E. H. SHERBONDY.

TURBOCOMPRESSOR CONTROL.

APPLICATION FILED MAY 14, 1918.

1,419,316. Patented June 13, 1922.

FIG. 1.

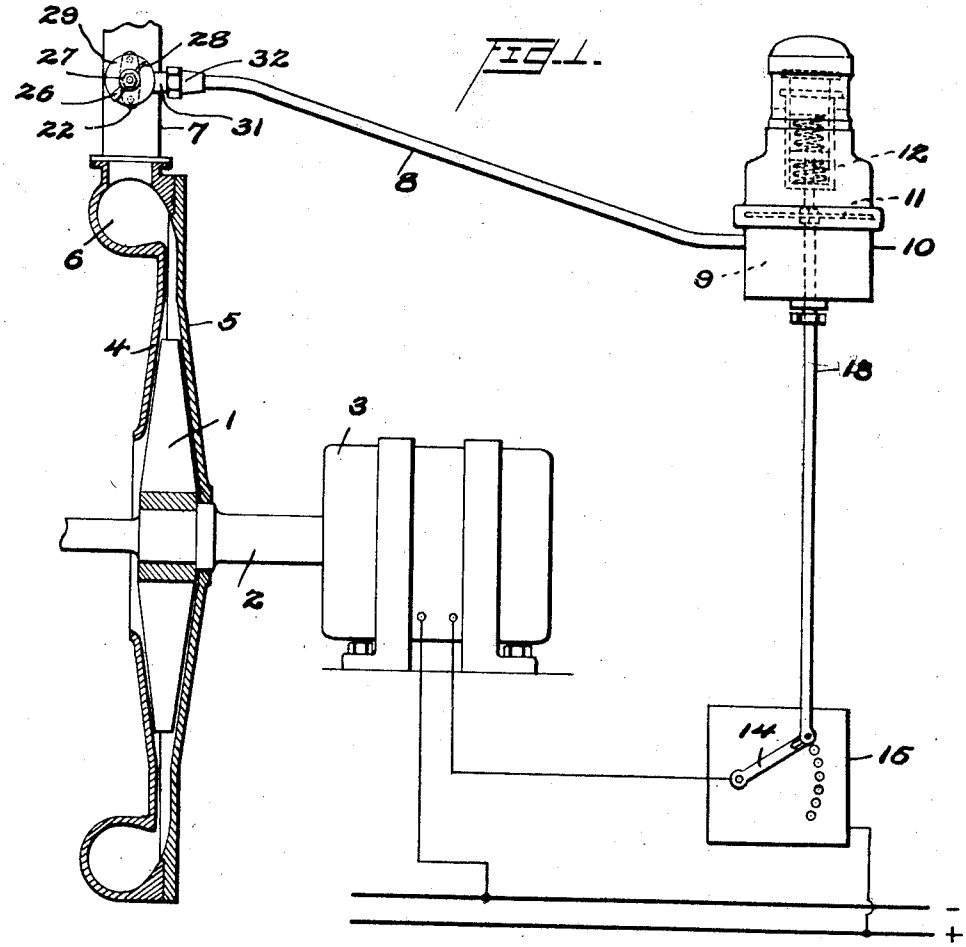


FIG. 2.

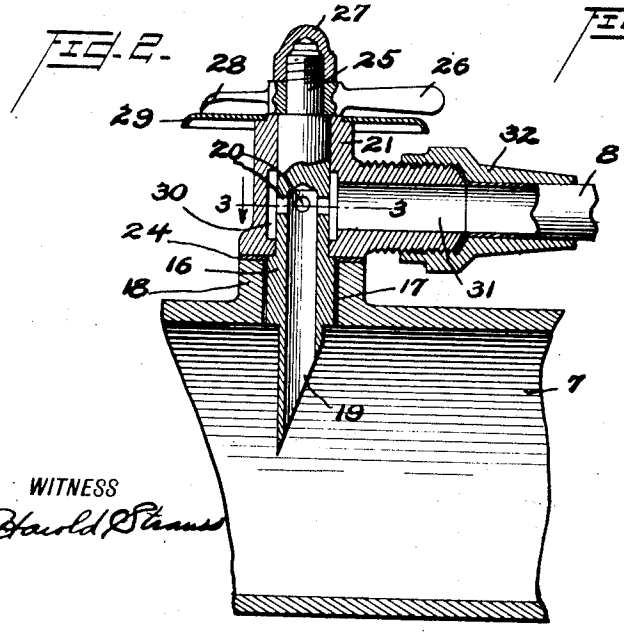
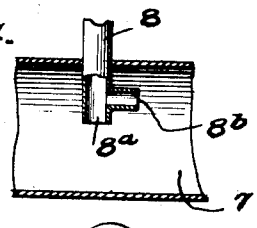


FIG. 4.



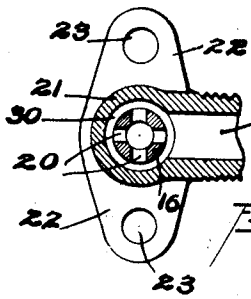


FIG. 3.

WITNESS

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UNITED STATES PATENT OFFICE.

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TURBOCOMPRESSOR CONTROL.

1,419,316. Specification of Letters Patent. Patented June 13, 1922.

Application filed May 14, 1918. Serial No. 234,560.

To all whom it may concern:

Be it known that I, EARL H. SHERBONDY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Turbocompressor Controls, of which the following is a specification.

This invention relates to controlling means for fluid pumps in general, and more particularly to controlling means for an air compressor.

More particularly the invention comprises automatic controlling means for said air compressor, a means in which a pressure responsive element is subjected to the delivery pressure of said air compressor, it in turn controlling means to vary the speed, and consequently the delivery pressure of the air compressor.

To this end some form of tap-off device is used. This invention comprises a tap-off device which is so designed that by adjusting it to different positions in the delivery stream from the air compressor, that a pressure is transmitted to the pressure responsive element which, as desired, may be equal to or greater or less than the actual pressure in the delivery pipe from the compressor. The advantage of such a tap-off device is that by suitably positioning it, the compressor may be caused to deliver its normal output or an output greater or less than normal.

More particularly the invention comprises a tap-off pipe with a mouth which may be adjusted to face into or away from the stream in the delivery pipe, or in any intermediate position, each different position resulting in more or less air being taken into the tap-off pipe, whereby more or less pressure is transmitted to the pressure responsive element.

Other objects and advantages will appear as the description proceeds.

In the drawings representing embodiments of this invention, Fig. 1 shows the automatic control in relation to the air compressor or other fluid pump; Fig. 2 is a sectional detail on an enlarged scale, of the adjustable tap-off pipe; Fig. 3 is a view on line 3—3 of Fig. 2; and Fig. 4 represents a modification.

In the drawings which are diagrammatic, a centrifugal blower wheel or compressor 1 is mounted on a shaft 2, which shaft 2 may be rotated by a suitable motor 3. Casing elements 4 and 5 are associated with said wheel to define a casing therefor, and the usual collecting ring 6, from which leads the delivery pipe 7. A pipe 8 opens into this delivery pipe 7, and at its other end opens into an air tight chamber 9, which may be defined by a casing 10 in cooperation with a pressure responsive element, such as a diaphragm 11. At its lower side diaphragm 11 is subject to the pressure transmitted through the pipe 8, and at its upper side may be provided with suitably loading means, such as springs 12, or a confined body of air, or both.

The diaphragm 11 has connected therewith a stem 13, which partakes of the movements thereof to control any suitable means for controlling the output of the air compressor. In this case stem 13 is shown as controlling the arm 14 on rheostat 15 which is suitably connected to a suitable source of electrical energy, whereby it is evident, movement of the diaphragm will control the speed, and consequently the delivery pressure of the compressor. It should be understood, however, that this stem 13 may control other means for controlling the speed of the compressor, such as that shown in my co-pending case, Serial No. 224894 filed March 26, 1918.

The tap-off pipe with which this invention is more particularly concerned, is indicated at 16. This pipe 16 may be mounted in a suitable opening 17 in the delivery pipe 7, on a base 18, which may be attached to or integral with the pipe 7. The end of pipe 16 projecting into the pipe 7 is cut off diagonally to define an air intake mouth 19. The pipe 16 is bored out a little more than half way up, and is provided with one or more radial holes 20. Pipe 16 is mounted in a suitable standard 21, which is provided with lugs 22, and bolt or screw holes 23, for mounting the pipe 16 on the part 18, a washer 24 may be used, if desired, to make an air tight fit. The pipe 16 is adapted to be rotated on its own axis, within the standard 21, so that the mouth 19 may be caused to face into, away from or in any intermediate position with respect to the direction of travel of the air or other fluid in the pipe 7.

The upper part of the pipe 16 is provided with a head 25, on which may be mounted a handle 26, by a suitable nut 27, said handle

being clamped tightly to the head 25, so that the pipe 16 will turn therewith. The handle 26 may be provided with a pointer 28, which moves over a graduated disc 29, rigidly fastened on the standard 21.

Standard 21 is provided with a suitable groove 30, which groove is in connection with the radial ports 20, leading from the interior of the pipe 16. The standard 21 is provided with a laterally extending nipple 31, which opens into said groove 30. The nipple 31 in turn communicates with the pipe 8, the two being held together by a suitable collar 32. It will now be evident that with the parts positioned as in Fig. 2, dynamic force of the air, due to its velocity in the pipe 7, will cause a pressure in excess of the actual static pressure in the delivery pipe 7, to be delivered through the ports 20, groove 30, and pipe 8, to the pressure responsive element. The pressure responsive element accordingly responds as if the compressor were delivering excess of air and accordingly operates to slow it down. Were the mouth 19 turned in the opposite direction, the rush of air past the mouth 19 would have somewhat of an injector action to draw out air from the pipe 16, to correspondingly reduce the pressure in the chamber 9, whereupon the pressure responsive element would respond as if the air compressor were delivering insufficient air, and cause the motor 3 to speed up. Adjustment between these two extremes may obviously be had by positioning the mouth 19 in proper intermediate positions.

It may be mentioned in this connection, that variations in the spring or other loading of the pressure responsive element 11 will result in a corresponding supercharging or undercharging of the compressor, as more particularly described in my co-pending case, Serial No. 231,771, filed April 29, 1918. The control through adjustment of the pipe 16 is intended to be used in conjunction with and in addition to the spring loading adjustment just mentioned. This pipe adjustment is very simple and very quickly made, and presents little likelihood of getting out of order.

In the modification shown in Fig. 4, the pipe 8 terminates in two mouths 8^a and 8^b, the plane of the mouth 8^a being substantially parallel to the direction of travel in the pipe 7, and the mouth 8^b being at right angles thereto. The mouth 8^a is responsive mainly to static pressure, and the mouth 8^b is responsive mainly to dynamic pressure. The pipe 8 may be rotated on its own axis so that the mouth 8^b is caused to face into, away from or in the various intermediate positions with respect to the direction of travel of the air in the pipe 7, whereby an effect similar to the effect obtained with adjustment of pipe 16 is obtained.

While I have shown the invention as applied to an air compressor, it should be understood that it may be applied to fluid pumps in general.

While I have shown possible embodiments of my invention, it should be understood that it may be carried out in other ways, as defined within the scope of the appended claims.

I claim—

1. In combination, a fluid pump, a delivery pipe for the pump, a pressure responsive means to control said pump, and devices connected to said pressure responsive means adapted to be adjustably positioned in the fluid column within said delivery pipe to vary the intensity of the pressures communicated to said pressure responsive means in accordance with the angular position of said device relative to the axial flow of said fluid column.

2. In combination, a fluid pump, a pressure responsive means to control said fluid pump and means that may be adjusted to face into the delivery stream from said pump, away from said stream or in intermediate positions to subject said pressure responsive means to a pressure bearing a definite relation to the delivery pressure from said pump.

3. In combination, a fluid pump, a delivery pipe therefor, a pressure responsive means to control said pump, means associated with said delivery pipe having an opening which may be caused to face in any desired direction with respect to the direction of travel of the fluid in said delivery pipe, said means being connected to said pressure responsive means.

4. In combination, a fluid pump, a delivery pipe therefor, a pressure responsive means to control said pump, a tap-off pipe, having a diagonally cut end associated with said delivery pipe and means connecting said tap-off pipe to said pressure responsive means, said tap-off pipe being adjustable.

In testimony whereof I affix my signature.

EARL H. SHERBONDY.