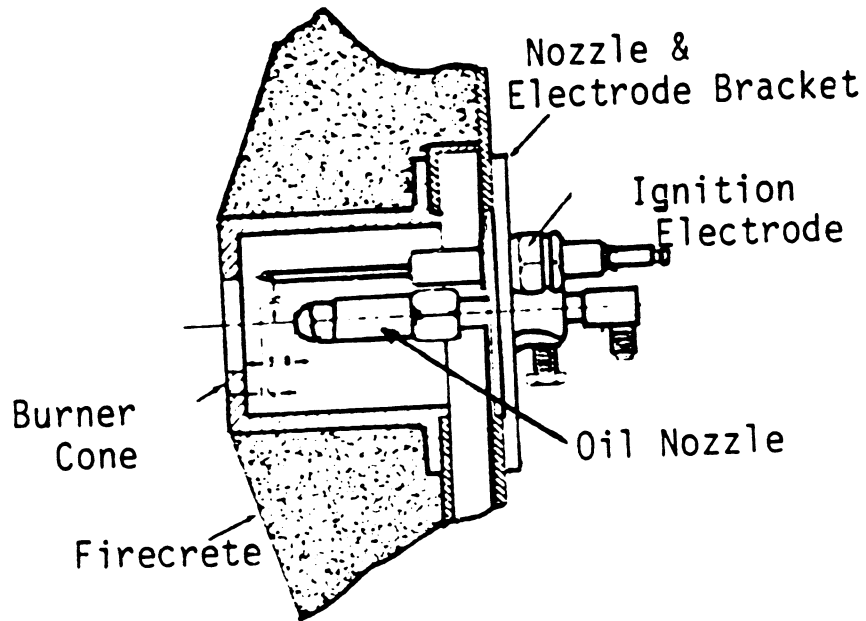


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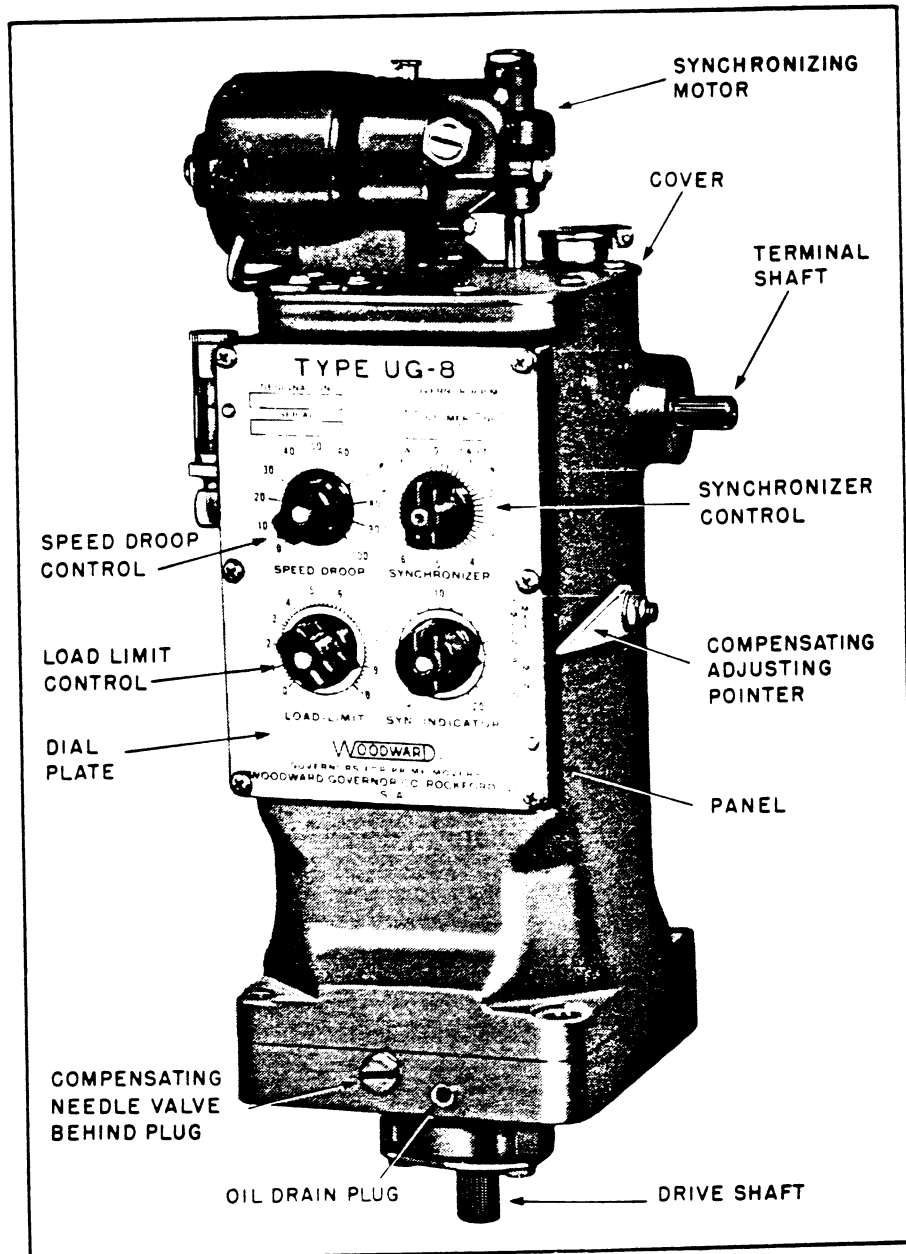


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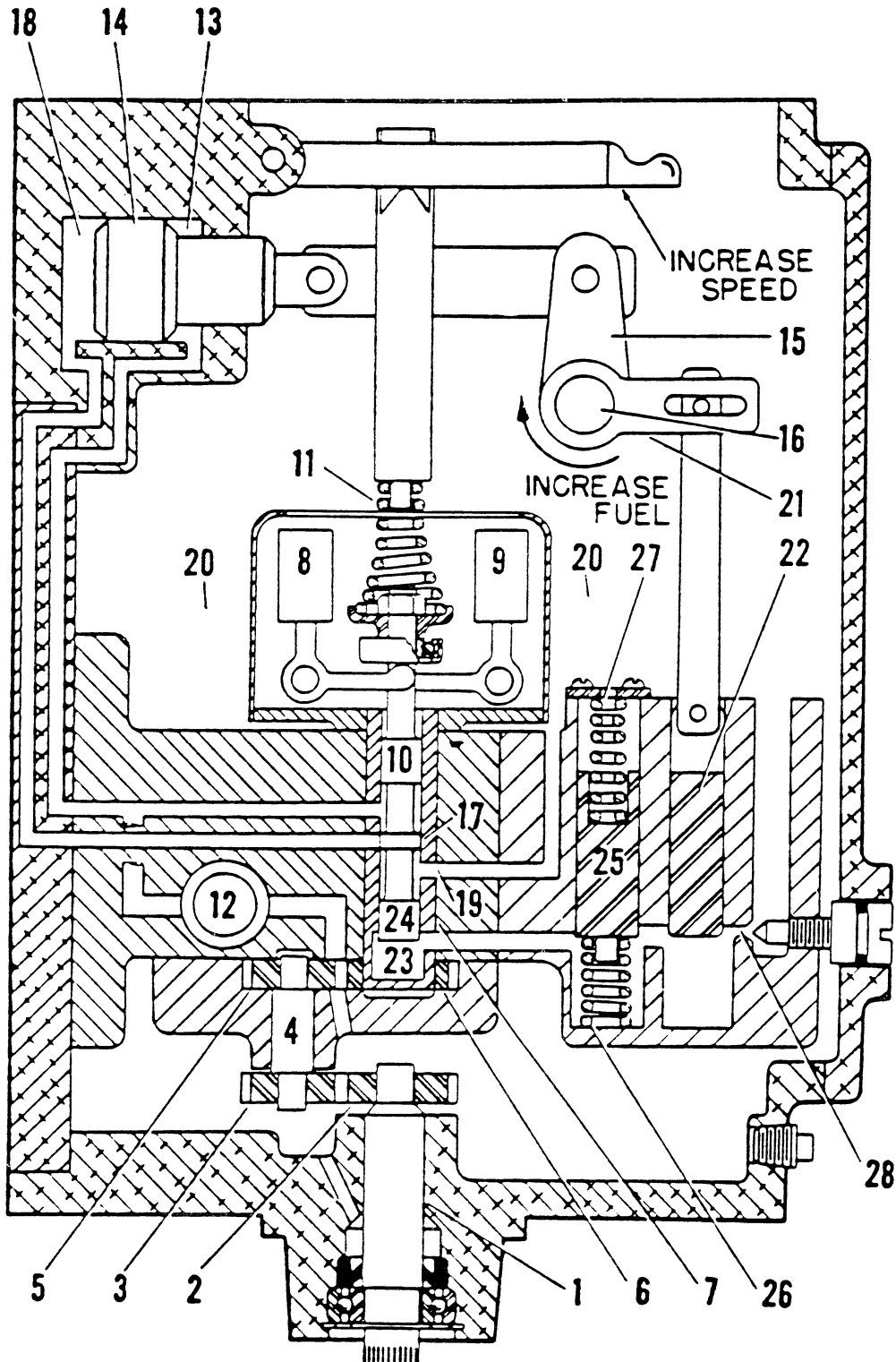


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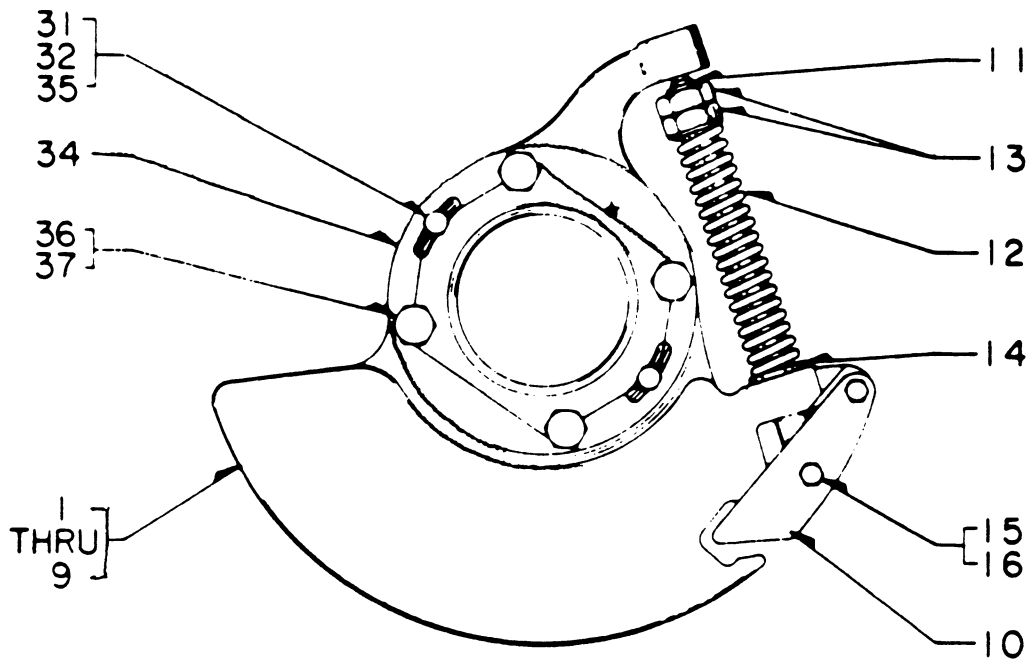


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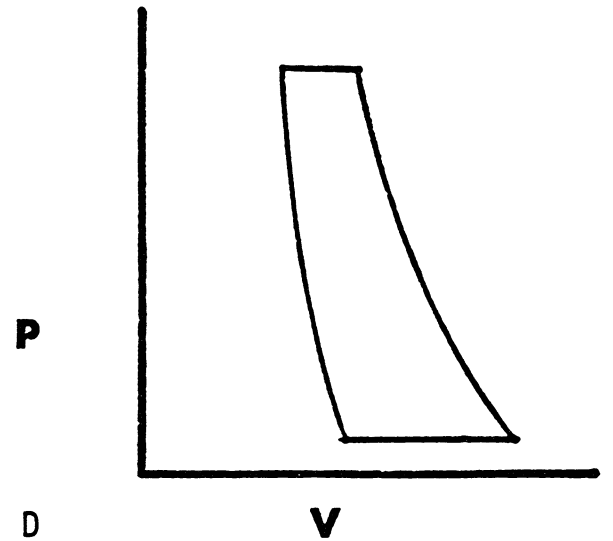
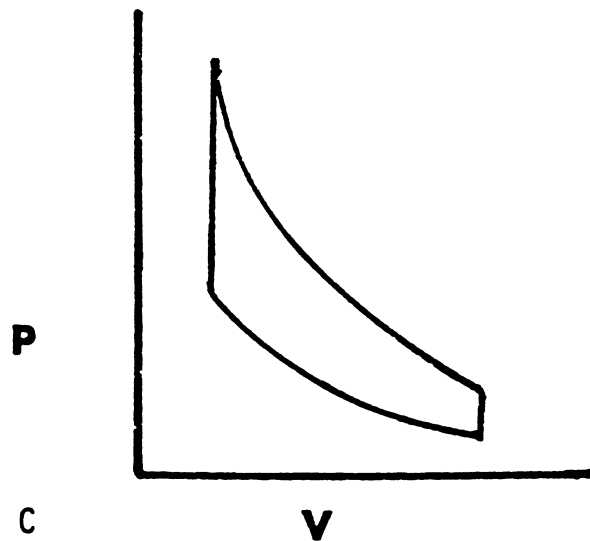
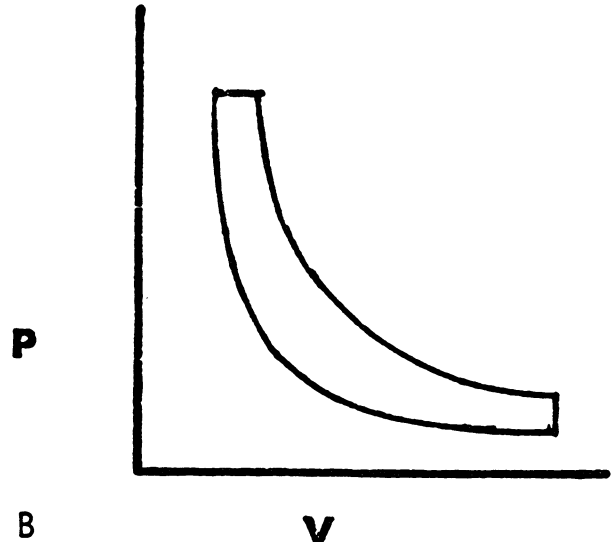
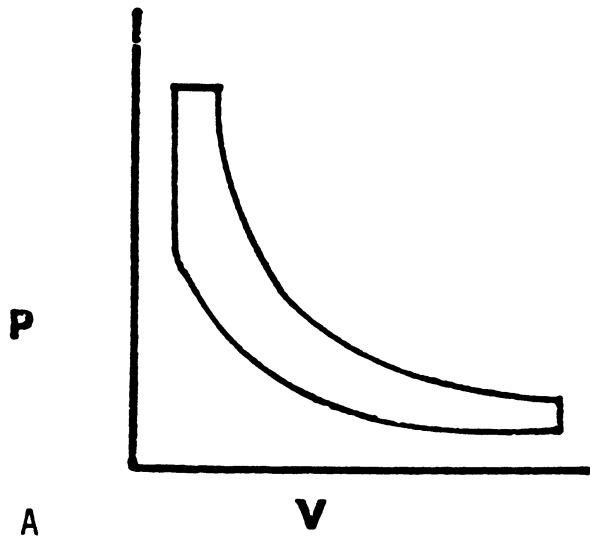
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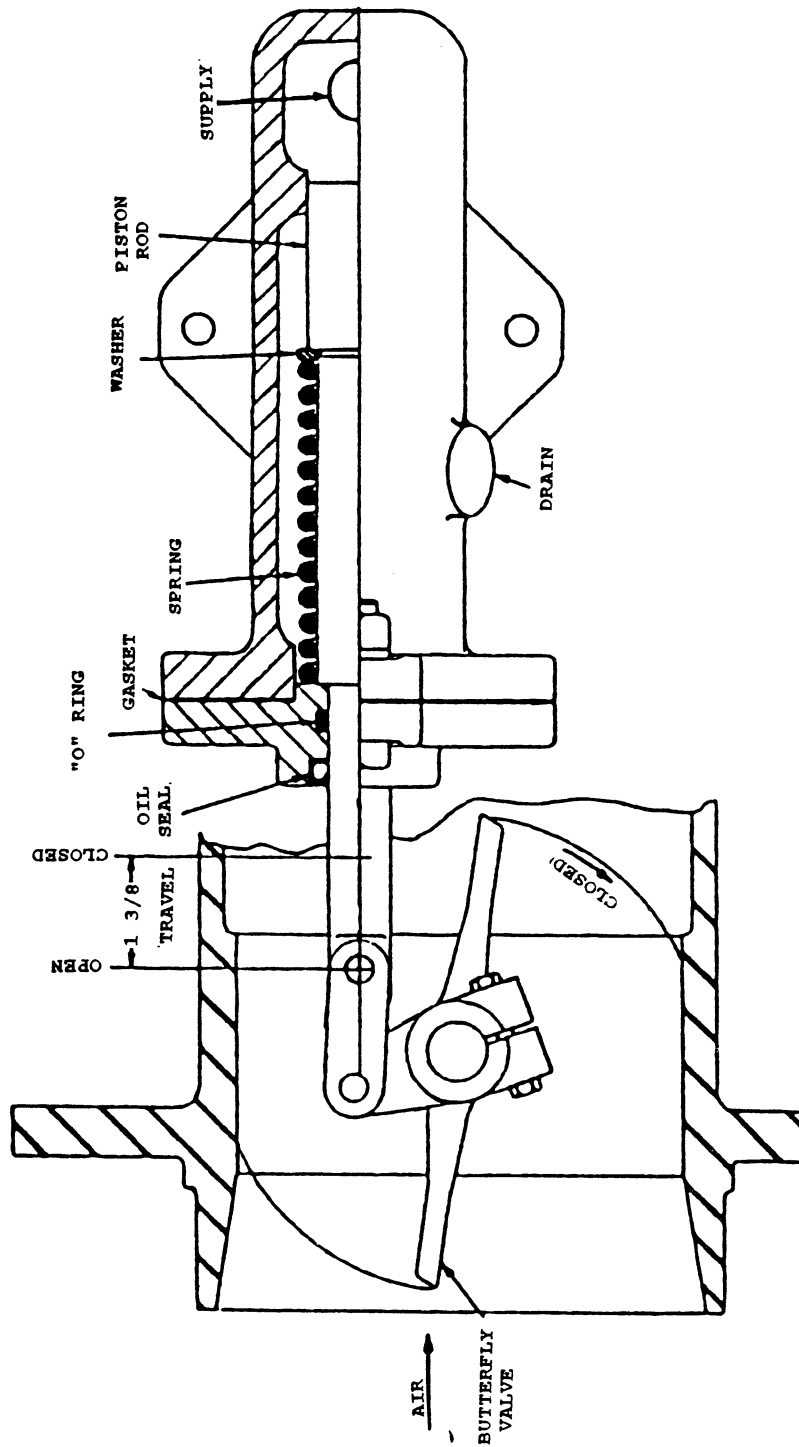
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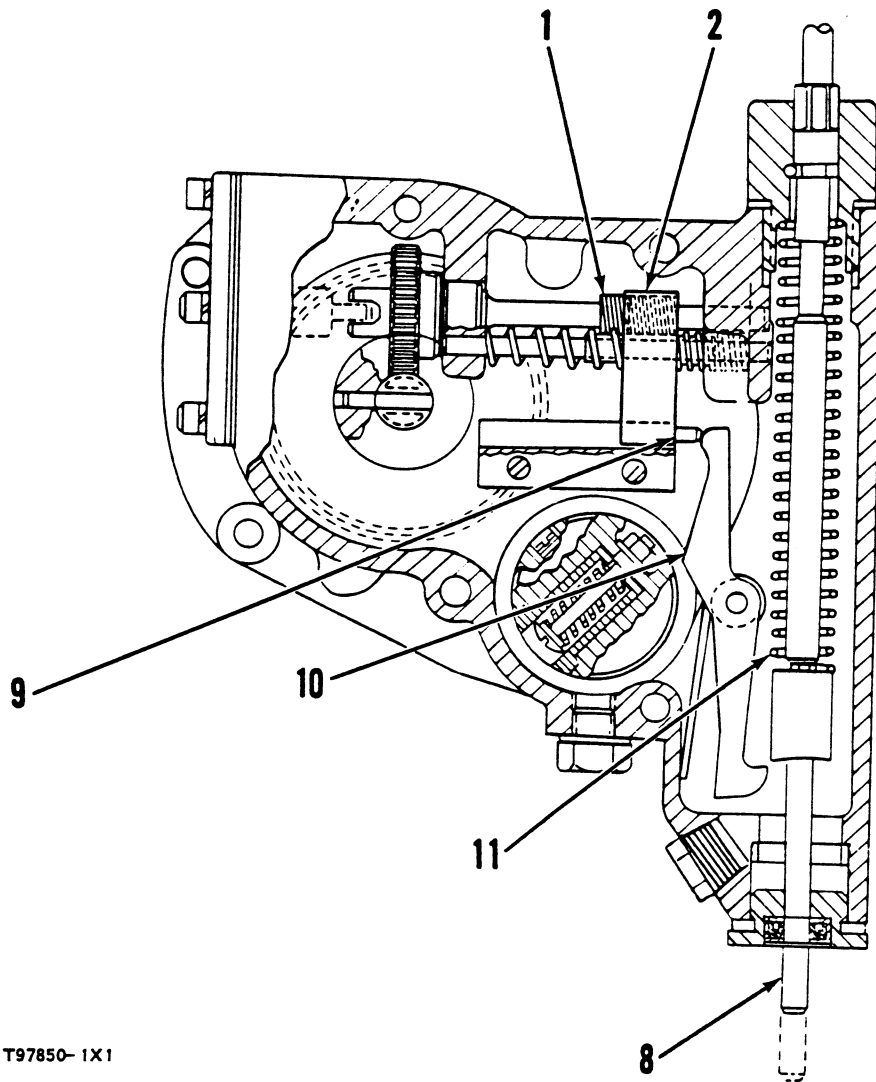
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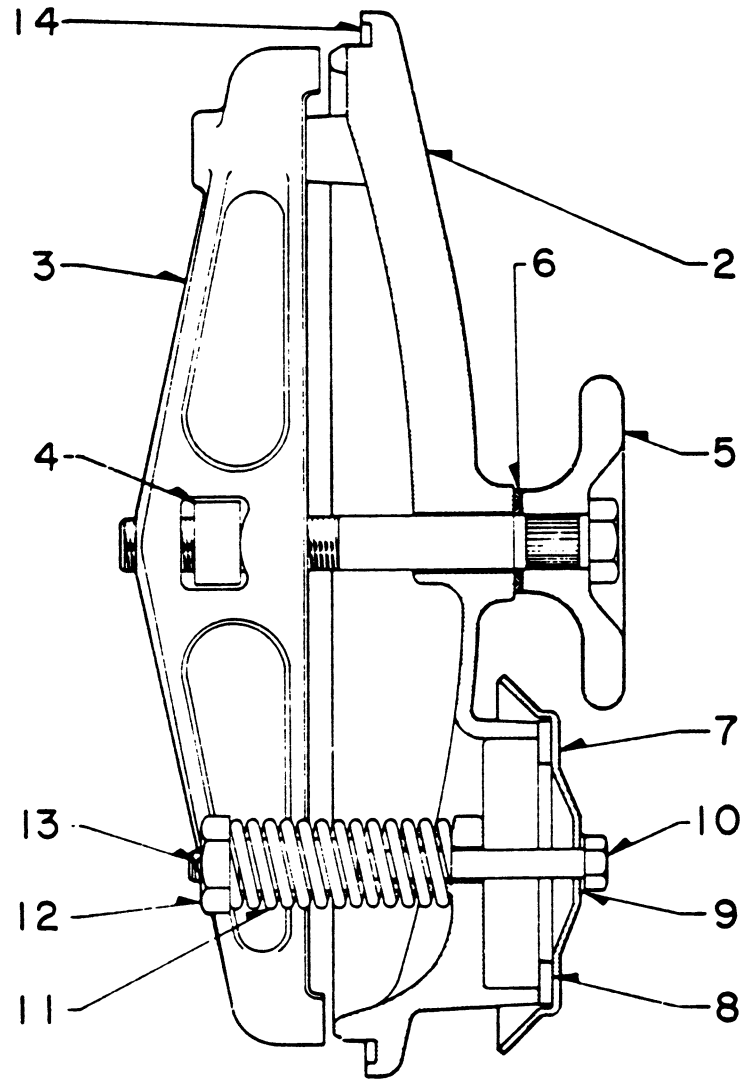


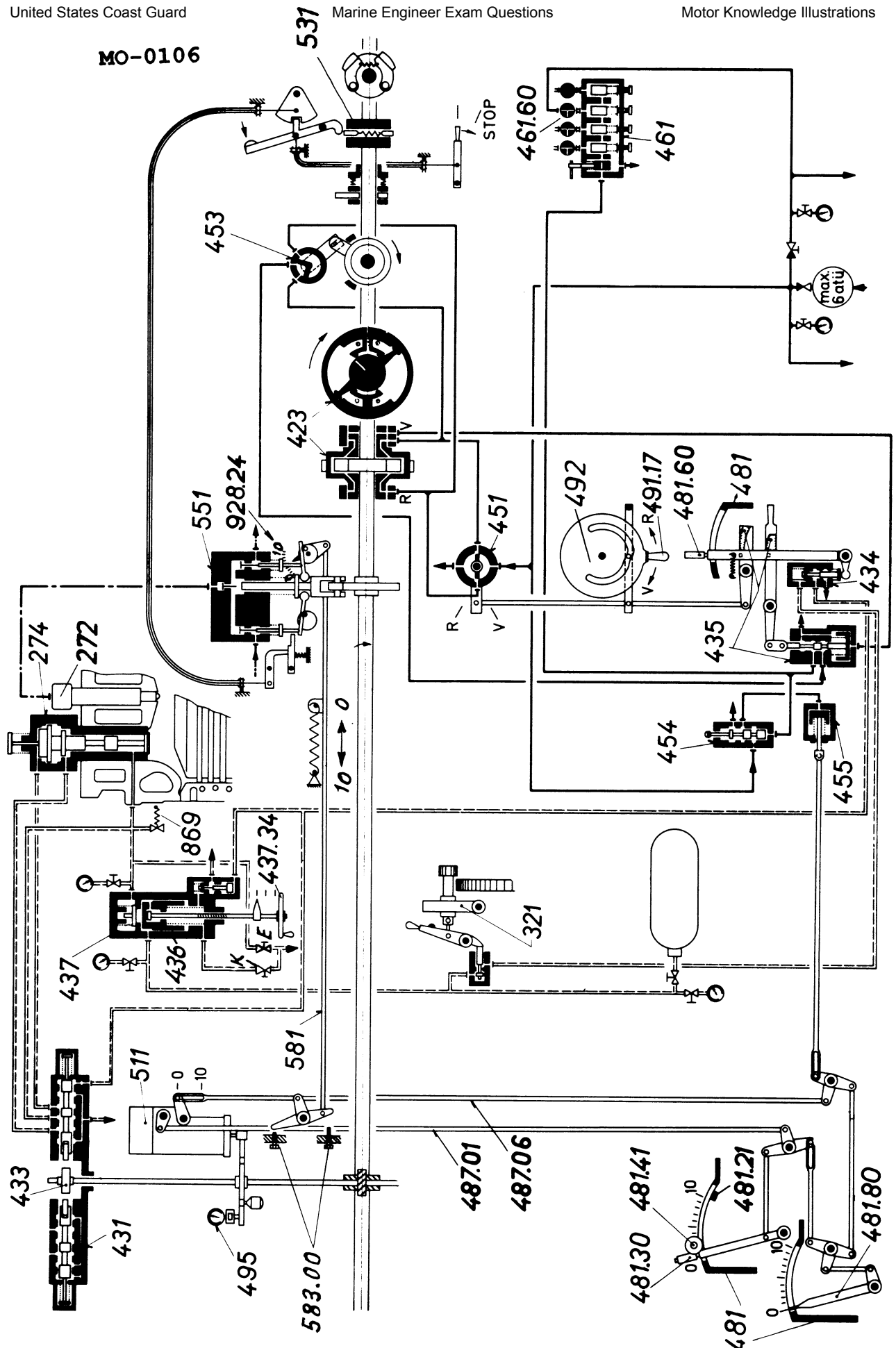
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**MO-0105**

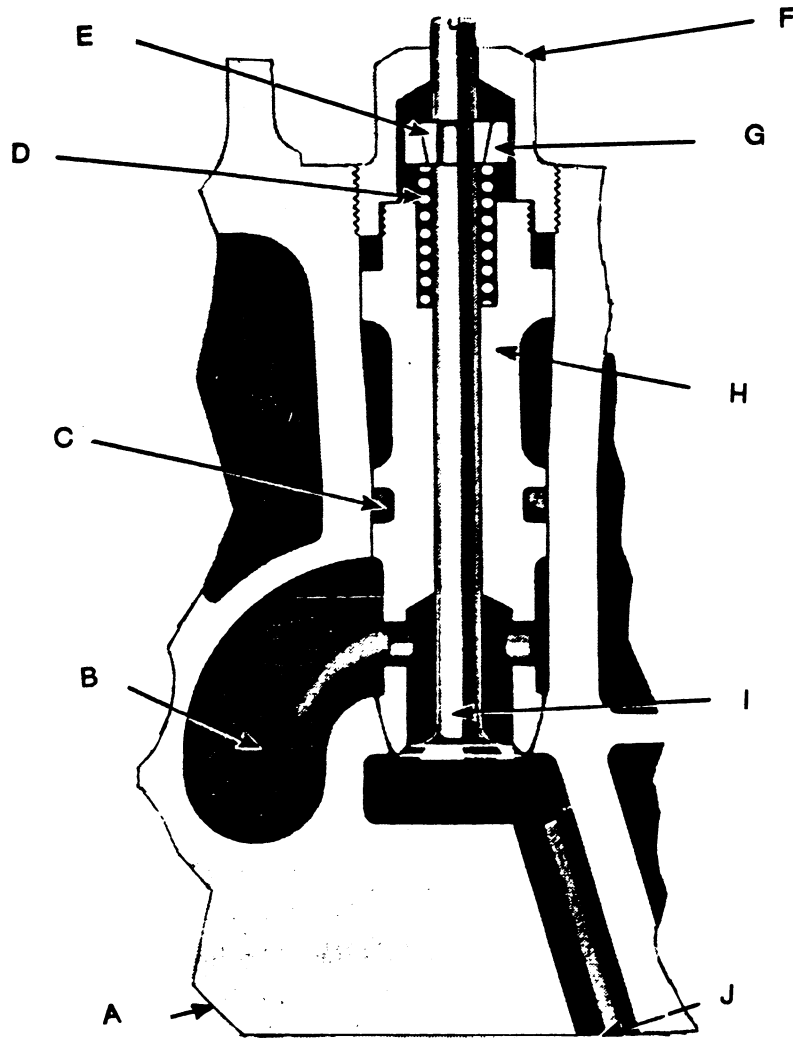




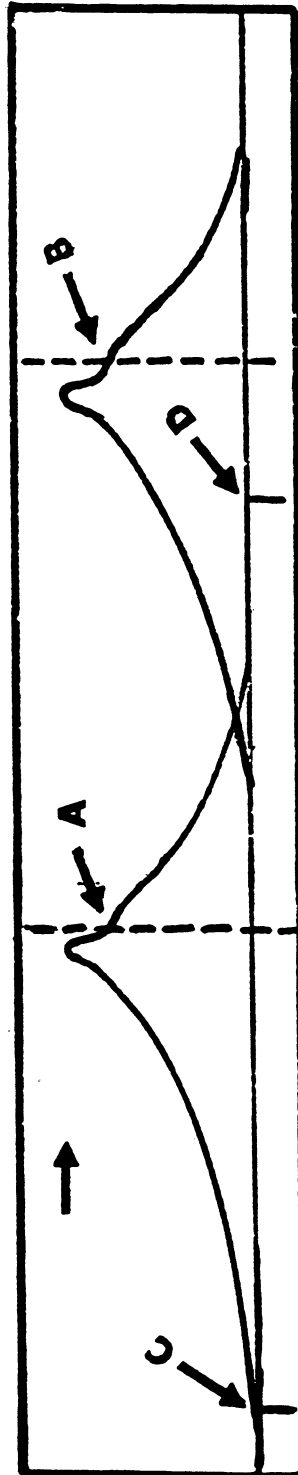
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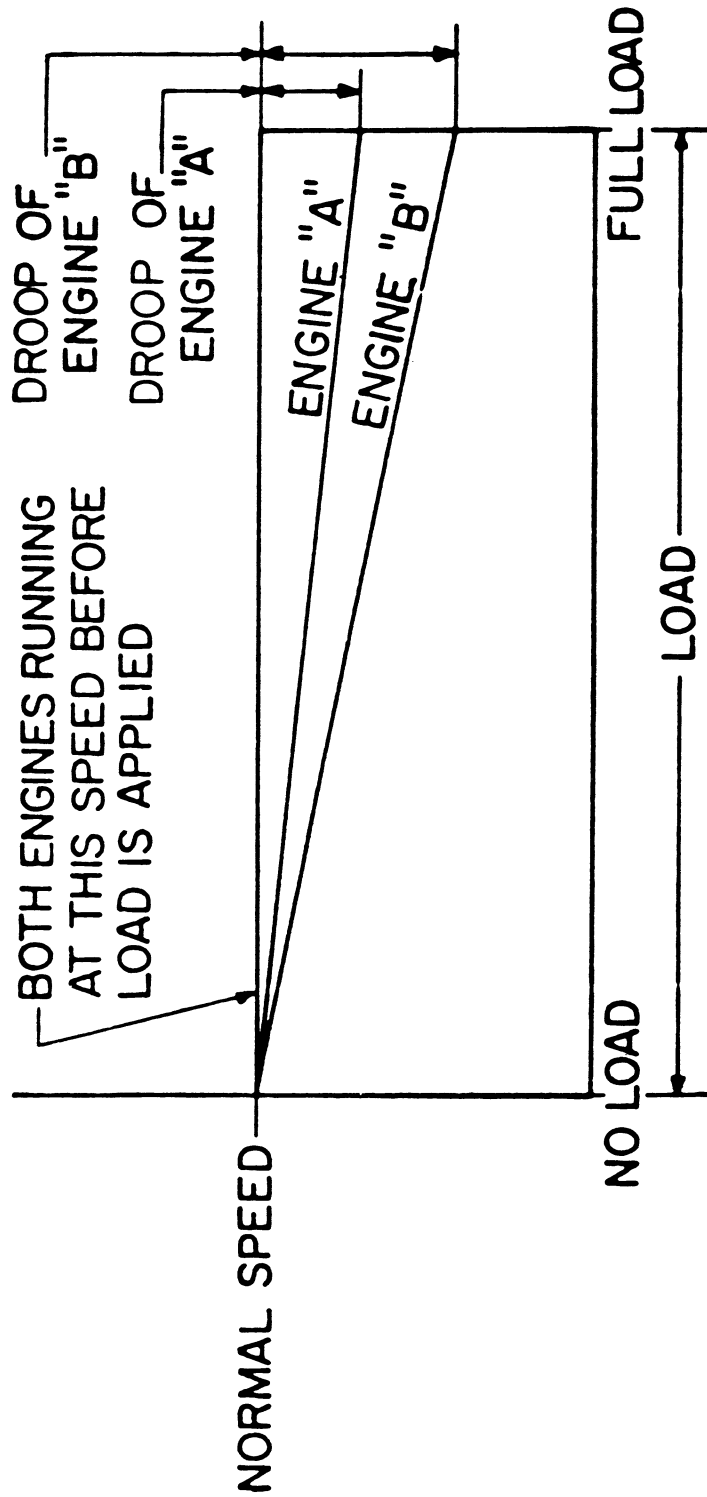
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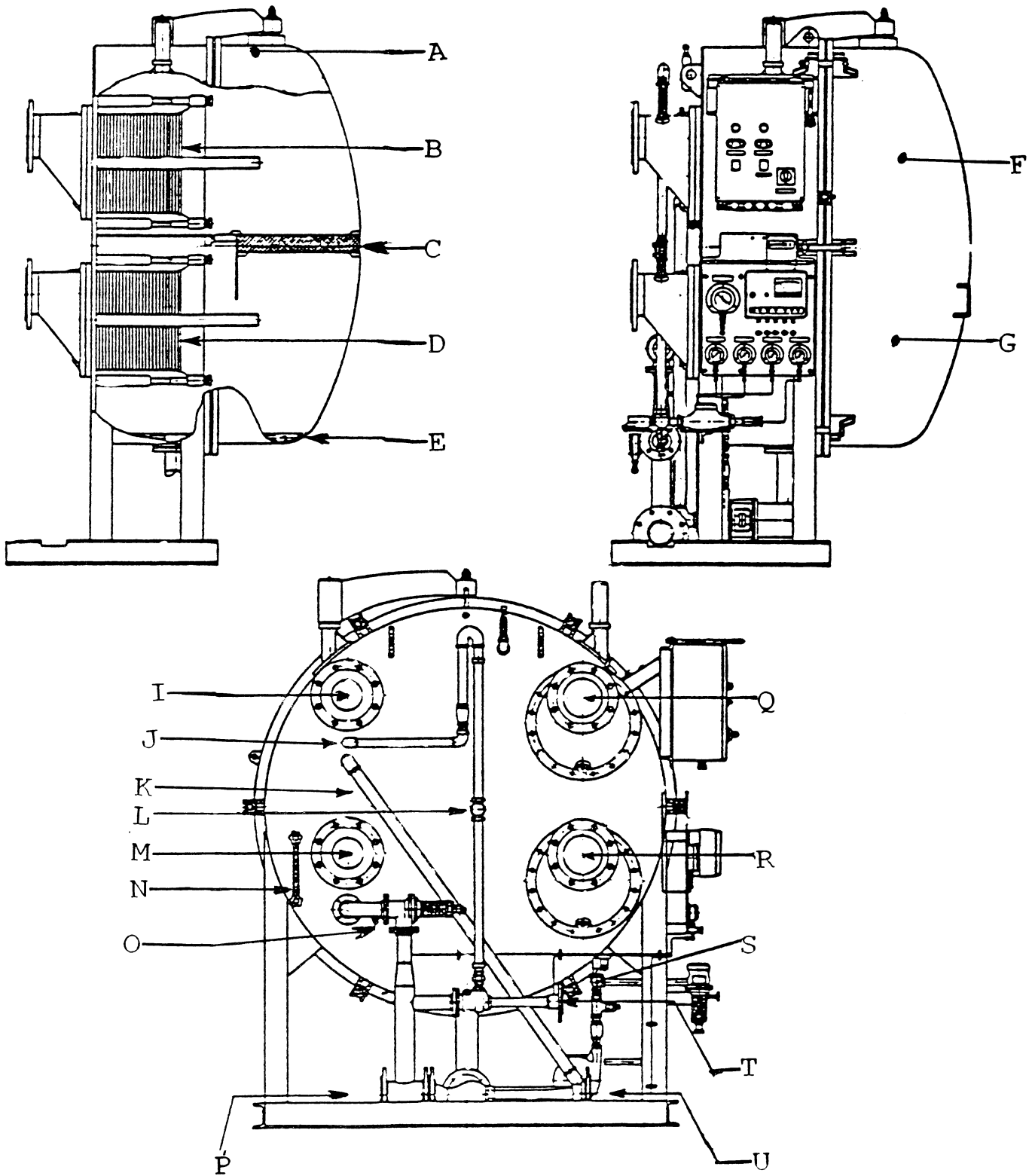
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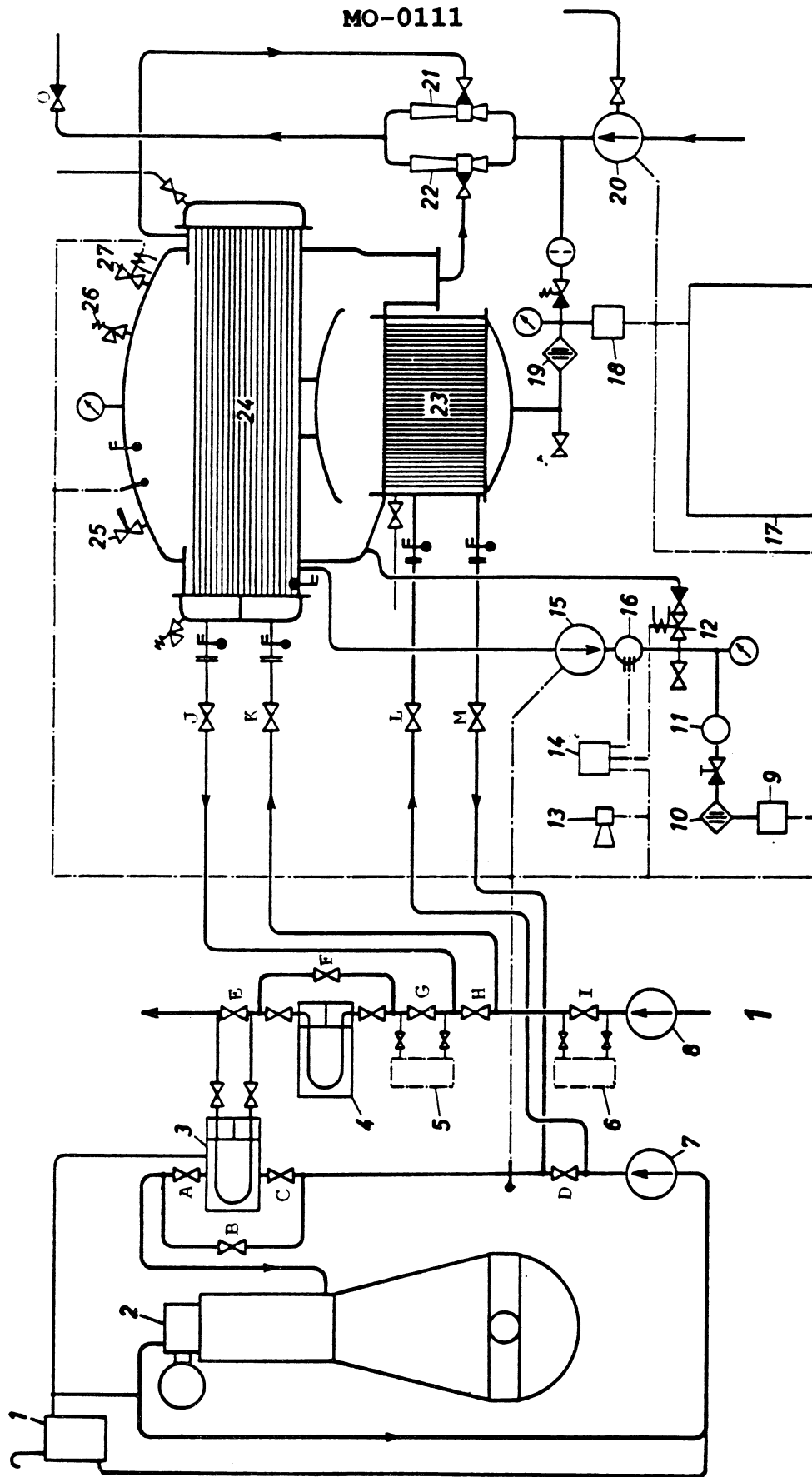
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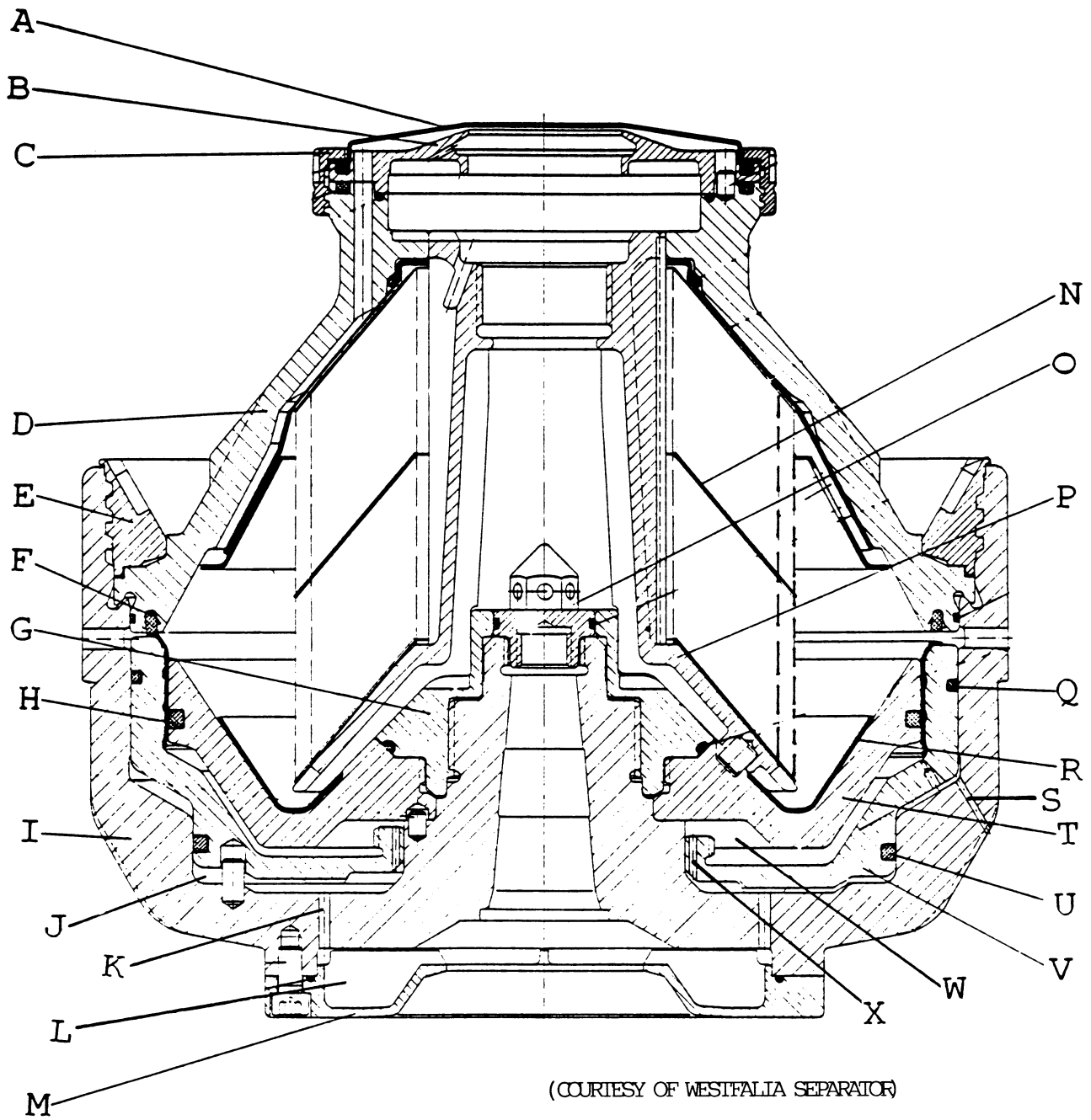


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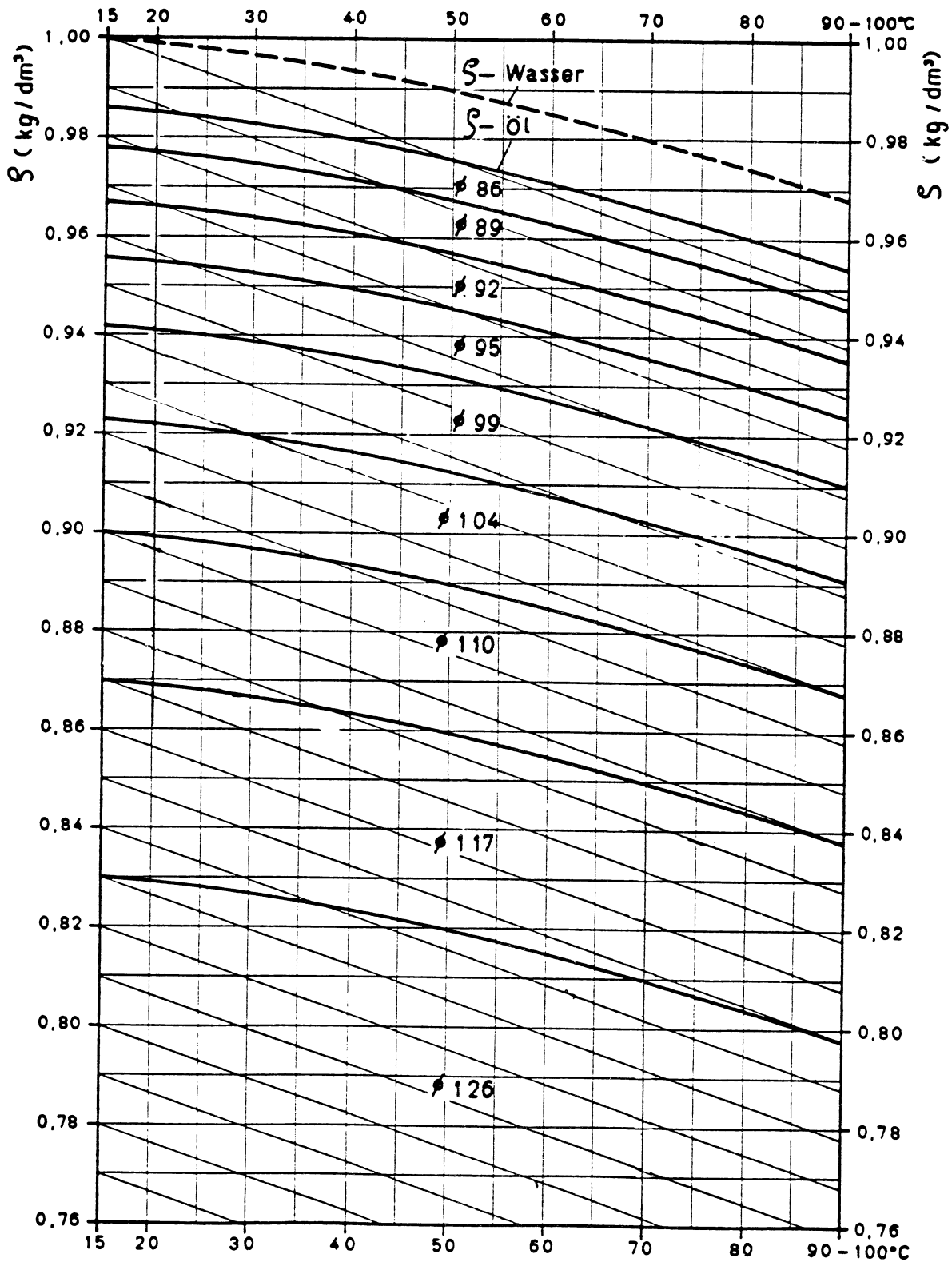


(COURTESY OF G.E.C. GAD PUBLISHERS)

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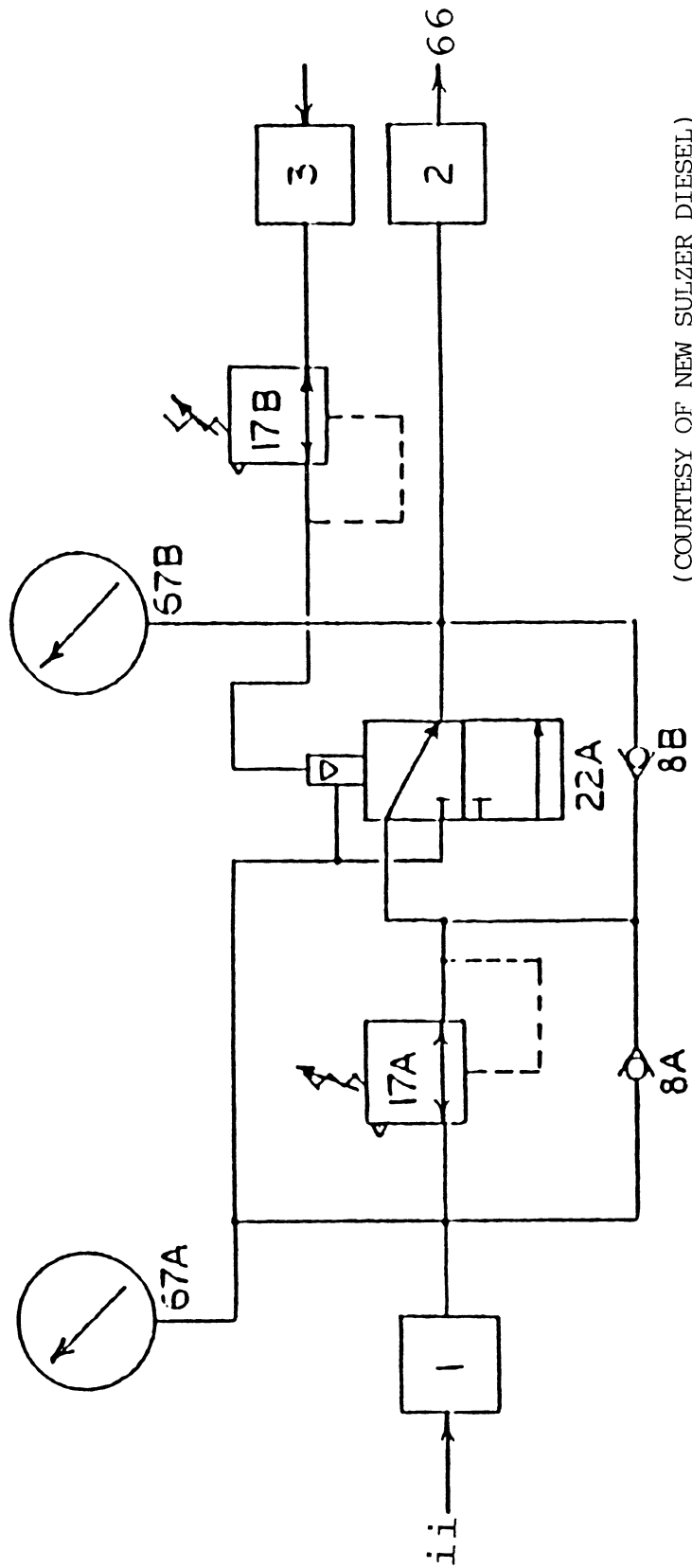
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Separating temperature

(COURTESY OF WESTFALIA SEPARATOR)

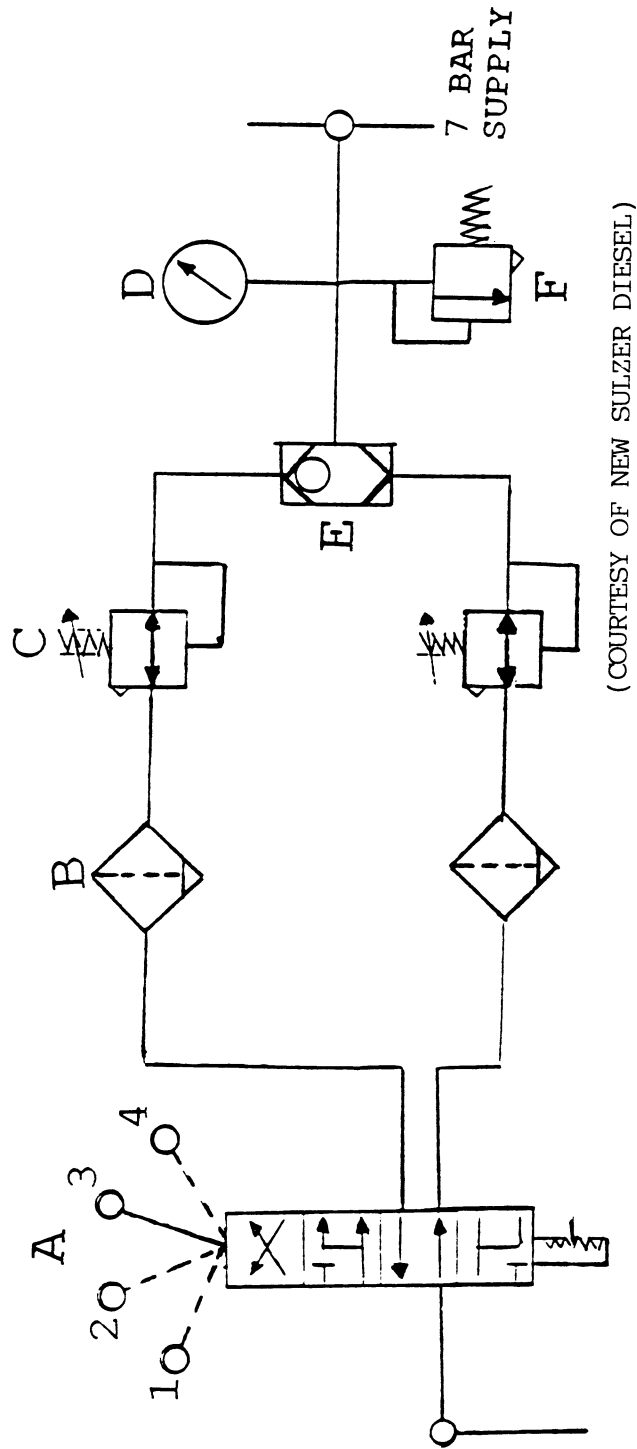
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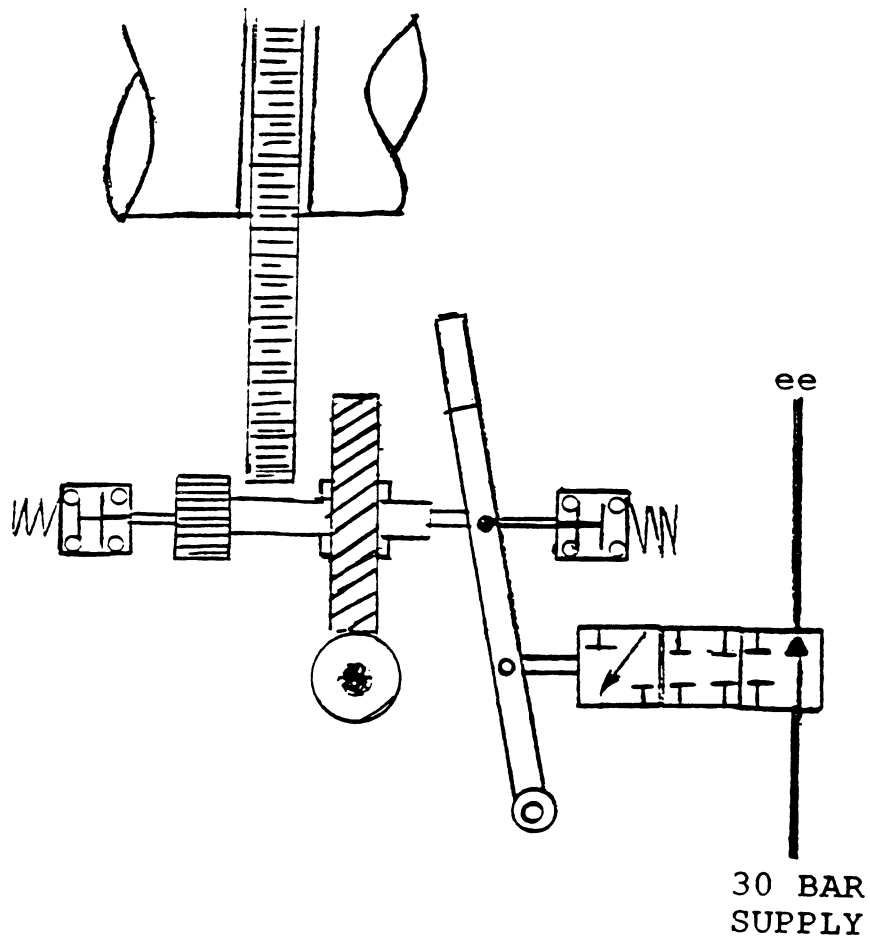


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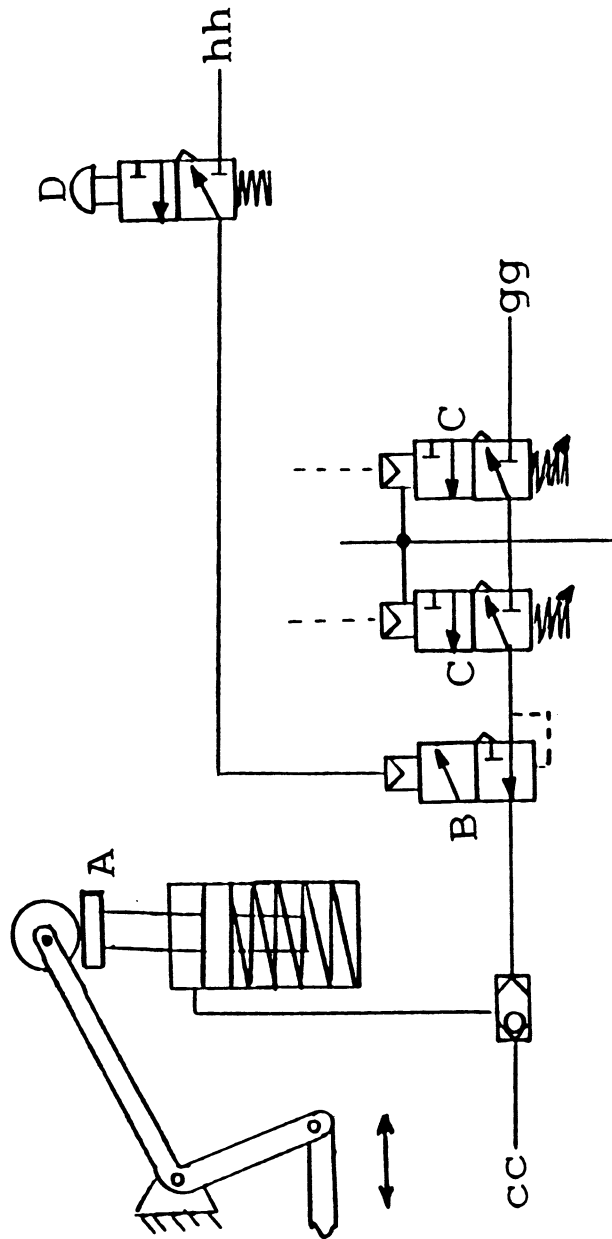
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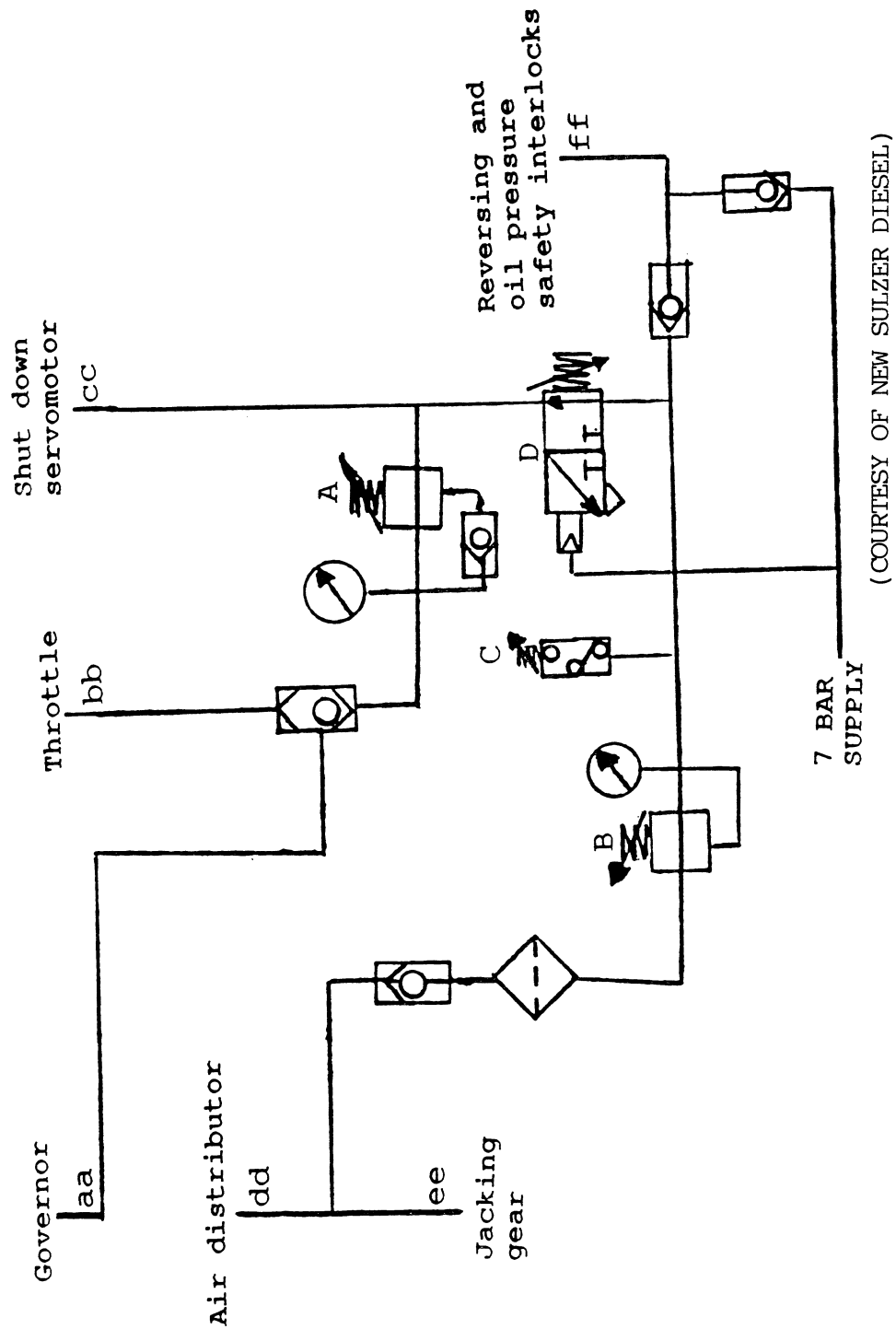
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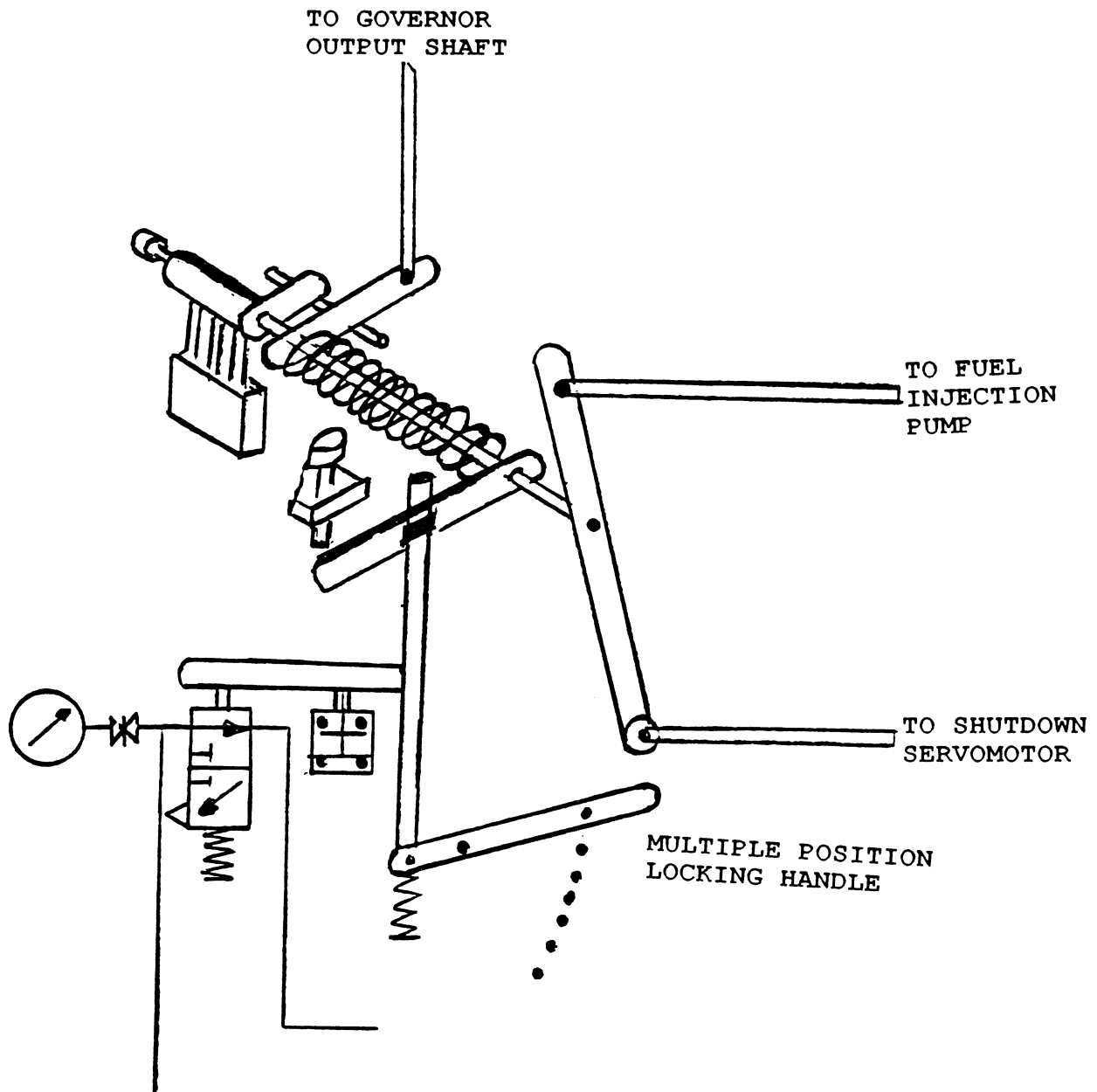


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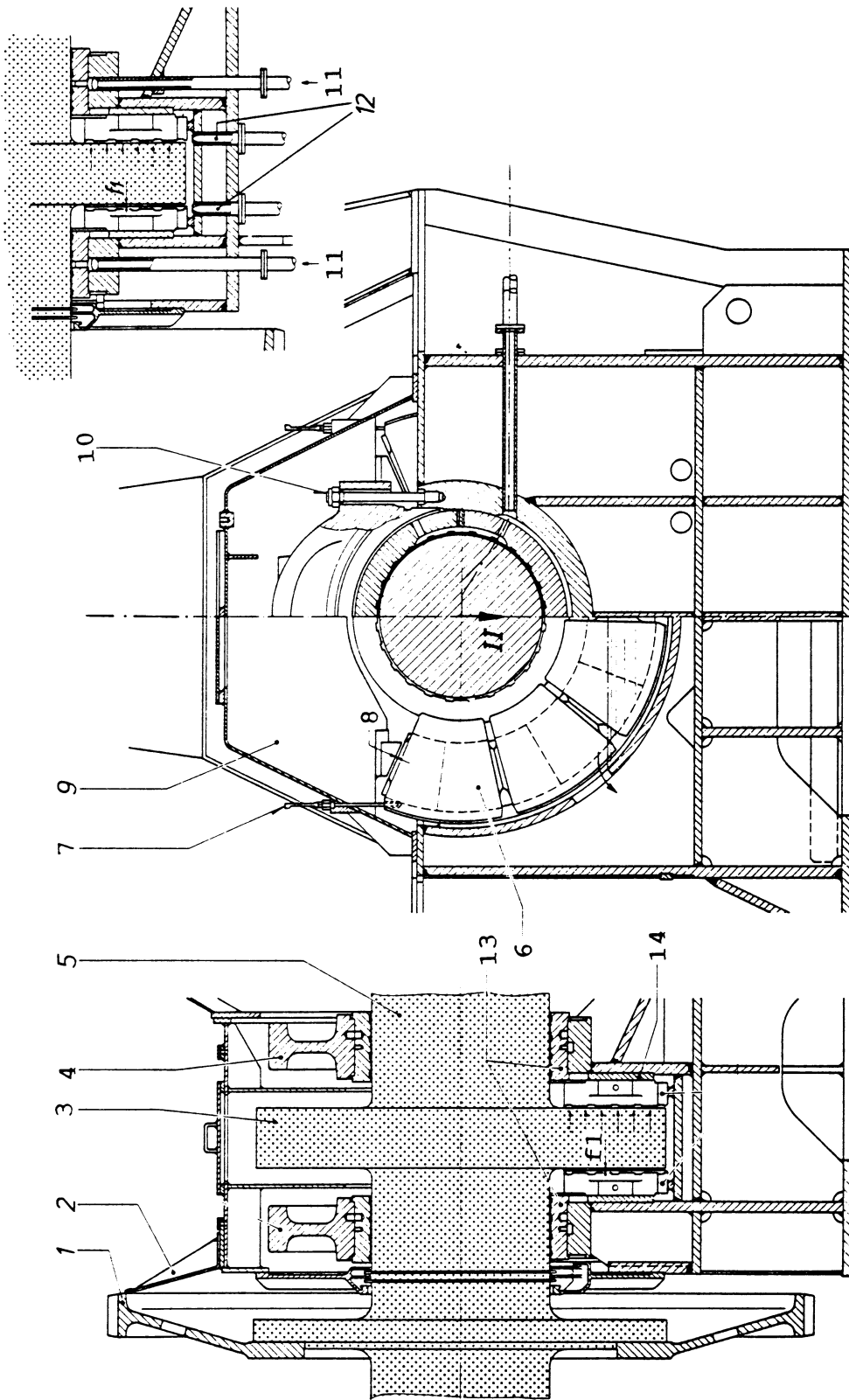


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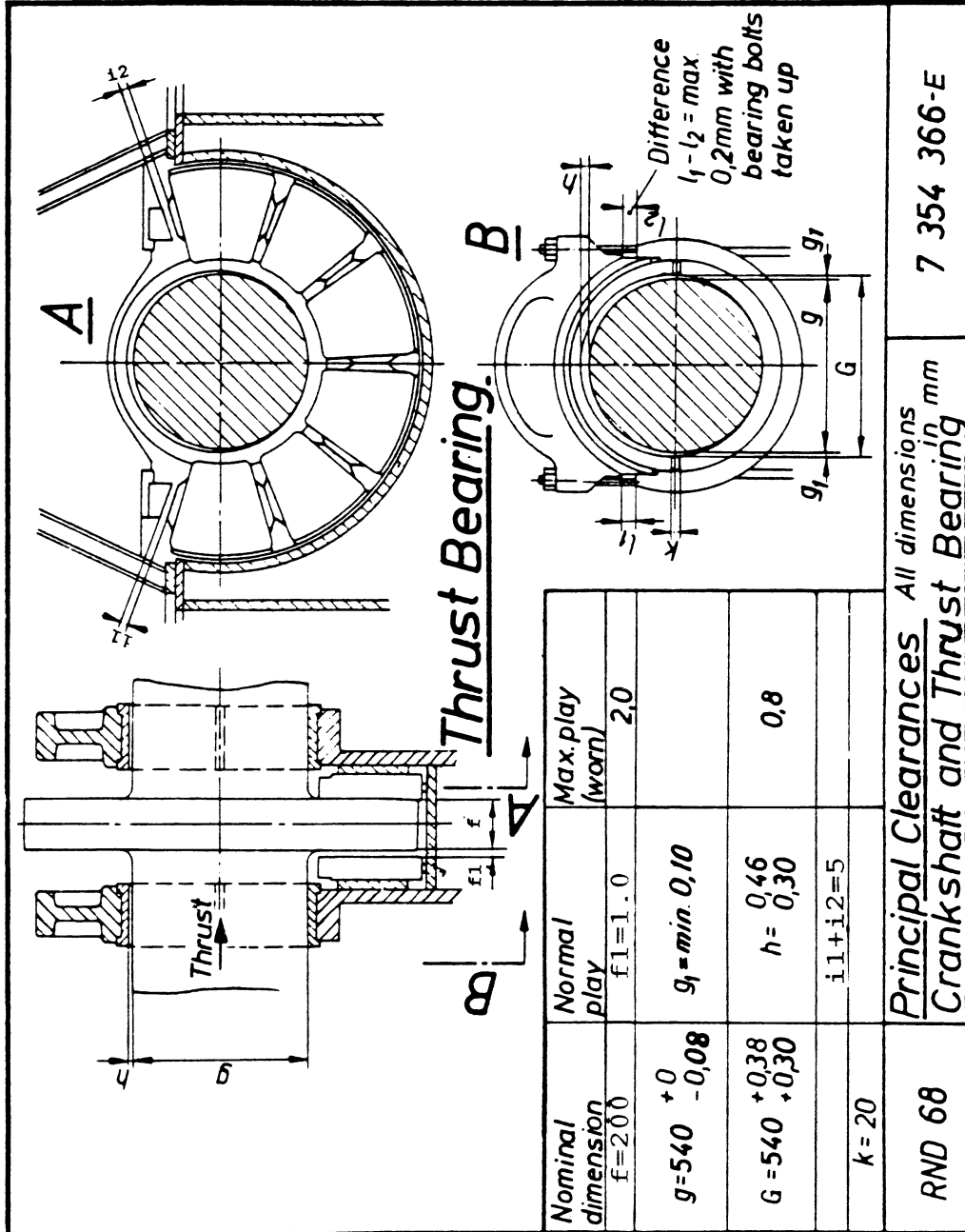
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(COURTESY OF NEW SUJZER DIESEL)

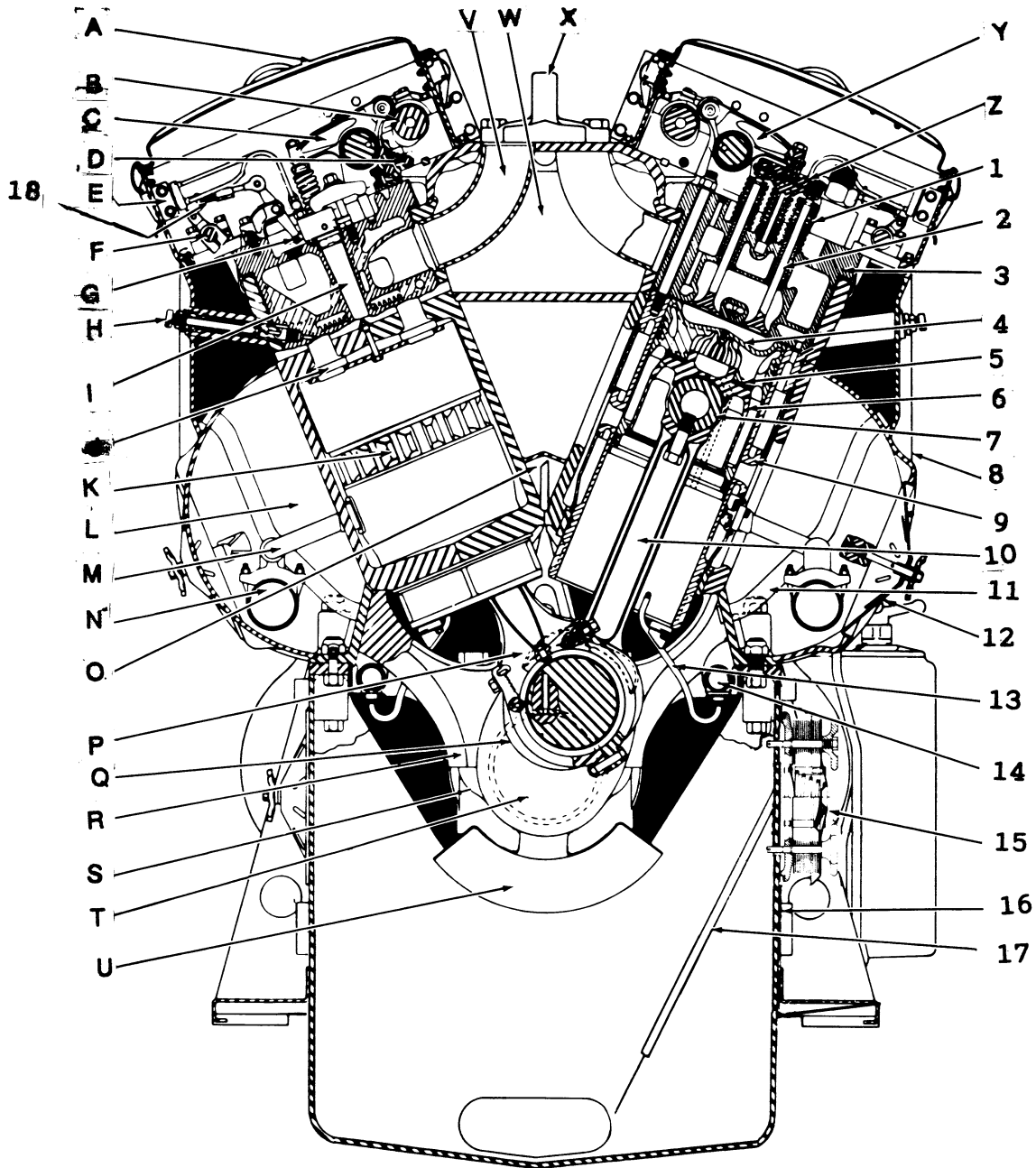
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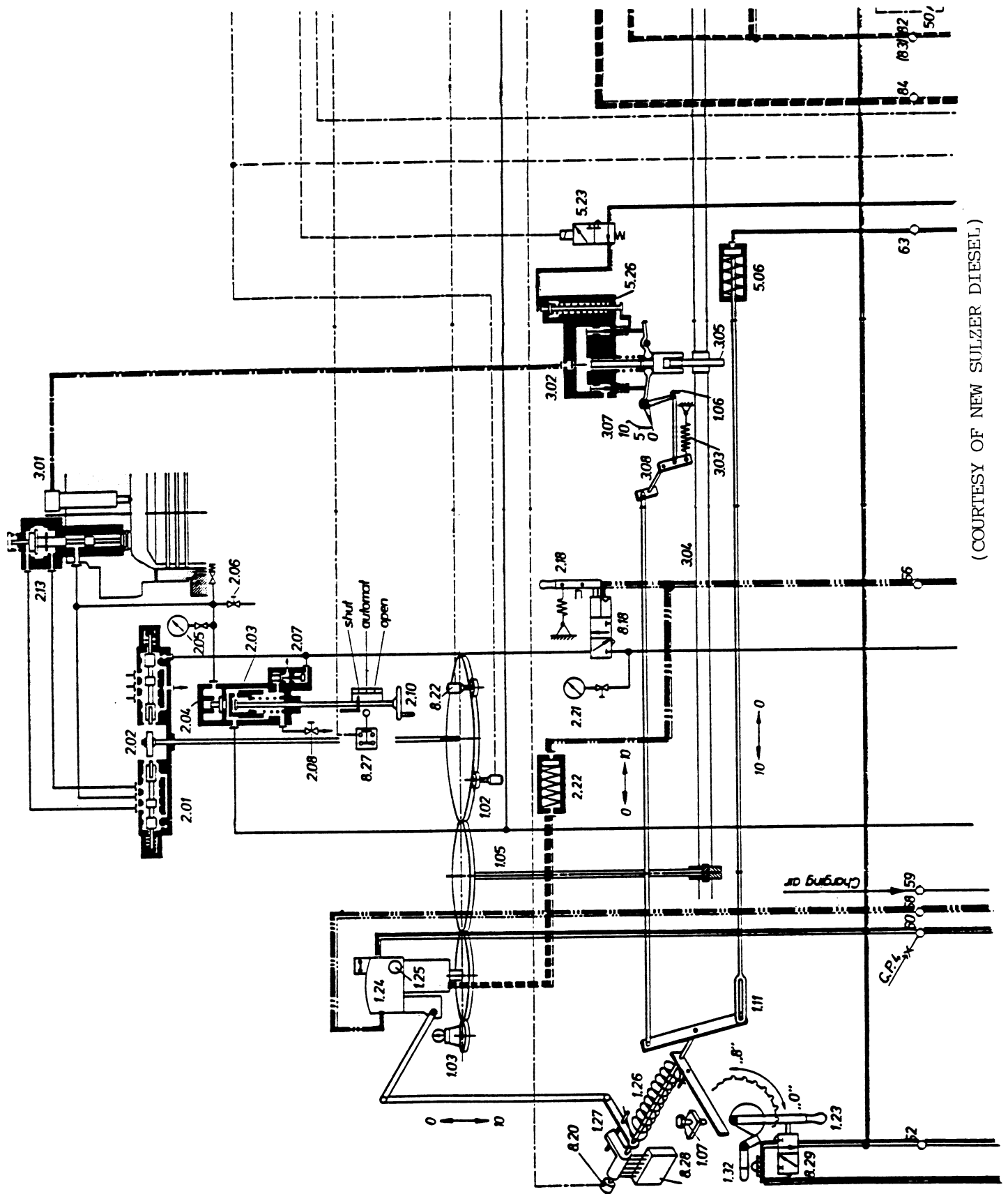


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3-104



MO-0123-A

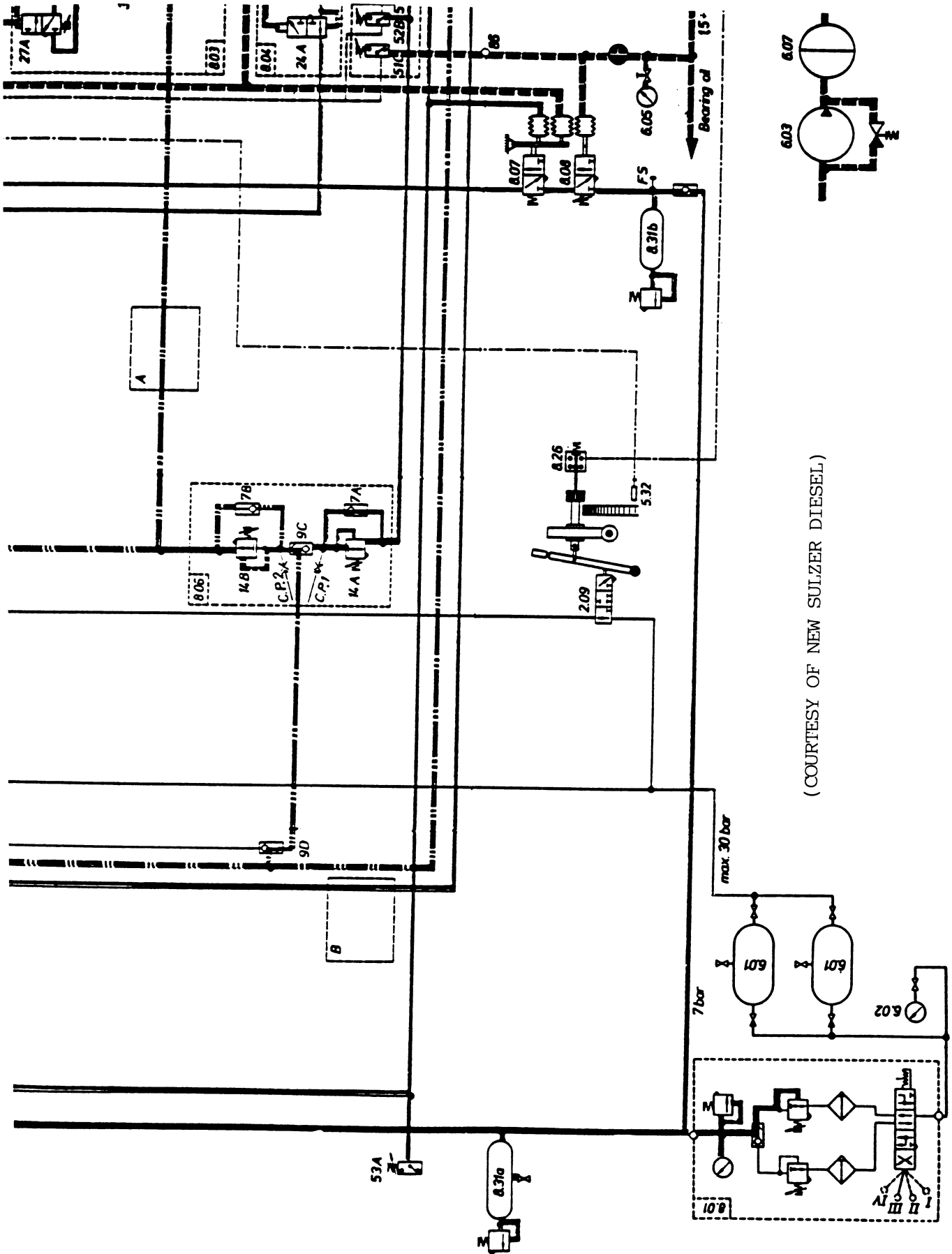
Page 1 of a two page illustration



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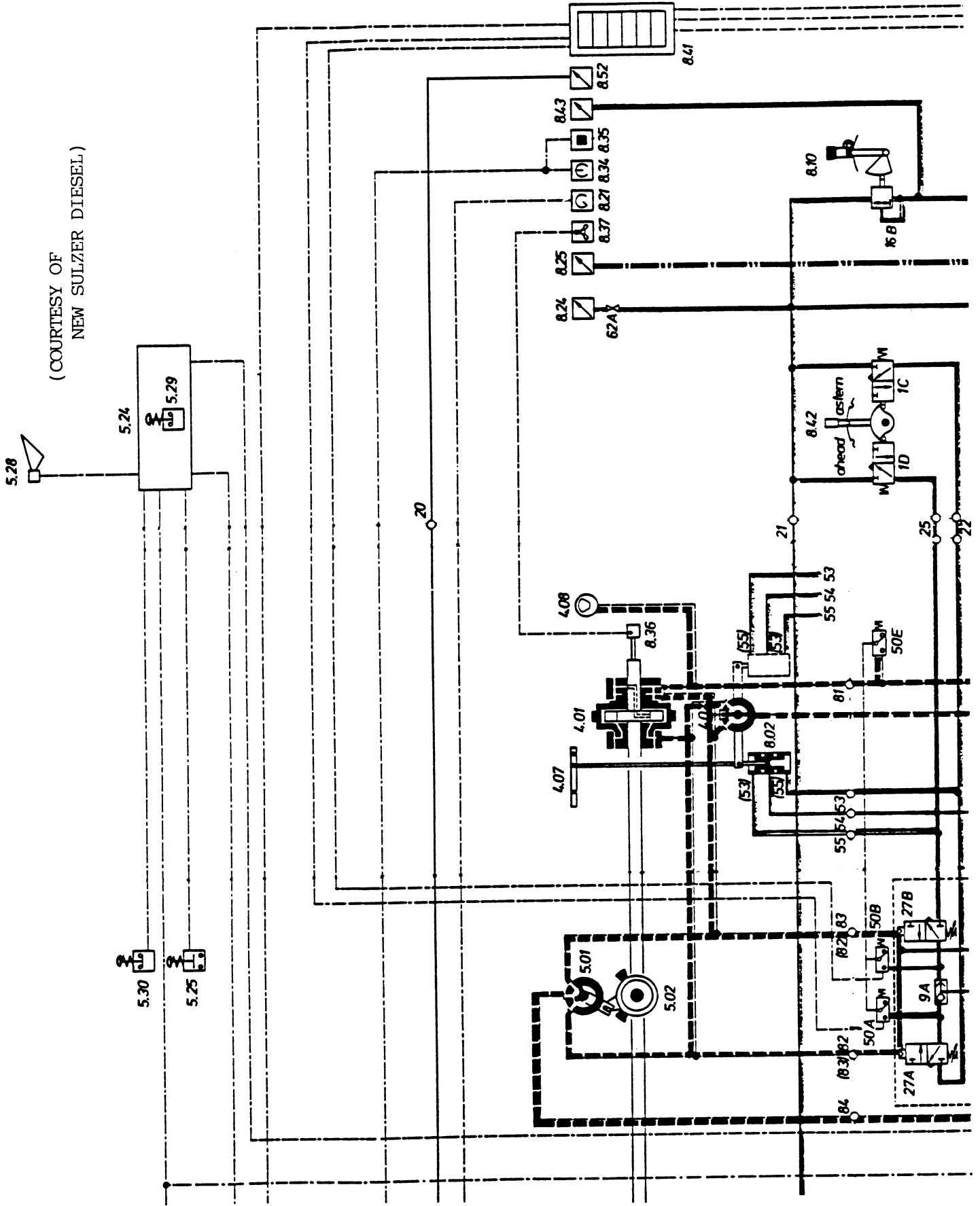
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Page 2 of a two page illustration



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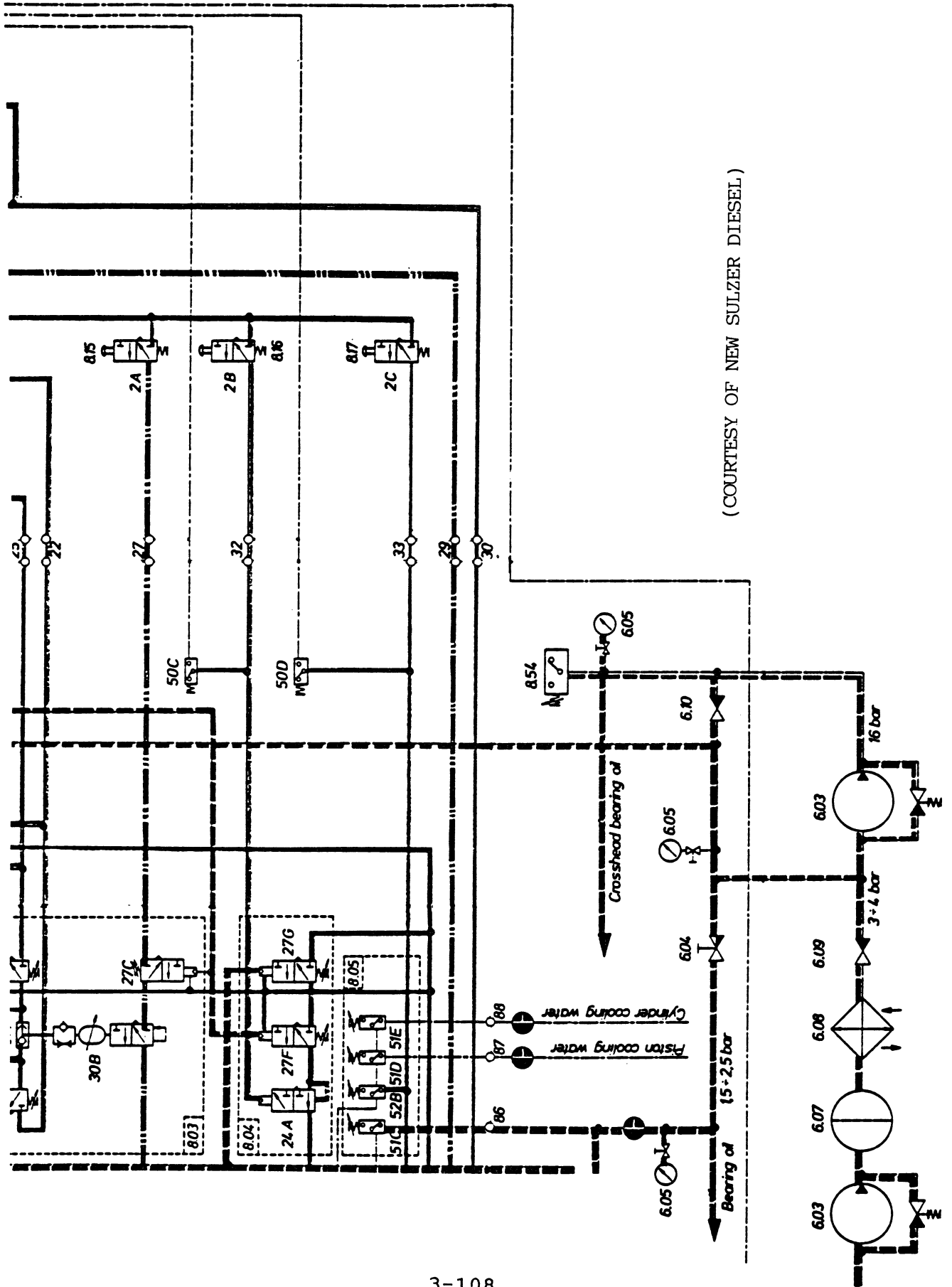
Page 1 of a two page illustration



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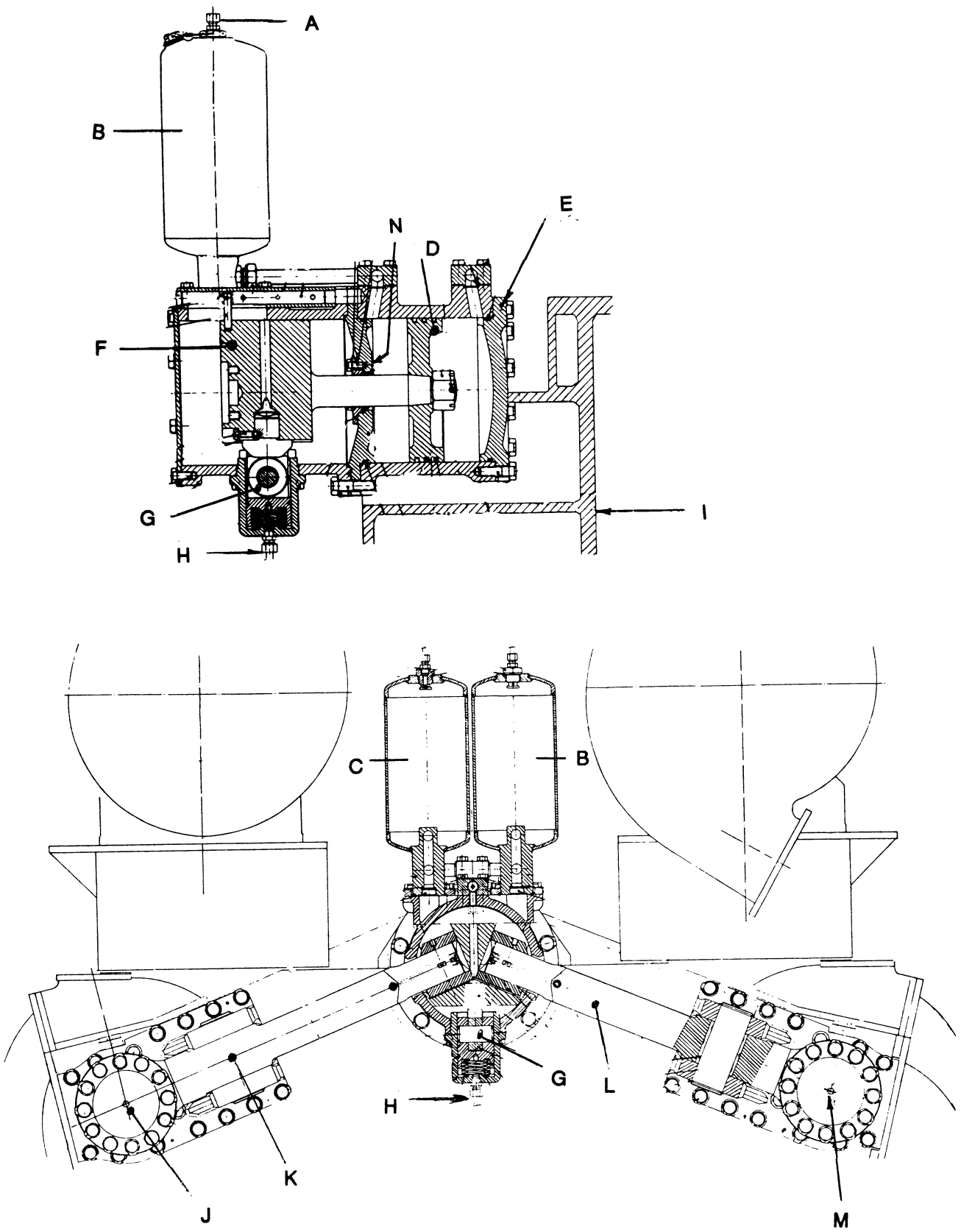
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Page 2 of a two page illustration



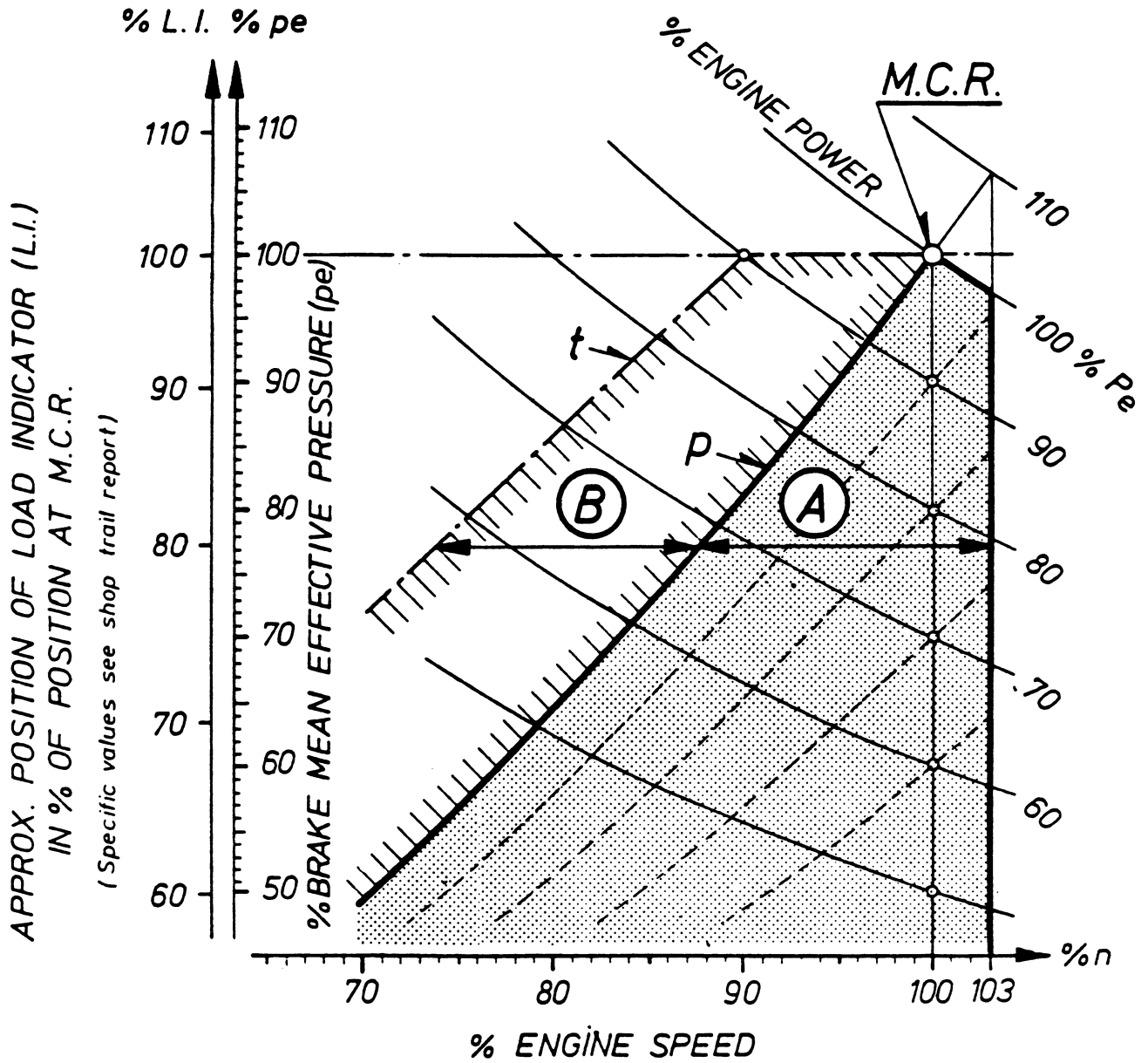
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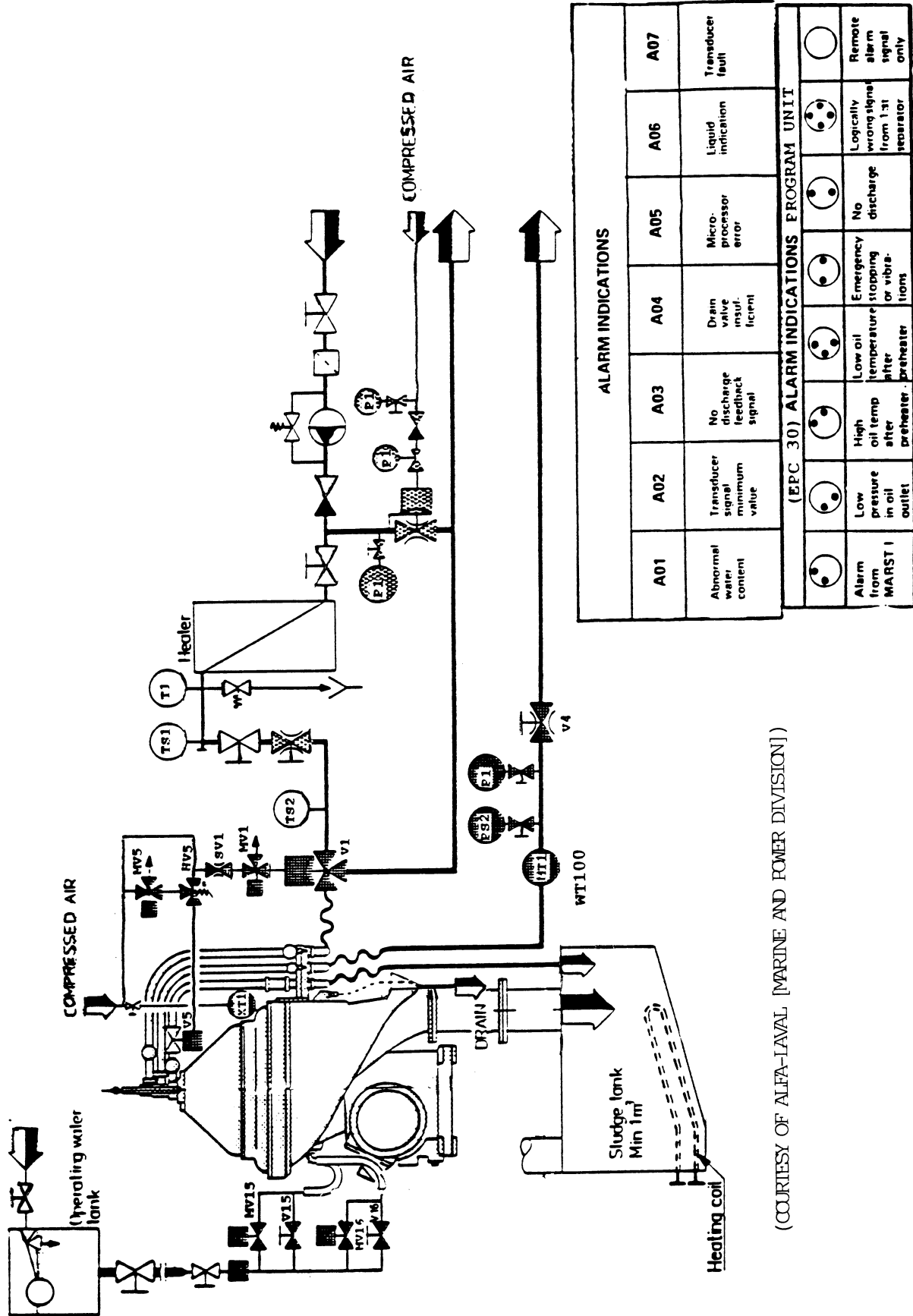
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MO-0126



(COURTESY OF NEW SULZER DIESEL)

MO-0127



(COURTESY OF ALFA-LAVAL [MARINE AND POWER DIVISION])