Aug. 15, 1933. R. C. McALLISTER 1,922,705

PRESSURE ACTUATED GOVERNOR TRIP

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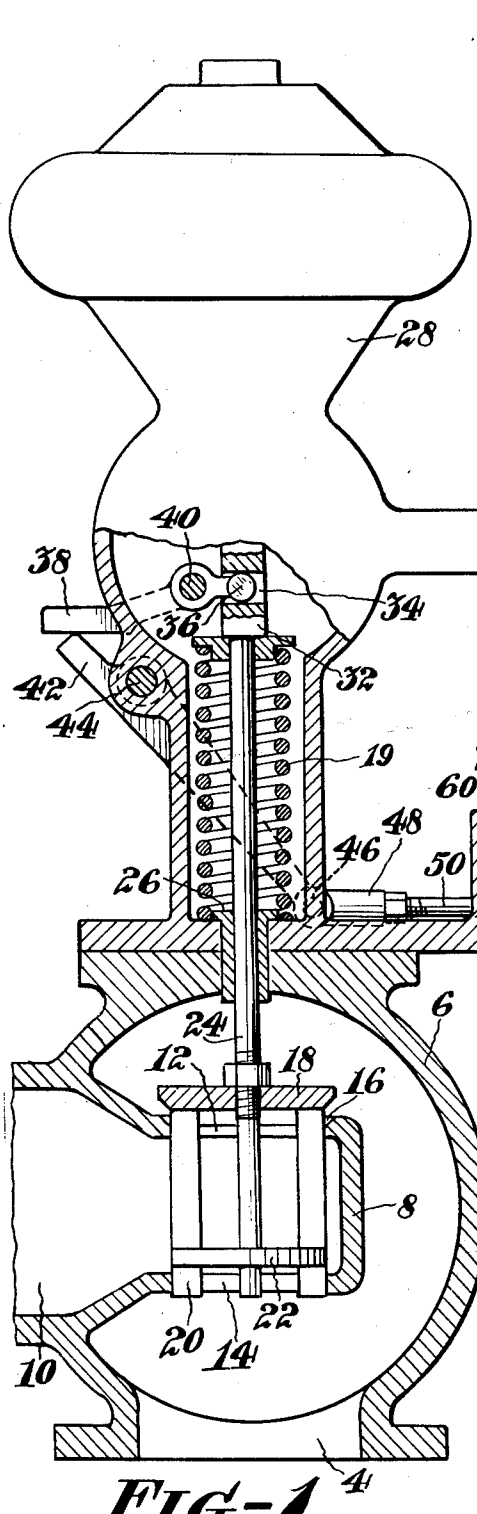


FIG.-1.

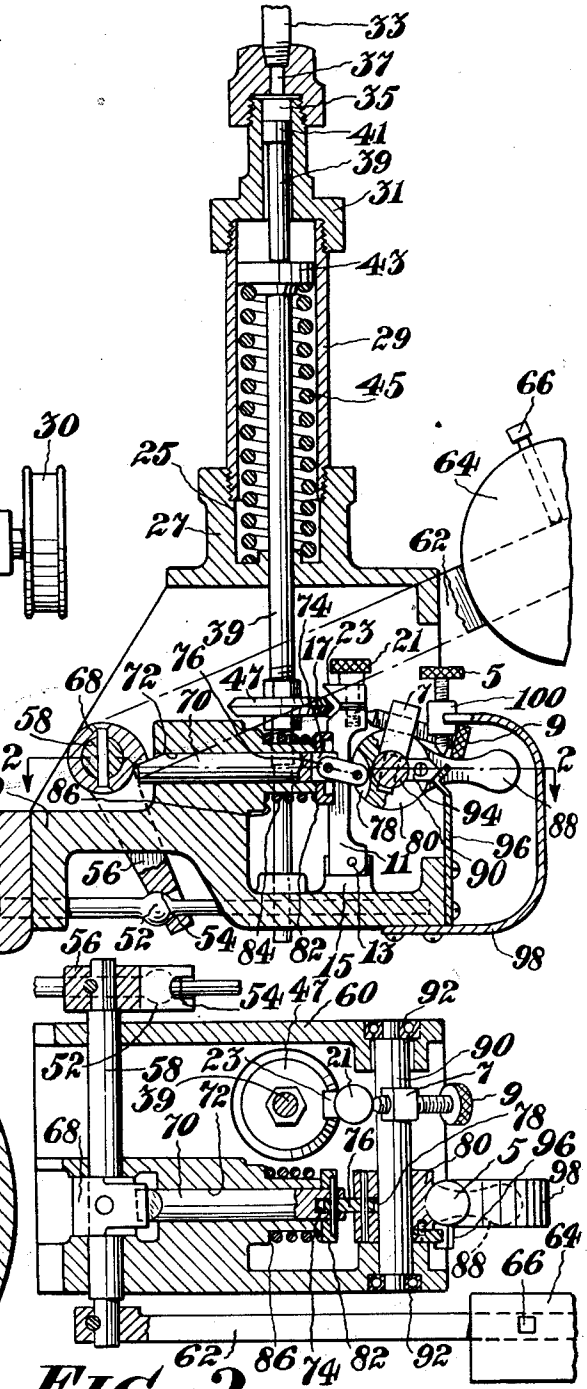


FIG.-2.

INVENTOR.
Raymond C. McAllister
BY
HIS ATTORNEY.

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PRESSURE ACTUATED GOVERNOR TRIP

Raymond C. McAllister, Painted Post, N. Y., assignor to Ingersoll-Rand Company, Jersey City, N. J., a Corporation of New Jersey

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8 Claims. (Cl. 137—140)

This invention relates to a pressure actuated governor trip and more particularly to a device to be used with a compressor and adapted to become operative to trip the governing mechanism controlling the motive power when a predetermined maximum or minimum pressure has been reached.

An object of the invention is to provide a device of the type indicated which shall be simple, compact, positive in operation, and inexpensive to make and operate.

Oother objects will either be apparent or will be referred to hereinafter.

In the accompanying drawing,

Figure 1 shows a governor partly in section to which the invention has been applied and the invention itself is shown in longitudinal section, and

Figure 2 is a cross section of the invention taken on the line 2—2 of Figure 1 looking in the direction of the arrow.

Referring to the drawing, a steam inlet 4 is provided in a casing 6. A nose 8 of a valve chamber 10 projects into the interior of the casing 6 and is provided with upper and lower inlets 12 and 14. The upper inlet is provided with a valve seat 16 upon which the upper portion 18 of a box valve 20 is adapted to seat. The lower opening 14 is controlled by the base 22 of the box valve. The box valve 20 is actuated by a valve rod 24 which extends through a suitable bushing 26 in the casing 6 into a governor housing 28 which is seated upon the casing 6. The rod 24 is suitably connected with a governor (not shown) which is disposed in the upper part of the governor housing 28 and is driven by suitable means including a sheave 30. A return spring 19 is suitably applied to the valve stem 24 to restore the valve to its open position when the trip mechanism hereinafter described is in cocked position.

The valve rod 24 is provided with an enlargement 32 in which is a bore 34. Disposed in the bore is a knob or ball 36 connected to an arm 38 which is pivoted upon a pin 40 in such a manner that when the arm 38 is raised the ball 36 is depressed and causes the valve rod and the valves to move downwardly to close the openings 12 and 14.

In sliding contact with the arm 38 is one end of a lever 42 which is fulcrumed upon a pin 44. The other end of the lever 42 is suitably pivoted upon a pin 46 of a head 48 which is threaded upon a rod 50.

Midway of the rod 50 is a rounded enlargement 52 which abuts a slot 54 in an arm 56 which is suitably pinned to a shaft 58 and rotates therewith. The shaft 58 is mounted in a frame 60 which may be suitably affixed to the governor housing 28. The opposite end of the shaft 58 is pinned to a lever arm 62 on which is attached a weight 64 which is held in position by a set screw 66. Downward movement of the arm 62 causes a clockwise rotation of the shaft 58 which, in turn, causes the arm 56 to move to the left forcing the rod 50 to move with it and transmitting the motion to the lever 42 which pivots on the pin 44 and lifts the arm 38 causing the valve rod 24 to be depressed and causing the valves 18 and 22 to close the openings 12 and 14 respectively.

The arm 62 is held against downward movement by a latch mechanism comprising a latch member 68 which is affixed to an intermediate point on the shaft 58 and a plunger or trip 70 which is normally held in engagement with the latch member. The plunger 70 is slidable in a bore 72 through an internal projection of the frame 60. In the end of the plunger 70, opposite the pawl 68, is a slot 74 in which is pinned a connecting rod 76, the other end of which is pinned into a slot 78 of a crank 80.

Surrounding the slotted end of the plunger 70 is an annular head 82 which serves as an abutment for a spring 84 which surrounds the projection of the frame 60 in which is located the bore 72. The spring 84 exerts pressure between a shoulder 86 of the frame 60 and the head 82, thereby urging the plunger 70 out of engagement with the latch member 68.

The crank 80 is in the form of a cylinder which is provided with a handle 88 for ease in setting and to prevent undesirable rotation as hereinafter described. The crank 80 is provided with an axial bore in which an axis shaft 90 is fitted. The shaft 90 is suitably journalled in bearings 92 in the frame 60. Attached to one side of the crank 80 is a small pointed projection 94, the point of which extends beyond the circumference of the cylinder in a direction parallel to the handle 88. Affixed to the frame 60 and extending upwardly so as to bear against the member 94 is a spring member 96 which yieldably resists clockwise movement of the crank 80. Attached also to the frame 60 is a curved arm 98 which curves about the end of the handle 88 in the form of a guard and terminates in a plug 100 through which extends a set screw 5 which bears against the shank of the handle 88 and limits its movement in a counter-clockwise direction. It is this set screw 5 and its arm which provides

resistance to the spring 84 when the trigger mechanism is cocked.

Fastened to the shaft 92 within the frame 60 is a lug 7 through which is threaded a set screw 9 which may be adjusted to bear against an arm or trigger 11. The arm 11 is suitably attached by an off-center pin 13 to a lug 15 on the base of the frame 60. One of the lower corners of the arm 11 is cut away so that the arm may swing on the pin 13 toward the shaft 90. The upper end of the arm 11 has an inclined face 17. Fastened to the upper end of the arm 11 by a thumb screw 21 is a head 23 also provided with an inclined face.

Mounted in a bore 25 of a projection 27 on the upper part of the frame 60 is a tube 29, to the top of which is fitted a cap 31 suitably connected to a pipe 33 which leads to a source of pressure fluid (not shown). The cap 31 has a bore 35 connected to a passage 37 which communicates with the pipe 33. Closely fitting the bore 35 is the head 41 of a plunger 39 which is adapted to be actuated downwardly by fluid pressure. The plunger 39 extends downwardly through the tube 29 and the frame 60. In the tube 29 the plunger 39 is fitted with a shoulder 43. Intermediate the shoulder 43 and the casing 60 and bearing against these members is a spring 45 which opposes downward movement of the plunger.

Within the frame 60 and upon the plunger 39 is fastened a disc 47 the circumference of which is wedge-shaped and which projects into the opening created by the inclined faces on the arm 11 and the head 23 thereof.

The disc 47 acts as a finger to pull the trigger 11, which operates the lock mechanism to actuate the trip 70, which in turn releases the valve actuating linkage.

When the pressure in the bore 35 acting against the head 41 overcomes the opposition of the spring 45 it forces the plunger 39 downwardly. The disc 47 moves downwardly with the plunger and the under side of the bevelled circumference engages the inclined face 17 of the arm 11. Continued downward movement of the disc 47 pushes the arm 11 to the right. This movement is communicated through the set screw 9 to the lug 7 and tends to cause the shaft 90 to turn clockwise, carrying with it the crank 80 and its associated parts. This turning movement is opposed by the springs 96 and 84, the tension of which is added to the resistance of the spring 45. Sufficient pressure upon the head 41, however, overcomes this added resistance and the spring 96 is displaced. The turning movement acting upon the connecting rod 76 depresses the spring 84 and forces the plunger to the left momentarily. As soon as the connecting rod 76 has passed dead center the spring 84 forces the plunger 70 out of engagement with the latch 68 and the crank 80 and its associated parts swing through a clockwise arc.

When the plunger 70 is withdrawn from engagement with the latch 68 nothing remains to maintain the weight 64 in its elevated position and the force of gravity on this weight causes the arm 62 to rotate upon the pin 58 thereby forcing the associated arm 56 to swing to the left forcing before it the ball portion 52 of the rod 50 and moving the lever 42 on the fulcrum pin 44 thereby raising the arm 38 and closing the box valve 20 as hereinbefore described, thereby shutting off the steam and stopping the engine.

When the pressure in the bore 35 acting upon the head 41 is reduced below a predetermined point the tension of the spring 45 lifts the plunger 39 and its attached disc 47 until the upper face of the bevelled edge of the disc 47 comes into engagement with the inclined face of the head 23 of the arm 11. The arm 11 is forced to the right in opposition to the springs 96 and 84 and overcomes their resistance to cause the same cycle of operations as just described in connection with the maximum pressure release.

Before the valve 20 may be reopened the trip mechanism must be recocked. In order to reset this mechanism the weight 64 is lifted manually thus removing pressure from the valve parts. The crank 80 is rotated counter-clockwise by means of the handle 88 until counter-clockwise motion is arrested by the set screw 5 and the locking spring 96 snaps into engagement with the member 94 thereby setting the entire mechanism in its original position.

When the source of supply of pressure fluid contains pressure at less than the minimum pressure the disc 47 may be above part 23 or in such a position as to operate the trip as soon as it is cocked. In order to allow the operation of the engine under such circumstances it is necessary to loosen the thumb screw 21 and turn the head 23 through an arc of 90° which will permit the disc 47 to move without obstruction. After the pressure has been built up above the desired minimum the head 23 may be reset in operative position. If for any reason it is desirable to operate without the minimum pressure trip it may be dispensed with by leaving head 23 in its inoperative position.

It will be seen that by changing the position of the disc 47 on plunger 39 and by providing for more or less play between the head 23 and the set screw 9 an adjustment of the minimum and maximum actuating pressures may be made.

Having thus described my invention, I do not desire to be restricted to the exact form illustrated but claim:

1. In a device of the character described, a valve, a speed responsive governor normally controlling the valve, means connected to the valve and normally locked in inoperative position to close the valve independently of the governor, and trip means responsive to pressure changes above and below a predetermined range to unlock the valve closing means.

2. In a device of the character described, a valve, a speed responsive governor normally controlling the valve, means connected to the valve and normally locked in inoperative position to close the valve independently of the governor, a trip to unlock the valve closing means and trigger mechanism responsive to pressure changes above and below a predetermined range to operate the trip.

3. In a device of the character described, a valve, a speed responsive control device therefor, weighted means independent of the speed responsive device to close the valve, a trip normally holding the weighted means in an inoperative position, and trigger mechanism connected to the trip and responsive to pressure changes above and below a predetermined range to operate the trip.

4. In a device of the character described, a valve, a governor to control it, mechanical means connected to the valve and adapted to close it independently of the governor, said means including linkage actuated by a weighted member, a trip to control the operation of said linkage, and trigger mechanism responsive to pressure

changes above and below a predetermined range to release the trip.

5. In a device of the character described, a valve, a governor to control the valve, means adapted to close the valve irrespective of the governor including a linkage terminating in a weighted member, a trip to hold the weighted member in inoperative position and means responsive to pressure changes above and below a predetermined range to release the trip.

6. In a device of the character described, a valve, a governor to control the valve, means adapted to close the valve irrespective of the governor including a linkage terminating in a weighted member, locking means to hold the weighted member in suspended position, compression means to release the weighted member, means to oppose said compression means, and means responsive to pressure changes to remove the opposition to said compression means.

7. In a device of the character described, a valve, a governor to control the valve, means adapted to close the valve irrespective of the governor including a linkage terminating in a weighted member, latch and plunger means to hold the weighted member in suspended position, spring means tending to move the plunger out of engagement with the latch, means comprising a crank and connecting rod opposing said spring means, and means responsive to pressure changes to rotate said crank to assist said spring means to disengage the plunger from the latch and release the weighted arm.

8. In a device of the character described, a valve, a speed responsive control for said valve, means to close said valve independently of the speed responsive means, means to hold said valve closing means inactive, and pressure actuated means operative above and below a predetermined pressure range to release the closing means from the holding means.

RAYMOND C. McALLISTER.