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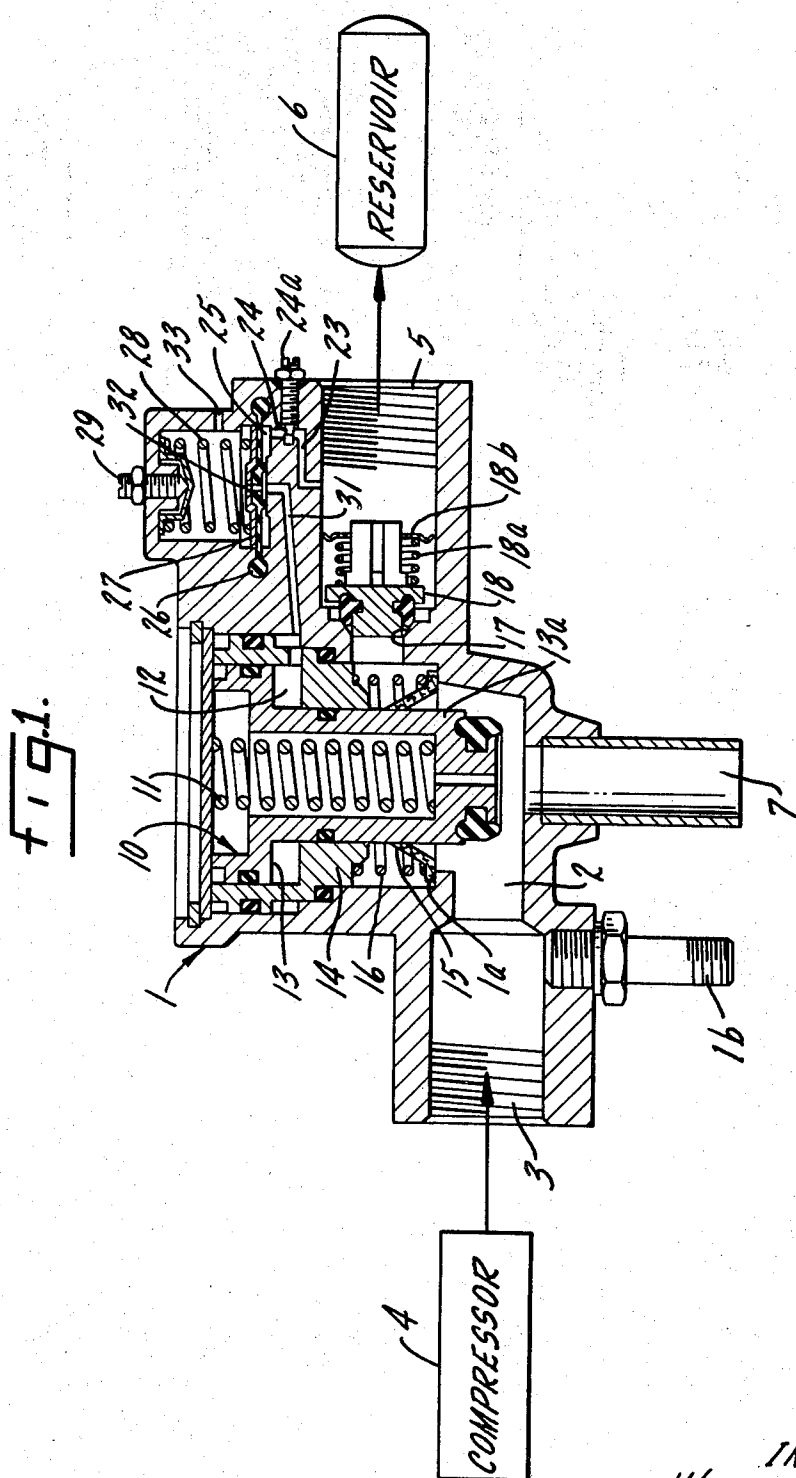
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3,545,887

COMPRESSOR GOVERNOR

Filed July 3, 1968

2. Sheets-Sheet 1



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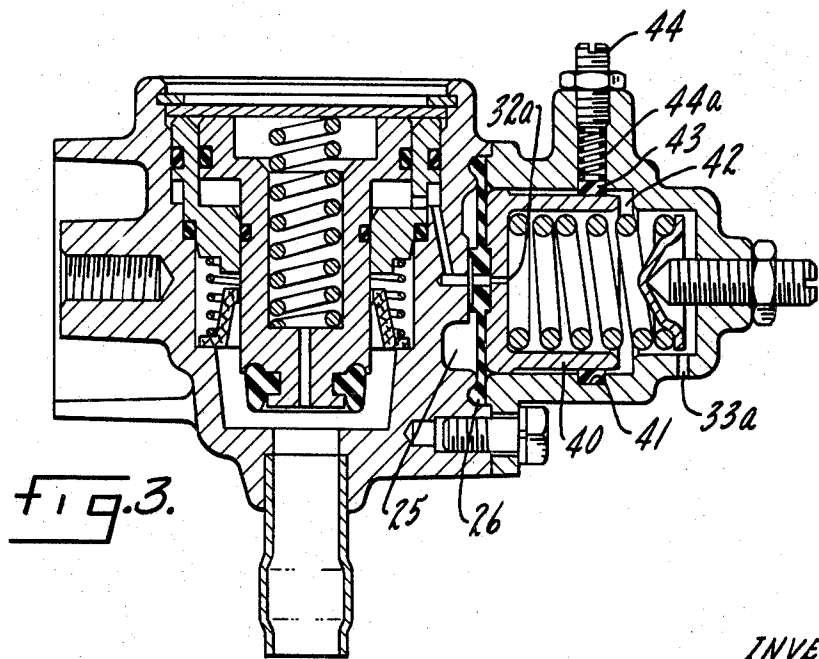
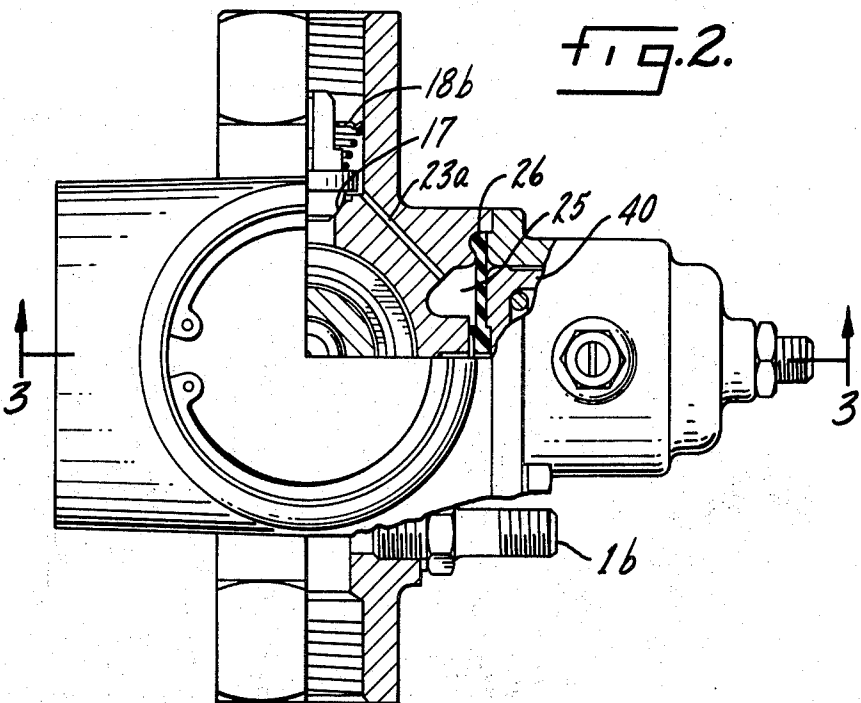
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1

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COMPRESSOR GOVERNOR

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3 Claims

ABSTRACT OF THE DISCLOSURE

A compressor governor having means communicating a compressor alternatively with atmosphere and a reservoir in automatic response to predetermined pressure levels in said reservoir, means for adjusting said predetermined pressure levels and means for dampening pulsations of said governor.

SUMMARY OF THE INVENTION

A compressor governor including a housing having an inlet communicating with the compressor and an outlet communicating with the reservoir, an exhaust communicating intermediate said inlet and said outlet, a valve closing and opening said exhaust in response to the pressure delivered by said compressor to said reservoir. An adjustable second valve controlling the delivery of fluid pressure to said exhaust valve for opening the same and means dampening the pulsations of said governor.

This invention relates to compressor governors and has particular relation to a compressor governor automatically effective to deliver fluid pressure at a predetermined level to a reservoir and thereupon to exhaust said compressor to atmosphere.

One purpose of the invention is to provide a compressor governor having means dampening the pulsations thereof.

Another purpose is to provide a compressor governor having a first valve controlling an exhaust for said compressor and a second valve controlling said exhaust valve.

Another purpose is to provide a compressor governor having an exhaust valve, a second valve controlling said exhaust valve and means dampening the action of said second valve.

Other purposes will appear from time to time during the course of the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawings wherein:

FIG. 1 is a cross-sectional view of one form of the invention;

FIG. 2 is a top plan view, with parts in cross section, of another form of the invention; and

FIG. 3 is a cross-sectional view taken on the line 3-3 of FIG. 2.

Like parts are indicated by like numerals throughout the specification and drawings.

The compressor governor of the invention includes a housing 1 having a passage 2 formed therethrough. The passage 2 has an inlet 3 for communication with a compressor 4. An outlet 5 of passage 2 communicates with a reservoir 6. An exhaust passage 7 communicates with passage 2 intermediate inlet 3 and outlet 5.

An exhaust valve 10 is positioned for controlling exhaust passage 7 and is yieldingly urged into closing engagement with exhaust passage 7 by spring 11. Slidable within a chamber 12 and in sealing engagement therewith, the exhaust valve member 10 has an enlarged piston portion 13. The member 10 includes the piston portion 13 and an elongated extension 13a of reduced diameter and slidable in sealing engagement with a bushing 14.

A frusto-conical filter member 15 slidably engages the extension 13a and is urged by spring 16 upon a ledge

2

1a formed in housing 1 and surrounding an intermediate portion of passage 2.

Beyond the inlet 3 from filter 15 the passage 2 has formed therein a passage-surrounding seat 17 against which a check valve 18 is yieldingly urged by a spring 18a. A suitable spring retainer is shown at 18b.

A branch passage 23 communicates at one of its ends with passage 2 downstream of seat 17 from filter 15 and exhaust passage 7. Intermediate its ends the passage 23 has a restriction 24 created by the interposition of adjustable restriction member or nozzle member 24a. The opposite end of passage 23 communicates with a chamber 25. A valve member formed of the diaphragm 26 and backing plate 27 is yieldingly urged as by spring 28, the effect of said spring 28 being adjustable by means 29, into a position closing communication of a branch passage 31 with chamber 25. The opposite end of branch passage 31 communicates with chamber 12 beneath piston 13, as the parts are shown in the drawings. A restricted passage 32 is formed through diaphragm 26 and backing plate 27 for exhaust of chamber 12 through passage 31, restricted passage 32 and the exhaust passage 33 formed in housing 1 beyond valve 26 from chamber 25.

In the form of the invention illustrated in FIGS. 2 and 3, passage 23a extends unbrokenly from just downstream of seat 17 to chamber 25 and the control valve 26 is backed by a suitable cup-shaped piston 40. A groove 41 is formed in the circumferential wall of the chamber 42 in which piston 40 is slidable. Within groove 41 is positioned a friction ring 43, the inner circumferential surface of which engages the outer circumferential surface of piston 40. An adjustable friction control member takes the form of the element 44 threaded into housing 1 to urge spring 44a against the outer circumferential surface of ring 43 for increasing and decreasing the frictional engagement of ring 43 with, and its effect upon, the piston 40 and thus upon valve 26. Restricted exhaust passage 32a is formed in diaphragm valve 26 and the bottom wall of piston 40, as shown, and as passage 32 is in valve 26 and plate 27 of FIG. 1.

Indicated at 1b is a branch fitting communicating with passage 2 intermediate inlet 3 and exhaust 7 for connection with desired elements (not shown), such as tire valves for example, to supply air from compressor 4 to said elements when desired and in circumstances permitting such employment of compressor air.

Whereas there has been shown and described an operative form of the invention, it should be understood that this showing and description are to be taken in an illustrative or diagrammatic sense only. There are many modifications in and to the invention which will be apparent to those skilled in the art and which will fall within the scope and spirit of the invention.

The use and operation of the invention are as follows:

The compressor 4 will deliver fluid pressure through inlet 3 and into passage 2. With the reservoir pressure below a predetermined level, the valve member 10 will be in closing position against the inner surface of housing 1 surrounding the point of communication of exhaust passage 7 and housing passage 2. Fluid pressure will therefore flow through filter 15 and will be sufficient to unseat valve 18 from seat 17 against the action of spring 18a urging valve 18 toward seat 17. Fluid pressure will therefore flow through outlet 5 to reservoir 6.

Should filter 15 become clogged, the fluid pressure entering inlet 3 will unseat filter 15 from its ledge 1a, against the action of spring 16, to permit the flow of fluid pressure from compressor 4 to reservoir 6.

Fluid pressure being supplied to reservoir 6 is delivered to chamber 25 through passage 23. So long as said fluid pressure is below the predetermined reservoir level, it will be continued to be supplied to reservoir 6 and

valve diaphragm 26 will remain seated in its position closing passage 31.

When said pressure rises, however, above said predetermined level, said pressure, communicated to chamber 25 through passage 23, will be effective to unseat valve diaphragm 26 and to deliver said pressure through passage 31 to chamber 12. Thereupon the action of said fluid pressure within chamber 12 and acting upon the large undersurface, as the parts are shown, of piston portion 13 will cause the exhaust valve member 10 to move rapidly away from exhaust passage 7 and to communicate compressor 4 immediately with said exhaust passage. Upon the communication of compressor 4, inlet 3 and passage 2 with exhaust passage 7, the immediate drop in fluid pressure within chamber 2 upstream of seat 17 causes valve 18 to close in response to the action of spring 18a and to preclude the loss of fluid pressure from reservoir 6 in return direction through exhaust passage 7.

With the control valve 26 in open position, fluid pressure in reservoir 6, passage 23, chamber 25, passage 31 and chamber 12 is communicated slowly through restricted passage 32 and exhaust outlet passage 33 to atmosphere. Upon reduction of fluid pressure in chamber 25 to a predetermined level, spring 28 will return control valve 26 to the closed position illustrated in FIG. 1, for example. Said closure will prevent any further diminution of reservoir pressure through restricted exhaust orifice 32 and passage 33. Said exhaust passages 32, 33 will, however, remain continuously in communication with passage 31 and chamber 12 to exhaust chamber 12 and enable spring 11 to return the exhaust valve 10 into its position closing exhaust passage 7.

When the fluid pressure in reservoir 6 and the force of spring 18a are once again less than the fluid pressure delivered by the compressor 4, the valve 18 will separate from its seat 17 and fluid pressure will again flow from compressor 4 to reservoir 6 and the cycle described above will be repeated automatically as conditions require.

In the form of the invention in FIG. 1 the restricted orifice 24 created by element 24a serves to limit or slow delivery of fluid pressure to chamber 25 and thus to impede or slow a too-sensitive action of control valve 26 upon the reaching of the predetermined desired level of fluid pressure in outlet 5 and reservoir 6. Similarly, the restricted exhaust orifice 32 for chamber 12 in passage 31 slows or impedes the otherwise rapid return of exhaust valve 10 to closed position after it has been opened. Thus the pulsating effect of the compressor between its communication with the reservoir and with exhaust passage 7 is greatly reduced and dampened.

Nonetheless, a desired "snap-action" of exhaust control valve member 10 is accomplished. Chamber 25 is filled through restriction 24 and when the pressure adjustably set by means 29 is reached, valve 26 will open to deliver said pressure rapidly through passage 31 to raise valve 10 rapidly and positively. Immediately upon opening, valve 26 exposes exhaust passages 32 and 33 to reservoir 6. In view of the restricted nature of passage 32, however, the pressure in reservoir 6 and in chamber 12 beneath piston 13 is not immediately exhausted and a rapid or chattering return of valve 10 to exhaust-closing position is avoided. Valve 26 will close when the pressure in chamber 25 falls below the level set by means 29. Chamber 12, however, remains in restricted communication with atmosphere through passages 32, 33 and valve 10 is guaranteed return to its closed position.

In the form of FIG. 2, the restriction 24 is absent and passage 23a communicates with passage 2. The cup-shaped piston 40 backs diaphragm valve 26 and is urged thereagainst by spring 28, the effect of which is adjustable by means 44. A ring 42 surrounds piston 40 and means 44, 44a adjustably determines the friction engagement of ring 43 and piston 40 to restrict the movement of valve 26 and thus to dampen the otherwise existing pulsations of the governor of the invention between commu-

nication of compressor 4 with atmosphere and with reservoir 6.

Thus threaded means 29 adjustably controls the maximum reservoir pressure desired and threaded means 24a and 44 adjustably controls the desired pressure differential and check valve 18, positioned between exhaust valve structure 7, 10 and control valve elements 23, 24, 25, 26, 27, 31, 32, 33 or 23a, 25, 26, 31, 32a, 33a, 40, 41, 43, 44, protects reservoir 6 against loss of fluid pressure through exhaust 7.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A compressor governor including a housing, a passage through said housing and having an inlet for communication with a reservoir, an exhaust communicating with said through passage, an exhaust valve chamber, an exhaust valve member slidable in said chamber and positioned to open and close said exhaust, a control valve member communicating with a portion of said through passage downstream of said exhaust and openable in response to a predetermined pressure in said downstream passage portion to communicate said downstream portion with said exhaust valve chamber to open said exhaust valve, and means restricting the opening response time of said control valve member,

said restriction means comprising a backing member slidable in a second chamber and engaging one surface of said control valve member, a friction member carried by said second chamber and engaging said backing member and means adjustably controlling the frictional engagement of said friction member and said backing member.

2. The structure of claim 1 wherein said backing member comprises a cup-shaped piston, said friction member comprises a ring of friction-creating material secured in a groove in said second chamber and surrounding the circumferential wall of said piston and said last-named means comprises an element movably carried on said housing and engaging an outer surface of said ring.

3. In combination, a compressor, a reservoir, a governor communicating with said compressor and reservoir, an exhaust and an exhaust valve in said governor, a control valve responsive to pressure in said reservoir, said control valve being openable to deliver fluid pressure from said reservoir to said exhaust valve to open the same in response to fluid pressure above a predetermined level in said reservoir, and means restricting the opening movement of said control valve, said restricting means including a backing member for said control valve, a friction member engaging said backing member and means adjustably controlling the frictional engagement of said backing and frictional members.

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