

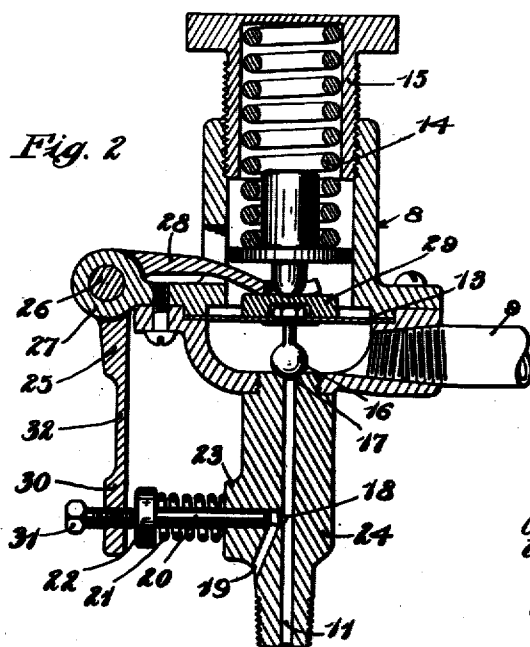
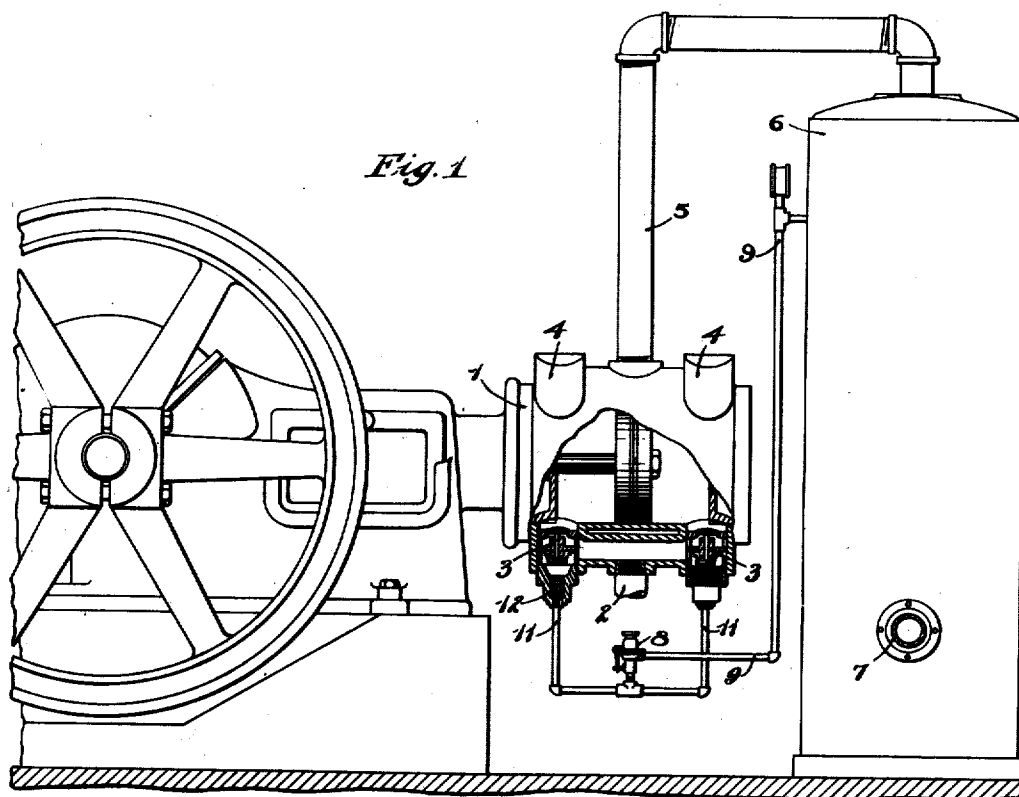
Dec. 30. 1924.

C. H. ALLEN

1,521,211

COMPRESSOR

Filed May 5, 1919



Inventor:
Charles H. Allen.
by
[Signature]
Att'y.

UNITED STATES PATENT OFFICE.

CHARLES H. ALLEN, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO SULLIVAN MACHINERY COMPANY, A CORPORATION OF MASSACHUSETTS.

COMPRESSOR.

Application filed May 5, 1919. Serial No. 294,871.

To all whom it may concern:

Be it known that I, CHARLES H. ALLEN, a citizen of the United States, residing at Claremont, in the county of Sullivan and State of New Hampshire, have invented certain new and useful Improvements in Compressors, of which the following is a full, clear, and exact specification.

This invention relates to compressors and more particularly to compressor unloading mechanism.

One object of the present invention is to provide an improved unloading means. Still another object is to provide an improved controlling means for controlling a flow of pressure fluid to an unloading mechanism whereby the flow to the mechanism and the exhausting of the pressure fluid therefrom may be easily and accurately controlled. These and other objects and advantages of my improved construction will, however, hereinafter more fully appear.

In the accompanying drawings, I have shown for purposes of illustration one embodiment which my invention may assume in practice.

In these drawings,—

Fig. 1 is a side elevation of a compressor unit, parts thereof being shown in section to facilitate illustration.

Fig. 2 is a longitudinal sectional view through the controlling means which controls the unloading mechanism.

In this illustrative construction I have show a compressor unit having a cylinder 1 into which air is drawn through an inlet 2 past the inlet valves 3, herein shown as of the spring pressed puppet valve type, the compressed air being discharged through outlet valves 4 and through a pipe 5 to a receiver 6 from which the fluid is taken to the line by a main 7. When the pressure in the receiver rises above normal, pressure fluid is admitted by a suitable controlling means 8 from the receiver 6 through pipe lines 9 and 11 to force plungers 12 upward to hold the intake valves off their seats and thereby unload the compressor.

The pilot valves usually used to control the flow of pressure fluid from the receiver to the unloading mechanism have a pressure operated diaphragm or piston, herein the former is shown at 13, which is normally depressed by a relatively heavy spring 14 whose tension may be adjusted, as by an ad-

justable sleeve 15, to hold a valve element 16 against a cooperating valve seat 17, and thereby close communication between the conduits 9 and 11. When the pressure in the tank rises above normal operating pressure, the fluid pressure on the lower side of the diaphragm 13 will move the valve element 16 upward against the tension of the spring 14 and permit a flow of compressed air from the tank to the lower sides of the piston 12 and thereby unload the compressor. It is also a common practice to provide an exhaust port between the valve seat 17 and pistons 12 to exhaust pressure fluid from the conduits 11 after the valve 16 is again seated, and thereby load the compressor. However, these exhaust ports are always open and permit a flow of pressure fluid to the atmosphere during both the loading and the unloading of the compressor. Because the flow of pressure fluid from the valve 8 to the unloading mechanism would be very slow and inefficient if the exhaust port were large, this exhaust port is made very small, usually about two-hundredths of an inch in diameter. Because this exhaust port is so small, the reloading of the compressor takes an appreciable time and often more time than is necessary to permit the compressor driving means to come up to speed if the compressor driving means has stopped or slowed down during the unloading interval.

In my improved controlling means, I preferably provide a relatively large exhaust port 18 communicating with the atmosphere, as through a relatively large passageway 19, and I also provide an exhaust port closing means, such as the movable valve member 20, which is normally held in an inoperative position by a spring 21 which abuts against a disk 22 formed on one end of the valve member 20, and a boss 23 formed on the side of the valve nipple 24. This valve member 20 may be forced inwardly to close the exhaust during the unloading of the compressor, by any suitable means, but for this purpose I preferably provide a bell crank 25 pivotally mounted on a bolt 26 carried by an extension 27 of the valve casing 8, one arm 28 of the bell crank being projected within the valve casing into contact with the bearing 29 mounted upon the upper side of the diaphragm 13 in such a manner that when the

diaphragm 13 is moved upwardly to raise the valve element 16, the other arm 30 of the bell crank will force the valve member 20 inwardly to close the exhaust port 18. The position of the valve member 20 relative to the exhaust port may be adjusted through manipulation of an adjusting screw 31, herein shown as carried adjacent the end of the bell crank arm 30. As the upward movement of the diaphragm 13 may force the valve element 20 against its seat with considerable pressure and bend or distort one or both of the arms of the bell crank, I preferably provide a resilient means between the diaphragm and the valve element 20 which will prevent the distortion of any of the operating parts. In the form of my invention shown herein, I provide this resilient connection by cutting away a portion of the arm 30, as shown at 32, so that this arm will be flexed should the end of the valve member 20 strike its seat before the diaphragm has moved to the upper limit of its travel.

It is thus seen that I have provided an improved unloading means which permits a rapid exhaust of the pressure fluid from the unloading mechanism and that I have provided an improved adjustable means for closing the exhaust port. It should further be noted that this adjustable means may be operated to adjust the size of the exhaust port and thereby adjust the time element governing the reloading of the compressor after the supply of pressure fluid from the tank has been cut off. It should also be observed that when the supply of pressure fluid is admitted to the unloading mechanism, the exhaust port is automatically closed, and that thereby the operation of the unloading mechanism to unload the compressor is made more positive, more accurate, and more efficient.

While I have in this application specifically described one embodiment which my invention may assume in practice, it is to be understood that this form is used for illustrative purposes only and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. A compressor unloading means comprising, in combination, an unloading mechanism, fluid pressure conducting means communicating therewith, and a pressure fluid controlling means for alternately permitting a flow to said unloading mechanism and exhausting fluid therefrom, said means comprising a plurality of valves moving in lines parallel to intersecting lines.

2. In combination, a compressor unloading means, fluid pressure actuated operating means therefor, and controlling means for

said operating means comprising a member responsive to receiver pressure, inlet and discharge connections for said operating means, and separate valves controlled by said member and moving in lines parallel to intersecting lines for controlling said connections.

3. A compressor unloading means comprising, in combination, an unloading mechanism, fluid pressure conducting means connected thereto, and a pressure fluid controlling means comprising a plurality of valves, one movable in a plane perpendicular to the other.

4. A compressor unloading means comprising, in combination, an unloading mechanism, fluid pressure conducting means connected thereto, and a pressure fluid controlling means comprising a valve normally closing said conducting means, an exhaust port for exhausting pressure fluid from said unloading mechanism, and adjustable means for closing said exhaust port when said valve is open.

5. A compressor unloading means comprising, in combination, an unloading mechanism, fluid pressure conducting means connected thereto, and a fluid pressure controlling means comprising a diaphragm and a plurality of valves controlled thereby, one of said valves being rigidly connected to said diaphragm while another is controlled thereby by mechanism contacting therewith.

6. A compressor unloading means comprising, in combination, an unloading mechanism, fluid pressure conducting means connected thereto, and a pressure fluid controlling means for alternatively permitting a flow to and from said unloading mechanism comprising a plurality of simultaneously operative separately spring pressed valves set to open and close at a predetermined pressure.

7. A compressor unloading means comprising, in combination, an unloading mechanism, fluid pressure conducting means connected thereto including a port, and a pressure fluid controlling means therefor including a plurality of angularly moving end seating valves controlling the flow of pressure to and from said port.

8. A compressor unloading means comprising, in combination, an unloading mechanism, fluid pressure conducting means connected thereto, and a pressure fluid controlling means therefor comprising a plurality of separate resiliently seated end-seating valves having different rates of simultaneous movement; one operative upon movement of another.

9. A compressor unloading means comprising, in combination, an unloading mechanism, fluid pressure conducting means connected thereto, a plurality of simultaneously moving valves controlling the flow through

said conducting means, and fluid actuated means set at a predetermined pressure to control said valves, one of said valves being secured thereto and movable therewith to assist movement thereof.

10. In combination, a compressor unloading means, fluid pressure actuated operating means therefor, and controlling means for said operating means comprising a member responsive to receive pressure, inlet and discharge connections for said operating means, and separate valves for controlling said connections movable in different directions by said member.

11. In combination, a compressor unloading means, fluid pressure actuated operating means therefor, and controlling means for said operating means comprising a member responsive to receiver pressure, inlet and discharge connections for the operating means, and separate valves for controlling said connections, one of said valves being directly connected to said member and the other being resiliently connected thereto.

12. In combination, a compressor unloading means, fluid pressure actuated operating means therefor, and controlling means for said operating means comprising a member responsive to receiver pressure, inlet and discharge connections for the operating means, and separate valves for controlling said connections, one of said valves being directly actuated by said member and the other being operated by way of a bell crank therefrom.

13. In combination, a compressor unloading means, fluid pressure actuated operating means therefor, and controlling means for said operating means comprising a member responsive to receiver pressure, a branched passage connected with said operating means, one of said branches being adapted to be connected to the atmosphere, and the other with a fluid pressure supply, and end seating valves controlling said passages and controlled by said member.

14. A compressor unloading means comprising, in combination, an unloading mechanism, fluid pressure conducting means com-

municating therewith, and a pressure fluid controlling means for alternatively permitting a flow of pressure fluid to said unloading mechanism and exhausting fluid there-through, said means including a diaphragm having a plurality of springs constantly acting thereon in one direction and a valve resiliently operatively connected to said diaphragm.

15. A compressor unloading means comprising, in combination, an unloading mechanism, fluid pressure conducting means communicating therewith, and a pressure fluid controlling means for alternately permitting a flow of pressure fluid to said unloading mechanism and exhausting fluid there-through, said means including a diaphragm and a plurality of spring pressed valves operated thereby adapted to open and close at a predetermined pressure.

16. A compressor unloading means comprising, in combination, an unloading mechanism, fluid pressure conducting means communicating therewith, and a pressure fluid controlling means for alternately permitting a flow of pressure fluid to said unloading mechanism and exhausting fluid there-through, said means including a diaphragm and a plurality of valves operated thereby, said valves moving in lines parallel to intersecting lines.

17. A compressor unloading means comprising, in combination, an unloading mechanism, inlet and discharge fluid pressure conducting means connected thereto, and a plurality of valves having different rates of simultaneous movement for controlling flow of fluid through said conducting means.

18. A compressor unloading means comprising, in combination, an unloading mechanism, fluid pressure conducting means connected thereto, a plurality of valves having different rates of simultaneous movement for controlling the flow of fluid through said conducting means, and fluid actuated means set at a predetermined pressure to control said valves.

In testimony whereof I affix my signature.
CHARLES H. ALLEN.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,521,211, granted December 30, 1924, upon the application of Charles H. Allen, of Claremont, New Hampshire, for an improvement in "Compressors," an error appears in the printed specification requiring correction as follows: Page 3, lines 63 and 74, claims 15 and 16, for the word "alternately" read *alternatively*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 17th day of February, A. D. 1925.

[SEAL.]

KARL FENNING,
Acting Commissioner of Patents.