

Sept. 23, 1941.

B. W. MANTLE

2,256,565

UNLOADING DEVICE

Filed Sept. 30, 1939

2 Sheets-Sheet 1

Fig. 1.

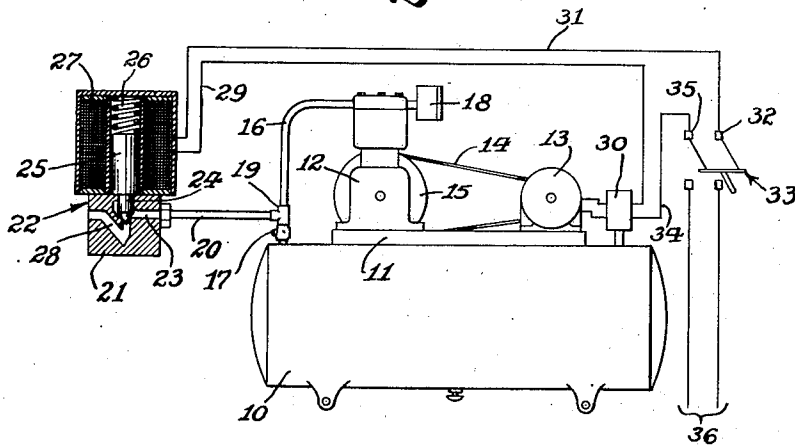


Fig. 2.

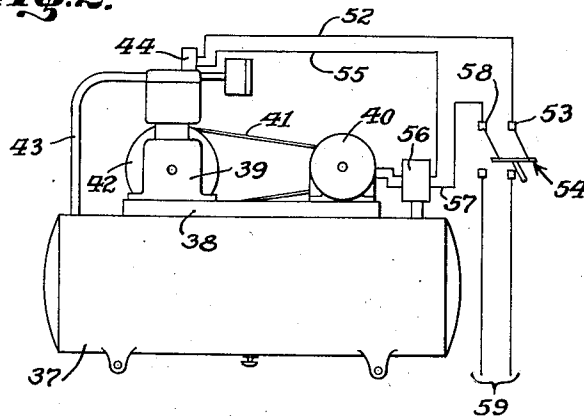
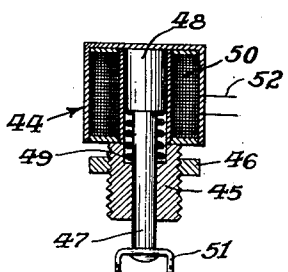


Fig. 3.



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2 Sheets-Sheet 2

Fig. 4.

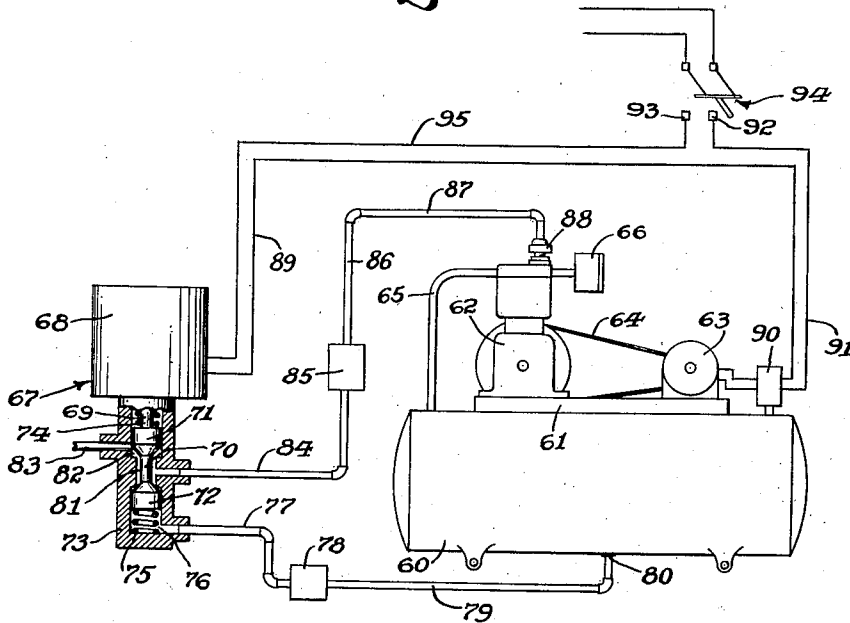


Fig. 5.

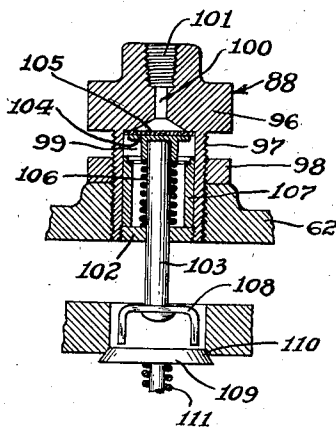
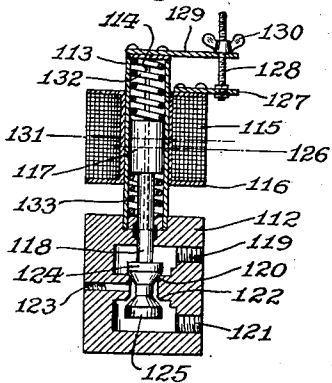


Fig. 6.



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2,256,565

UNLOADING DEVICE

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Application September 30, 1939, Serial No. 297,215

19 Claims. (Cl. 230—31)

This invention relates to improvements in unloading devices, and has for an object the provision of a magnetically controlled valve mechanism which functions when the current consumed by the motor of a motor driven compressor, pump or the like, increases above the normal running current of the motor. The mechanism may permit the compressor to discharge in other channels than normal, or it may unseat at least one of the valves in the compressor.

Another object of the invention is the provision in a motor driven compressor organization, of a magnetically controlled valve device associated with the discharge from the compressor for by-passing the discharged fluid medium to the air when the current consumed by the motor increases above its normal running current.

A further object of the invention is the provision, in a motor driven compressor outfit, of a magnetically controlled valve mechanism having its magnetic winding in series with the motor circuit for minimizing the load on the compressor when the current consumption becomes higher than the normal current consumed by the motor.

Still another object of the invention is the provision, in a motor compressor unit including an air tank, of a magnetically controlled valve mechanism for unloading the compressor and permitting collected moisture to discharge from said tank during each starting period of the motor.

Other objects and advantages of the invention will be obvious to those skilled in the art by a perusal of the following specification.

Referring to the drawings:

Figure 1 is a diagrammatic representation of a motor compressor unit including an air tank, and one modification of the invention by means of which the load on the compressor is reduced when the motor consumes current above its normal running current;

Figure 2 is a modification of the arrangement shown in Figure 1, in which the magnetic device is arranged to open the inlet valve of the compressor during the time the running current consumption of the motor rises above normal;

Figure 3 is a cross sectional diagrammatic view showing the arrangement of the valve mechanism for depressing the inlet valve in the compressor, Figure 2;

Figure 4 is a diagrammatic representation of a further modification in which valve mechanism is provided for depressing the inlet valve in the compressor and for permitting accumulated moisture from the bottom of the tank to pass out into a series of pipes during the starting period

of the motor. When the motor comes up to speed the valve mechanism, due to the decrease in current through its winding, permits the moisture in the pipes to discharge into the air;

Figure 5 is a diagrammatic representation, in section, of the device for depressing the inlet valve in the compressor, Figure 4; and

Figure 6 is a diagrammatic view showing a further modification.

In Figure 1, a tank 10 serves as a support for the motor and compressor, and as a reservoir for compressed air. A base 11, mounted on the tank, carries a compressor 12, and a motor 13. A belt 14, driven by the motor, in turn drives the compressor by means of a pulley 15. The discharge from the compressor passes through the pipe 16 and the check valve 17 into the tank 10.

The suction inlet of the compressor is provided with a strainer 18. The pipe 16 is provided with a T 19 and a pipe 20 which leads to a valve body 21 of the magnetic valve mechanism generally designated by the numeral 22. The pipe 20 communicates with a passage 23 which terminates above the seat in the valve mechanism. A valve 24 is attached to a solenoid plunger 25, and a spring 26 normally holds the valve 24 on its seat. A solenoid winding 27 embraces the plunger 25 and when the solenoid is highly energized due to the starting current of the motor, the plunger 25 is raised against the urge of the spring 26, thereby permitting the air discharged from the compressor via the pipe 16 to pass through the pipe 20 to the passage 23 and through the valve seat and out via a passage 28 to the atmosphere. The terminals of the solenoid winding are connected as follows.

A wire 29 connected to one end of the solenoid winding, has its other end connected through a pressurestat 30 to one terminal of the motor 13. A wire 31 has one end connected to the other terminal of the solenoid winding and its other end connected to a terminal 32 of a switch 33. The other terminal of the motor is connected through the pressurestat 30 via a wire 34 to the terminal 35 of the switch 33. The wires 36 which extend from a source of current are connected to the other two terminals of the switch 33 so that when the switch is closed, current will flow from the source via the wire 34 to the motor, from the motor via the wire 29, to the solenoid winding, from the solenoid winding via the wire 31 to the other side of the source. When the switch is first thrown the starting current of the motor is sufficiently strong to raise the plunger 25, open the valve 24 and permit the

discharge from the compressor to pass out to the atmosphere. As soon as the motor gets up to speed and the starting winding is cut out, the current required by the motor is substantially reduced, with the result that the spring 26 acting against the plunger 25, causes the valve 24 to seat, whereupon the compressed air will pass from the compressor via the pipe 16 and the check valve 17 into the tank 10.

From this, it can be seen that whenever the compressor is started up, my new and improved relief valve mechanism unloads the compressor and keeps the same unloaded until the motor gets up to full speed, thereby insuring easy starting of the device and preventing undue loads from being imposed upon the motor.

In the arrangement shown in Figure 2, the unloading of the compressor is effected in a little different manner, although controlled in the same manner. The tank 37 carries a base 38 upon which is mounted a compressor 39 and a motor 40 similar to the compressor 12 and motor 13 described above. A belt 41, through the mediums of a pulley 42, drives the compressor. The discharge from the compressor is led through a pipe 43 into the tank 37.

Mounted on the cylinder head of the compressor 39 is a magnetic unloader device 44, details of which may be seen in Figure 3. The unloader device has a body portion 45 which is externally threaded and provided with a lock nut 46. A piston rod 47 is reciprocally mounted in the body 45 and carries at its upper end a plunger member 48. The plunger member is shown in its normal position in Figure 3 and a spring 49 normally tends to maintain the plunger 48 in its upper position.

When the winding 50 is energized by the heavy starting current of the motor, the plunger 48 moves downwardly against the urge of the spring 49, and a yoke member 51 carried on the lower end of the rod 47 engages and unseats the intake valve in the compressor. The valve and the relation of the yoke member 51 to it are not shown in Figure 2 or 3, but a similar arrangement may be seen in Figure 5 and may be described in connection with that figure.

One end of the winding 50 is connected by means of a wire 52 to the terminal 53 of a switch 54 and the other end of the winding 50 is connected by a wire 55 and through the pressurestat 56 to one terminal of the motor 40. The other terminal of the motor is connected via a wire 57 to the terminal 58 of the switch 54. The other terminals of the switch are connected via wires 59 to a source of current.

When the switch 54 is closed, the starting current drawn by the motor passes through the winding 50 and energizes the same, causing the plunger 48 to move downwardly and thereby the yoke 51 depresses the intake valve and thus prevents the compressor from functioning as a compressor. Due to the light load, the motor starts easily and as soon as it gets up speed and its starter mechanism cuts out, the only current flowing through the winding coil 50 is the running current of the motor which is not strong enough to move the plunger 48 downwardly against the urge of the spring 49. Therefore, this spring urges the plunger 48 to the top limit of its stroke and thereby the yoke 51 moving therewith releases the intake valve and allows the compressor to function as a compressor.

In the modification shown in Figure 4, a tank 60 carries a base 61 upon which is mounted a

compressor 62 and a motor 63, the compressor being driven by a belt 64. The discharge outlet of the compressor is connected to the tank 60 through the pipe 65. The intake of the compressor is provided with a strainer 66. The magnetically controlled valve 67 is provided with a winding mounted within the housing 68 and embracing a plunger (not shown). A connecting rod 69 connects the plunger to a valve member 70 carrying seating members 71 and 72.

The valve body 73 is provided with a series of aligned passages in which the valve and its seating members 71 and 72 may move. A spring 74 embraces the connecting rod 69 and is of less strength than a spring 75 which acts against the seating member 72. The spring 75 normally holds the seating member 72 upon its seat, thereby isolating the bottom chamber of the passage from the remainder of the passage. The bottom chamber is designated by the numeral 76 and is connected via a pipe 77 to a strainer 78 and thence via a pipe 79 to the bottom of the tank at the point 80.

When the winding in the housing 68 is energized, the valve seating member is moved downwardly against the urge of the spring 75 and seats, thereby dividing the passage into chambers 81 and 82. A pipe 83 communicates with the interior of the chamber 82 and the pipe 84 communicates with the chamber 81. The pipe 84 connects to a trap 85, and pipes 86 and 87 lead from the trap 85 to the relief valve mechanism 88 mounted in the cylinder head of the compressor. The details of the relief valve mechanism will be hereinafter explained in connection with Figure 5.

One terminal of the winding in the casing 68 is connected via a wire 89 and through a pressurestat 90 to one terminal of the motor. The other terminal of the motor is connected to the pressurestat and extends via the wire 91 to one terminal 92 of a switch 94. The terminal 93 of the switch is connected via a wire 95 to the other terminal of said electromagnetic winding within the housing 68.

The main object of this arrangement is to repetitively permit accumulated moisture to discharge from the air tank 60 each time the compressor starts its operation.

The valve mechanism is shown in detail in Figure 5. It is comprised of a body portion 96 having a threaded portion 97 which may screw into the cylinder head of the compressor 62 and a lock nut 98 by means of which the mechanism may be secured in an adjusted position thereon. The interior of the threaded portion 97 is bored out to form a cylinder 99. The upper end of the cylinder communicates through the passage 100 to a threaded hole 101 which is adapted to accommodate a male pipe fitting. The lower end of the cylinder 99 is threaded and a bearing plate 102 is screwed into the cylinder forming a bearing for the piston rod 103. The upper end of the piston rod carries a piston 104 provided with a packing 105. Between the piston 104 and the plate 102 a helical spring 106 extends, embracing the piston rod 103. A sleeve 107 is mounted in the lower end of the cylinder resting on plate 102. The upper end of the sleeve is shaped to receive and be engaged by the upper end of the piston and thereby to act as a stop for limiting the lowermost position of travel of the piston. Whenever pressure is applied to the head of the piston, which in the example shown, is the packing 105 via the pas-

sage 100, the piston moves downwardly until stopped by the sleeve 107. The lower end of the piston rod 103 carries a yoked member 108 similar to the yoke member 51 shown in Figure 3. Assuming that the valve 109 is the intake valve of the compressor urged against its seat 110 by the spring 111, it can be seen that pressure applied to the cylinder head via the passage 100 will cause the piston to move downwardly, whereupon the ends of the yoke 108 would engage the valve 109 and push it downwardly off its seat 110. As long as the intake valve of the compressor is open it will run light and as soon as the intake is allowed to reseat itself, the compressor will start functioning and will be loaded.

When the switch 94 is closed, the starting current drawn by the motor energizes the magnetic winding within the housing 68 and causes its plunger (not shown) to be moved downwardly. This movement through the medium of the connecting rod 69, is imparted to the valve member 70, causing the seating member 72 to leave its seat and the seating member 71 to contact its seat, thereby closing off the chamber 81 from the chamber 82. This permits the air in the tank to exert pressure via the pipes 79, 77, to chamber 76, the chamber 81, the pipes 84, 86 and 87 to the valve mechanism 88. This pressure via the passage 100 is applied to the cylinder head, causing the intake valve on the compressor to open.

Due to the fact that this pressure is exerted from a low point in the tank, condensed moisture will also pass into the pipes and chambers enumerated. As soon as the compressor gets up to its normal speed and the starting winding is cut out, the valve member 70 moves upwardly due to the reduced current in the winding and the spring 75 causes the seating member 72 to contact its seat and the seating member 71 to leave its seat, thereby providing a passage to the atmosphere via the pipe 83, the chamber 82 and the chamber 81, for the air and moisture in the pipes 84, the trap 85, the pipes 86 and 87 to discharge into the open air. The motor compressor outfit then runs normally until the next starting period, which may be as controlled either by the pressurestat 90 or by the switch 94.

In connection with the above examples of the use of the invention, I have disclosed the use of springs associated with the solenoid plunger. I do not wish to limit myself to the use of springs in connection with the plungers, as other arrangements contemplate the omission of the springs. For example, I have run a series of investigations and tests and have discovered that by changing the weight of the plunger, for example, the plunger 25, the valve may be made suitable for use with various sizes of motors consuming a wide range of currents; therefore, the same valve structure can be adapted to use for various sizes of motors by merely changing the weight of the plunger, letting the same work by gravity, and this is believed to be advantageous because the friction imposed by the spring is removed.

To change the weight of the plunger for various currents, the plunger may be made hollow with a plug cap, and this plug may be removed and lead weights may be inserted into the cavity within the plunger to obtain sufficient weight to meet the requirements under which the plunger is to work.

For convenience in manufacture, I contemplate making the solenoid windings so that they can be

used for dual voltages, for example, by making a solenoid with a double winding, these windings to be connected in series for use on 220 volts and in multiple or parallel for use on 110 volts.

In the three examples herein given, pressurestats or pressure switches are shown associated with the air pressure and with the motor circuit. I do not wish to limit myself to the use of pressurestats in every installation in which my new and improved unloader is incorporated, as it is obvious that a motor-compressor outfit can be controlled by manually operating the switch instead of employing a pressurestat to do this automatically. It is also obvious that my improvements may be used in connection with motor compressors without air tanks attached.

In connection with the arrangement shown in Figure 4, although it is herein described by way of example as removing condensed moisture from the tank, it may just as well be used for withdrawing a small quantity of a fluid medium from one place during the time the motor is drawing starting current and delivering said fluid medium to another place after the motor is started. For example, it might be used for the purpose of lubricating bearings in what might be called a "one shot lubrication system" wherein each time the mechanism is started a small quantity of lubrication may be withdrawn from a source of supply and after the motor has completed its starting operation and is drawing running current this oil can be delivered via the pipe 83 to the various bearings.

In the present specification, the unloading device is described as "operating when the current consumed by the motor increases above its normal running current." This may be taken to mean that the device operates on any current greater than the normal running current of the motor (1) when the motor is starting and the total current consumed by the motor passes through the solenoid; (2) when for any other reason the motor consumes an abnormal current (current greater than its normal running current). This covers conditions in which the mechanism driven by the motor runs heavy due to stuck bearings, etc. or in cases where the automatic pressure switch fails to stop the compressor and the compression continues to build up. It is obvious that this would cause the motor to consume greater current than normal and actuate the unloading device.

In describing the operation of my new and improved valves, in some instances where the movement of the valve is described as "against the urge of the spring" it is obvious to those skilled in the art that if air pressure is impressed on the chamber in which the valve moves, that the valve is also moved against the pressure of the air. For example, in Figure 4, the movement of the valve 72 is described as "against the urge of the spring 75." However, the chamber 76 is under the same pressure as the pressure in the air tank 60; therefore the valve 72 is not only moved against the urge of the spring 75 but also against the pressure within the chamber 76.

In Figure 6, a modified form of valve is disclosed in which the pull of the solenoid on its plunger may be obtained in either an up or down direction by manually setting the solenoid winding relative to its plunger. A valve body 112 has mounted thereon a cylinder 113, preferably of non-magnetic material and having a longitudinal slit 114 formed therein. A solenoid winding 115 is carried on the spool or bobbin 116 which forms

a working fit with the outside of the cylinder 113. A solenoid plunger 117 is mounted to reciprocate within the cylinder 113 and has a valve stem 118 extending downwardly therefrom, the lower end of which carries a valve, to be presently described.

A passage 119 in the valve body 112 terminates in the valve seat 120 and the second passage 121 in the valve body terminates in the valve seat 122. A passage 123 terminates within the valve body between the seats 120 and 122 and a valve member 124 carried by the stem 118 seats on the seat 120 and a valve 125 also carried by the stem 118 is normally open and is adapted to seat on the seat 122 when the valve is actuated. Before the valve is actuated, a fluid medium may flow into the valve body 112 via the passage 121, past the seat 122 and out via the passage 123, or in reverse order.

After the valve is actuated, the fluid medium may flow into the valve body via the passage 119, past the seat 120 and out via the passage 123, or vice versa.

The center of the plunger 117 lies approximately along the line 126. The bobbin 116 has an extension 127 secured to one head thereof and a bolt 128 is secured to the extension 127. An arm 129 secured to the cylinder 113 has a hole formed therein through which the bolt 128 extends. By means of a wing nut 130, the height of the bobbin 116 may be adjusted either upwardly or downwardly. In the instance illustrated in Figure 6, the bobbin 116 has been adjusted so that the line 131 of its magnetic center is above the center 126 of the plunger 117. Therefore, when the solenoid 115 is energized, the plunger 117 will move upwardly and cause the valve 125 to engage its seat 122. A spring 132 may be provided for causing the plunger 117 to move downwardly to return the valve 124 to its seat when the current passing through the solenoid 115 is reduced. Instead of the spring 132, the weight of the plunger 117 may be depended upon to return the valve to its seat or the plunger 117 may be hollowed out and a suitable weight of lead may be inserted to cause the valve 124 to return to its seat when the current is reduced, as explained above.

If it were desired to have the valve 125 normally rest on its seat 122, a spring 133 might be provided to urge the plunger upwardly and consequently valve 125 toward its seat, in which event, by means of the thumb screw 130, the bobbin 116 would be lowered on the cylinder 113 until the magnetic center line 131 is below the center line 126 of the plunger, in which event, upon the flow of abnormal current through the winding 115, the plunger would move downwardly and thereby unseat the valve 125 and seat the valve 124.

Having provided an adjustable feature as described in connection with Figure 6, I have also found that by using a solenoid formed of wire having sufficient circular mil cross section to carry the starting current of a 5 H. P. motor, that an unloader employing such a coil mounted on a cylinder such as the cylinder 113 can be varied along said cylinder by means of the thumb screw 130 and used on a range of motors all the way from $\frac{1}{4}$ H. P. to 5 H. P. In other words, in constructing an unloader in this manner, the adjustment between the bobbin 116 and the plunger 117 is such that it can be changed by merely moving a thumb screw or wing nut. Adjustments to take care of high or low voltage conditions may be made in the field at the time

of installation. It is particularly adapted to be used in connection not only with single phase motors but also with polyphase motors having a wide range in current consumption.

Although several embodiments are herein shown and described, it must be understood that these are merely given by way of example, and that many variations in the arrangements herein shown and described may be made, without departing from the spirit of the invention as set forth in the following claims.

What is claimed is:

1. In combination, an electric motor driven pump, a tank, a conduit between the discharge port of said pump and said tank, a check valve in said conduit, a magnetic valve having a body with a passage extending therethrough, a movable valving member therein and having a plunger of ferrous material extending laterally therefrom, an actuating winding supported on said body for said plunger, said actuating winding being connected in series with the starting winding of said motor, means for connecting said motor to a source of current, said valve being normally closed and adapted to open when said motor draws a current greater in value than its normal running current, and a second conduit connected to said valve and said first conduit between said discharge port and said check valve, whereby said first valve will permit said pump to discharge into the atmosphere when said motor draws current greater than normal as aforesaid.

2. In combination, a pump, an electric motor operatively connected to said pump, a tank, a conduit between the discharge port of said pump and said tank, a check valve in said conduit, a magnetic valve including a body with a passage extending therethrough, a movable valving member therein and having a plunger of ferrous material extending laterally therefrom, an actuating winding supported on said body for said plunger, said actuating winding being connected in series with said motor, said movable member being so balanced that the starting current of the motor will actuate the same spring means acting on said movable member to prevent the actuation of said valve when the normal load current of the motor only passes through said winding, a conduit connected to an inlet port of said valve and to said first conduit between said discharge port and said check valve whereby said magnetic valve will permit said pump to discharge into the atmosphere during the time said motor is drawing starting current in addition to said load current.

3. In combination, an electric motor driven pump, a tank forming a support for said motor and pump, a conduit between the discharge port of said pump and said tank, and a magnetic valve control having its winding connected in series with said motor and having its mechanism associated with said pump and adapted to vent the discharge from said pump to the atmosphere and thereby prevent the pressure of said discharge from building up pressure while the starting current of said motor is passing through said winding.

4. In combination, an electric motor driven pump, a tank forming a support for said motor and pump, a conduit between the discharge port of said pump and said tank, a magnetic valve control including a valve body, a solenoid mounted on said body, a solenoid plunger reciprocally mounted in said body and influenced

by said solenoid, said plunger having a portion projecting from said body, valve engaging means carried on the projecting portion of said plunger, means connecting said solenoid in series with said motor, and means for adjustably supporting said magnetic valve control on said pump with said valve engaging member in cooperative relationship with the inlet valve of said pump whereby said inlet valve opens during the time said motor is drawing current greater than its normal running current.

5. In combination with a motor compressor air supply system in which the compressor includes an inlet valve, a magnetic valve control mechanism including a valve body, a solenoid winding mounted on said body and connected in series with said motor, a plunger reciprocally mounted on said body and having a portion projecting from said body, spring means acting against said plunger to prevent its actuation when said motor is drawing its normal running current, said plunger and spring being so balanced that said plunger is actuated when said solenoid winding carries current greater than the normal running current of the motor, and engaging means carried on said projecting portion of said plunger for engaging and for unseating the intake valve of said compressor when said plunger is actuated.

6. In combination with a motor driven air supply system including a tank, a magnetic valve connected to a low point in said tank, said valve including a solenoid winding connected in series with the motor and adapted to be actuated when said motor draws starting current whereby condensed moisture may automatically be removed from said tank each time said motor starts.

7. In combination, an electric motor driven pump, a tank, a conduit between the discharge of said pump and said tank, a magnetically controlled valve, a solenoid winding connected in series with said motor, and a conduit connected between a low point in said tank and said valve, said valve including spring means to effect a balance which is only upset by the passage of the motor starting current through said solenoid winding whereby condensed moisture from said tank may be discharged each time said motor starts.

8. In combination with a motor driven air supply system including a compressor and a tank connected to receive the discharge from said compressor, a magnetic valve including a winding interconnected with the motor, a valve body, a solenoid plunger and seating mechanism actuated thereby, a conduit connection between a low point in said tank and said body, and a passage in said body leading to the atmosphere, said valve having a seat adjacent to said first conduit connection and normally closed and a second seat adjacent to said passage with a chamber between said seats whereby, when said valve is actuated by the starting current of the motor, condensed moisture from said tank may pass into said chamber to be thereafter discharged via said passage to the atmosphere when said valve is de-actuated due to the reduction of the current drawn by said motor when its starting winding is cut out.

9. In combination with a motor driven air supply system including a compressor and a tank connected to receive the discharge from said compressor, pressure controlled mechanism on said compressor including an air operated plunger carrying an engaging member in cooperative relation with the inlet valve in said compressor for

unseating said valve and preventing said compressor from functioning, and a magnetically controlled valve body positioned between said tank and said pressure controlled mechanism including a solenoid winding supported on said body and a solenoid plunger under the influence of said winding, a valve in said body connected to said plunger and thereby controlled by the starting current of said motor for subjecting said mechanism to air under pressure while said motor is starting for unloading the compressor.

10. In combination with a motor driven air supply system including a compressor and a tank connected to receive the discharge from said compressor, pressure controlled mechanism adjustably mounted on said compressor including an air operated plunger projecting into the cylinder head of the compressor and carrying an engaging member in cooperative relation with the inlet valve in said compressor for unseating said valve thereby unloading said compressor, a magnetic valve including a valve body having a passage therein, a valve in said passage, a solenoid winding mounted on said body, a plunger under the influence of said solenoid connected to said valve and adapted to be actuated by current greater than the normal running current of said motor, a connection between said pressure controlled mechanism and said valve, and a connection between said valve and a source of air under pressure, whereby pressure is supplied to said mechanism for unloading the compressor each time the motor draws current greater than its normal running current.

11. The combination according to claim 10, in which the source of pressure is said tank, and in which the connection between the valve and the source of pressure is a conduit leading from a low point in said tank to said valve, and in which said valve body includes a passage leading to the atmosphere whereby when current greater than the normal running current of the motor passes through the winding of said magnetic valve, said pressure controlled mechanism is subjected to pressure from the tank, and condensed moisture together with said pressure occupies the conduits forming said connections and passes out into atmosphere, due to the action of said valve, when the current through said windings is reduced to normal.

12. In combination with a motor driven air supply system including a compressor and a tank connected to receive the discharge from said compressor, unloading means including a solenoid connected in series with said motor, a valve body having a pair of chambers formed therein with a passage therebetween and valve seats at each end of said passage, a valve seating member carrying oppositely disposed seating faces adapted to cooperate with said seats, one of said seating faces normally contacting its seat and the other seating face being adapted to contact its seat when said first valve face is unseated, spring means associated with said valve seating members tending to maintain said normally contacting relation, a conduit leading from a low point in said tank to the chamber in which said valve seating member is normally seated, a passage leading from the other of said chambers to the atmosphere, and a conduit leading from said passage to pneumatic unloading means associated with said compressor whereby the starting current drawn by said motor will unseat the seating face in said first chamber and cause the seating face in said second chamber to engage its seat thereby sup-

plying pressure and condensed moisture from the bottom of said tank to the conduit leading to said pneumatic unloading means to be discharged into the atmosphere when said normally contacting relation is reestablished due to the reduction of the current drawn by the motor to normal.

13. A magnetic valve having, in combination, a valve body having passages formed therein, a seat formed in said body, a valve member, a plunger above said valve body, a stem connecting said valve to said plunger, a cylinder projecting above said valve body substantially concentric with said plunger, a solenoid winding movably carried on said cylinder, and means for adjusting said winding along said cylinder relative to said plunger.

14. A magnetic valve having, in combination, a valve body having passages formed therein, a seat formed in said body, a valve member, a stem reciprocally mounted in said body, said valve member being carried on one end of said stem, a plunger connected to the other end of said stem, a cylinder supported on said valve body embracing and substantially concentric with said plunger, a solenoid winding movably carried on said cylinder, and means for adjusting said winding along said cylinder relative to said plunger.

15. A magnetic valve having, in combination, a valve body having passages formed therein, a seat formed in said body, a valve member, a stem reciprocally mounted in said body, said valve member being carried on one end of said stem, a plunger connected to the other end of said stem, a cylinder supported on said valve body embracing and substantially concentric with said plunger, a solenoid winding movably carried on said cylinder, a threaded screw carried on said winding, a support carried by said cylinder and having a hole formed therein for said screw, and a nut engaging said screw above said support and adapted to be rotated in one direction to permit said solenoid winding to move toward the valve body and adapted to be turned in the opposite direction to move said winding in a direction away from said valve body.

16. In a device for unloading compressors or the like by unseating the inlet valve therein, a body, means to adjustably mount said body in the head of said compressor adjacent to said inlet valve, a cylindrical cavity formed in said body, a passage formed in said body communicating with

said cavity and terminating in a fitting in said body for connection to a source of fluid medium under pressure, a piston in said cavity, a piston rod connected to said piston, a valve engaging member carried on said rod and adapted to engage and unseat said inlet valve when said cylindrical cavity and the piston therein is subjected to the pressure of said source, and means to control the subjection of said device to pressure from said source.

17. In a magnetic valve, in combination, a valve body having a plurality of passages formed therein, a pair of valve seats therein spaced apart from each other and facing in opposite directions, one of said passages communicating with the space between said seats, an elongated valve member carrying faces, one of which cooperates with one of said seats and the other of which cooperates with the other of said seats, a solenoid winding carried on said body above said valve member and said seats, a solenoid plunger under the influence of said winding and forming a straight line extension of said valve member, a cylindrical support on said body for said winding embracing said plunger, and means for preventing fluid mediums passing through said valve body from entering said cylindrical support.

18. In combination with a motor driven air supply system including a tank having a low point or sump therein containing a liquid, a magnetic valve having a conduit in communication with said low point or sump, and a second conduit connected to said valve and leading to a point where said liquid is to be delivered, said valve including a solenoid winding connected in series with said motor and adapted to be actuated only when said motor draws starting current, whereby said liquid may be delivered during each starting cycle of said motor.

19. In a magnetic valve, in combination, a valve body having passages formed therein, a seat formed within said body, a valve member, a plunger above said valve body, a stem connecting said valve to said plunger, a cylinder projecting upwardly from said body and embracing said plunger, and means for adjusting said winding along said cylinder so as to position the magnetic center of said winding in a definite relation to the center of mass of said plunger.

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