

April 6, 1943.

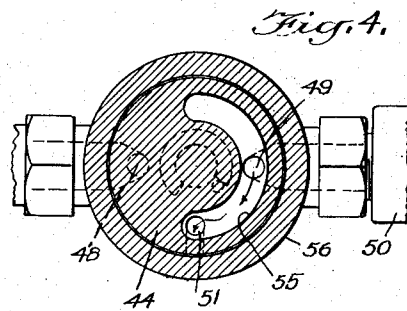
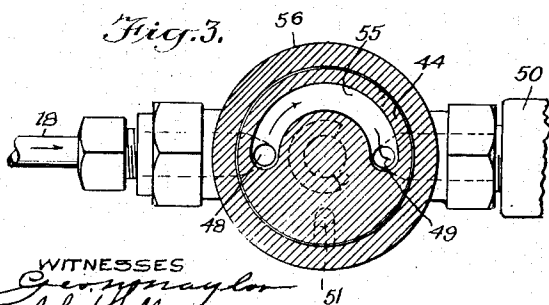
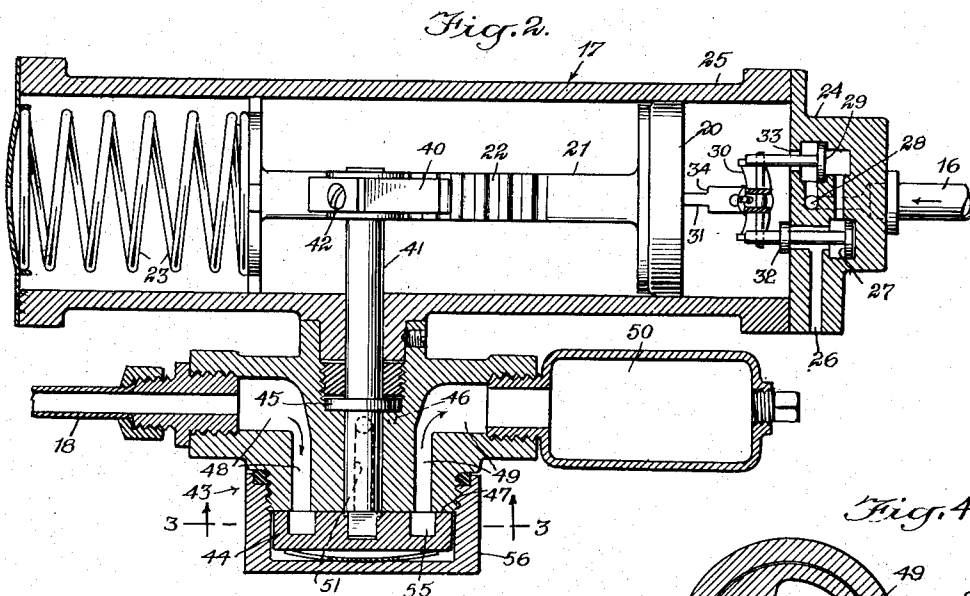
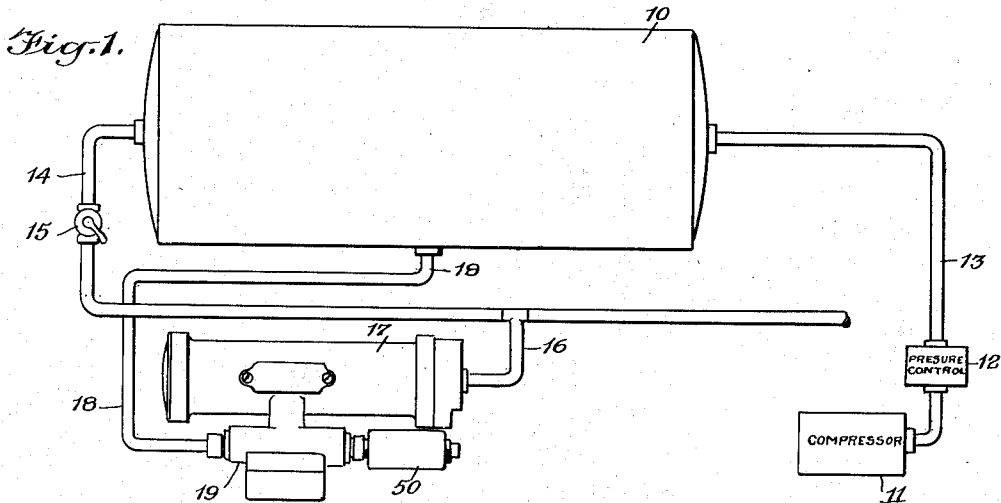
M. DACH

2,316,052

MOISTURE REMOVING DEVICE FOR AIR COMPRESSOR SYSTEMS

Filed Dec. 21, 1940

3 Sheets-Sheet 1



WITNESSES
George Maylor
John V. McCum

INVENTOR
Max Dach
BY
Munn, Anderson & Lobb
ATTORNEYS

April 6, 1943.

M. DACH

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MOISTURE REMOVING DEVICE FOR AIR COMPRESSOR SYSTEMS

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Fig. 5.

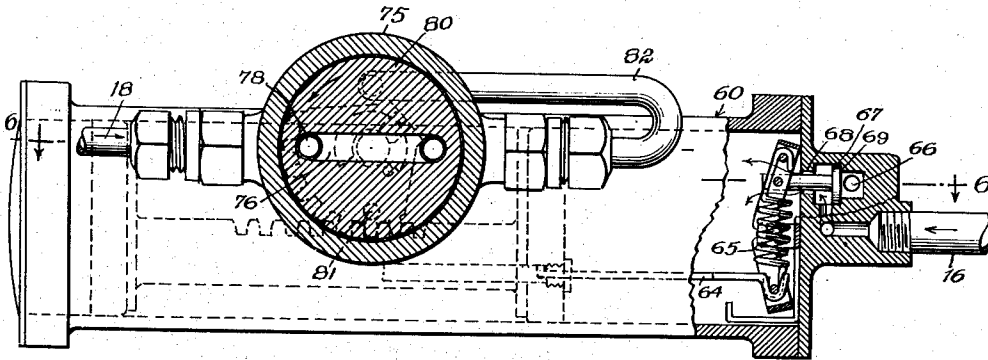


Fig. 6.

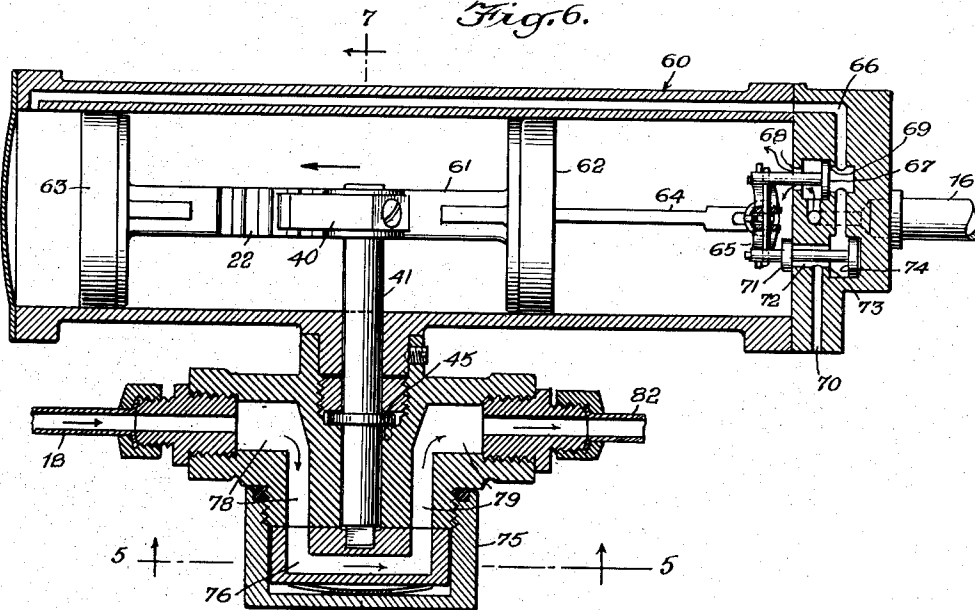


Fig. 7.

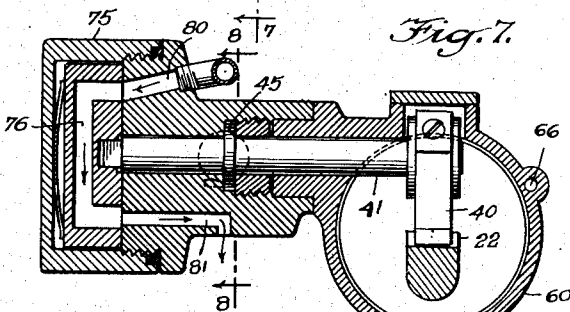
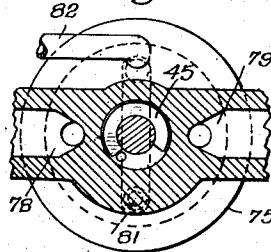


Fig. 8.



WITNESSES

Geo. H. Grayson
John V. Glaccum

INVENTOR

Max Dach

BY

Munn, Anderson & Liddy
ATTORNEYS

April 6, 1943.

M. DACH

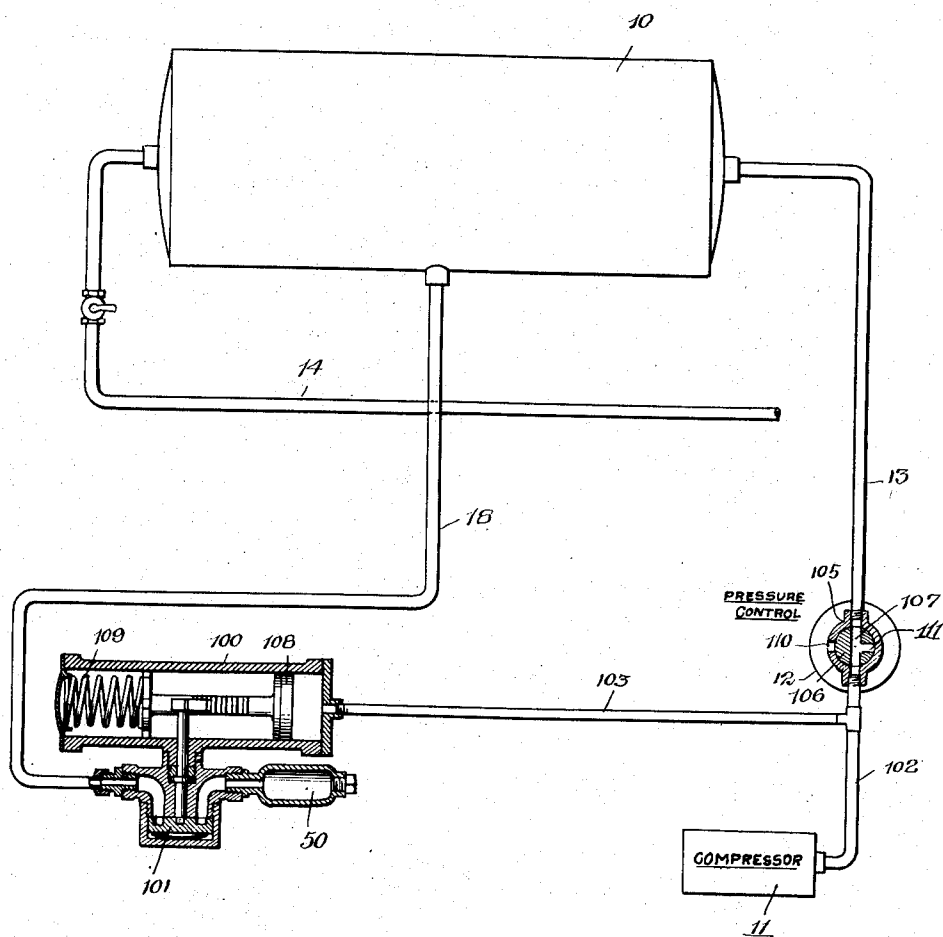
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MOISTURE REMOVING DEVICE FOR AIR COMPRESSOR SYSTEMS

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3 Sheets-Sheet 3

Fig. 9.



WITNESSES
George Taylor
John V. Maccum

INVENTOR
Max Dach
BY
Munn, Anderson & Liddy
ATTORNEYS

UNITED STATES PATENT OFFICE

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MOISTURE REMOVING DEVICE FOR AIR
COMPRESSOR SYSTEMS

Max Dach, Flushing, N. Y.

Application December 21, 1940, Serial No. 371,167

1 Claim. (Cl. 303—88)

This invention relates to air compressors and machinery operated by compressed air. More particularly, the invention relates to mechanism for cleaning compressed air and removing from the tank, water, oil, dirt or other foreign matter.

It is well known that moisture or foreign matter collects at the bottom of air tanks and unless removed causes rust, gumming, and premature wear of piston and valve parts.

The purpose of this invention is to provide a mechanism for removing from the tank and lines moisture and foreign matter without releasing the pressure in the tank.

Another object is to perform the functions indicated automatically and thus avoid the possibility of losing pressure due to open valves.

A further object is to provide a simple and economical device which will require a minimum of care and upkeep.

In the accompanying drawings—

Fig. 1 is a side view showing an embodiment of the invention;

Fig. 2 is a side view in section of my device;

Fig. 3 is a cross-sectional view taken on the line 3—3 of Fig. 2, showing the valve;

Fig. 4 is a view similar to Fig. 3 with the valve rotated;

Fig. 5 is a view partly in section taken on the line 5—5 of Fig. 6, showing a modification of my invention;

Fig. 6 is a cross-sectional view taken on the line 6—6 of Fig. 5;

Fig. 7 is a cross-sectional view taken on the line 7—7 of Fig. 6;

Fig. 8 is a sectional view on the line 8—8 of Fig. 7;

Fig. 9 is a side view partly in cross-section showing a modification of the invention.

Fig. 1 illustrates an embodiment of my invention which involves a tank 10, a conventional compressor 11, a pressure control 12, and a pipe 13 leading from the compressor to the tank. A tank outlet pipe 14 is provided with a valve 15. The valve 15 represents the valve controlling the passage of air to the mechanism (not shown) to be operated, such as doors, brakes, drills, etc. A pipe 16 leads from the pipe 14 to an air motor 17. A drainage pipe 18 leads from the bottom of the tank 10 to a chamber 19. It will be apparent that when the valve 15 is turned air from the tank 10 will pass through the pipe 14 to the machinery to be operated and that a portion of the air will be directed into the pipe 16 leading to the air motor 17.

In Fig. 2 I have shown a reciprocating air mo-

tor which includes a piston 20, a shaft 21 bearing a rack 22, and a spring 23. It will be seen that the spring 23 will tend to push the piston toward the end 24 of the cylinder 25. The end 24 of the cylinder 25 includes an outlet port 26 controlled by a valve 27 and a valve 32, and an inlet port 28 from the pipe 16 controlled by a valve 29. A snap switch 30 is operated by a sliding arm 31, so that on each reciprocation of the shaft 21 the switch 30 will be reversed. As shown in Fig. 2, the valve 29 is open while the valve 32 mounted on the same stem as the valve 27 is closed. Whenever the valve 15 is opened, air will pass from the pipe 16 through the port 28 and into the cylinder 25. When the cylinder is forced to the other end of the chamber, the sliding arm 31 will trip the switch 30 causing the valve 29 to close the opening 33, and the valve 32 will be moved forwardly so that air may escape through the port 26, the valve 27, at the same time, closing the opening leading from the pipe 16. As the air escapes, the spring 23 will push the shaft 21 forwardly until the end of the piston engages the shoulder 34 of the arm 31 to reverse the operation. The piston will continue to move back and forth operating the snap switch 30 as long as the valve 15 is open and the speed of the piston will depend upon the size of the pipe 16 and the amount of pressure maintained in the tank. It will also be seen that when the valve 15 is closed the piston will stop and remain stationary until the valve is again opened.

Engaging the rack 22 is a segment 40 fixedly mounted on a shaft 41 by means of a screw 42. The shaft 41 extends through an extension 43 and engages a turntable valve 44. The shaft 41 is provided with a collar or bushing 45 which is partly cut away to limit its movement. The bushing 45 rests in a seat 46 and the valve 44 engages a valve seat 47 which has three openings,—one opening 48 communicates with the discharge pipe 18, the second opening 49 leads to a dirt chamber 50, and the third opening 51 connects with the atmosphere.

It will be seen that when the valve 15 is opened to allow the passage of air through the pipe 14, air will enter the air motor 17, causing the piston 20 to reciprocate and then, through the action of the rack 22 and the segment 40, the shaft 41 will be caused to rotate a quarter turn or so and back again. Due to the pressure in the tank, water, dirt, or other matter will be discharged through the pipe 18 into the member 43 through the opening 48. As the valve 44 is rotated by the shaft 41, its arc-shaped opening 55 will uncover

two of the openings in the valve seat at a time. As shown in Fig. 3, one reciprocation will cause the openings 48 and 49 to register with the opening in the valve 44, thus allowing the dirty air to move through the valve into the dirt chamber 50. As the piston is pushed forwardly by the spring 23, the valve 44 will be rotated so that the openings 49 and 51 will be exposed, thus allowing the dirty air from the chamber 50 to be expelled through the opening 51 into the atmosphere. It will be noted that I have constructed the chamber 50 so that it may be easily removed and cleaned and that the valve structure is held in place by a cap 56 and may be easily cleaned or repaired.

The modified form shown in Figs. 5 to 8 operates in the same manner except that the motor is operated by air entirely and does not have a spring similar to the spring 23. The opening in the valve is U-shaped rather than arc-shaped. It will be seen that the motor 60 is provided with a shaft 61 and has two piston heads 62 and 63 and a sliding arm 64 operating the trip switch 65 in the same manner as heretofore described. Air from the pipe 16 passes through the opening 66 to exert pressure on the piston head 63 when the valve 67 is moved inwardly to close the opening 68 and leave the opening 69 open. When the valve is moved to the position shown in Fig. 6, pressure is directed through the opening 68 and the piston head 63 will expel the air through the opening 66 and out through a port or opening 70. It will be seen that a valve 71 closes the port 72 in the position shown in Fig. 6. When the switch is moved to the other position, the opening 71 will be free and an opening 73 will be closed by the valve 74.

In the modified valve 75, the opening 76 is U-shaped in cross-section and the valve seat 77 is provided with four openings 78, 79, 80 and 81. When the valve is in one position the opening or channel in the valve will register with the opening 78 which connects with the pipe 18. It will also register with an opening or port 79 leading to a pipe 82 which doubles around and terminates in the opening 80. The pipe 82 may be longer than is shown or may be provided with a chamber similar to the chamber 50 intermediate its ends to provide a larger area if desired. When the valve is placed in the opposite position, the channel 76 will register with the openings 80 and 81, allowing the dirty air to escape into the atmosphere. It will be seen that the air coming from the discharge pipe 18 will pass successively through the passage 78, through the valve channel 76, passage 79, pipe 82, through the opening 80 into the channel 76 again and out through the opening 81 into the atmosphere.

In the modification shown in Fig. 9, the air motor 100 is similar in its operation to that shown in Fig. 2, but it is powered directly from the compressor rather than from the pipe 14. The drainage pipe 18 leads from the tank in the same manner and the valve 101 is similar to the valve 44. A pipe 102, however, extends from the compressor 11 to the pressure control 12 which is conventional in size and operation. An additional pipe 103 leads from the pipe 102 to the motor 100. The pressure control contains an automatically operated valve 105 with the rotatable member 106 having a T-shaped channel 107. When the compressor is in operation the disk 106 is in the position shown in Fig. 9, so that air will pass directly to the tank 10. Air will also be forced through the pipe 102 to press the piston 108 backwardly against the spring 109 to rotate the disk valve 101 and allow moisture or dirt in the pipe 18 to go into the chamber 50. When the compressor is shut off the disk 106 rotates in a clockwise direction so that one end of the channel 107 communicates with the port 110 into the atmosphere while the port 111 communicates with the pipe 102. The pressure is therefore released from the piston 108 and the spring 109 will move the piston toward the pipe 102 at the same time rotating the disk valve 101 so that the moisture or foul air may go from the chamber 50 into the atmosphere. It will be appreciated that this operation will take place every time the compressor starts and stops, and that it is not dependent upon the passage of the air through the pipe 14. Moisture and dirt will therefore be drawn from the tank 10 through the pipe 18 whenever the compressor operates as it does many times during the day even though no air is drawn from the tank.

I claim:

In combination with an air tank and a compressor having an outlet pipe, a drainage pipe, a valve connected to said drainage pipe, a chamber communicating with said valve, an opening from the atmosphere to said valve, said valve being circular in shape and having a channel therein adapted to alternately connect said drainage pipe with said chamber and said chamber with said opening to the atmosphere when said valve is alternated, means for alternating said valve, said means including a shaft in said valve adapted to rotate therewith, a segment on said shaft, a rack engaging said segment, and means operated by air from said compressor for reciprocating said rack when said compressor is operated.

MAX DACH.