GOVERNOR FOR COMPRESSORS

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This invention relates to governors and, more particularly, to governors for compressor pumps and the like.

In prior governors of the type disclosed herein, it is necessary to open the unloader valve when starting the compressor. This is usually done manually or it could be done by means of a solenoid valve. In either case, time, inconvenience, or expensive equipment is required.

In the present invention, a valve is provided which is held closed by suction of the compressor when the compressor is running. The valve is forced open by a spring when the compressor stops. Therefore, the valve is automatically opened and closed by the compressor itself and requires no attention or expensive equipment.

The purpose of the governor disclosed herein is to increase the volumetric efficiency of the compressor and to reduce noise and wear on the machine.

Most compressors, when in normal operation, are either pumping at full capacity or idling. Therefore, the receiver pressure may vary between considerable limits. The governor disclosed herein will hold the pressure constant and the load on the compressor motor will be in direct proportion to the air demand, thus resulting in a lower overall load factor. Because the machine is constantly pumping air, pistons of the compressor are cushioned at all times at the end of each stroke. The inertia of the moving parts of the compressor is absorbed by the air cushion, reducing the bearing thrust. The governor disclosed herein has only two moving parts which are the diaphragm with a valve connected thereto and the automatic unloader valve.

It is, accordingly, an object of the present invention to provide an improved governor for an air compressor.

Another object of the invention is to provide a governor for an air compressor that is simple in construction, economical to manufacture, and simple and efficient in use.

A further object of the invention is to provide an automatic unloader valve for an air compressor.

With the above and other objects in view, the present invention consists of the combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawing and more particularly pointed out in the appended claims, it being understood that changes may be made in the form, size, proportions, and minor details of construction without departing from the spirit or sacrificing any of the advantages of the invention.

The drawing shows a longitudinal cross sectional view of a governor according to the invention.

Now with more particular reference to the drawing, the governor disclosed herein has a governor body 10 which may be of cast metal or the like with an outlet chamber 22 and an inlet chamber 21 therein.

The improved control has a control body 11 which is threaded into an opening 23 in the governor body 10. The governor body 10 has a connection 18 for connecting it to a receiver and a connection 19 to connect it to an inlet valve of a compressor. A bleeder screw 17 is hollow and, when rotated inwardly to close it, communicates through its hollow from the outside to the outside of the control chamber 22 to bleed the residual air out of the outlet chamber 22.

The top of the governor body 10 is counterbored at 25 to receive a bonnet 26 and the bonnet 26 has a threaded bore 27 which receives a pressure adjusting nut 28. The pressure adjusting nut 28 is hollow and receives a pressure adjusting spring 29 therein. The spring 29 bears at its upper end on the bottom of the bore and, at its lower end, it bears against a head 29' of a shaft 29. The shaft 29 is threadably received in a boss 30 which has a valve member 31 attached thereto by means of a spherical top 31' clamped between the boss 30 and the threaded end of the shaft 29. The valve member 31 opens and closes a valve orifice 32 in a partition 33.

The peripheral edges of a rubber diaphragm 34 are clamped between the body 10 and the bonnet 26 and it supports the shaft 29 in the valve member 31.

A valve stem 42 is urged to open position by a spring 13 and forced close when the compressor is running by suction of the compressor on a piston 40. The control body 11 has a bore 49' therein which receives the spring 13. The spring 13 rests on the top of the bore 40' at its upper end and against piston 40 on the valve stem 42.

The valve stem 42 is an elongated member 128 set in the bore 128 thereon which seats in an orifice 43 in the partition 33. An adjusting nut 14 is threadably received in a counterbore in the body 11 and has a vent hole 16 therein to vent air from behind the piston 40 pumped in and out as the piston moves.

A suction line 15 communicates between the bore 40' and the chamber 22.

The governor shown is connected to the inlet valve of an air compressor 50 at 51 with the threaded connection 18 connected to an air receiver 52 and the threaded connection 19 connected to the inlet valve to the compressor 50. The outlet of the compressor 50 is connected to the receiver 52 by means of a line 53. The main supply of air to the compressor 50 is drawn through inlet 54. When the compressor is not running, the pressure in the chambers 21 and 22 will be equal. Therefore, the valve member 31 will be closed and, since there is no suction on the connection 19, the spring 13 will hold the valve stem 42 open.

When the compressor starts and a suction is exerted in the chamber 22, the suction will be exerted through the line 15 to bring the valve on valve stem 42 to close the orifice 45. As pressure builds up in the receiver and it reaches the pressure for which the spring 28 is set by means of the nut 20, the diaphragm 34 will be forced upward against the tension of the spring 28 which will move the valve member 31 to open the orifice 32. This will allow the air to flow through the orifice 32 and, therefore, act as a bypass.

Pressure adjustment for the receiver is made by changing the tension on the spring 28 by means of the nut 20.

As the compressor comes to a stop, as soon as the compressor is running, the suction is removed, by a check valve 40 on the spring 40 being closed. When the pressure in the inlet line falls below a predetermined value, the spring 40 being closed.

The foregoing specification sets forth the invention in its preferred practical forms but it is understood that the structure shown is capable of modification within a range of equivalents without departing from the invention which is to be understood is broadly novel and is commensurate with the appended claims.

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

1. In combination, a governor connected with an air compressor and a receiver,

said governor comprising a governor body having an inlet chamber connected to said receiver and an outlet chamber connected to the inlet of said air compressor,

said inlet chamber and outlet chamber separated by a partition means having a first and a second spaced opening connecting said inlet chamber to said outlet chamber,

valve means to close said first opening when the pressure in said inlet chamber falls below a predetermined value, and means on said governor body responsive to the inlet pressure of said compressor.
and actuated by the operation of said compressor to hold said second opening closed and to open said second opening when the operation of said compressor is discontinued.

2. The governor recited in claim 1 wherein said means to close said second opening comprises a valve stem having second valve means on one end to close said second opening and a piston on the end opposite said second valve means, a control body having a bore defining a cylinder therein, said piston being slidably received in said control body, a spring urging said piston to move said second valve means out of closing relation to said second opening, and means connecting said cylinder to said inlet chamber whereby fluid force generated by said compressor reduces the pressure in said cylinder to cause said piston to move said second valve means to closed position.

3. The governor recited in claim 2 wherein an adjusting nut is threadably received in said control body, said control body having means rotatable to vary the force on said spring whereby the fluid force generated by said compressor required to open said second valve means can be varied.

4. The governor recited in claim 3 wherein a bleeder hole is disposed in said means rotatable to vary force whereby the air between said nut and said piston can be varied.

5. In combination, a governor connected with an air compressor and a receiver, said governor comprising a governor body having an inlet chamber connected to said receiver and an outlet chamber connected to inlet of said compressor, said inlet chamber and outlet chamber separated by a partition means having a first and a second spaced opening connecting said inlet chamber to said outlet chamber,

a diaphragm within said governor body forming a closure for one side of said inlet chamber,

a first valve means attached to said diaphragm and movable with said diaphragm in communication with said first opening to open and close said first opening,

a compression spring engaging said diaphragm on the side thereof remote from said first valve means urging said first valve means to close said first opening against the pressure in said inlet chamber,

a second valve means for closing said second opening when the pressure within said outlet chamber falls below a predetermined value,

said second valve means being actuated by the suction pressure of said air compressor so as to hold said second opening closed and to open said second opening when the suction of said compressor is discontinued.

6. The governor recited in claim 5 wherein said means to close said second valve second opening comprises a valve stem having second valve means on one end to close said second opening, a piston on the end opposite said second valve means, a control body having a bore defining a cylinder therein, said piston being slidably received in said control body, a spring urging said piston to move said second valve means out of closing relation to said second opening, and means connecting said cylinder to said inlet chamber whereby suction of said compressor reduces the pressure in said cylinder to cause said piston to move said second valve means to closed position.

7. The governor recited in claim 6 wherein an adjusting nut is threadably received in said control body, said adjusting nut being rotatable to vary the force on said spring whereby the suction required to open said second valve means can be varied.

8. The governor recited in claim 7 wherein a bleeder hole is disposed in said adjusting nut whereby the air between said nut and said piston can be released to the atmosphere.

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