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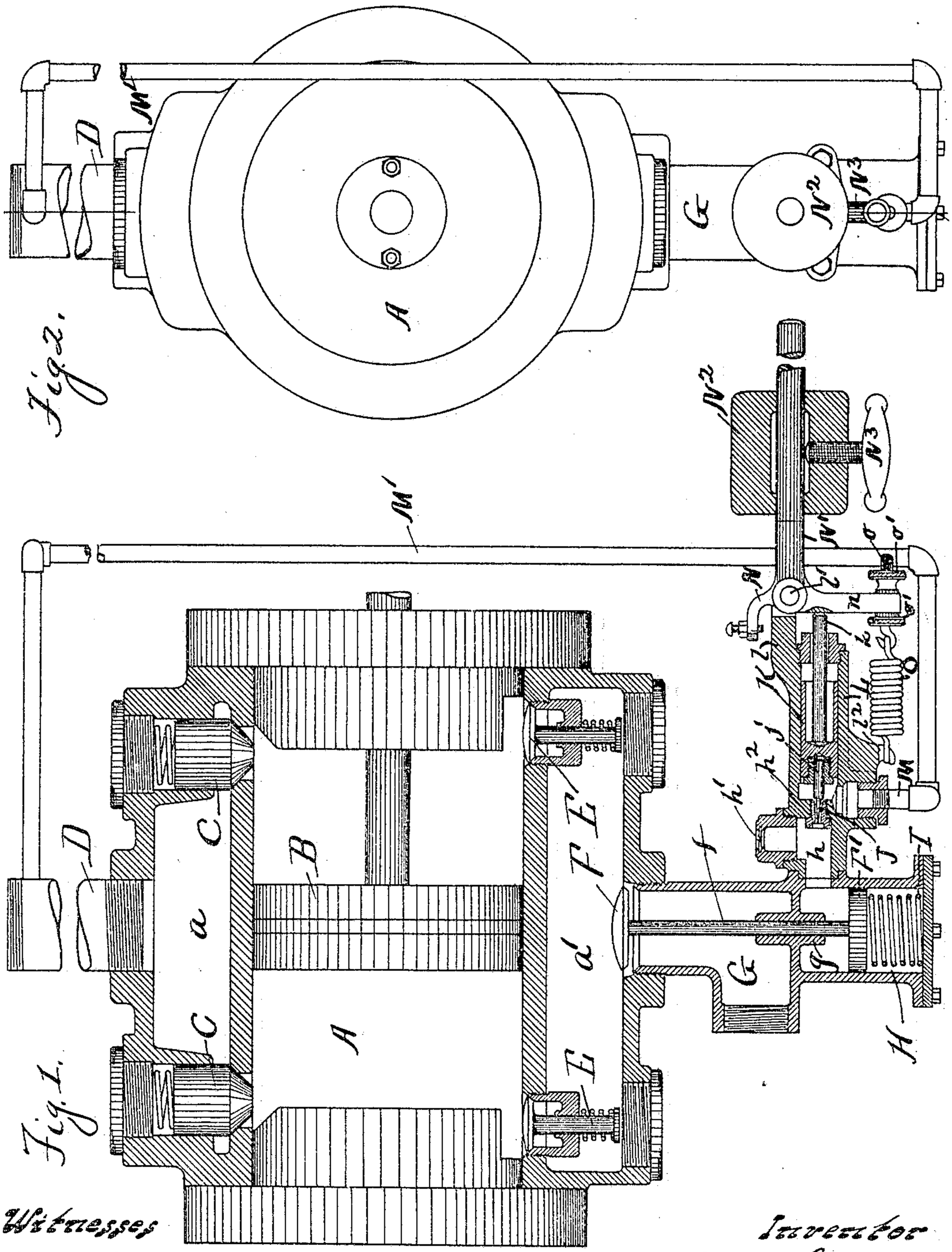
R. CONRADER.

REGULATOR FOR COMPRESSORS OR THE LIKE.

APPLICATION FILED FEB. 17, 1902.

NO MODEL.



Witnesses

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No. 775,393. Patented November 22, 1904.

UNITED STATES PATENT OFFICE.

RUDOLPH CONRADER, OF ERIE, PENNSYLVANIA.

REGULATOR FOR COMPRESSORS OR THE LIKE.

SPECIFICATION forming part of Letters Patent No. 775,393, dated November 22, 1904.

Application filed February 17, 1902. Serial No. 94,517. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH CONRADER, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Regulators for Compressors or the Like; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to regulating devices for compressors and the like; and it consists in certain improvements in the construction thereof, as will be hereinafter fully described, and set forth in the claims.

The object of the invention is to provide a regulating device operating upon the intake of the compressor, said device being capable of regulating the inflow of gases, as well as relieving the compressor when the receiver exceeds the maximum pressure.

The invention is illustrated in the accompanying drawings, as follows:

Figure 1 is a central longitudinal section of the compressor and regulating device. Fig. 2 is an end view of the compressor and regulating relief mechanism.

A marks the compressor-cylinder; B, the compressor-plunger; C, the discharge-valve; a, the discharge-port; D, the discharge-pipe, which may be termed the "receiver;" E E, the inlet-valves; a', the inlet-port. These parts are similar to like parts now in use.

The intake-passage G opens into the port a' and is controlled by the valve F. The stem f of the valve F extends through the gland g into the chamber H. The plunger F′ is arranged to operate in the chamber H and is secured to the stem f. A spring I is arranged under the plunger F′ and tends to force the valve F to an open position. The force of the spring increases as the plunger moves downwardly to close the valve. It will be noted that the valve moves in opening and closing in the line of the flow of the fluid as distinguished from a slide-valve. The motor comprising the chamber H may be termed the "secondary" or "regulating" motor and is adapted to control the regulating relief device or valve F. A passage h opens into the chamber H. It is provided with the minute vent-opening h' and an inlet-passage h^2. The passage h^2 forms a means of connection to a fluid-supply for the regulating-motor and is controlled by a needle-valve J, carried by the stem j. The stem j is secured to a plunger K. The plunger K operates in a chamber L. The chamber L has the receiver connection M, which is connected by the pipe M′ with the pipe or receiver D, so that the plunger K is subjected to receiver-pressure at all times. The arm l extends from the chamber L, and a lever N is pivoted at l' on this arm. An arm n extends downwardly from the lever, and a stem k is placed between the plunger K and the arm n. At the lower end of the arm n is an adjusting-hook o, provided with the thumb-screw o' and by which the hook may be adjusted. A spring O is secured to the hook o and a hook l^2, extending from the chamber L. The strength or tension of this spring may be adjusted by the nut o'. Extending from the lever N is an arm N′, on which is a weight N^2. The weight N^2 may be adjusted and secured at any point of adjustment by the screw N^3.

The motor comprising the chamber L may be termed the "primary" or "controlling" motor. The general operation of this device is similar to the regulating device shown in my application filed January 29, 1902, Serial No. 91,785, and the relief device shown in my application filed on the same date, Serial No. 91,783.

The present invention resides in the form of relief device and the combining of the relief and regulating device and the arrangement of the relief device on the intake of the compressor rather than in the detailed mechanism which is shown in my prior application. The valve F shown is of the disk type; but it will be understood that my invention, broadly considered, includes a valve similar to the one shown in said application Serial No. 91,785.

The operation of the device is as follows: After the compressor has raised the pressure in the receiver to that desired, this pressure, operating in the chamber L against the

plunger K, moves the plunger K so as to permit a certain amount of fluid to enter the passage h by the supply-opening h^2. This creates pressure on the plunger F'. The vent-opening remains constantly open, so that there is a constant escape of gas from the passage h so long as the passage h^2 is open. The proportions of the passages h^2 and h' are such that with ordinary receiver-pressures there is a very great change in the pressure in the passage h and in the chamber H, with very small change of pressure in the receiver. In other words, a small change of pressure in the receiver moves the plunger K to a sufficient distance to open the supply-opening h^2 so that it has a much larger area than the vent h'. Under these conditions the pressure in the chamber H will rapidly rise, and if the supply-opening h^2 were to be made large enough it will of course be understood that the pressure in the chamber H would approximate receiver-pressure. On the other hand, it will be understood that if the opening h^2 were made small enough relative to the vent h' the pressure in the chamber H would be practically atmospheric pressure. By proportioning the openings h^2 and h' a change of pressure in the receiver may be intensified in the chamber H, so that a very minute change in the receiver may be attended with a very marked change in the pressure operating upon the plunger F'. This operating upon the valve F regulates the amount of fluid taken into the receiver through the intake. If the receiver-pressure rises above the desired maximum, it operates upon the plunger K sufficiently to so open the valve J that the fluid is supplied to the chamber H in sufficient quantities to create a pressure in said chamber great enough to overcome the spring I and atmospheric pressure on the valve F so that the valve is completely closed. The compressor will then exhaust the air or gas in the passages and will run in a partial vacuum and will use but very little power. When this happens—that is, when there is a complete closure—the device is what is commonly known as a "relief" device, so that the apparatus as a whole having this property of complete closure and regulation may be and is termed in the claims a "regulating relief mechanism." As soon as receiver-pressure becomes reduced to within the desired limit the valve J is closed sufficiently to reduce the pressure in the chamber H to a point where the spring I and the atmospheric pressure operating upon the valve F will open it a sufficient distance to give the compressor the desired amount of inflow, so that the valve F is held in a position that will permit an inflow commensurate with the volume of fluid being drawn from the receiver.

What I claim as new is—

1. In a regulating device, the combination with a compressor; of a regulating-valve arranged to operate upon the intake of the compressor; a valve-actuating motor arranged to influence the regulating-valve; means for connecting said motor with a fluid-supply, said motor being arranged to act with a change of pressure in the receiver for said compressor; and means for controlling the fluid-pressure on the motor while in communication with the fluid-supply to intensify the variations of pressure on the motor over the fluctuations of pressure in the receiver.

2. In a regulating device, the combination with a compressor; of a regulating-valve arranged to act upon the intake of the compressor; a valve-actuating motor arranged to influence the regulating-valve; means for connecting said motor with a fluid-receiver the fluid-supply of which is to be regulated, said motor being arranged to act with a change of pressure in the receiver; and means for controlling the fluid-pressure on the motor while in communication with the receiver to intensify the variations of pressure on the motor over the fluctuations of pressure in the receiver.

3. In a regulating device, the combination with a compressor; of a regulating-valve arranged to operate upon the intake of the compressor; a motor arranged to influence the regulating-valve; a counter-pressure arranged in opposition to said motor and increasing in strength with a movement of the motor; incident to an increase of fluid-pressure on the motor; means for connecting said motor with a fluid-supply; and means for controlling the fluid-pressure on the motor while in communication with the fluid-supply to intensify the variations of pressure on the motor over the fluctuations of pressure in the receiver of the compressor.

4. In a regulating device, the combination with a compressor; of a regulating-valve arranged to operate upon the intake of the compressor; a motor arranged to influence the regulating-valve; means for connecting said motor with a fluid-supply, said motor having a supply-opening from said means of connection and a vent-opening; and means for automatically varying the relative capacities of the supply and vent openings while the supply-opening is in communication with said means of connection to intensify the variations of the pressure on the motor over the fluctuations of the pressure in the receiver of the compressor.

5. In a regulating device, the combination with a compressor; of a regulating-valve arranged to operate upon the intake of the compressor; a motor arranged to influence the regulating-valve; means for connecting said motor with a fluid-receiver, the fluid-supply of which is to be regulated, said motor having a supply-opening from said means of connection and a vent-opening; and means for automatically varying the relative capacities of the sup-

ply and vent openings while the supply-opening is in communication with said means of connection to intensify the variations of the pressure on the motor over the fluctuations of the pressure in the receiver.

6. In a regulating device, the combination with a compressor; of a regulating-valve arranged to operate upon the intake of the compressor; a motor arranged to influence the regulating-valve; means for connecting said motor with a fluid-supply, said motor having a supply-opening from said means of connection and a vent-opening; means for automatically varying the relative capacities of said openings while the supply-opening is in communication with said means of connection to intensify the variations of pressure on the motor over the fluctuations of pressure on the receiver of the compressor and means for controlling the extent the variation is intensified with a given variation of receiver-pressure.

7. In a regulating device, the combination with a compressor; of a regulating device arranged to operate upon the intake of the compressor; a fluid-actuated motor arranged to restrict the intake by means of the regulating device, upon an increase of pressure on the motor; means for connecting said motor with a fluid-supply, through a supply-opening, said motor also having a vent-opening; a counter-pressure device opposing the movement of the motor when actuated by the fluid and increasing in strength as the motor is moved by the fluid; and means actuated by receiver-pressure for varying the relative capacities of the supply and vent openings while the motor is in communication through the supply-opening with said connecting means to intensify the variation of pressure in the motor over fluctuations of pressure in the receiver of the compressor.

8. In a regulating device, the combination with a compressor; of a regulating-valve arranged to operate upon the intake of the compressor; a regulating-motor arranged to influence the regulating-valve; a controlling-motor; means for connecting said controlling-motor with the receiver; means actuated by said controlling-motor for admitting fluid to said regulating-motor and for controlling the fluid-pressure on the regulating-motor after the admission of fluid to the regulating-motor to intensify the variations of pressure on the regulating-motor over the fluctuations of pressure in the receiver of the compressor.

9. In a regulating device, the combination with a compressor; of a regulating-valve arranged to operate upon the intake of the compressor; a regulating-motor arranged to influence said regulating-valve, said motor being provided with supply and vent openings, said supply-opening leading to a fluid-supply; a controlling-motor; means for connecting said controlling-motor with the receiver of the compressor; and a valve actuated by said controlling-motor and arranged to vary the relative capacities of said supply and vent openings while the regulating-motor is in communication with the fluid-supply to intensify the variations of pressure on the motor over the fluctuations of pressure in the receiver.

10. In a regulating device, the combination with a compressor; of a primary motor; means for connecting said motor with a receiver; a valve controlled by said primary motor; a secondary motor controlled by said valve; and a regulating relief mechanism arranged to operate upon the intake of the compressor and actuated by said secondary motor to vary the intake-opening in proportion to the volume of fluid being drawn from the receiver.

11. In a regulating device, the combination with a compressor; of the valve F, arranged on the intake-passage; the plunger F′, connected with said valve; the chamber H, in which said plunger operates; a counter-pressure mechanism comprising the spring I; the passage h, having the supply-opening h^2, and vent-opening h'; the needle-valve J, arranged in the supply-opening; the plunger K, for operating the valve J; the chamber L, in which the plunger operates; the lever N, arranged to exert counter-pressure on the plunger K; the spring O, arranged on the lever N; a connection M′, between the receiver and the chamber L; and said receiver or outlet D.

In testimony whereof I affix my signature in presence of two witnesses.

RUDOLPH CONRADER.

Witnesses:
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G. E. Yard.