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W. B. HODGE

SELF CLEANING PORT

Original Filed May 19, 1923

Fig. 1.

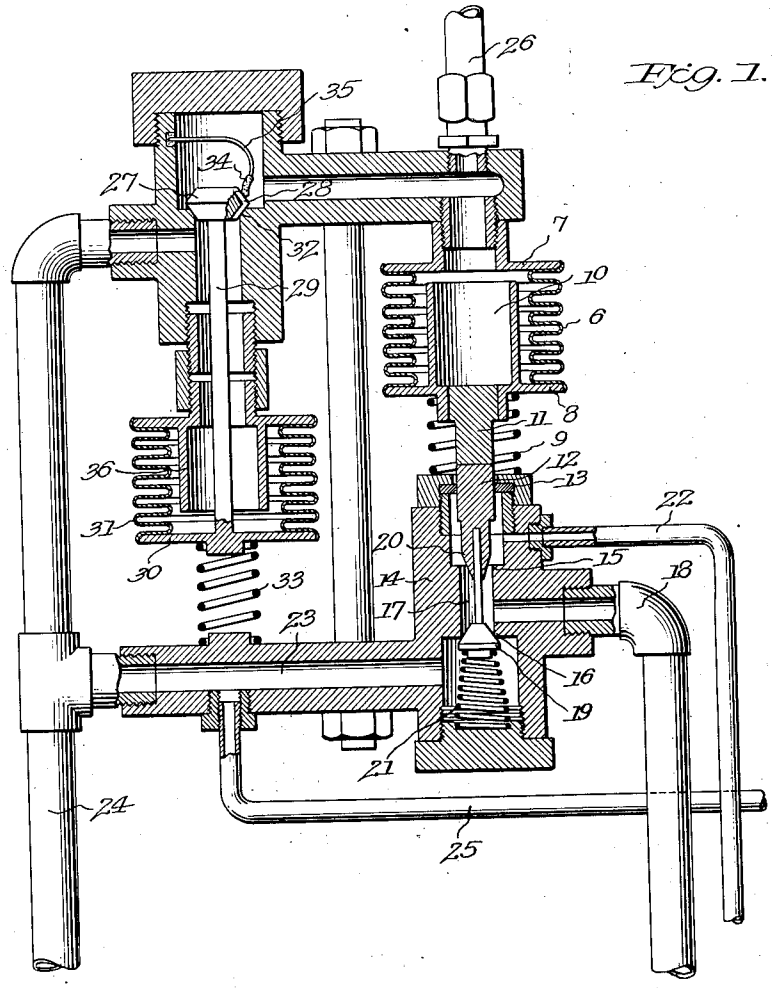
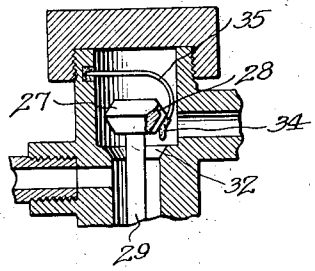


Fig. 2.



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UNITED STATES PATENT OFFICE.

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SELF-CLEANING PORT.

Original application filed May 19, 1923, Serial No. 640,283. Divided and this application filed September 9, 1924. Serial No. 736,802.

This invention relates to cleaning devices for the throttling feed ports of pneumatic devices, and provides a mechanism intended particularly for use in pneumatic relay motors such as are used in temperature and humidity controlling systems.

The present application is a division of a prior application, Serial No. 640,283, filed May 19, 1923.

Generally stated the invention contemplates the use of a motor, subject to the pressure of the air supply, and rendered operative to clean the feed port by a reduction of supply pressure, caused for the purpose, or as an incident to shutting down the system.

The relay motors used in temperature and humidity regulating systems commonly include a diaphragm chamber having a leak port controlled by a thermostatic or hygrostatic valve. When the system is in operation air under pressure is constantly fed to the diaphragm chamber through a throttling feed port whose capacity is less than that of the leak port. Thus the closing and opening of the leak port by the thermostatic or hygrostatic valve causes the alternate distention and collapse of the diaphragm.

Such throttling feed ports being quite minute are apt to become clogged with dust and scale, and the present invention provides means for cleaning such ports each time the supply pressure is materially reduced, as it is, for example, when the system is shut down.

The application of the invention to a known type of relay motor used in temperature and humidity regulation is illustrated in the accompanying drawing, in which:—

Fig. 1 is a section showing the main operative parts of the motor.

Fig. 2 is a fragmentary section showing the feed port opened and its contact with the wiper when the air supply is shut off.

The diaphragm motor above referred to consists of a corrugated metal bellows 6, closed at one end by a fixed head 7 and at the other by a movable head 8. A spring 9 acts against the head 8, tending to collapse the diaphragm, but the range of collapsing movement is limited by a flange 10 formed on head 8.

The head 8 is further provided with a projecting stud 11 which abuts against a valve stem 12. This valve stem 12 passes through a packing 13 in relay valve casing 14. The casing 14 is provided with an exhaust valve seat 15 and an inlet valve seat 16 at opposite ends of a passage 17, from which a branch connection 18 leads to the controlled device.

The relay valve consists of an inlet valve 19 and an exhaust valve 20 mounted in thrust relation with each other. The stem of the exhaust valve 20 has an axial recess in which the end of the inlet valve stem seats and is guided, and a spring 21 which bears against the inlet valve, serves to close the latter and open the exhaust. The space above exhaust valve 20 is connected to atmosphere by a pipe 22 which directs the exhausted air to a point of use disclosed in the parent application but not material to the present invention. The space below inlet valve 19 is connected by passage 23 to the compressed air supply pipe 24.

The branch pipe 25 is for a purpose disclosed in the parent application and not material to the present application, since it merely supplies air under pressure to certain accessory apparatus.

The pressure fluid within diaphragm 6 is confined and vented alternately by the opening and closing of a familiar type of leak port to which the pipe 26 leads. One embodiment of the port with its controlling valve is illustrated in the parent application, but since it is not material to the present invention it is here omitted.

To operate a motor of the above described type air must be supplied constantly to the diaphragm chamber at a rate less than the outflow capacity of the leak port, by the use of a restricted feed port. According to the present invention I form this port on the side of a movable valve-like member 27, the port consisting of a groove 28.

The member 27 is supported on a stem 29 which is fixed on a head 30, while the head 30 is carried by a metallic bellows diaphragm 31. The compressed air supply pipe 24 communicates with the interior of bellows 31 so that when the supply pressure is on, the valve-like member 27 is drawn down into a seat 32, formed to receive it. In this position the groove 28 offers the only path past the member 27.

When the supply pressure is materially reduced or shut off a spring 33 acting

against head 30 lifts member 27 from seat 32, (see Fig. 2) and wipes groove 28 against a swab 34 which is carried on a resilient overhanging arm 35. When the air pressure again rises the member 27 will again be seated, but before seating occurs the air flow will carry away any accumulated scale or dust, loosened by the swab. The upward movement of rod 29 is limited by a flange 36 within bellows 31.

Thus whenever the system is shut down, the feed groove will be effectively cleaned. Since most such systems are shut down at night the invention provides cleaning at least once each twenty-four hours.

What is claimed is:

1. The combination with a pressure fluid actuated control device of the relay motor type requiring a restricted port, which serves as a feed port for said relay motor of a valve like member and a seat therefor, one of which is formed at its seating area with a groove arranged to serve, when the two are in contact, as said restricted port; and means including an abutment subject to supply pressure and arranged to seat said valve like member in said seat when supply pressure is active, and to separate the two at other times.

2. The combination with a pressure fluid actuated control device of the type requiring a restricted port, of a conical seat member; a conical valve-like member adapted to seat therein and having a channel in its conical fact adapted to serve, when the valve-like member is seated, as said restricted port; means including an abutment subject to supply pressure, and arranged to seat said valve-like member in said seat when supply pressure is active and to separate the two at other times; and a wiper resiliently mounted in position to wipe said groove as the valve moves near its fully separated position.

3. The combination with an automatic control device of the pressure fluid actuated type, including a restricted port formed between two relatively movable members; an abutment subject to the pressure of pressure fluid supply in one direction and connected to produce movement of said members upon variation of such pressure; and yielding means acting on said abutment in opposition to said supply pressure.

4. The combination with an automatic control device of the pressure fluid actuated type, including a restricted port formed between two relatively movable members; a wiper in position to be engaged by the first of said members during such relative movement; an abutment connected with said first member and subject to the pressure of pressure fluid supply in one direction; and yielding means acting on said abutment in opposition to said supply pressure.

5. The combination with an automatic control device of the relay motor type, of a seat; a head adapted to seal against said seat and having a groove on its seating face which serves as a restricted feed port for pressure fluid to said control device; an abutment subject to the pressure of fluid supply and connected with said head to move the same upon changes of pressure of motive fluid supply; a wiper mounted in a position to engage said head and the groove therein as the head moves away from said seat; and resilient means urging said abutment in opposition to said fluid pressure.

In testimony whereof I have signed my name to this specification.

WILLIAM B. HODGE.