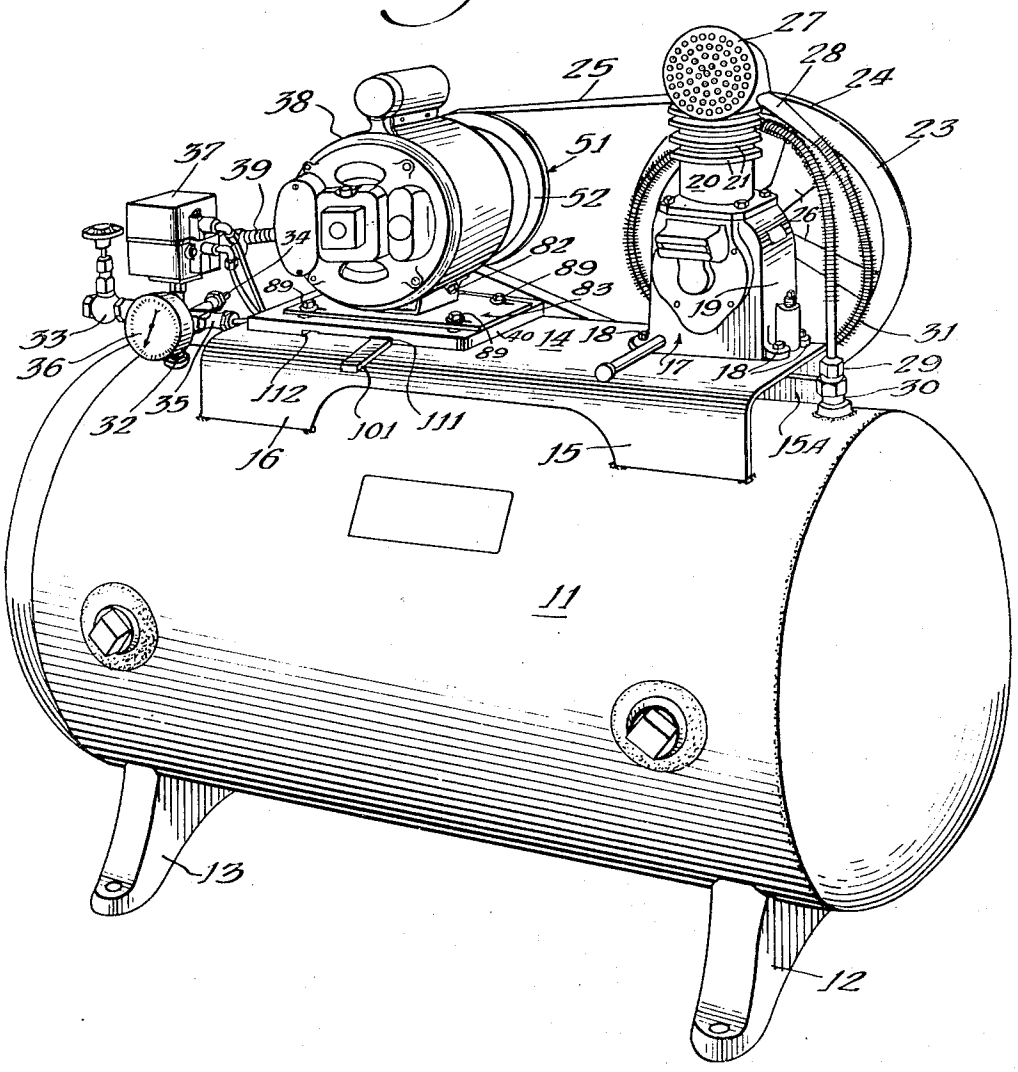
Aug. 31, 1948. B. W. MANTLE 2,448,379

COMPRESSOR SYSTEM

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Fig. 1.



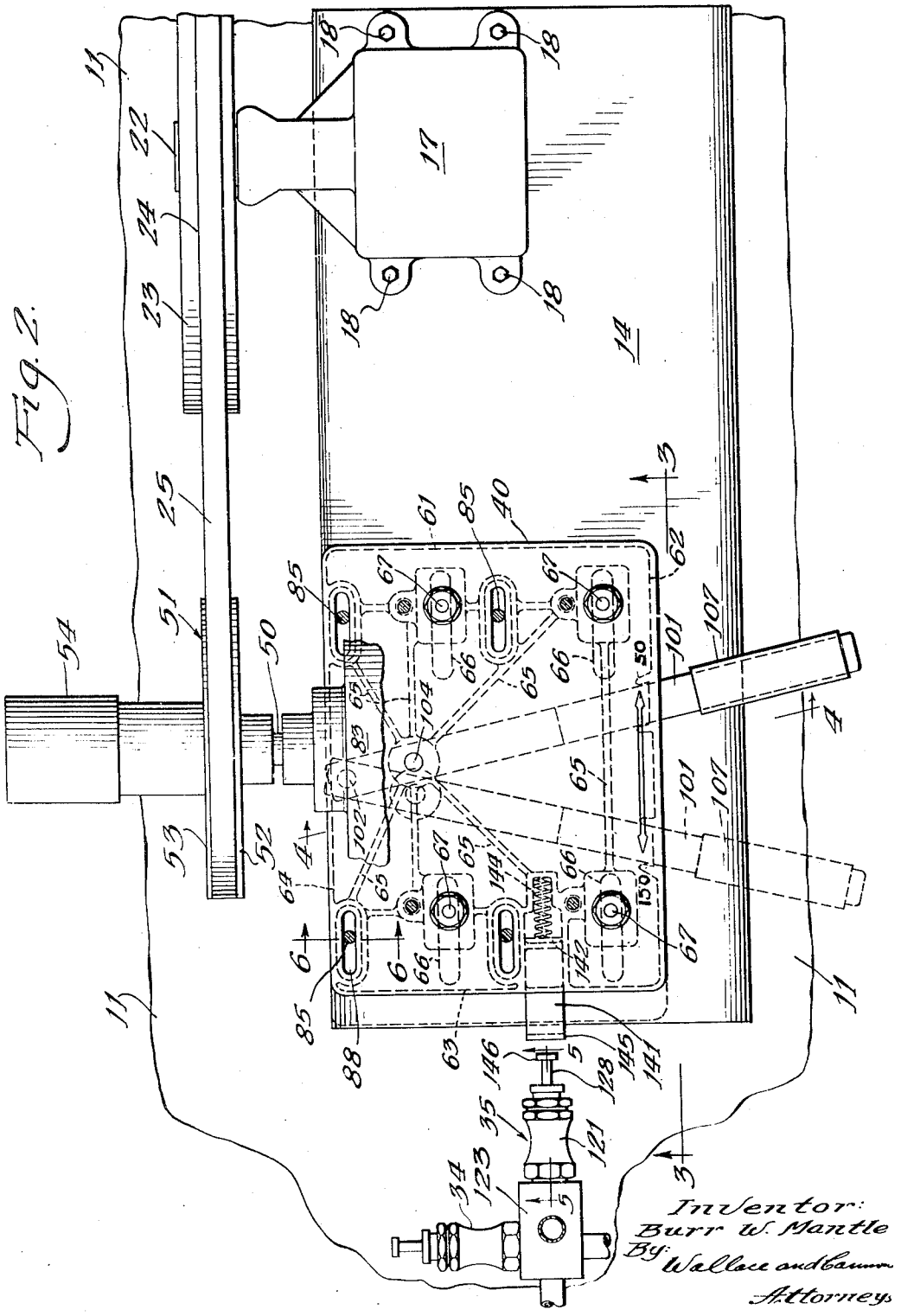
Inventor:
Burr W. Mantle
By:
Wallace and Cannon
Attorneys

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COMPRESSOR SYSTEM

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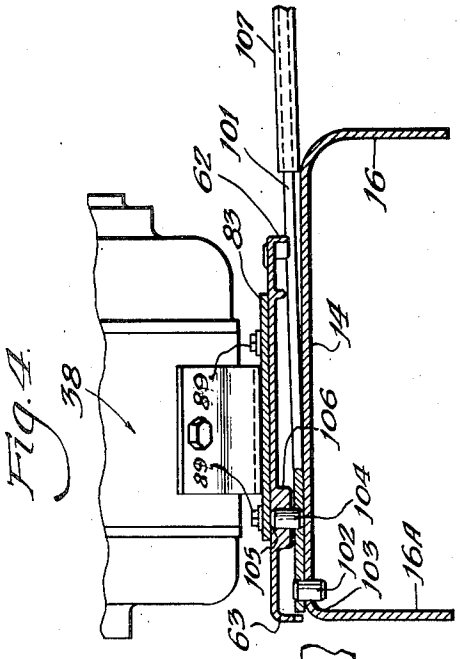
Fig. 2.

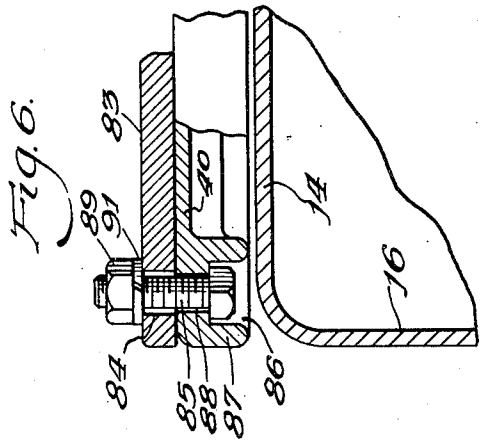


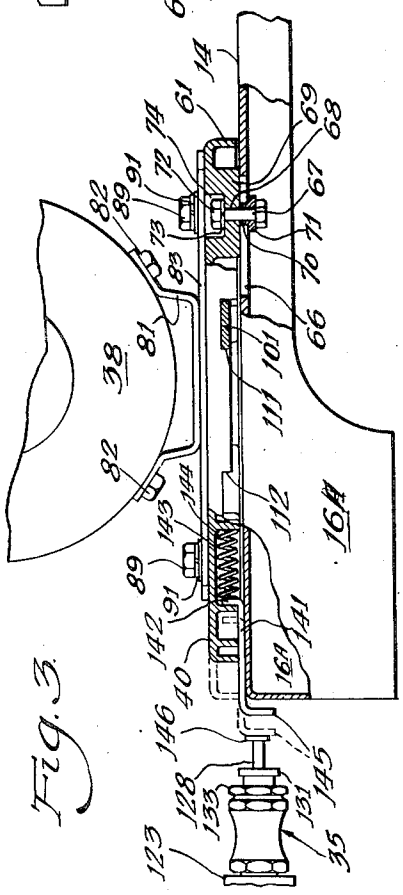
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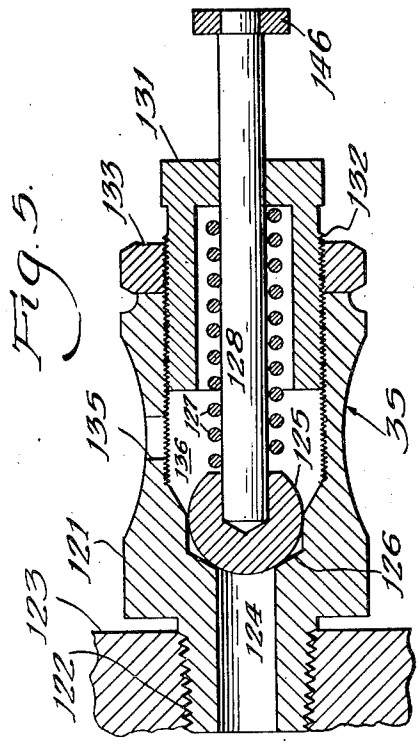
COMPRESSOR SYSTEM

Filed July 19, 1946 3 Sheets-Sheet 3









Inventor:
Burr W. Mantle
By: Wallace and Cannon
Attorneys

Patented Aug. 31, 1948 2,448,379

UNITED STATES PATENT OFFICE

2,448,379

COMPRESSOR SYSTEM

Burr W. Mantle, Pittsford, N. Y., assignor to American Brake Shoe Company, New York, N. Y., a corporation of Delaware

Application July 19, 1946, Serial No. 684,654

13 Claims. (Cl. 230—11)

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The present invention relates to a compressor system and particularly to a dual capacity air compressor system of the general character described in my prior Patent No. 2,253,859, patented August 26, 1941. The present invention has to do more particularly with a number of improvements over the system described in the aforesaid patent with a view to changing from one type of operation to another by a simple control movement which changes automatically the necessary safety valve settings, pulley arrangements and the like.

In garages, shops, service stations and the like, it is desirable to have an air compressor system capable of supplying compressed air at a relatively high pressure, for example 125 to 150 pounds per square inch, for inflating pneumatic tires, operating equipment employing pneumatic motors, and the like. It is also desirable to have a low pressure system where a relatively large supply of air may be made available at a pressure range, for example, of 40 to 50 pounds per square inch, for operating paint spray guns and the like. In large shops it may be economical to provide separate systems but in smaller shops and stations it is desirable to have a single system capable of both types of operation.

The system described in my aforesaid patent provides for the operation of a compressor at two different rates of speed for high pressure low volume output and low pressure high volume output respectively. However, the system therein described requires manual changes in pulley adjustments and the like. It depends, furthermore, among other things, upon a thermal overload device for protecting an electric driving motor against injury, in case the compressor should be set to operate, for example, at high pressure and at high speed, for high volumetric output at the same time. This arrangement is objectionable, even though the motor is amply protected against burning out, since it interferes with continuous operation of the system.

It is, therefore, an object of my invention to place various safety devices and speed adjusting means for a dual capacity compressor system under the direct and positive control of a single master control element.

An additional object is to prevent overloading of a drive motor by positively operated means so arranged that movement of a control device to change the operating speed of a compressor driven by such motor is effective to produce a correlative change in the maximum output pressure of such compressor.

Still another object of my invention is to interrelate the various controls and safety devices of a dual capacity compressor system so that they can be operated directly by manipulation of a single manual control element, thus eliminating

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the possibility of having certain controls and devices set for one type of operation, while others are set for another type of operation.

A further object of my invention is to mount a compressor and a drive motor therefor in such a manner that they can be moved relatively, the drive arrangement between them being such that said relative movement is effective automatically to change their speed ratio, and the arrangement being such that unloader mechanism for the compressor is automatically and selectively rendered operative or inoperative by said relative movement.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show a preferred embodiment of the present invention and the principles thereof and what I now consider to be the best mode in which I have contemplated applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is a perspective view of a compressor unit or system embodying my invention;

Fig. 2 is a plan view of the unit shown in Fig. 1 on a somewhat larger scale, part of the pressure tank being broken away;

Fig. 3 is a fragmentary elevational view taken substantially along the line 3—3, Fig. 2, this view being on a somewhat larger scale than Fig. 2, with certain parts broken away and parts shown in section;

Fig. 4 is a transverse sectional view taken substantially along the line 4—4, Fig. 2;

Fig. 5 is an enlarged sectional detail view of a relief valve which comprises a part of my invention, this view being taken substantially along the line 5—5, Fig. 2; and

Fig. 6 is an enlarged sectional detail view taken substantially along the line 6—6, Fig. 2.

Referring first to Fig. 1 of the drawings, there is shown an air compressor system comprising a storage tank 11 which supports a compressor, a drive motor, and certain control mechanisms to be described hereinafter.

The storage tank 11 is of suitable size, shape and thickness for storing compressed air, or other compressed fluid, at a pressure up to the maximum pressure required for the service intended. The tank is mounted on suitable supports or feet 12, 13 which hold it in upright position.

A platform 14 is mounted on top of the tank 11 for supporting a compressor and motor and

this platform is formed of any appropriate material, preferably of sheet metal of suitable gauge formed to provide a flat table top supported by downturned side flange portions 15, 15A, 16 and 16A, which provide feet to rest on the cylindrical surface of the tank 11. These feet or flanges are secured firmly to the tank, preferably by welding, so that the platform is rigidly mounted, providing a firm base for the motor and compressor.

An air compressor 17 is mounted on one end of the platform by suitable means such as studs or bolts 18. This compressor may be of any appropriate type, but as shown it comprises a crank case 19, a cylinder 20 provided with cooling fins 21, a shaft 22 for driving the compressor (Fig. 2) and a pulley 23 for driving shaft 22. The pulley has a grooved rim, as shown at 24, for a V-belt or the like 25, and it may comprise spokes 26 which are beveled or twisted like fan blades or propellers for causing a rapid circulation of air over the compressor to facilitate its cooling.

An air intake 27, which may comprise a filter, if desired, is mounted on top of the compressor and an outlet or exhaust tube 28 leads from the cylinder to form a cooling loop and connects to the pressure tank by means of a tubing nut 29 and a check valve 30 that is threaded into a suitable opening in the tank 11. The tube 28 may be provided with cooling fins 31 to radiate heat to the atmosphere, the tube thus serving as an after cooler to reduce the temperature of the compressed air before it reaches the storage tank.

At the end of the tank 11 opposite that to which connection 28 is attached, an outlet connection 32 is provided. This connection leads to a six-way connector to which are attached a valve 33 for the pneumatic line, a high pressure safety valve 34, a low pressure relief valve 35, a pressure gauge 36 and a pressure controlled electric switch 37.

Air pressure applied through the connection 32 operates the pressure gauge 36 which may be of any standard type. The low pressure relief valve 35 is operated under some conditions and is rendered inoperative under others, as will be more fully described hereinafter. The high pressure safety valve 34 is effective to release air from the tank when a maximum allowable pressure has been reached. The pressure controlled electric switch 37, which may be of conventional type and is well known, per se, in the prior art, functions to energize or deenergize an electric power circuit to a drive motor 38 of suitable character. An electric cable 39 connects the switch 37 with motor 38. The valve 33, of course, is manually controlled, being normally left open so that air is supplied through a suitable pipe or hose to the devices which operate thereby.

The motor 38 may be an electric motor of appropriate size and type or, if desired, it may be a gasoline motor. It is mounted adjustably on a plate or base 40 which, in turn is slidably mounted on the platform 14 in a manner and by means which will be described presently. Motor 38 comprises a drive shaft 50 which operates an adjustable pulley 51 suitably secured to shaft 50 for rotation therewith.

The pulley 51 is of the type that enables the pitch diameter type thereof to be adjusted automatically as an incident to changes in the spacing of the axes of the driving and driven pulleys, and such adjustable pulleys are known per se in the prior art. It is comprised of two halves, disc-like members 52 and 53 which oppose each other to provide a V-groove for a V-belt or the like, and

the effective pitch is determined by the spacing between the halves 52 and 53. Both of the inner discs 52 and 53 are fixed on the motor shaft in a rotative sense, and are arranged for relative axial movement in which either one or both of the discs may move relative to the motor shaft. As herein shown, the disc 52 is fixed to the shaft 50, while the disc 53 is axially slidable thereon, and spring means, not shown, are enclosed in an axially fixed hub 54 to press the disc member or pulley half 53 toward the opposing member 52.

The V-belt or the like 25, mentioned above, passes about the pulley 51, or between the two halves 52 and 53 thereof, and its position between such halves obviously determines the effective pitch diameter of pulley 51. If the motor 38 and compressor 17 are moved farther apart, increased tension causes the belt 25 to wedge the pulley halves 52, 53 away from each other and the belt moves to a smaller effective pitch diameter. As a result the compressor is driven more slowly. On the other hand, if the motor is moved closer to the compressor, tension is reduced and the belt 25 climbs outwardly on pulley 51 and the spring means mentioned above moves the outer half 53 toward the opposing member 52 to increase the effective pitch diameter. As a result, the compressor is driven more rapidly, assuming that the motor shaft 50 continues to operate at the same speed.

The movable plate 40 which supports the motor 38 comprises a substantially flat member of suitable material, such as cast or forged metal, provided with downturned edge flanges 61, 62, 63 and 64 and reinforcing ribs 65, as best shown in Fig. 2. The platform 14 is provided with longitudinal openings or slots 66 in which bolts 67 are slidably mounted. These bolts pass through openings 68 in boss portions 69 provided on the lower surface of member 40 and they pass through spacers 70 which have head portions 71 wider than the slots and have their reduced sleeve portions slidably mounted in slots 66. A nut 72 and washer 73 on each of the bolts 67 seat in a recess 74 provided in the upper surface of the member 40 for each of the openings 68. The spacers 70 permit tightening of the nuts 72 without preventing free sliding movement of the plate or base member 40 along the platform member 14. See Fig. 3.

The motor 38 is supported on a bracket 81 secured thereto as by bolts 82 and welded or otherwise fastened to a plate 83, Fig. 3. The plate 83 is provided with longitudinal slots 84 through which bolts 85 may be secured. These bolts have their heads seated in recesses 86 provided in boss elements 87 on the lower surface of the base member 40 and are passed through openings 88 therein as best shown in Fig. 6. By means of a nut 89 and washer 91 each of the bolts 85 may be tightened to hold the plate 83 in adjustment with respect to the base member 40. Hence the motor is adjustable with respect to the base 40 and the base 40 is slidably mounted with respect to the platform 14 and the compressor 17 supported thereby.

A lever 101 is provided for shifting the base member 40 longitudinally so as to move the motor 38 toward or away from the compressor and thus cause the pulley 51, through tension applied to the belt 25, to change its effective diameter in the manner described above. This lever bears a downwardly projecting stud 102 at its rear end, or at the left as seen in Fig. 4, which engages in an opening 103 provided in the platform member

14. Forwardly of the stud 102 the lever bears another stud 104 which projects upwardly into an opening 105 formed in a boss portion 106 on the lower side of the base member 40. The stud 102 serves as a fulcrum and the stud 104 causes the slidable motor-supporting base member 40 to move as the lever 101 is moved between the full line position at the right and the dotted line position at the left as shown in Fig. 2.

The lever 101 is arranged to spring upwardly at its forward end and is provided with a grip 107 of suitable material such as hard rubber, plastic, or the like. The front flange 62 of the base member 40 is notched at two points, as shown at 111 and 112, Fig. 3, to latch or retain the lever 101 in either of the two positions shown in Fig. 2. When the lever is moved to the right, Fig. 2, to its full line position, the motor is advanced toward the compressor and tension on belt 25 is reduced, permitting the pulley 51 to close and thereby increase the effective pitch of the pulley 51. This increases the speed at which the compressor is driven, assuming that the motor operates at a substantially constant speed. Indicia "50," cast or otherwise formed on the base 40 adjacent the notch 111 indicate the general pressure range at which the compressor may be operated when thus set without overloading the motor.

When the lever 101 is shifted to the dotted line position, Fig. 2, the base 40 is moved to the left as seen in said figure, increasing the distance between the motor 38 and the compressor 17 so as to apply increased tension to the belt 25. This tension causes the belt 25 to wedge the two halves 52 and 53 of the drive pulley 51 away from each other so that the belt rides inwardly of the periphery of the drive pulley, thereby reducing its effective pitch diameter. The result of this is that the motor drives the compressor at a slower rate of speed, again assuming that the motor operates at a substantially constant speed. Hence the compressor may be operated at greater output pressure although its volumetric output is reduced. The indicia "150" cast or otherwise formed on the base 40 adjacent the notch 112 indicate the general pressure range at which the compressor may be operated when the lever is shifted to this position.

Mention was made hereinabove of the low pressure relief valve 35 and the high pressure safety valve 34. When the compressor is being driven at high speed, that is when the lever 101 is in its full line position, Figs. 1 and 2, it is necessary that the tank pressure be limited so that the motor will not be over-loaded. The valve 35 is designed to release air from the tank 11 whenever pressure exceeds that required for the lower pressure type of operation. This pressure range may be of the order of 50 pounds per square inch as previously mentioned, although different pressure may be selected when the apparatus is designed for other uses or types of use.

The low pressure relief valve 35 comprises a body member 121 provided with a threaded connection 122 preferably of the tapered type which fits into the six way connection mentioned above and indicated at 123, Fig. 2. A portion of this connection is shown also in Fig. 5.

The body member 121 connects with the member 123 through a port 124 which is closed by a valve member 125. As shown in Fig. 5 the valve member 125 may be substantially spherical in form and adapted to rest in a valve seat 126 under the pressure of a spring 127 which surrounds a

valve stem 128 secured to the spherical member 125.

The member 121 is threaded internally at its outer end and an adjustable bushing 131 is threaded as indicated at 132 to fit into the threaded connection just mentioned. A lock nut 133 is provided for holding the member 131 in any position of adjustment. An opening 135 leads to the atmosphere from the chamber 136 in which the valve closing member 125 is mounted.

By means of the construction just described, air in the tank 11 is released to the atmosphere whenever its pressure exceeds the lower operating pressure of the compressor, as indicated when the lever 101 is in its full line position shown in Figs. 1 and 2. In case air is not being drawn from the supply valve 33, the compressor 17 may continue to operate, the valve member 125 being lifted off its seat 126 to permit continuous release of air through the ports 124 and 135.

When it is desired to operate the compressor at its high pressure range, means are provided for holding the low pressure relief valve 35 inoperative. As shown in Fig. 3, a bar 141 is slidably mounted between the platform 14 and the base member 40, an upturned end 142 of this bar being received within a recess 143 formed in the lower surface of the base member 40. A compression spring 144 is also mounted in the recess 143 in such a manner as to urge the bar 141 to the left as seen in Figs. 2 and 3. The outer end of the bar 141 is bent downwardly so as to cooperate with the head 146 of the valve stem 128 mentioned above.

As long as the unit is adjusted for low pressure operation, the bar 141 has no effect on the valve 35 and the latter is free to operate and prevent over-loading of the compressor. However, when the lever 101 is shifted to the left as seen in Figs. 1 and 2 to the dotted line position shown, the downturned end 145 of the bar 141 tends to push the valve stem 128 inwardly. The spring 144 is placed under compression and thus applies its effect to augment the effect of spring 127 to hold the valve 125 tightly on the valve seat 126. The combined effect of the two springs 127 and 144 is such that the valve 125 remains closed at pressures equal to, or above the higher maximum pressure of the high pressure range, as determined by the high pressure safety valve 34.

Hence when the compressor unit is operating in the high pressure range the relief valve 35 remains closed for normal operation and the safety valve 34 becomes operative. The valve 34 is similar to or identical with valve 35 in internal construction except that a stronger spring tension is employed and the valve is otherwise designed to open only when a maximum allowable pressure is exceeded. In the example given above, this pressure might be of the order of 150 pounds per square inch, although it may be varied as desired within the limits set by the design of the equipment.

From the above description it will be apparent that by simply moving the lever 101 to either of the positions shown in Fig. 2, all the necessary controls may be set for operating the compressor unit at the desired range. When the unit is set for low pressure operations the low pressure relief valve becomes operative to limit the working pressure and the belt 25 automatically climbs to the outer position on the drive pulley 51 so as to operate the compressor at a relatively high rate of speed with good volumetric output. When the compressor unit is set for operation in the

high pressure range, the relief valve 35 is rendered inoperative as described above, thereby placing the safety valve 34 in operation to limit maximum pressure, and at the same time the pulley 51 adjusts itself to a smaller effective pitch diameter to drive the compressor at a slower rate of speed and thereby avoid over-loading the motor.

Although the description given above refers to the use of an electric motor, and the cable 39 by which the pressure switch 37 controls the motor would normally be the conductor for the line current, the same general type of control might be used in the conventional way in connection with a gasoline motor, in which case a reverse acting switch would be employed in the unit 37 to short circuit the magneto of the engine when the engine is to be cut off or stopped.

For low pressure operation the lever 101 is set as indicated in Fig. 1, and as shown in full lines in Fig. 2, and if air is not used as rapidly as it is being compressed, the excess is vented to the atmosphere through the low pressure relief valve 35 in the manner described above, and since the pressure in the tank is thus maintained far below the cut-off value of the switch 37, the motor 38 will operate continuously.

For high pressure operations the compressor is driven at a lower rate of speed, the relief valve 35 is rendered inoperative in the manner described above, and the pressure switch 37 normally controls operation of the motor. This switch, as is well known in the art, is so designed that the motor will be placed in operation when pressure in the tank 11 drops to a minimum for the higher operating range, for example 120 pounds per square inch. This minimum may of course be adjusted to any desired figure consistent with the design of the unit. The motor then operates continuously until the pressure reaches a predetermined maximum, whereupon the switch 37 cuts off the current to the motor. This maximum may be varied, since switch 37 can be adjusted to the desired figure, for example 150 pounds per square inch. As long as the pressure switch operates properly, the safety valve 34 may remain closed, since it will normally be set to open at a slightly higher pressure than required to operate the switch 37 to cut off the motor. However, if for any reason the pressure switch 37 fails to cut off the motor, the safety valve 34 will open and prevent building up dangerous or excessive pressure within the system.

Although I have described the invention above in connection with an air compressor unit of a particular type, it will be understood that my invention is not necessarily limited thereto, but it may be applied to other types of compressors, and may be used in connection with the compression of fluids other than air. As pointed out above, the motor may be either electric or gasoline and the pressure ranges may be chosen as desired, within the limitations of the design of the equipment, appropriate choices being made of the self-adjusting pulley 51, the safety valves 35 and 34, the pressure switch 37, and other operating parts.

The power required to operate a compressor is roughly proportional to the product of the operating speed or volumetric output rate multiplied by the output pressure. Temperature rises, of course, cause departures from an exact ratio. Since it is desirable to obtain maximum operating efficiency of the motor and at the same time avoid objectionably overloading it, the variable

pulley 51 should be so designed as to change its effective pitch diameter and the speed at which it drives the compressor so that such efficiency is attained in both settings of the apparatus. Thus, in the example given above, where the operating ranges are about 50 and 150 pounds per square inch for low and high pressure, respectively, the pulley may be designed to drive the compressor approximately one and one-half times as fast at low pressure as at high pressure. It will be noted, however, that both the lower and the higher pressure ranges may be varied considerably by adjusting the low pressure relief valve 35 and/or the high pressure safety valve 34. Hence the design of pulley 51, or the extent to which its pitch diameter may be varied in moving the motor from one position to the other, may be chosen to fit the intended operating ranges.

The extent to which the pulley 51 changes its effective pitch diameter depends on the changes in tension on belt 25. This is a function of the distance through which the motor is moved, and can be varied as desired to obtain the required operating speeds. The essential criterion is that the compressor should be driven, in either the low pressure or the high pressure range, at a speed that involves efficient motor operation without objectionable overload.

While I have described the motor 38 as being movably mounted on the frame for the purpose of changing the tension on belt 25 and thereby effecting a shift from one pitch diameter to another on the driving pulley 51, it will be understood that other means might be utilized for accomplishing the same result. For example, a shiftable idler roller applied to the belt might be used to change its tension or effective length and to thereby effect a change in pitch diameter of pulley 51 without moving the motor. It will be apparent that this and other equivalents fall within the scope of my invention and the claims are intended to cover such scope. This alternative arrangement is not shown, being considered obvious in view of the above discussion.

As described above, it is preferred to use a safety valve 34 for high pressure operation, in addition to the low pressure valve 35 which normally operates only when the motor is shifted toward the compressor, lever 101 being in the full line position of Figs. 1 and 2. However, the spring 144 which is effective to augment the force of spring 127, may be so chosen, and the pressure applied thereto so adjusted, that when the lever 101 is shifted to the dotted line position, Fig. 2, the valve 35 becomes a high pressure safety valve. In this case, the valve 34 may be eliminated. For flexibility in setting both the upper and lower pressure ranges, however, the use of both valves is considered preferable.

Thus, while I have illustrated and described the preferred embodiment of my invention, it is to be understood that this is capable of variation and modification and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In a compressed air supply system, the combination which comprises an air compressor including a driven pulley, a driving motor including a variable pitch diameter drive pulley arranged to change said pitch diameter according to tension on a belt passing over [illegible]

a drive belt for connecting said pulleys, movable means for changing the tension on said belt to cause said drive pulley to change its pitch diameter, and valve means controlled by said movable means for regulating the output pressure of said compressor in correlation with the speed of said compressor.

2. In a dual capacity compressed air system, a movably mounted motor, means for moving said motor, means driven by said motor for operating a compressor at a high rate or a low rate of speed depending upon the position of said motor, and means for limiting maximum pressure to a low level when said compressor is operated at a high rate, said last named means being rendered inoperative when said motor is moved to operate said compressor at a low rate of speed.

3. In a compressed air supply system, a relief valve comprising a spring pressed closure element, movable means for changing the volumetric output rate of said system, and resilient means controlled by said movable means for augmenting the pressure applied to said closure element and thereby to increase the pressure range at which said relief valve becomes operative when said volumetric rate is reduced.

4. In a compressed air supply system, the combination of a pressure relief valve operable at a low pressure range, and a safety valve operable at a high pressure range, resilient means for holding said relief valve closed below said low pressure range, and other resilient means effective to augment said first named resilient means and hold said relief valve closed at pressures below said high pressure range.

5. In a compressed air system, the combination of a compressor, a drive motor, a belt pulley on said motor for driving said compressor, said pulley being of automatically variable pitch diameter dependent upon belt tension, movable means for varying said tension to cause said pulley to assume a large pitch diameter in one position and a small pitch diameter in another position; and a relief valve for limiting maximum pressure when said pulley assumes large pitch diameter, said valve being rendered inoperative by said movable means when said pulley assumes a small pitch diameter.

6. In a compressed air system, the combination of compressor means operable at either a high or a low volumetric output rate, a shiftable member for controlling the volumetric rate selectively, and pressure limiting means controlled by said shiftable member for maintaining relatively high pressure when the volumetric output rate is low and for maintaining a lower pressure when the volumetric output rate is high.

7. In a compressed air supply system, the combination of a compressor having a driven pulley, a motor having a drive pulley of variable pitch diameter, a belt connecting said pulleys, means for changing said pitch diameter to change the speed at which said compressor is driven by said motor, a pressure switch for stopping and starting said motor automatically at the higher and lower limits of a high pressure operating range, and a relief valve controlled by said changing means for relieving the output pressure of said compressor below said high pressure range when said compressor is driven at a comparatively high rate of speed.

8. In a compressed air supply system, the combination of a compressor having a driven belt pulley, a driving motor having a variable pitch diameter belt pulley, a belt connecting said pulleys, movable means for changing the tension on said belt and thereby changing the effective pitch of said variable pulley, and plural pressure relief valve means selectively controlled by said movable means.

9. In combination a variable pitch drive pulley, a compressor including a driven pulley, a belt connecting said pulleys, means for controlling the output pressure of said compressor, and a movable member for simultaneously changing the tension on said belt, changing the pitch of said variable pulley, and changing the operation of said output pressure control means.

10. In combination, a storage tank for compressed air or the like, a platform mounted on said tank, a compressor secured to said platform, a base movably mounted on said platform, a motor mounted on said base, a relief valve mechanism mounted on said tank, and resilient means carried by said base for controlling said relief valve in response to movement of said base.

11. In combination, a compressor, means for driving said compressor at variable speed, valve means for regulating the pressure output of said compressor, a movable member for varying said compressor speed, and a spring-urged element carried by said movable means for rendering a part of said valve means inoperative when said speed is changed.

12. In a compressed air supply system having a storage tank, a compressor, and a drive motor, the combination which includes means for varying the drive between said motor and said compressor to change the speed and volumetric output of said compressor without material change in the speed of said motor, valve means for relieving pressure in said tank at a low range when said compressor is being driven rapidly, and means carried by said drive-varying means for rendering said valve means inoperative when the speed of said compressor is reduced.

13. In a system of the character described, the combination of a storage tank, a low pressure relief valve, a high pressure safety valve, spring means for closing each of said valves, control means for varying the rate of supply of a fluid to said storage tank, and means operable by said control means to apply resilient force, in addition to said spring means, to said low pressure relief valve to hold it closed at pressures substantially below the operating pressure of said safety valve.

BURR W. MANTLE.

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320,023	France	1902