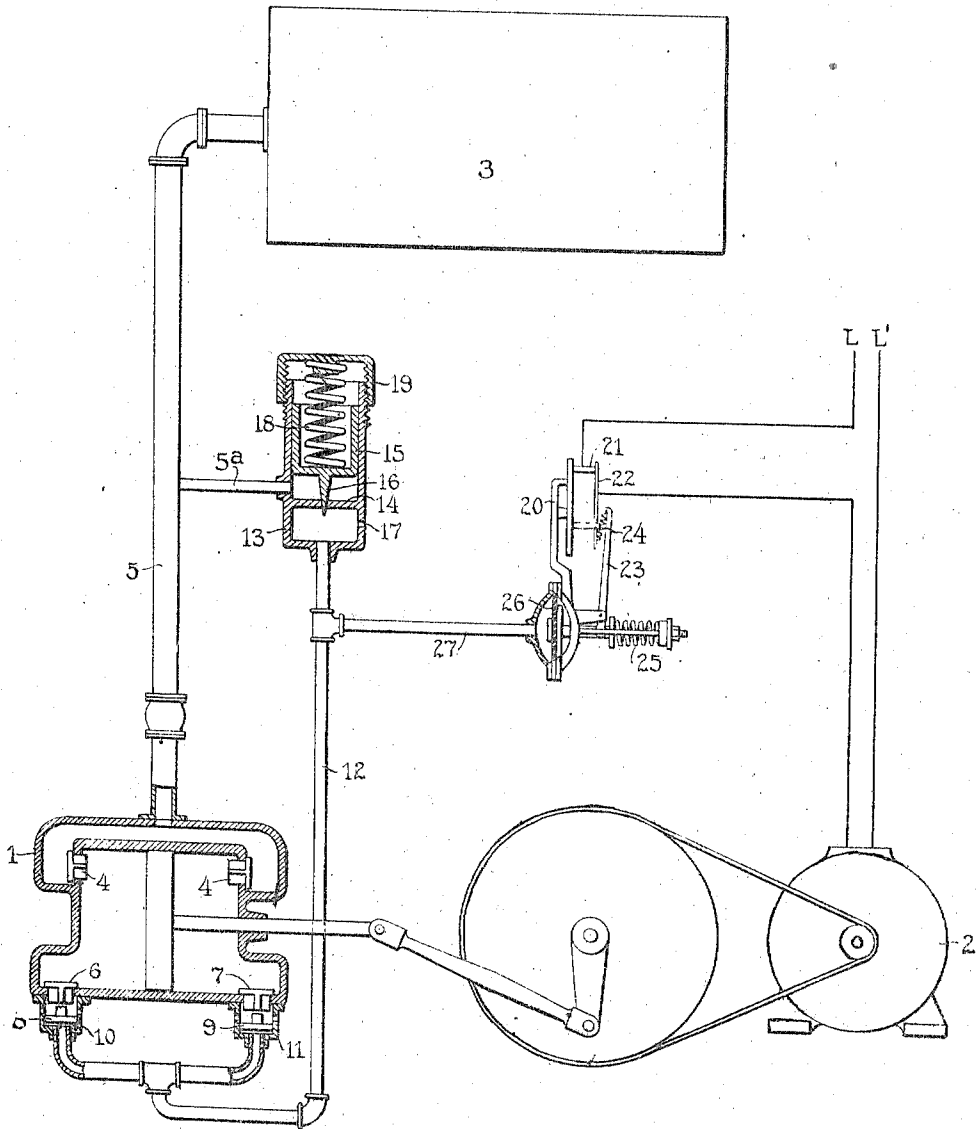


L. L. TATUM.
MOTOR DRIVEN COMPRESSOR.
APPLICATION FILED NOV. 18, 1916.

1,315,433.

Patented Sept. 9, 1919.



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MOTOR-DRIVEN COMPRESSOR.

1,315,433.

Specification of Letters Patent.

Patented Sept. 9, 1919.

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To all whom it may concern:

Be it known that I, LEWIS L. TATUM, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Motor-Driven Compressors, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

This invention relates to motor driven compressors having unloaders responsive to storage tank pressure and more particularly to control means for the compressor motor to automatically start and stop the same under given storage tank pressures.

Unloaders of the character specified have been found very advantageous in themselves, but use thereof has given rise to difficulties in controlling the compressor motor by the customary pressure responsive means. For example, where such an unloader and control means are employed the latter being directly subjected to the pressure of the storage tank, difficulty has been experienced through response of the control means prior to response of the unloader, or response of the unloader prior to response of the control means. In the former instance, the unloader is rendered ineffective so that the compressor motor must restart under full load, while in the latter instance response of the unloader so reduces the pressure in the storage tank as to render the switch unresponsive to stop the compressor motor. Various compressor systems, such as those including electrically operated unloaders, have been proposed to overcome the difficulties mentioned but it is understood that the only successful systems are of an elaborate and costly character.

The present invention has among its objects to so associate the pressure control means with the storage tank and unloader as to enable entirely satisfactory use of an unloader of the type mentioned and in fact practically any species of such type.

A further object is to so incorporate the pressure control means in the compressor system as to render response thereof to stop the compressor motor dependent upon response of the unloader valve and as to insure its release to restart the compressor motor prior to closure of the unloader valve.

Various other objects and advantages of the invention will hereinafter appear.

The accompanying drawing schematically illustrates one embodiment of the invention which will now be described, it being understood that the embodiment illustrated is susceptible of various modifications falling within the scope of the appended claims.

Referring to the drawing, there is illustrated a compressor 1 driven by a motor 2 through the usual driving connections to supply air to a storage tank 3 through check valves 4 and pipe 5. The compressor is provided with intake valves 6 and 7 respectively provided with pistons 8 and 9 fitting cylinders 10 and 11 respectively, both cylinders being connected through a pipe 12 to an unloader valve 13. This valve is of a well known type comprising a casing having a partition 14 and piston 15 reciprocable within said casing and provided with a needle valve 16 controlling an opening in said partition. The section of the casing below the partition is connected to pipe 12 and has a bleeder port 17 while the section of the casing above the partition is connected by pipes 5^a and 5 to the storage tank 3. Thus the lower side of the piston of the unloader valve is subjected to the pressure of the storage tank, while an opposing helical spring 18 is interposed between said piston and an end cap 19 of the valve casing. The spring 18 thus serves to regulate the action of the unloader valve, said spring being variable in its action by threaded adjustment of the cap 19 on the casing.

The above described system is of a well known type and as will be understood the unloader valve will respond at a predetermined maximum storage tank pressure to open the needle valve and thus admit air from the storage tank to the cylinders 10 and 11 to thereby lift the pistons 8 and 9 and open the intake valves 6 and 7 for discharge of the compressor to the atmosphere. Thus assuming stopping and restarting of the compressor motor prior to reduction of the storage tank pressure to release the intake valves, the motor will be permitted to start under a light load and as soon as the storage tank pressure decreases to a predetermined value to release the unloader valve the bleeder port will permit the air to gradually escape from the cylinders 10 and

11 thereby permitting the intake valves to reclose to load the motor.

Considering now the control means for the motor, the same is shown as comprising
 5 a well known type of pressure switch 20 to connect the motor 2 directly across supply lines L and L', it being understood that this switch might also be utilized to control the motor through intermediate control
 10 means. Briefly described, this switch is provided with a stationary contact 21 and a cooperating pivoted contact 22, the latter being operable by a pivoted arm 23 through a helical spring connection 24, said arm being adapted to shift said spring relatively
 15 to the fulcrum point of said pivoted contact to operate the latter in reverse directions with a snap action. The arm 23 is biased by a spring 25 in a direction to engage contact 22 with contact
 20 21 and is operatively connected to a diaphragm 26 to be moved in reverse direction to disengage said contacts under given pressure conditions, said diaphragm having
 25 its casing connected by a pipe 27 to pipe 12. Thus the switch is connected to the storage tank through the unloader valve and in consequence will respond only when the unloader is rendered effective.

30 Hence assuming adjustment of the pressure switch for response at substantially the same pressure value as the unloader valve it will respond immediately upon response of the latter and in so doing will break the
 35 compressor motor circuit. Then through leakage and use of the storage tank air the pressure in the piping system of the unloader will gradually decrease and assuming the adjustment of the pressure valve to
 40 release at a pressure value slightly higher than at which the unloader valve closes, the motor will be insured restarting while the intake valves are still retained in open position. Accordingly the unloader and the
 45 pressure control switch will cooperate to insure the desired conditions in stopping and restarting of the controlled motor.

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

50 1. In combination, a motor driven compressor, a storage tank supplied thereby, a starting and stopping device for said compressor, an unloader valve for said compressor, means for subjecting one of said last
 55 two mentioned elements to control by the pressure within said tank and means coordinating said elements for control one by

the other for unloading said compressor when stopped and for restarting operation of said device prior to return of said unloader valve. 60

2. In combination, a motor driven compressor, a storage tank supplied thereby, compressor unloading means including an unloader valve directly responsive to storage tank pressure and control means for the compressor motor responsive to storage tank pressure but subject to control by said unloader valve, said control means being biased to return to normal position at a pressure value exceeding that at which said valve recloses. 65 70

3. In combination, a motor driven compressor, a storage tank supplied thereby, a starting and stopping device for said compressor responsive to variations in the pressure within said tank and an unloader valve operatively associated with said device and having a setting to insure opening thereof during successive starting operations of said device. 75 80

4. In combination, a motor driven compressor, a storage tank supplied thereby, compressor unloading means including an unloader valve directly responsive to storage tank pressure and a chamber to be subjected to and relieved of such pressure by said valve and pressure responsive means subjected to the pressure of said chamber to start and stop the compressor motor, said control means being biased to return to normal position at a pressure value insuring continued unloader pressure for a subsequent temporary period. 85 90

5. In combination, a motor driven compressor having a valve to permit the same to discharge to the atmosphere, said valve having means responsive to fluid pressure to hold said valve open, a storage tank connected to said compressor, a supply connection between said valve operating means and said storage tank including an unloader valve directly responsive to the storage tank pressure and having a bleeder opening, and a starting and stopping switch for the compressor motor responsive to fluid pressure and connected to said storage tank through said unloader valve, said switch being biased to return to normal position at a pressure exceeding that at which said valve recloses. 95 100 105 110

In witness whereof, I have hereunto subscribed my name.

LEWIS L. TATUM.