

SECTION III

DESCRIPTION

A. CASE

The case consists of three parts: i. e., Base, Body and Cover. They are machined accurately from special aluminum castings and forgings. Before assembly, they are anodized to prevent corrosion.

B. BOOSTER GEAR PUMP

This consists of the Drive Gear Shaft, the Idler Gear and the Idler Gear Shaft.

The Drive Gear Shaft is made from molybdenum steel. It is through this shaft that the gear pump and the flyball assembly are driven. One end of the shaft has twelve splines which are designed to fit the engine drive coupling. Above and below the spur gear portion of the shaft are bearing surfaces and located at each of these are oil ports. The upper ports permit the high pressure oil from the booster pump to enter the drive gear shaft. The lower ports are open to the propeller oil line. The bearing surfaces and the inner walls of the shaft are held to close tolerance limits.

The Idler Gear is made from molybdenum steel. The Idler Gear is supported by the Idler Gear Shaft. This shaft is hollow and is made from cast iron. Cast iron is used to provide a satisfactory bearing surface for the Idler Gear. The pump gear wear is evenly distributed by using thirteen teeth on the drive gear and fourteen teeth on the Idler Gear.

C. RELIEF VALVE ASSEMBLY

This assembly consists of a Bushing, Plunger, Spring and Plug with Locking Washer. The Bushing is made from hardened carbon steel and is a press fit in the body, and acts as a guide from the Plunger. The Plunger is also made from hardened carbon steel. The O. D. of the outer end of the Bushing is reduced and the end slotted. This permits any oil which may work past the plunger to escape through the relief valve drain channel. The Spring is inspected for flatness and must, when the Plug is screwed tightly in place, relieve at 180-200 pounds pressure. This relief pressure requires adjustment only at overhaul periods.

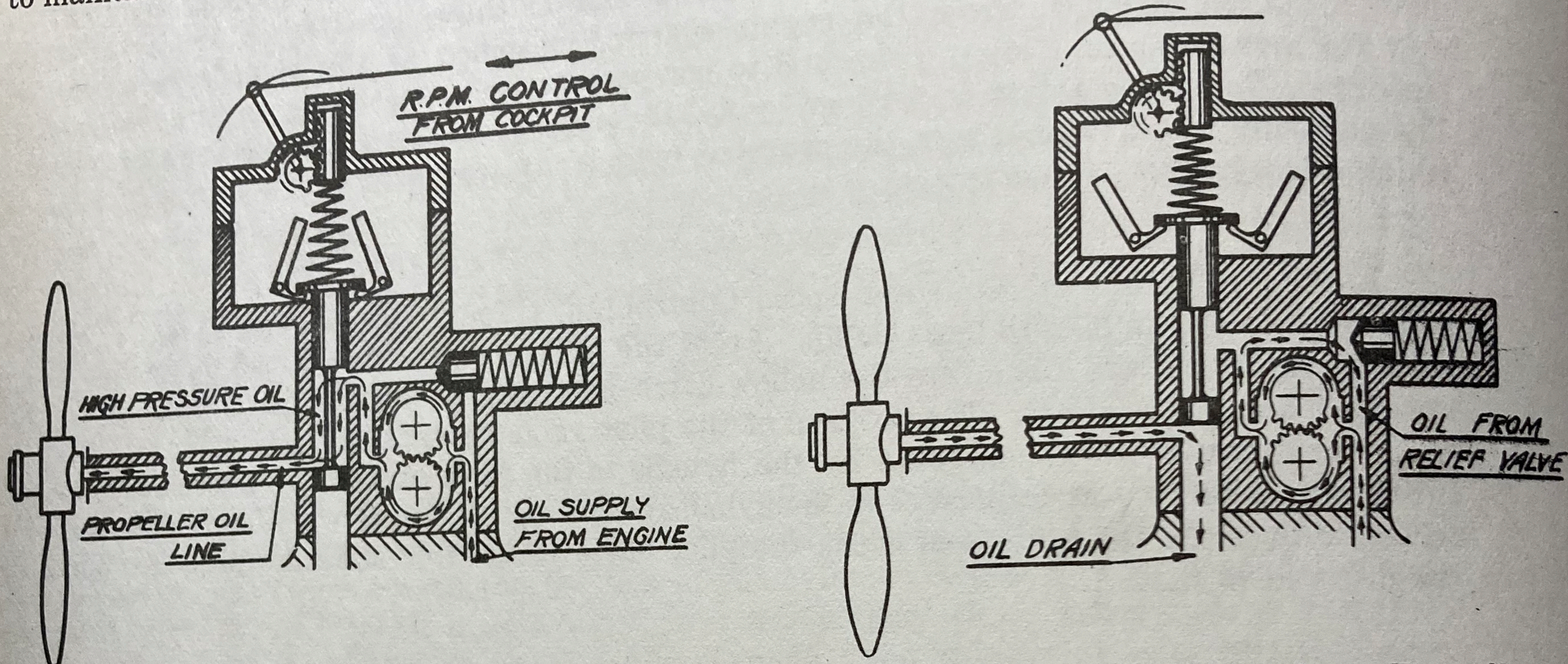
D. PILOT VALVE — SPEEDER SPRING ASSEMBLY

The Pilot Valve is made from a carbon steel which is case hardened. The upper and lower bearing surfaces are held to close tolerance limits. The upper end of the pilot valve is threaded to fit the spring collar. Between the threaded portion and the upper bearing surface is located the Pilot Valve Ball Bearing. This ball bearing is a press fit on the Pilot Valve. The Pilot Valve is designed to equalize the pressure forces of the oil.

The Spring Collar is made from a carbon steel which is not hardened. It is threaded at the lower end to fit the pilot valve stem and is threaded at the upper end for the pilot valve nut and lock nut. The flange at the base of the spring collar supports the base of the speeder spring.

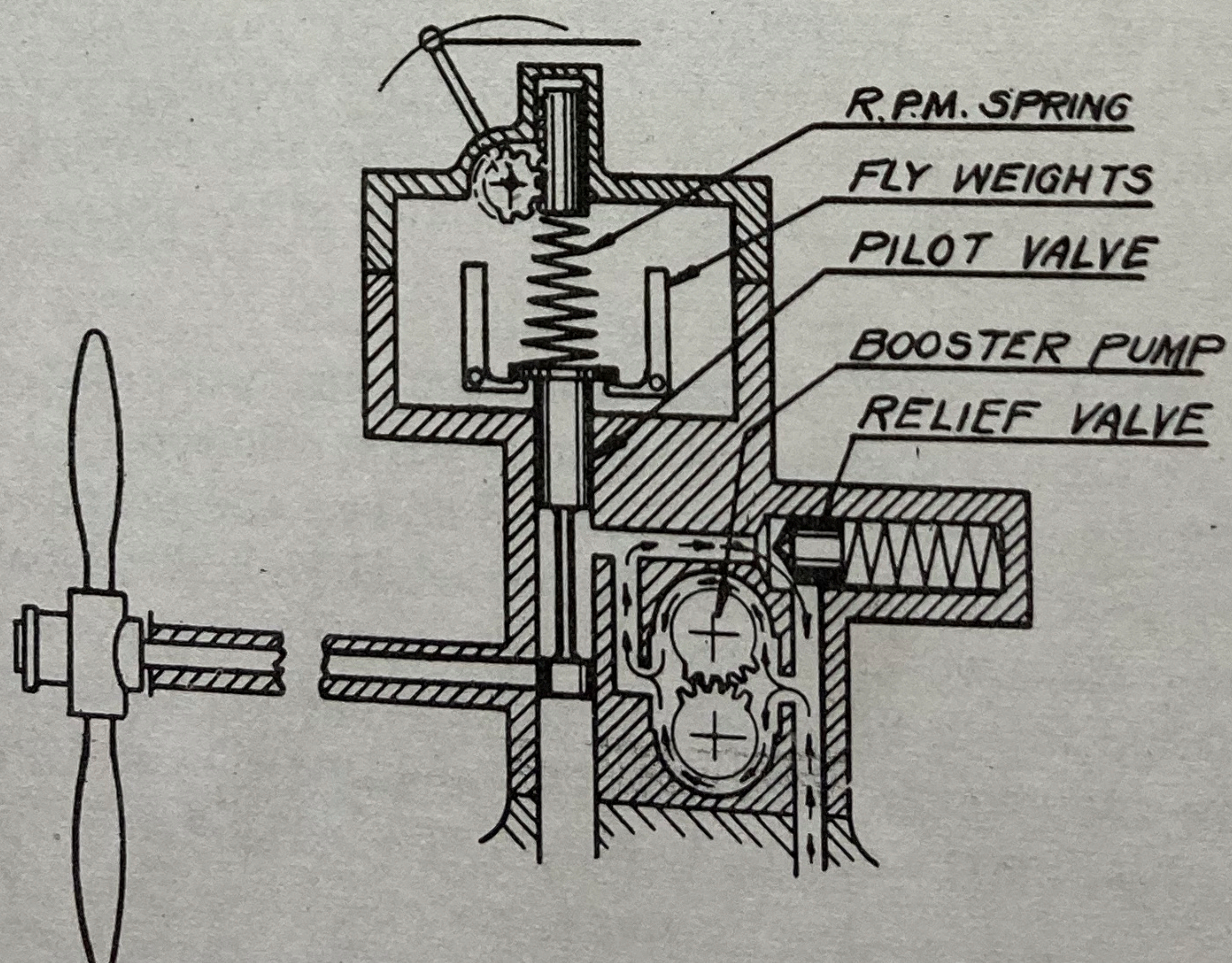
ting is increased. tional speed and a corresponding system is thrown out of balance as the force generated by the flyballs lift the pilot valve and open the propeller ports to the drain position. In moving outward, the flyballs lift the pilot valve, permitting the blades to assume a higher pitch and thus bring the engine RPM back to the desired figure.

Under actual operating conditions, the pilot valve speeder spring system is rarely in the position indicated by the "On Speed" sketch. Due to more or less constant changes in altitude, to bumpy air, to variations in engine h. p., or to maneuvers of the plane, the Constant Speed Control is continually operating to make corrections in propeller blade pitches necessary to maintain the engine RPM constant.



UNDERSPEED—High Pressure Oil Enters Propeller Line To Decrease Pitch

OVERSPEED—Oil Drains from Propeller To Increase Pitch



ON SPEED—Pilot Valve Closes Propeller Line To Maintain Pitch

ACCEPTANCE TEST FOR CONSTANT SPEED CONTROLS

HAMILTON STANDARD SPECIFICATION NO. 14

This specification applies to both new and serviced Constant Speed Controls.

Before shipment, each Constant Speed Control will be subjected to a one hour continuous run, after which it is tested, to insure that the Control complies with the following requirements:

1. The internal leakage, when operating at 1750 RPM and at a pressure between 180 and 200 lbs. per square inch, does not exceed 20 quarts* per hour with the governor set in positive low pitch position.
2. The relief valve is set to maintain a pump pressure of from 180 to 200 lbs. per square inch.
3. There is no external leakage when the pump chamber and oil passages are subjected to a pressure of 400 lbs. per square inch.
4. The pump capacity is not less than 8 quarts per minute at 175° RPM, at a back pressure of 150 lbs. per square inch.
5. All the above tests are to be conducted at room temperature, using an oil of approximately SAE No. 10 viscosity.
6. A record of the above data is to be made on a suitable form and filed with the parts list applying to each governor assembled.
7. Name plates bearing the model and serial numbers of the governor are to be fastened on each unit in accordance with SK 1867.

* For serviced Controls, 30 quarts per hour is permissible.

It is also essential that the unit be carefully checked to insure that there are no external oil leaks. The point at which leaks are most likely to occur is at the joining surfaces of the mounting base and at the control shaft.

Constant Speed Controls which do not meet the above requirements should be returned to the factory for overhaul.

DIRECTION OF DRIVE ROTATION

The Constant Speed Control is so designed that it can be adapted to operate for clockwise or counter clockwise direction of rotation. Located on both the high pressure and the low pressure side of the booster pump are two plug holes; one in the base for engine inlet oil, and one in the body for high pressure booster pump oil. The four holes are stamped A and B in the base, and B and A in the body. Two Oil Control Plugs are screwed in the A-A holes if the direction of rotation of the drive, when viewing the engine pad, is counter clockwise, and in the B-B holes, if the drive rotation is clockwise.

SECTION VI

INSPECTION AND MAINTENANCE

Since the Constant Speed Control is a self-contained unit continually working in oil, it is subjected to little wear. Between overhauls, the only inspection necessary is a visual examination to see that there are no external oil leaks and that the control system is free from lost motion. In cases where external piping is required, special attention should be given to the high pressure oil line to insure that it is securely mounted and not subjected to excessive vibrations which might cause failure.

A. INSPECTION

Maintenance at overhaul periods consists mainly of cleaning the unit. The following parts, however, should be inspected for wear:

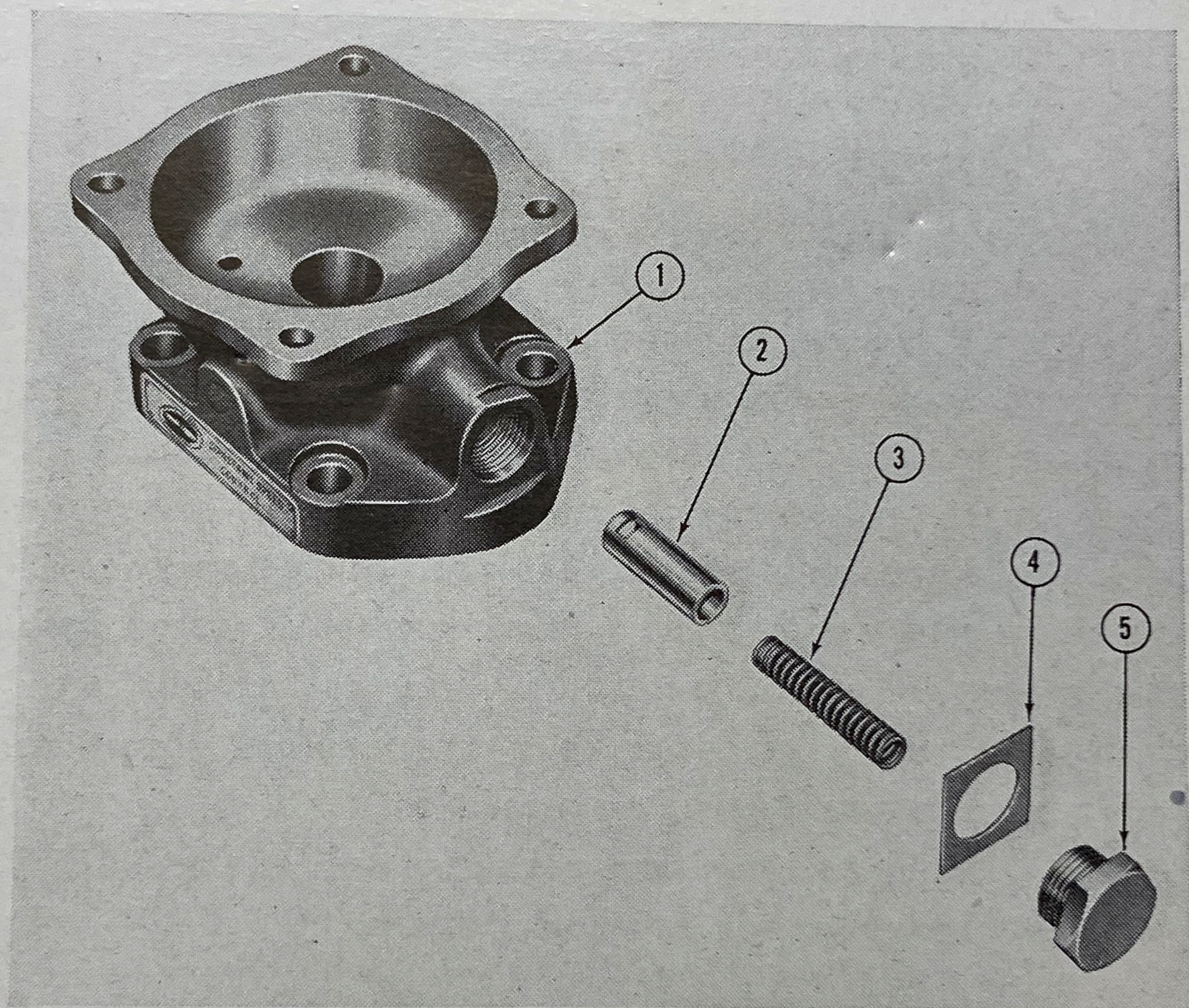
1. The pilot valve ball bearing should be cleaned and carefully examined to insure good condition. This part should be replaced if found worn.
2. The threads on the upper end of the spring collar should be examined to be sure that they have not been worn by the pilot valve nut. If worn, the pilot valve spring collar assembly should be replaced.
3. The spring collar spacer and the oil pressure relief valve plunger should be inspected for indications of scoring. If these units show signs of being scored they should be polished with fine emery and crocus cloth.
4. The idler gear shaft should be inspected for side wear. If it shows indications of being worn, the shaft should be replaced.
5. The teeth of the control shaft should be inspected for wear. This shaft is plated and the wearing off of the plating should not be confused with actual wearing of the teeth. This shaft should be replaced if the teeth are badly worn.
6. The test stand run-up of the unit will check the wear on the gear pump, the fit of the pilot valve in the drive gear shaft, and the oil pressure relief valve assembly.

B. TESTING

* Drawing M-85 shows a satisfactory test stand set-up. This apparatus consists of a suitable mounting for the control unit, driven by a $\frac{1}{2}$ h. p. motor. A supply of oil is required having a viscosity of engine oil at operating temperature. (SAE 10 approximates this requirement). A suitable oil pressure gauge, piping, and valves complete the apparatus.

* Drawing M-85, 1 and 2 may be obtained upon request from Hamilton Standard Propellers, East Hartford, Conn.

rear chamber to the fly-weight chamber prevents pressure build-up due to leakage past the plunger, which would otherwise make the valve inoperative. Since the function of the relief valve is to limit the



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| 1 GOVERNOR BODY | 3 RELIEF VALVE SPRING |
| 2 RELIEF VALVE PLUNGER | 4 RELIEF VALVE GASKET |
| 5 RELIEF VALVE PLUG | |

Figure 11—Single Capacity Relief Valve