H. F. THOMA.

AUTOMATIC CONTROL FOR PRESSURE APPARATUS.

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963,662.

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Fig. 1.

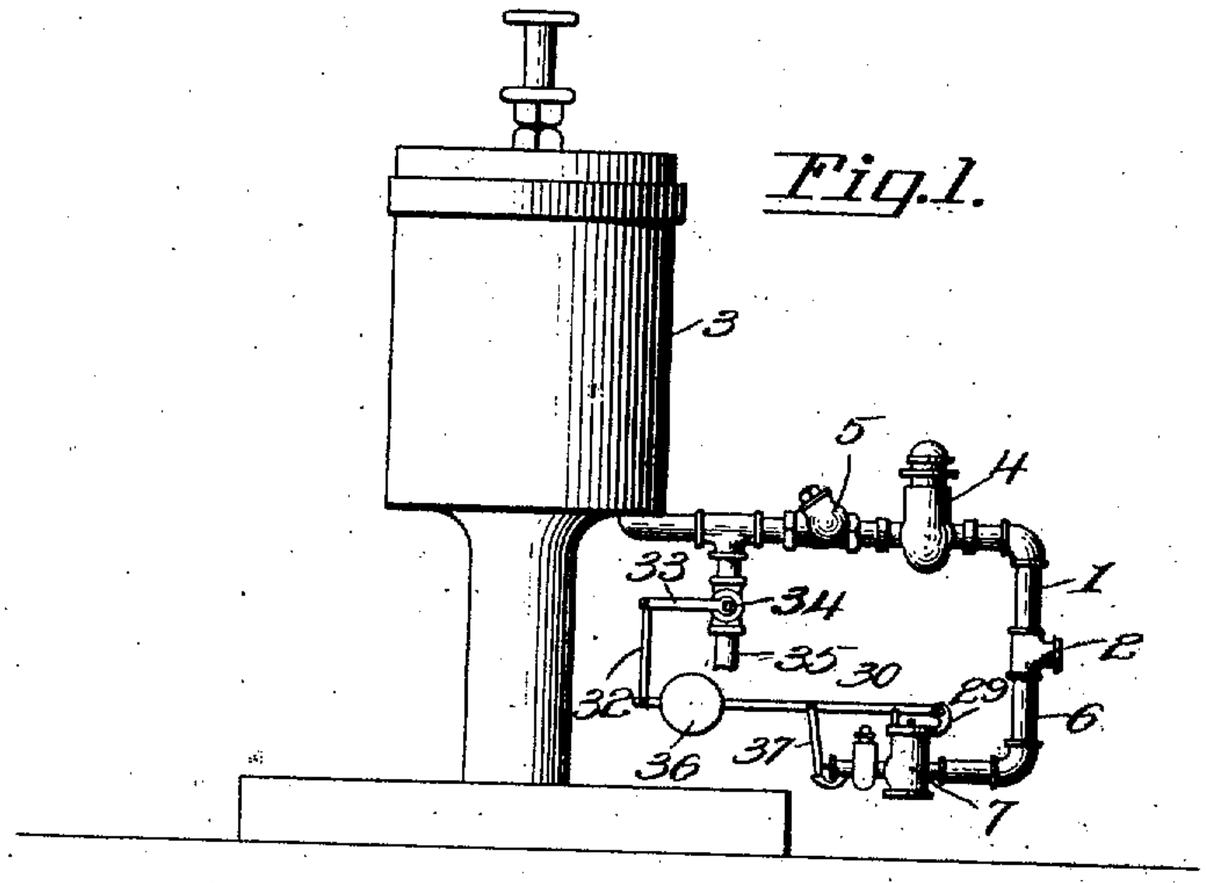


Fig. 3.

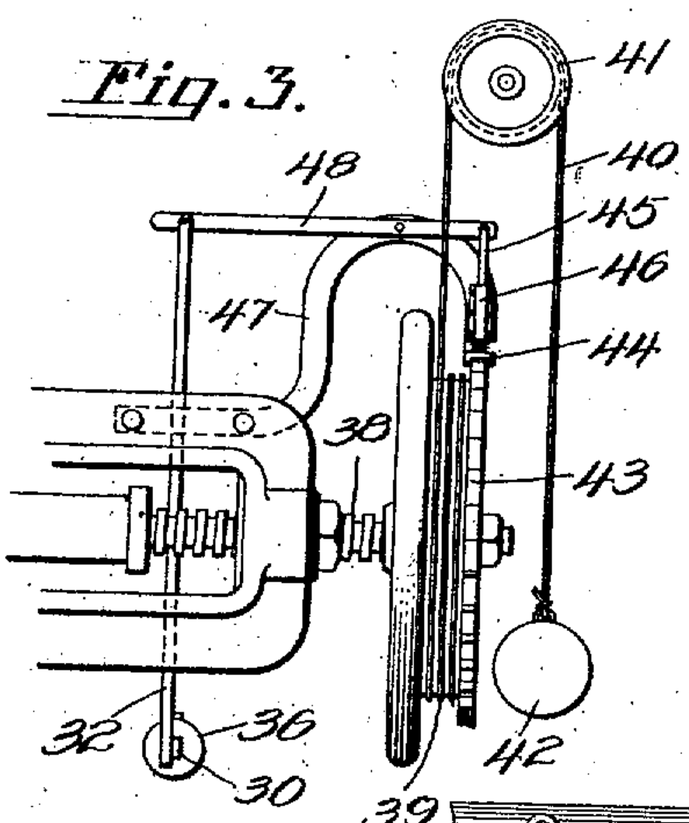


Fig. 4.

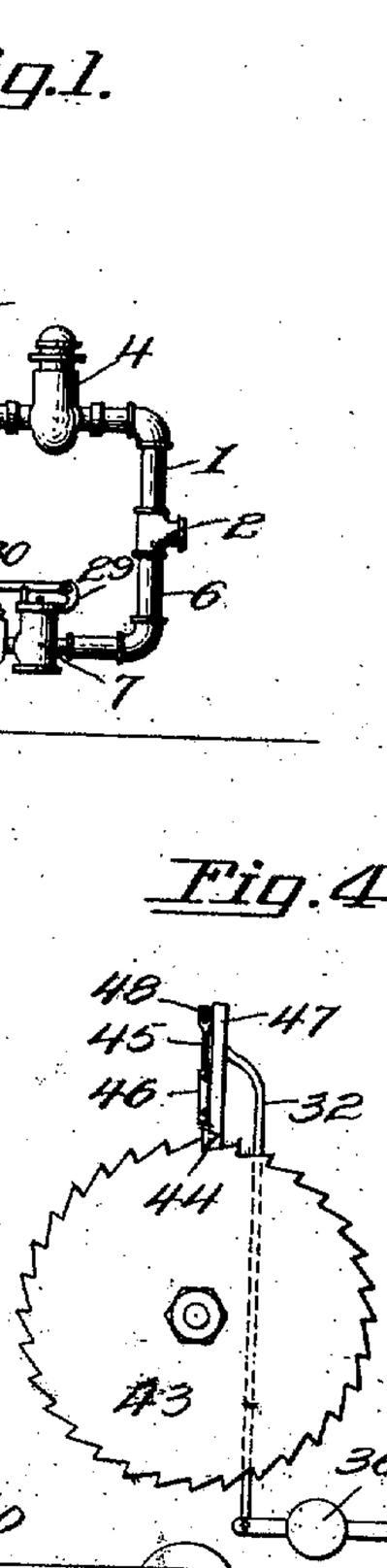
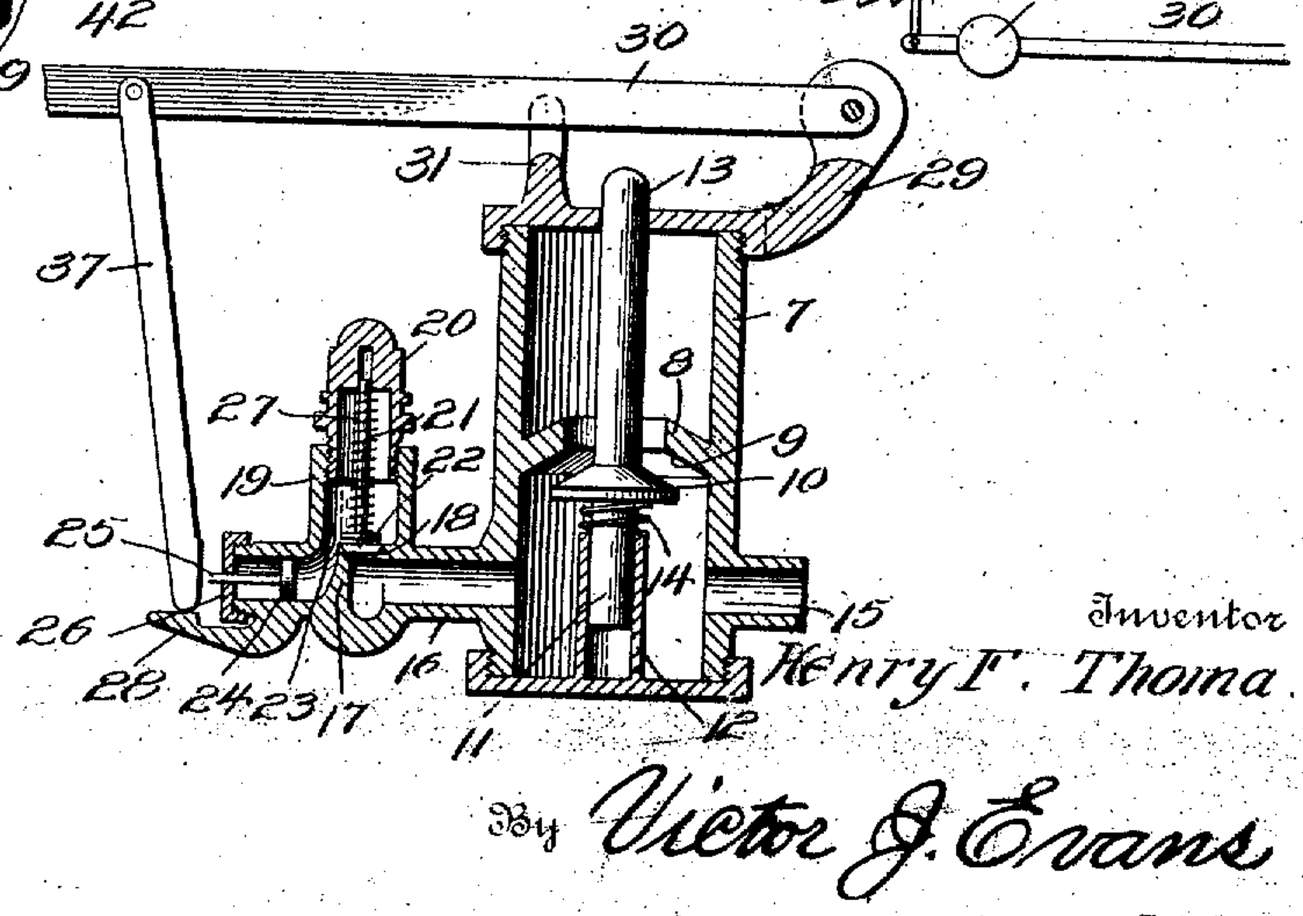


Fig. 2.



Witnesses

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AUTOMATIC CONTROL FOR PRESSURE APPARATUS.

963,662. Specification of Letters Patent. Patented July 5, 1910.

Application filed December 21, 1909. Serial No. 534,381.

To all whom it may concern:

Be it known that I, HENRY F. THOMA, a citizen of the United States, residing at Sand Coulee, in the county of Cascade and State of Montana, have invented new and useful Improvements in Automatic Control for Pressure Apparatus, of which the following is a specification.

The invention relates to an automatic control for pressure regulators in use on air compressors, being more particularly directed to a means in the nature of a safety device whereby the engine is automatically throttled when the working air pressure drops to a point of danger from any cause whatever.

The main object of the present invention is the provision of an automatic control for the admission of steam to the pressure regulator which control is governed entirely by the line air pressure, the construction providing for the admission of steam to the regulator and a consequent throttling of the engine upon the diminution of air pressure beyond a predetermined point, whereby to prevent danger incident to the over-running of the engine on the sudden decrease of its ordinary load.

The invention in its preferred details of construction will be described in the following specification, reference being had particularly to the accompanying drawings, in which:—

Figure 1 is a view in elevation illustrating the improvement. Fig. 2 is a sectional view of the automatic governor, the parts being shown in elevation. Fig. 3 is an edge elevation of a slightly modified form. Fig. 4 is a front elevation of the same.

Referring particularly to Figs. 1 and 2, wherein is shown the preferred form of details, the improved automatic control includes a pipe section 1 having communication with the air line at 2 and with the ordinary pressure regulator 3. In the pipe section 1 between the air inlet 2 and the pressure regulator is an ordinary pop valve 4 and also a wing valve 5, the latter permitting the free passage of air through the pipe to the regulator while preventing travel of the fluid in the opposite direction. The air line connector 2 is also in open communication with an additional pipe section 6, and in the latter is arranged the improved governor shown more particularly in Fig. 2.

As shown the governor comprises a casing 7 in which is arranged a partition 8 centrally formed to provide a valve seat 9 on its lower surface. A conical valve 10 is arranged to coöperate with the seat 9, said valve being provided with a depending stem 11 guided in a sleeve 12 projecting upwardly from the bottom of the casing and an upwardly extending stem 13 which will hereinafter be termed the stop rod. The stop rod extends to and through the top of the casing, and the weight of the valve and stems is nearly but not quite equaled by the spring 14 coiled about the depending stem about the valve proper and the stem 11. The casing 7 is provided with an inlet 15 in open communication with the pipe section 6, said inlet opening into the casing below the partition 8. An outlet section 16 is provided on the casing which is formed at a point intermediate its ends with an interior, transverse partition 17 and immediately adjacent said partition with an opening 18 forming a valve seat. A sleeve-like extension 19 surrounds the valve seat and is adapted to receive at its upper end a cap member 20 forming a housing for the valve stem 21 carrying at its lower end a valve 22 for coöperation with the seat 18. Beyond the opening 18 and within the sleeve extension 19 the outlet section 16 is formed with an opening 23 establishing communication between the outlet section beyond the partition 17 and the sleeve 19. By this construction the air pressure can reach the relatively outer portion of the outlet section 16 only by passage through the opening 18, which opening is controlled by the valve 22. A piston 24 is mounted in the outlet section 16 beyond the opening 23, and provided with a stem 25 which projects through the cap 26 closing the end of the outlet section. The piston 24 is to be directly affected by the air pressure passing the valve 22. A coil spring 27 encircles the valve rod 21, being tensioned to a particular degree, as will presently appear. The outlet section is extended to provide a supporting lip 28 immediately underlying the projecting end of the piston stem 25.

The casing 7 is preferably closed at the respective ends by removable caps, the upper cap is provided at one end with an extension 29 in which is pivotally mounted one end of a lever 30, a guide projection 31 extending from the cap to guide the lever in vertical plane. The opposing end of the lever 30 is,

through the medium of a link 32, connected to an arm 33 controlling a valve 34 arranged in a pipe 35 open to the steam supply and beyond the valve 34 communicating with the pipe section 1 adjacent the pressure regulator 3. A weight 36 is adjustably mounted on the lever 30 and normally operative to depress the link connected end of the said lever with the effect to open the valve 34 and admit steam to the pressure regulator. The spring 27 on the valve rod 21, hereinbefore referred to, is tensioned so as to require a slightly greater pressure to operate the valve 22 than would be necessary to support the weight 36. A trip rod 37 is pivotally connected to the lever 30 and so positioned that its free lower end may rest upon the lip 28 of the outlet section of the governor. The pivotal connection of the trip rod 37 is slightly in advance of the position of the lip 28 toward the link connected end of the lever, so that when the trip rod is forced off the lip it will be held by gravity in such position that its lower end will be beyond the lip, as will be obvious from Fig. 2. The trip rod 37 is of such length that when supported on the lip 28 it will sustain the lever so as to hold the valve 34 closed and in such position that the lever will be slightly higher than the extreme upper position of the stop rod 13.

In operation the device is manually set by placing the free end of the rod 37 on the lip 28 thereby raising the lever 30 against the influence of the weight and closing the valve 34. When the air has reached a predetermined pressure the valve 10 is of course closed and the valve 22 opened to permit the air pressure to act upon the piston 24 and, through the medium of the stem 25, force the trip rod off the lip 28. This permits a slight downward movement of the lever until it engages and is supported by the upper end of the stop rod, which of course has been moved upwardly by the air pressure on the valve 10. The lever is still supported in the position to maintain the valve 34 closed, that is so that the usual operation ensues until upon any sudden reduction in the air pressure the pressure on the valve 10 is released and the stop rod permitted to move downwardly under the influence of the weight on the lever. The valve 34 is thus opened, steam is admitted to the pressure regulator and operates on the piston therein to throttle the engine and prevent an excessive and dangerous speed thereof.

In Figs. 3 and 4 I have shown a slightly different form of engine control in which the throttle rod 38 is provided with a drum 39 on which is wound a cable 40 extending beyond the drum and over the elevated pulley 41 and terminally provided with a weight 42. A ratchet wheel 43 is secured on the drum, the teeth of which are designed to be normally engaged by a dog 44 carried on a rod 45 mounted in a guide 46 secured on an extension 47 from the engine structure. The rod 45 is connected to a lever 48 pivotally mounted on the extension 47 and said lever is in turn connected to the weight lever 30 of the governor construction by the link 32. In this form of device the operation of the lever 30 on a decrease of air pressure will withdraw the dog 44 from the ratchet and permit the weight 42 to operate the drum and thereby throttle the steam.

In connection with the above apparatus it is to be particularly noted that the device is manually set and that the air pressure does not gain control thereof until such pressure has reached a predetermined point. This is an important feature as by a mere regulation of the tension of the spring 27, which may be accomplished by adjusting the cap 20 longitudinally in the sleeve 19, as illustrated in Fig. 2, and the consequent adjustment of the weight 36 on the lever, the controlling pressure at which the device may be set for automatic operation may be readily regulated.

Having thus described the invention, what is claimed as new, is:—

1. An air pressure apparatus including a motor throttling means comprising a gravity operated lever, manually operable means for initially holding said lever against operation, means actuated by the predetermined air pressure to relieve the lever of the holding means, and means automatically actuated by said predetermined pressure to hold the lever against throttling movement.

2. An air pressure apparatus including a motor throttling lever, a trip lever arranged for manual operation to normally hold said lever against throttling movement, means actuated by a predetermined air pressure to operate the trip lever to relieve the throttling lever, and a stop rod operated by said predetermined pressure to prevent throttling movement of said lever.

3. An air pressure apparatus including a gravity operated throttling lever, a valve casing open to the air pressure, a valve in said casing designed to be effected by the air pressure, a stop rod carried by the valve and adapted to be projected in the path of movement of the throttling lever, an outlet passage in communication with the casing, a valve controlling said passage, a piston arranged in the passage beyond the valve, a stem carried by the piston, a trip lever connected to the throttling lever, and a lip carried by the casing to support the free end of the trip lever in the path of the piston stem, said trip lever when supported on the lip holding the throttling lever against throttling movement.

4. An air pressure apparatus including a

gravity operated throttling lever, a valve casing open to the air pressure, a trip lever connected to the throttling lever, a projection carried by the valve casing to receive and support the trip lever to hold the throttling lever against throttling movement, and means arranged in said casing to be operated by a predetermined air pressure to simultaneously force the trip lever from the projection and move into the path of the throttling lever, a supporting element, whereby to relieve the throttling lever of the fixed support and subject it to a support by the air pressure.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY F. THOMA.

Witnesses:
JOHN N. PEARCE,
JAMES A. VERNON.