UNLOADING FOR COMPRESSORS

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4 Claims. (Cl. 220—31)

This invention relates to unloaders for compressors and an object of the present invention is to provide a simple, practical and positive loading and unloading mechanism for compressors of relatively small capacity, which will be positive in action and will unload the compressor upon the cutting off of operating power thereto and will load the compressor upon the cutting in of operating power.

Another object of the present invention is to provide electrically operated means controlling the loading and unloading of the compressor, which means embodies a mechanism to provide a time lapse between the starting of the compressor and its loading, thereby slowing the compressor and its operating motor to reach full speed before the load torque is imposed.

With these and other objects in view as may appear from the accompanying specification, the invention consists of various features of construction and combination of parts, which will be first described in connection with the accompanying drawings, showing an unloader for compressors of the preferred form, and the features forming the invention will be specifically pointed out in the claims.

In the drawings:

Fig. 1 is a diagrammatic view partly in section showing the improved compressor unloading mechanism.

Fig. 2 is a diagrammatic view partly in section showing a modified form of the compressor unloading mechanism.

Referring more particularly to the drawings, a reciprocating compressor 1, of any approved type, and of any size and capacity, is shown, which includes the piston 2, suction valve 3 and discharge valve 4. The compressor is driven by an electric motor 5 in the usual manner, that is, through any suitable power transmitting means or coupling.

The compressor 1 discharges through the pipe 6 to the receiver 7, and a check valve 8 is positioned in the pipe 6. The energizing and de-energizing of the motor 5 and consequently the operation of the compressor 1 is controlled by any approved type of control switch 10 which cuts in and out suitable electric current from the line wires 11.

To provide for the unloading of the compressor upon the stopping of its operation and for the loading of the compressor upon the starting, the unloading mechanism 12 is provided. The unloading mechanism 12 comprises a valve 13 which includes a valve cylinder 14 in which is provided a valve seat 15 against which the valve cone 16 rests. A pipe 17 connects to the pipe 6 between a compressor discharge valve 4 and the check valve 8 and it opens into the cylinder 14 on one side of the valve seat 15. A vent opening 18 is formed in the valve cylinder 14 on the opposite side of the valve seat 15 from the connection between the cylinder 14 and the pipe 17. The vent opening 18 may either open to atmosphere or it may be connected to the suction inlet of the compressor.

A valve stem 19 is connected to the valve cone 16 and projects upwardly out of the valve cylinder 14 having its upper end positioned in the path of the valve operating arm 20. The valve operating arm 20 is pivotally mounted as shown at 21 and is connected to the stem 22 of the solenoid operated structure 23. The solenoid operated structure 23 and the arm 20 may be any approved type of construction such as that shown in my companion application, Serial No. 747,528, filed of even date herewith. The solenoid 24 is connected in the line 25 which supplies power to the motor 5 between the motor 5 and the switch 10 so that the solenoid 24 will be energized when the motor 5 is energized. When the motor 5 is deenergized, and consequently when the compressor is stopped, the core 26 of the solenoid 24 will drop and move the arm 20 downwardly, moving the valve cone 16 off the seat 15. The moving of the valve cone 16 off the valve seat 15 will open the discharge space 4' of the compressor 1 and the pipe 6 between the compressor and the check valve 8 to the vent 18 to permit the bleeding of the pressure fluid out of the pipe 6 and the discharge space 4' for unloading the compressor. When the switch 10 is closed, to start the compressor, the core 26 will move upwardly which will release the arm 20 for upward movement. The arm 20 is moved upwardly by the spring 27; however, its upward movement is retarded by the action of the dashpot structure 28 so that the arm 20 will move slowly and the lapse of a definite period of time will be provided between the energizing of the motor 5 and the closing of the valve 13 by the seating of the cone 16 against the seat 15. During this time interval, the discharge of the compressor 1 will be vented or unloaded through the vent 18. However, when the arm 20 reaches its uppermost position the cone 16 will be seated against the valve seat 15 and the compressor will be loaded. The time interval provided by the retarding of the movement of the arm 20 will permit the motor 5 to attain full speed before the application of the torque load thereon.

The unloading mechanism and apparatus illustrated in Fig. 1 and above described, is applicable for compressors of relatively small size and capacity, and for compressors of large size and capacity it becomes practically impossible to pass a sufficient quantity of air or gas through the valve 13, for properly unloading the compressor. To provide for the proper unloading of compressors of larger sizes or capacities than can be effec-
From the foregoing description taken in connection with the accompanying drawings, it will be apparent that an unloading mechanism for air or gas compressors has been provided, which will effectively unload the compressor upon the cutting off of operating power thereto and will maintain the compressor in an unloaded state for a short time interval after the power is again cut off to the motor for operating the compressor, after which the compressor will be effectively loaded until the power is again cut off.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown but that they may be widely modified within the invention defined by the claims.

What is claimed is:

1. In a compressor unloading mechanism, the combination, of a compressor, an electric motor for operating the compressor, a valve for controlling the loading and unloading of the compressor, a pivoted lever connected to said valve for positively operating said valve, electrical means connected in circuit with said motor for moving said lever in one direction, means independently of said electrical means connected to said lever for moving it in the direction reversely to the direction of movement of the lever by said electrical means.

2. In a compressor unloading mechanism, the combination, of a compressor, an electric motor for operating the compressor, a valve for controlling the loading and unloading of the compressor, a pivoted lever connected to said valve for positively operating said valve, electrical means connected in circuit with said motor for moving said lever in one direction, means independently of said electrical means connected to said lever for moving it in the direction reversely to the direction of movement of the lever by said electrical means, and means associated with said lever for retarding its movement by said independent means.

3. In a compressor unloading mechanism, the combination, of a compressor, an electric motor for operating said compressor, pressure operating means for unloading said compressor, a valve for delivering pressure fluid to said compressor unloading means, a pivoted lever connected to said valve for positively operating said valve, electrical means connected in circuit with said motor for moving said lever in one direction, means independently of said electrical means connected to said lever for moving it in the direction reversely to the direction of movement of the lever by said electrical means.

4. In a compressor unloading mechanism, the combination, of a compressor, an electric motor for operating said compressor, pressure operated means for unloading said compressor, a valve for delivering pressure fluid to said compressor unloading means, a pivoted lever connected to said valve for positively operating said valve, electrical means connected in circuit with said motor for moving said lever in one direction, means independently of said electrical means connected to said lever for moving it in the direction reversely to the direction of movement of the lever by said electrical means.