

J. L. OSBORNE.
GOVERNOR.

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1,044,233.

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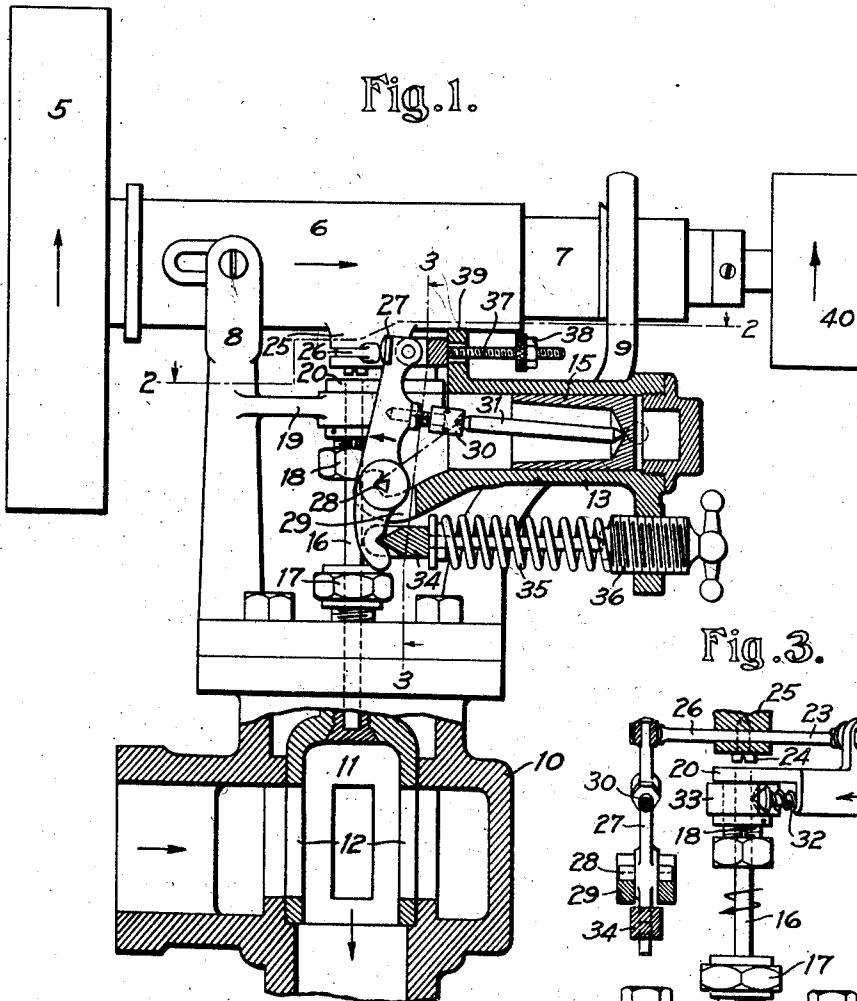


Fig. 2.

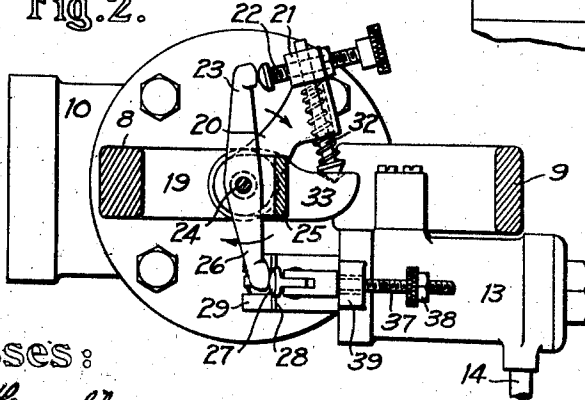
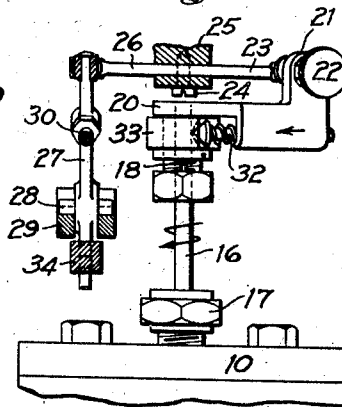


Fig. 3.



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GOVERNOR.

1,044,233.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN L. OSBORNE, a citizen of the United States, and resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Governors, of which the following is a specification.

This invention relates to a governor of the type employed to regulate the operation of an air-compressor, or the engine by which it is actuated, such a governor being adapted to vary the speed of the compressor in a definite proportion with the variations in the air-pressure produced.

In Letters Patent of the United States No. 963,803, granted to me July 12, 1910, I have disclosed a governor of the type in question, and the present invention relates to a governor generally similar in its mode of operation to the device of said patent.

The object of the present invention, generally speaking, is to produce a governor in which a simpler form of mechanism is employed to produce the required results.

More particularly, I aim to avoid lost motion and a multiplicity of accurately fitted joints, by means of an arrangement in which force-closure is employed throughout the connections between the throttle-valve and the pneumatic controller.

Another feature of the invention resides in the employment of a simplified mechanism for compensating for the increasing pressure of the controlling-spring throughout the range of movement of the pneumatic controller constituting an element of the governor.

Other objects and features of the invention will be set forth in connection with the following description of the illustrated embodiment of the invention.

In the drawings:—Figure 1 is a side-elevation of a governor embodying the present invention, with certain parts shown in vertical section; Fig. 2 is a plan-view, in section on the line 2—2 in Fig. 1; and Fig. 3 is a partial vertical section on the line 3—3 in Fig. 1.

The invention is illustrated as embodied in a governor of which the general form and operation are similar to those of the governor disclosed in my said Patent No. 963,803. As the centrifugal or speed-controlled mechanism may be similar to that of said patent, or may be of any ordinary or

suitable form, I have not particularly illustrated and described this part of the governor, but, as shown in Fig. 1, the centrifugal mechanism is inclosed within a casing 6, as in said patent, and is actuated continuously through a pulley 40, by power derived from the air-compressor of which the operation is to be regulated. This centrifugal mechanism is connected with a sleeve 6, which slides horizontally upon a stem 7, the stem being supported on uprights 8 and 9 rising from the casing 10 of the throttle-valve, all as in said patent. The sleeve 6 is moved, from the position illustrated, in a right-hand direction as indicated by the arrow, as the speed of operation of the compressor and the centrifugal mechanism increases.

The throttle-valve is provided with a rotatable cylindrical valve-member 11, having a plurality of ports 12 cooperating with corresponding ports in the valve-casing, so that by a partial rotation from the position in Fig. 1 the ports may be simultaneously closed.

The sliding sleeve 6 above referred to constitutes one of the two controlling-members of the governor, being designated in the claims as the "speed-controlled member", and the other controlling-member is in the form of a pneumatic device subjected to the pressure produced by the compressor. To this end a horizontal cylinder 13 is mounted upon the upright 9 and is connected, through a pipe 14, with the compressor (not shown), or with the reservoir into which it forces the compressed air. Within this cylinder is a piston 15, which constitutes specifically the pressure-controlled member of the governor.

In order that the throttle-valve may be operated by the conjoint action of the speed-controlled member and the pressure-controlled member, it is provided with a stem 16 passing through a gland 17, and through a bearing 18 which is supported by an arm 19 projecting from the upright 8. At the upper end of the stem 16 is fixed an arm 20, and in a lug 21 on this arm is threaded an adjusting-screw 22. This screw bears against one arm 23 of a horizontal lever which constitutes a differential connection between the several elements of the governor and which is pivoted on a pin 24 fixed in the bottom of the sleeve 6, the lever being

supported upon a lug 25 depending from the sleeve. The other arm 26 of the differential lever engages the upper end of a lever 27, by which the differential lever is connected with the pressure-controlled piston 15.

The lever 27 is fulcrumed by means of knife-edge pivots 28 seated in a bearing-member 29 projecting from the forward end of the cylinder 13. From the upper arm of this lever an adjusting-screw 30 projects toward the cylinder, this screw having a cupped head, and the lever is connected with the piston 15 by means of a spindle-shaped rod or link 31, which is seated in the screw-head, and in the concave interior of the piston, as shown in Fig. 1. Through this arrangement the pressure in the cylinder 13 causes the lever 27 to have a constant tendency to swing in the direction of the arrow in Fig. 1, and pressure is thus transmitted through the differential lever to the adjusting-screw 22, and thence to the arm 20. This pressure is constantly opposed, however, by the action of a spring-pressed plunger 32, which slides in a sleeve on the arm 20 and engages a lug 33 projecting from the arm 19. Through the opposed action of this spring-plunger and the pneumatic piston the several parts of the mechanism above described are kept constantly in operative engagement by force-closure, so that there is no lost motion, and so that the necessity of accurately-fitted closed joints, or other complicated and expensive arrangements, is obviated.

To partly balance the pressure against the piston 15, the governor is provided, as in my said patent, with a spring affecting the movements of the lever 27. To this end the lower arm of the lever has a knife-edge bearing against a plunger 34 upon which is a coiled compression-spring 35, seated against an adjusting-screw 36. This arrangement tends constantly to move the piston to the right, or to the position of Fig. 1 and the spring is adjusted so as nearly to balance the pneumatic pressure in the cylinder, leaving, however, a small margin of force to operate the governor-mechanism and control the throttle-valve. As the pressure of the spring 35 increases in proportion as the spring is compressed, I disclosed, in my said patent, mechanism associated with this spring and the pneumatic piston for compensating for such increase in pressure, so as to render the governor sensitive through a greater range of pressures. In the present device the same result is accomplished. Considering Fig. 1, it will be apparent that in the position of the parts there shown, corresponding to a minimum pressure in the cylinder 13 and a minimum degree of compression of the spring 35, the rod 31 and the lever 27 constitute, in effect, a linkage of which one member extends in the direc-

tion of the dot-and-dash line in Fig. 1, the two members being thus at an obtuse angle to each other. The effective length of the lever 27 with respect to the piston 15 is thus small in this position of the parts. As the piston moves to the left, however, the effective length of this lever rapidly increases, thus compensating for the increased pressure of the spring 35. In this connection the adjusting-screw 30 constitutes a valuable feature of the arrangement. It is not practical to produce springs, such as the spring 35, in quantity without substantial variation in their elasticity, and this screw, permits an adjustment of each governor in accordance with the individual characteristics of the spring employed therein. By the use of this screw the angle between the elements of the linkage may be varied, thus varying the compensating action to suit each case.

As in the device disclosed in my said patent, the present governor is adjustable to adapt it both for a given normal compression, and for a given normal speed in the compressor, these adjustments being required according to the normal output of the compressor, and the degree of compression and volume of compressed air required. The adjustment for compression is provided by the screw 36, acting upon the spring 35, while the adjustment for speed is provided by the screw 22, the latter regulating the position of the throttle-valve for any given position of the speed-controlled member and the pressure-controlled member of the governor. As in said prior patent, I also employ an adjustable stop for limiting the action of the pressure-controlled member. This stop is in the form of a rod 37, which is pivoted to the upper end of the lever 27 and provided with an adjustable stop-nut 38 adapted to engage a lug 39, through which the rod 37 passes loosely. By this arrangement the left-hand movement of the lever 27 may be limited, so as to prevent the throttle-valve from being closed, by this means, beyond a predetermined degree, thus insuring at least a minimum speed in the compressor and preventing it from coming completely to rest.

I claim:—

1. A governor for air-compressors having, in combination, a throttle-valve for controlling the operation of a compressor, a spring tending constantly to open the throttle-valve, a pressure controlled member subjected to and movable in accordance with the pressure produced by the air-compressor, and connections between the valve and said member comprising a train of levers maintained constantly in forcible engagement with each other by the opposed action of said spring and said member.

2. A governor for air-compressors having,

in combination, a throttle-valve for controlling the operation of a compressor a resilient device tending to open the throttle-valve, rigid connections between said device
 5 and said valve, a speed-controlled member movable in accordance with the speed of the compressor, a pressure-controlled member subjected to, and movable in accordance with, the pressure produced by the com-
 10 pressor, and connections between the valve and said members comprising a train of levers maintained constantly in forcible engagement with each other by the opposed action of said resilient device and said pres-
 15 sure-controlled member, one of said levers being fulcrumed upon the speed-controlled member so as to operate differentially according to the movements of both of said members.

20 3. A governor for air-compressors having, in combination, a throttle-valve for controlling the operation of a compressor, a speed-controlled member movable in accordance with variations in the speed of the compres-
 25 sor, a pressure-controlled member subjected to, and movable in accordance with, the pressure produced by the compressor, and connections between the valve and said members comprising a lever fulcrumed on the
 30 speed-controlled member and connected, at one end, with the valve, a second lever co-operating with the other end of the first-mentioned lever, and a link pivotally engag-
 35 ing the second lever and connecting it with the pressure-controlled member, the arm of the second lever which coöperates with said link lying at an obtuse angle with the link, and a spring coöperating with the second
 40 lever and acting in opposition to the pres-
 sure-controlled member.

4. A governor for air-compressors having, in combination, a throttle-valve for controlling the operation of a compressor, a speed-

controlled member movable in accordance with variations in the speed of the com- 45
 pressor, a pressure-controlled member subjected to, and movable in accordance with, the pressure produced by the compressor, and connections between the valve and said members comprising a lever fulcrumed on 50
 the speed-controlled member and connected, at one end, with the valve, a second lever co-operating with the other end of the first-mentioned lever, and a link connecting the
 55 second lever and the pressure-controlled member, the arm of the second lever which coöperates with said link lying at an obtuse angle with the link and being adjustable to vary said angle for a given position of the
 60 pressure-controlled member, and a spring co-operating with the second lever and acting in opposition to the pressure-controlled member.

5. A governor for air-compressors having, in combination, a rotary throttle-valve for 65
 controlling the operation of the compressor, an arm rigidly connected with the throttle-valve, a spring engaging said arm and tending constantly to move it in a direction to open the throttle-valve, a speed-controlled 70
 member movable in accordance with variations of the speed of the compressor, a pressure-controlled member subjected to and movable in accordance with the pressure
 75 produced by the compressor, and connections between said arm and said members comprising a lever fulcrumed on the speed-controlled member and engaging said arm, said connections being maintained constantly
 80 in forcible contact by the opposed action of the spring and the pressure-controlled member.

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Witnesses:

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