United States Patent

[11] 3,626,920

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[54] **POSITIONER, CONTROLLER AND GOVERNOR OR SAFETY SHUTOFF MECHANISM FOR A PRIME MOVER**
4 Claims, 10 Drawing Figs.

[52] **U.S. Cl.** ..... **123/198 DB,** 123/198 DC, 123/140 FG
[51] **Int. Cl.** **F01m 1/24,** F02b 77/00
[50] **Field of Search** ..... 123/198 DB, 198 DC, 140 FG

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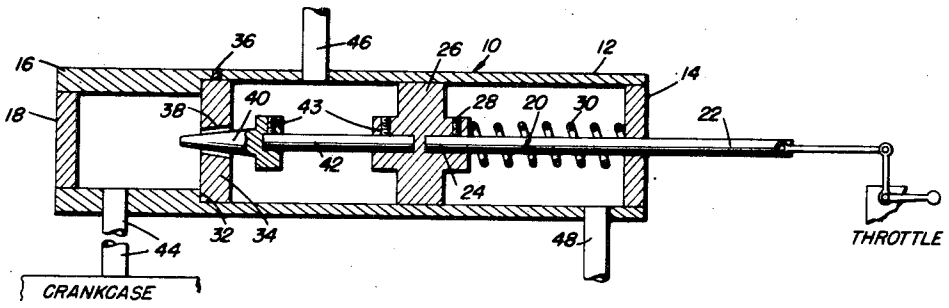
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Attorney—Gustave Miller

ABSTRACT: This invention provides a positioner, controller and governor or safety shutoff mechanism for a prime mover having a reciprocable control rod, and uses the crankcase lubricating oil pressure or turbine oil pressure as a means of adjusting or governing the prime mover's rate of speed or causing it to stop on cessation or oil pressure.



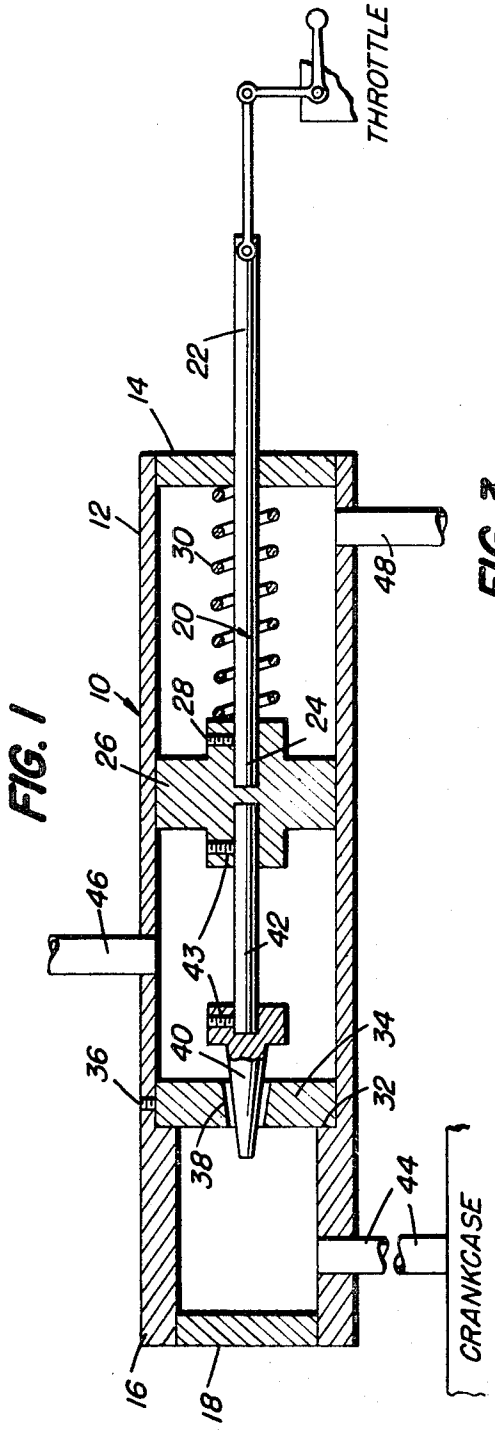


FIG. 1

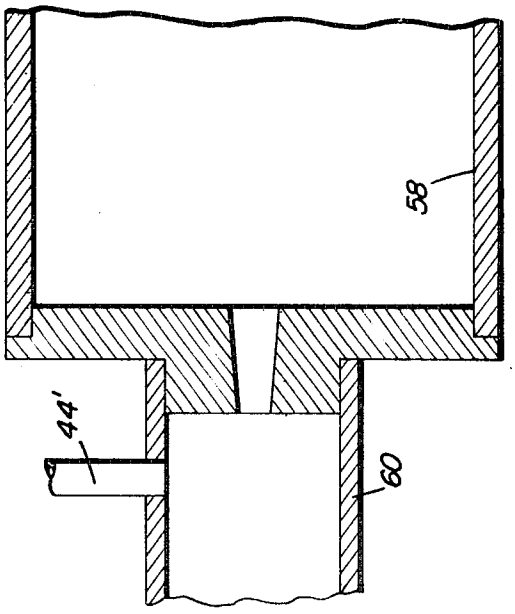


FIG. 3

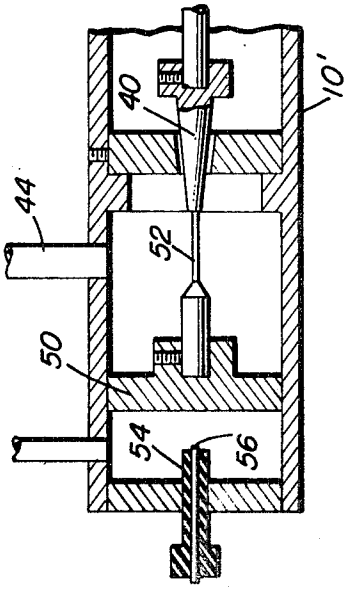


FIG. 2

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FIG. 4

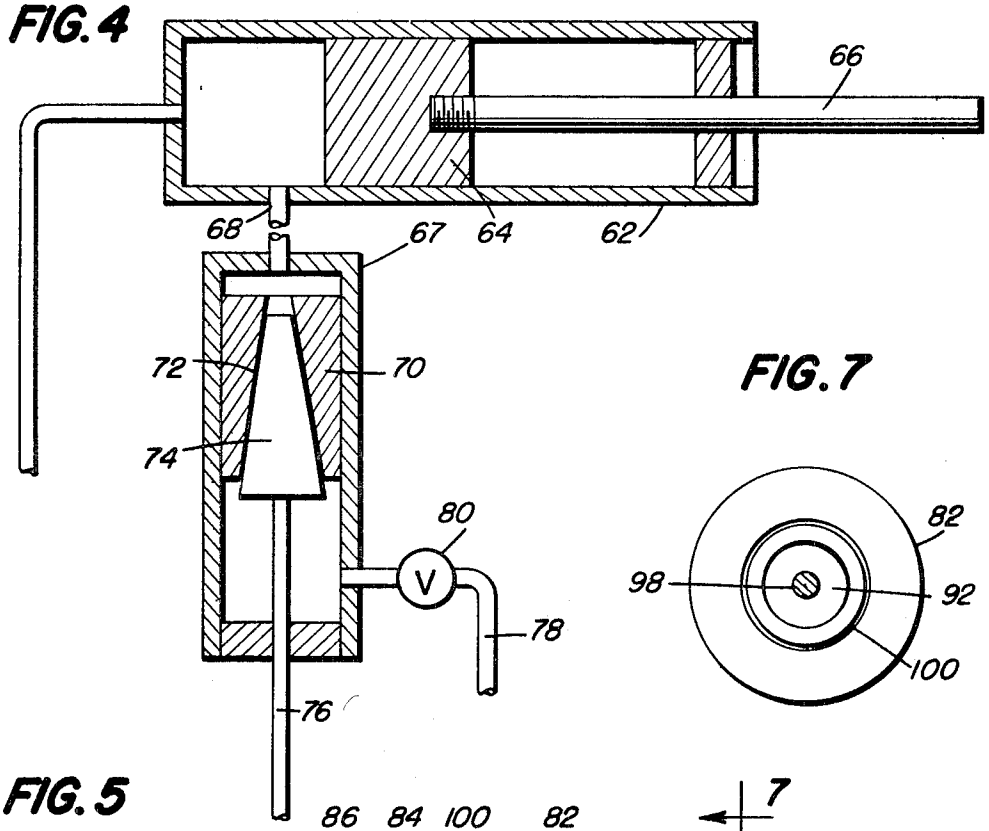


FIG. 7

FIG. 5

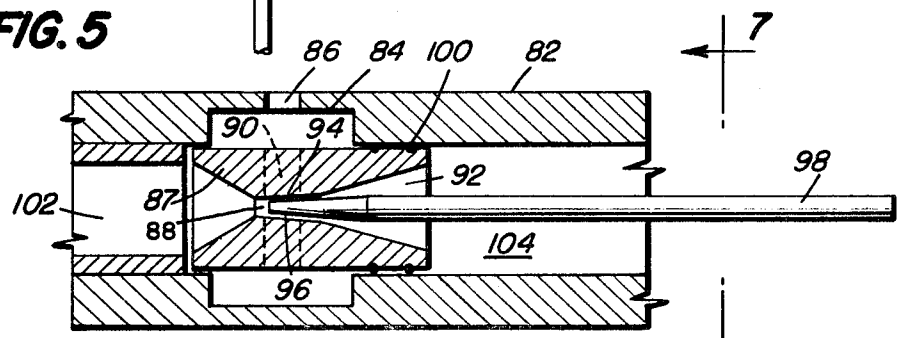
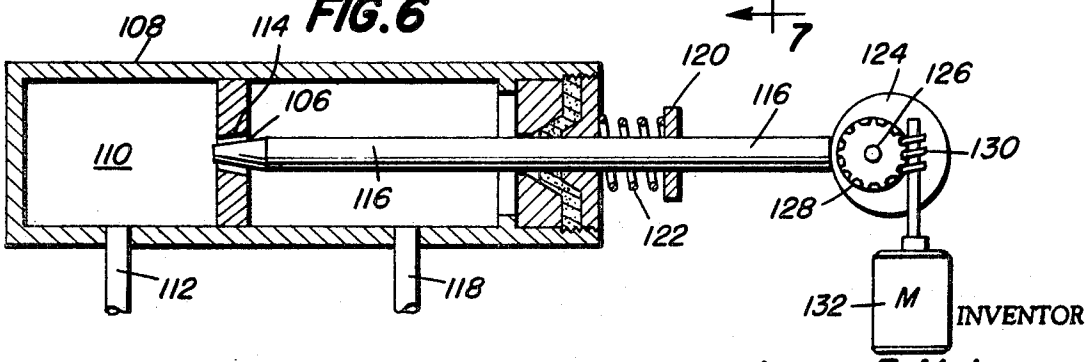


FIG. 6



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FIG. 8

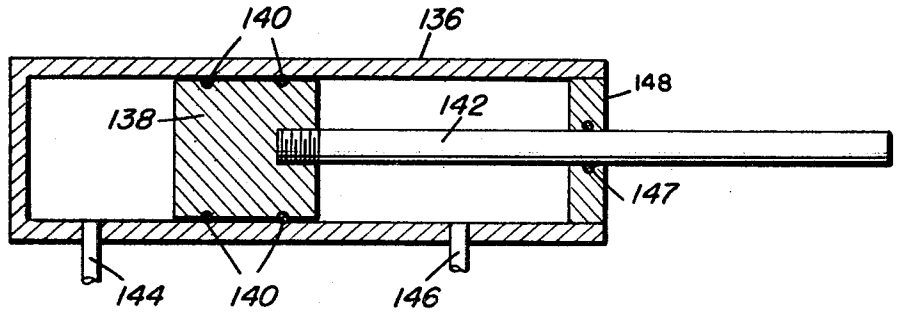


FIG. 9

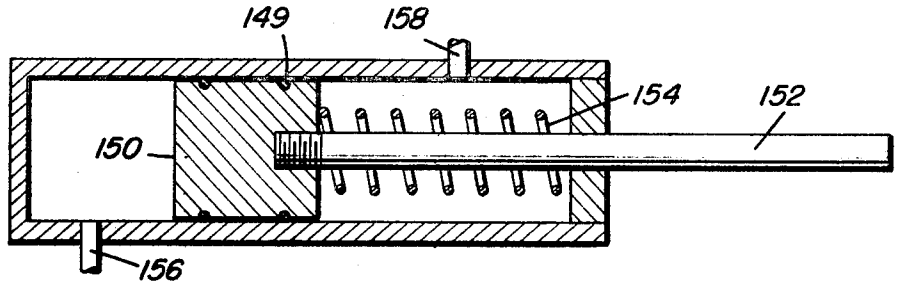
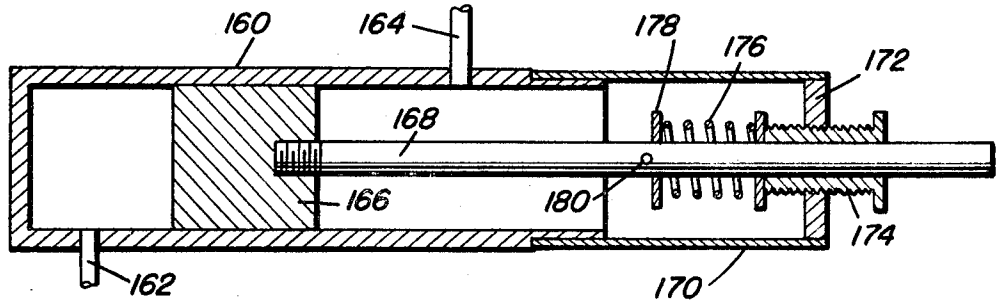


FIG. 10



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POSITIONER, CONTROLLER AND GOVERNOR OR SAFETY SHUTOFF MECHANISM FOR A PRIME MOVER

OBJECTS OF THE INVENTION

An object of the invention is to provide a controller for any prime mover having a fluid pressure source, said speed controller being applicable to a plurality of prime movers and adapted to be interconnected so as to stop one engine, start a second engine, or control the speeds of all engines in accordance with the fluid pressure of one or all engines.

Another object of the invention is to provide a device by means of which an engine control rod may be positioned responsive to a remote fluid pressure source.

A further object of the invention is to provide a governor for an engine which is foolproof in operation, is economically manufactured and installed and is highly efficient in action.

A further object of this invention is to provide continuous minute changes in governor application to a prime mover in relation to its speed being controlled, such control being transmitted to this device through variation in pressure being developed in the prime mover oil system.

These and other objects of the invention will be fully apparent from the following description taken in conjunction with the annexed drawings, in which:

FIG. 1 is a side view in section of the device of the invention.

FIG. 2 is a fragmentary side view, in section, of a modification.

FIG. 3 is a fragmentary side view in section of another modification.

FIG. 4 is a side view in section of a further modification.

FIG. 5 is a fragmentary view in section of a valve structure, in still another modification.

FIG. 6 is a view in section of another valve structure.

FIG. 7 is a view taken on line 7—7 of FIG. 5.

FIG. 8 is a view in section of a modification.

FIG. 9 is a view in section of still another modification, and

FIG. 10 is a view in section of yet another modified form of the invention.

Referring in detail to the drawings, in which like numerals indicate like parts throughout the several views, in FIG. 1 the numeral 10 indicates generally an elongated casing having one end 12 closed by an apertured plug 14 and the other end 16 closed by a second plug 18.

Slidable through the plug 14 is a piston rod 20 having an end portion 22 exteriorly of the casing 10 and having the other end portion 24 within the casing 10 and fixed to a piston 26. The piston 26 is secured to the piston rod 20 by means of a set screw 28, and a spring 30 circumposed about the piston rod 20 biases the piston 26 to the left in FIG. 1. The end portion 22 of the piston rod 20 may be connected to any actuator desired, such as a throttle control, or, directly or indirectly to any type of valve which requires reciprocation or levered action. A balanced position of the rod 20 is reached as a result of fluid or hydraulic pressure on the piston 26.

The casing 10 has an inwardly extending shoulder 32 against which valve plate 34 abuts with a set screw 36 holding the plate 34 in place. The plate 34 is provided with a tapered orifice 38 through which extends a tapered valve 40 mounted on a short rod 42. Set screws 43 secure the rod 42 to the valve 40 and to the piston 26.

Two conduits 44 and 46 open into the portions of the casing 10 on either side of the plate 34, and a third conduit 48 connects the interior of the casing 10 to the atmosphere.

In FIG. 2 a modification is shown in which the casing 10' is elongated in the portion to which the conduit 44 is connected and therein is a second piston 50 connected by a rod 52 to the valve 40 for movement therewith.

An insulating plug 54 extends through the adjacent end wall of the casing 10' and has a wire 56 extending longitudinally therethrough.

Upon extreme movement to the left in FIG. 2 of the valve 40, the piston 50 will be in electrical contact with the adjacent end of the wire 56 to close any desired circuit.

With reference to FIG. 3 it will be seen that the casing 58 is of a larger diameter than the tube 60 into which fluid pressure may be received from conduit 44'. In FIG. 4, there is casing 62 having therein a slidable piston 64 connected to one end of a piston rod 66. The other end of the piston rod 66 is exteriorly of the casing 62 and is adapted to be employed in the same manner as stated above with respect to the piston rod 20 of FIG. 1.

Remotely located, if desired, from the casing 62 is a valve body 67 connected to the casing 62 by conduit 68. In the valve body 67 is a valve block 70 having a tapered orifice 72 with a valve 74 closing or opening the orifice 72 in response to longitudinal movement of rod 76 to which valve 74 is fixed. A conduit 78 extends into the valve body 67 and has an openable and closable valve 80 therein.

The casing 62 in the end adjacent to the conduit 68 is connected by another conduit 81 to a source of fluid under pressure.

In FIG. 5 is shown a modified form of the valve structure and in which there is a cylindrical casing 82, shown in broken away view, having an annular recess 84 therein, with ports 86 opening from the exterior to the recess 84. A piston 87 is slidable in the casing 82 and is provided with a valve chamber 88 having ports 90 opening into the recess 84. A bore 92 extends longitudinally through the piston 87 and has a tapered portion 94 in which seats a valve 96 upon longitudinal movement, to the left in FIG. 5., of the piston rod 98 to which it is attached. O-rings 100 on the piston 87 seal the piston 87 for sliding movement in the casing 82.

Fluid under pressure may be admitted to the casing 82, or through the end 102 of the casing 82, or through the casing end 104, as well as through the ports 86. When fluid pressure enters through the end 102, it will bear against the piston 87 and move it toward the right in FIG. 5 opening communication between the casing end 102 and the recess 84 or, conversely, if it enters through the casing end 104 it will shift the piston 87 toward the left, thus closing the passage between the recess 84 and the casing end 102. Movement of the valve 96 serves in the same manner, but with a finer scope of adjustment.

With reference to FIG. 6, a servocontrol for the valve 106 is shown. The casing 108 has a chamber 110 at one end connected by conduit 112 to a source of fluid under pressure. The orifice 114 connects the chamber 110 with the space around the piston rod 116 and another conduit 118. A collar 120 secured to the piston rod 116 forms a seat for one end of a tension spring 122 which biases the valve 110 to open position and serves to press the free end of the piston rod 116 against the periphery of an eccentric 124 carried on shaft 126 which is driven by a conventional gear train including gear 128, worm 130, shaft 132, and motor 134.

Fluid pressure admitted through either conduit 112 or 118 is metered according to the valve opening, and the valve is controlled by the motor 134.

In FIG. 8 the casing 136 has a piston 138 slidable therein with O-rings 140 sealing the piston 138. The end cap 148 is sealed to the casing 136. Other O-rings 147 seal the piston rod 142 to the end cap 148 for sliding movement of the piston rod 142 through the cap 148. The piston 138 is carried on one end of the piston rod 142 which has its other end engaged with a throttle control mechanism as stated above with respect to piston rod 20. Fluid pressure is introduced into the casing 136 through conduit 144 and another conduit 146 connects the casing 136 to atmosphere.

In FIG. 9, the casing 149 has within it piston 150 on one end of a piston rod 152 and a spring 154 bears against one side of the piston 150 and against the adjacent end wall of the casing 149 so that the piston 150 is biased toward the conduit 156 through which is admitted a source of fluid under pressure. Conduit 158 exhausts the casing to atmosphere.

In FIG. 10 casing 160 is provided as above noted, with respect to casing 149, with conduits 162 and 164, and piston 166 on piston rod 168. A sleeve 170 is carried on one end of the casing 160 and has a closed end wall 172. A bushing 174 is

threadably mounted in the end wall **172**. A spring **176** has one end biased against the bushing **174** and the other end biased against a collar **178** secured by pin **180** to the piston rod **168**. Fluid pressure admitted to the casing **160** through conduit **162** acts to shift the piston rod **168** against the compression of the spring **176**, which compression is adjusted by screwing the bushing **174** inwardly or outwardly.

In operation, the control device of this invention may be used to close the throttle of any prime mover in response to a drop in crankcase lubricant fluid pressure.

The invention will be of use where oil well engines are remote and seldom attended. Upon failure of the oil pressure, one engine may be stopped, and one or more engines started.

Turbine type engines are included in the prime movers for which this device is intended to be of use, using the cessation of fluid or gas pressure to drive the piston to throttle-closing position, and electrically either starting another engine or sounding an alarm.

Although this invention has been described in considerable detail, such description is intended as being illustrative rather than limiting, since the invention may be variously embodied, and the scope of the invention is to be determined as claimed.

Having thus set forth and disclosed the nature of this invention, what is claimed is:

1. An automatic, self-energizing controller in combination with a prime mover having a reciprocable control rod, said prime mover providing the fluid oil pressure source necessary to its proper operation, said controller including an elongated casing arranged in axial spaced alignment with respect to said control rod, a piston rod having a portion adjacent one end within said casing and having the portion adjacent the other end exteriorly of said casing and adapted for attachment to said control rod, and a piston fixed on said piston rod one end portion, said piston being reciprocable within said elongated casing by variations of pressure in said fluid oil pressure source to control said prime mover reciprocable control rod and thus control said prime mover, and spring means biasing said piston in the direction away from said piston rod, there being a port in said casing on the side of said piston opposite to said piston rod, and means to connect said port to said fluid pressure source together with valve means connected in communication with said port, said valve means including a wall in said casing intermediate the ends thereof, there being an opening in said wall, a valve in said opening, and means connecting said valve to said piston.

2. The apparatus according to claim **1**, said wall opening and said valve being tapered complementary to each other.

3. The apparatus according to claim **1** in which there is provided another port in said casing on the side of said valve adjacent said piston.

4. The apparatus according to claim **1** including normally open electrical switch means operable to closed position responsive to cessation of fluid pressure in said casing.

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