May 23, 1950 A. N. TURNQUIST 2,509,022

AIR CIRCULATING SYSTEM

Filed Jan. 25, 1946 2 Sheets-Sheet 1

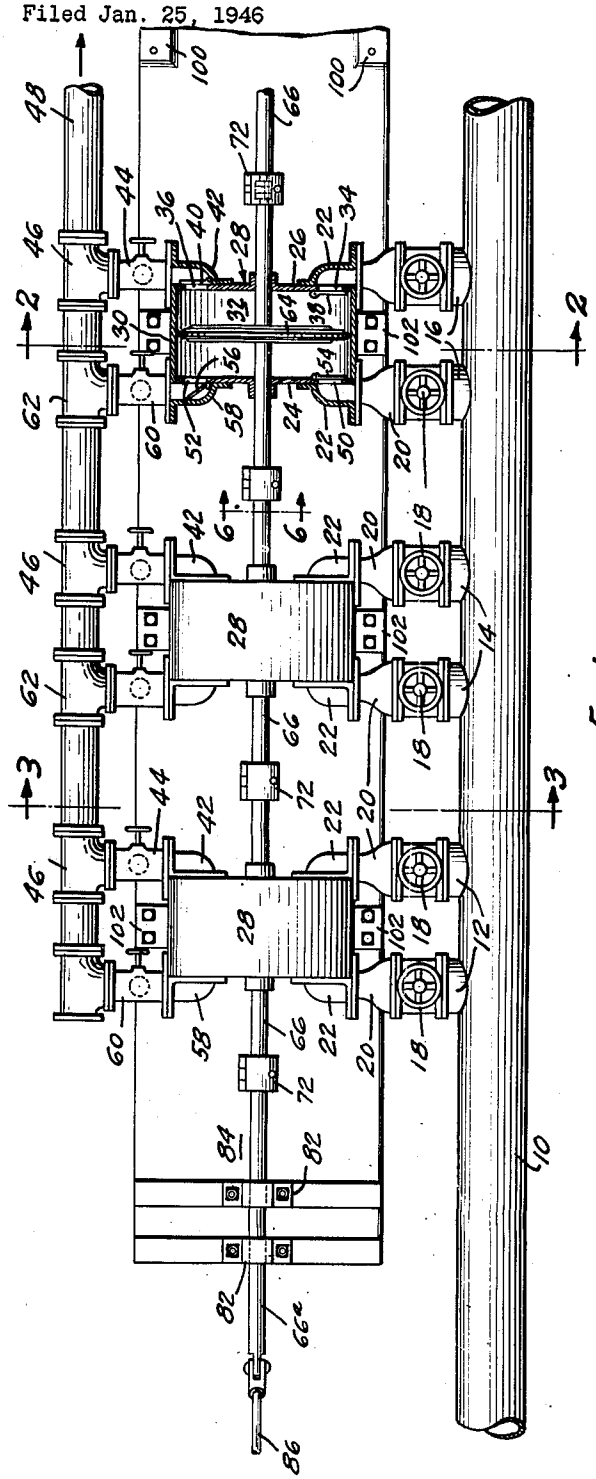


FIG. 1.

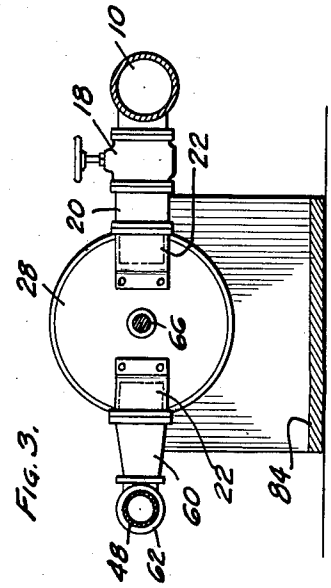


FIG. 3.

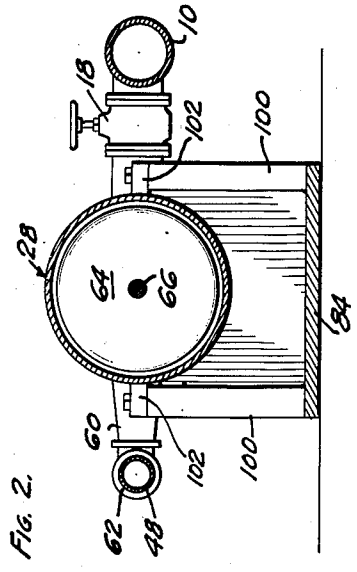


FIG. 2.

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AIR CIRCULATING SYSTEM

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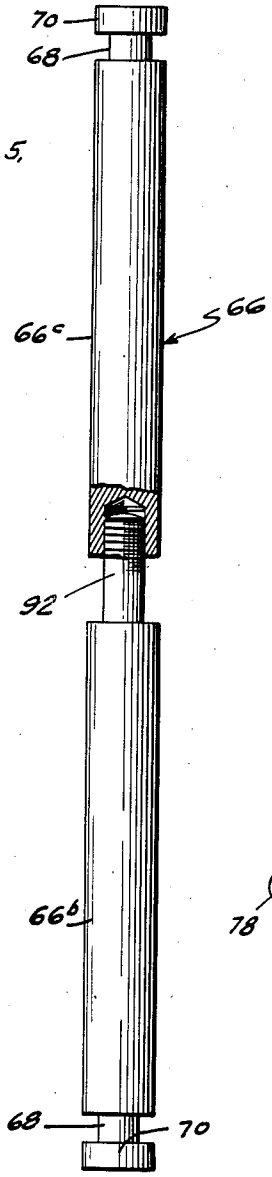


FIG. 5.

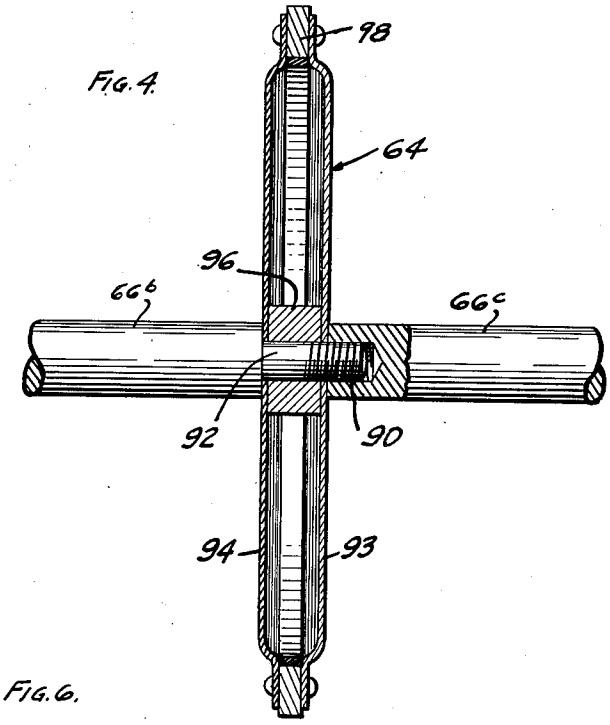
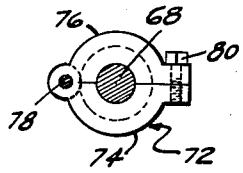


FIG. 4.

FIG. 6.



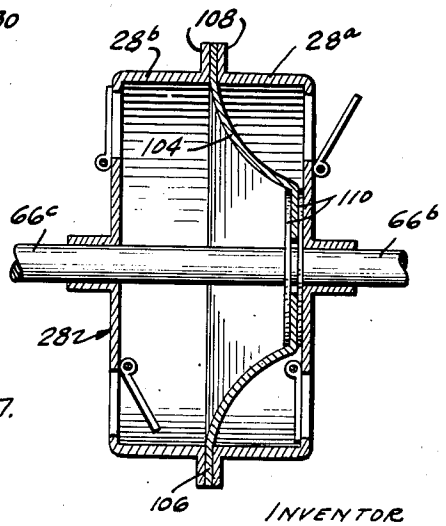


FIG. 7.

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AIR CIRCULATING SYSTEM

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Application January 25, 1946, Serial No. 643,459

2 Claims. (Cl. 230—189)

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My invention relates to improvements in compressor systems.

My invention relates more particularly to a system and apparatus for building up air pressure by means of a plurality of aligned compressors by the use of more or less of which the pressure may be increased or decreased as desired.

The principal object of the present invention is to provide an apparatus for providing air under pressure by the use of a plurality of aligned cylinders operated from a continuous source of power.

A further object of the present invention is to provide an apparatus of the type described wherein the cylinder and associated parts are removable and replaceable so that one or more may be employed at a time with a minimum of effort to set up the system for that purpose.

A further object of the present invention is to provide a cylinder and pump construction which is self-contained and unitary, so that it may be removed and replaced by a similar one with a minimum of time and effort.

A further object of the invention is to provide an apparatus for creating air pressure that is so constructed that the desired pressure may be controlled by cutting in or cutting out one or more of a plurality of aligned cylinders.

A further object of the invention is to provide in association with apparatus of the type described improved means for connecting together the operating parts of an aligned row of air pressure cylinders.

Other objects and advantages will be more apparent from the following description wherein reference is had to the accompanying two sheets of drawings upon which:

Fig. 1 is a plan view of a compressor system and the apparatus therefor constructed in accordance with my invention;

Fig. 2 is a cross sectional view through one of the cylinder units taken generally on the line 2—2 of Fig. 1;

Fig. 3 is a similar view thereof taken generally on the line 3—3 of Fig. 1;

Fig. 4 is an enlarged fragmentary view of one of the pistons which I employ;

Fig. 5 is a side elevational view of one of the piston rod segments;

Fig. 6 is a cross sectional view of one of the couplers used in connection with the piston rods and is taken generally on the line 6—6 of Fig. 1; and

Fig. 7 is a modified construction of the cylinder wherein I employ a diaphragm instead of a piston.

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In the embodiment of the invention which is illustrated in the drawings, I have shown an air intake conduit 10 which may have sets of side outlets 12, 14 and 16 extending therefrom. Each outlet is controlled by a valve 18 which is connected by a coupler member 20 to a fitting 22. The fittings 22 are connected upon opposite sides of the vertical walls 24 and 26 of a cylinder member 28. The cylinder member 28 may be formed with a cylindrical housing portion 30 to provide a chamber 32 between the end walls 24 and 26 and the housing 30. The end wall 26 may have a pair of ports 34 and 36 with suitable flap valves 38 and 40 provided for the ports. A pipe fitting 42 secured to the wall 26 may connect with a valve member 44 which, in turn, connects with the T-member 46 in the air outlet line 48. In a similar manner the cylinder wall 24 may have a port 50 and a port 52, the ports being provided with the flap valve 54 and 56 respectively. A pipe fitting 58 secured to the cylinder wall 24 communicates with a valve 60 secured to the T-member 62 in the outlet line 48.

Each of the cylinders 28 is provided with a piston 64 mounted for reciprocation upon a shaft or piston rod 66. The piston rod 66, as more clearly shown in Fig. 5, may be provided at each end with a reduced collar 68 spaced from the end 70 thereof. The piston rods 66 are connected together in a straight line alignment by means of coupling members 72 which comprise the half sections 74 and 76 pivoted together upon a pivot member 78 with their opposite ends locked together by means of a bolt member 80. The collar members have sections which engage in the grooved portions 68 of aligned piston rods to securely lock the same together.

The end piston rod 66 may be supported in a pair of bearing members 82 positioned upon the base 84 of the apparatus. The end of the piston rod 66*a* may be connected to a driving rod 86 which is oscillated by means of any suitable source of power.

In the operation of the mechanism which I have described, when the piston rods 66 are oscillated they will move the pistons 64 back and forth in the cylinders 28. In the stroke to the left, as shown on the drawings, air will be sucked in from the inlet 10 through the port 34 and be pushed out into the reduced outlet conduit 48 through the port 52. Upon the stroke to the right, air will be sucked in through the port 50 and pushed out through the port 36 thus build-

ing up the pressure which is being forced out through the outlet conduit 48.

While the piston 64 may be of any suitable or desirable construction, I prefer to construct it in the manner shown in Fig. 4. In this construction I split the piston rod 66 into the parts 66b and 66c, the parts 66c having a tapped opening 90 and the parts 66b having a threaded stud 92. These parts fasten over a pair of metallic disc members 93 and 94 separated by a spacer 96 and secured at their outer edges to a ring 98 preferably formed of leather or similar substance.

In referring to Fig. 2 the base 84, which may continue the length of the apparatus, is provided with a plurality of pedestals 100 to which brackets 102 connected to the sides of the cylinders 28, are bolted. In this way each of the cylinders is securely locked into position on its individual set of pedestals.

From the foregoing description it can be seen that if one of the cylinders 28 becomes broken or out of order the valves 18 may be shut as well as the valves 44 and the apparatus will operate as a unit without the use of the particular cylinder that is broken or is not working. If, for example, it is desired to replace one of the cylinders 28, the fittings 20 and valves 44 are disconnected from the same and a new cylinder may be substituted. The piston rod couplers 72 are, of course, separated so that the old piston rod, together with the cylinder, may be removed as a unit and a new piston and piston rod positioned in place. This makes a simple matter to remove and replace broken or non-operating pistons or additional pistons may be positioned in line in the event higher air pressure is necessary.

The compressor system, which I have described, may be particularly adopted for air conditioning in the homes. Air under pressure may be pumped through the high pressure outlet 48 into the various rooms of the house and, in this manner, an air-conditioning plant results. There are also a great many other uses to which the said invention may apply.

With the system which I have described, a continuous flow of air or other fluid under pressure results, due to the reciprocating action of the pistons in the cylinders whereby there is a continuous suction of air from the intake and a continuous forcing of air under pressure through the outlet conduit. I also contemplate that the apparatus described can readily be adapted for use in pumping water or other fluid under pressure. The only possible changes which might be necessary being in the construction of the valves and pistons. Inherently, however, the structure will remain the same whether used for pumping water, air or other fluids.

In Fig. 7, I have shown a modified construction of the cylinder 28 wherein I employ a diaphragm 104 instead of the piston 64. In this construction the flexible diaphragm 104 has its outer edge 106 securely fastened between the flanges 108 of the two sections 28a and 28b of the cylinder. Its inner edge may be fastened between a pair of washers 110 mounted on the shank 92 of the piston rod section 66b. The balance of the construction may be generally similar to that described in connection with the preferred form of the invention.

While I have illustrated and described a specific embodiment of the invention and the details thereof, it will be apparent to those skilled in the art that changes and modifications may be made in the exact details shown and I do not wish to limit myself in any particular; rather what I desire to secure and protect by Letters Patent of the United States is:

1. The combination with apparatus for circulating fluid under pressure which includes an intake conduit, an outlet conduit of a different size, a row of compressors positioned in a straight line and situated between said inlet and outlet conduits of a piston rod extending through all of said compressors, a piston on said rod in the chamber of each compressor, a hub on said piston having a bore therethrough, means connected to the end of said piston rod for reciprocating the same and inlet and outlet valves associated with said compressor whereby fluid is sucked into the chambers of the compressors and then forced out at a higher pressure, said piston rod being constructed of a plurality of sections, coupling means to connect said sections together end to end, one section extending through each compressor, a portion of each of said sections having a reduced threaded bolt extending through the bore of the hub of a piston and the other portion having a tapped bore to receive the bolt whereby each piston is connected to and between aligned piston rod sections.

2. The combination with apparatus for circulating fluid under pressure which includes an intake conduit, an outlet conduit of a different size, a row of compressors positioned in a straight line and situated between said inlet and outlet conduits of a piston rod extending through all of said compressors, a piston on said rod in the chamber of each compressor, a hub on said piston having a bore therethrough, means connected to the end of said piston rod for reciprocating the same and inlet and outlet valves associated with said compressor whereby fluid is sucked into the chambers of the compressors and then forced out at a higher pressure, said piston rod being constructed of a plurality of sections, coupling means to connect said sections together end to end, one section extending through each compressor, a portion of each of said sections having a reduced threaded bolt extending through the bore of the hub of a piston and the other portion having a tapped bore to receive the bolt whereby each piston is connected to and between aligned piston rod sections, each of said piston rod sections having a reduced collar at each end, said coupling means being in the form of split coupler members having recesses to receive adjacent collar portions of said piston rods.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
665,222	Isler	Jan. 1, 1901
847,470	Gray	Mar. 19, 1907
1,408,092	Keller	Feb. 28, 1922
1,508,568	Nelson	Sept. 16, 1924