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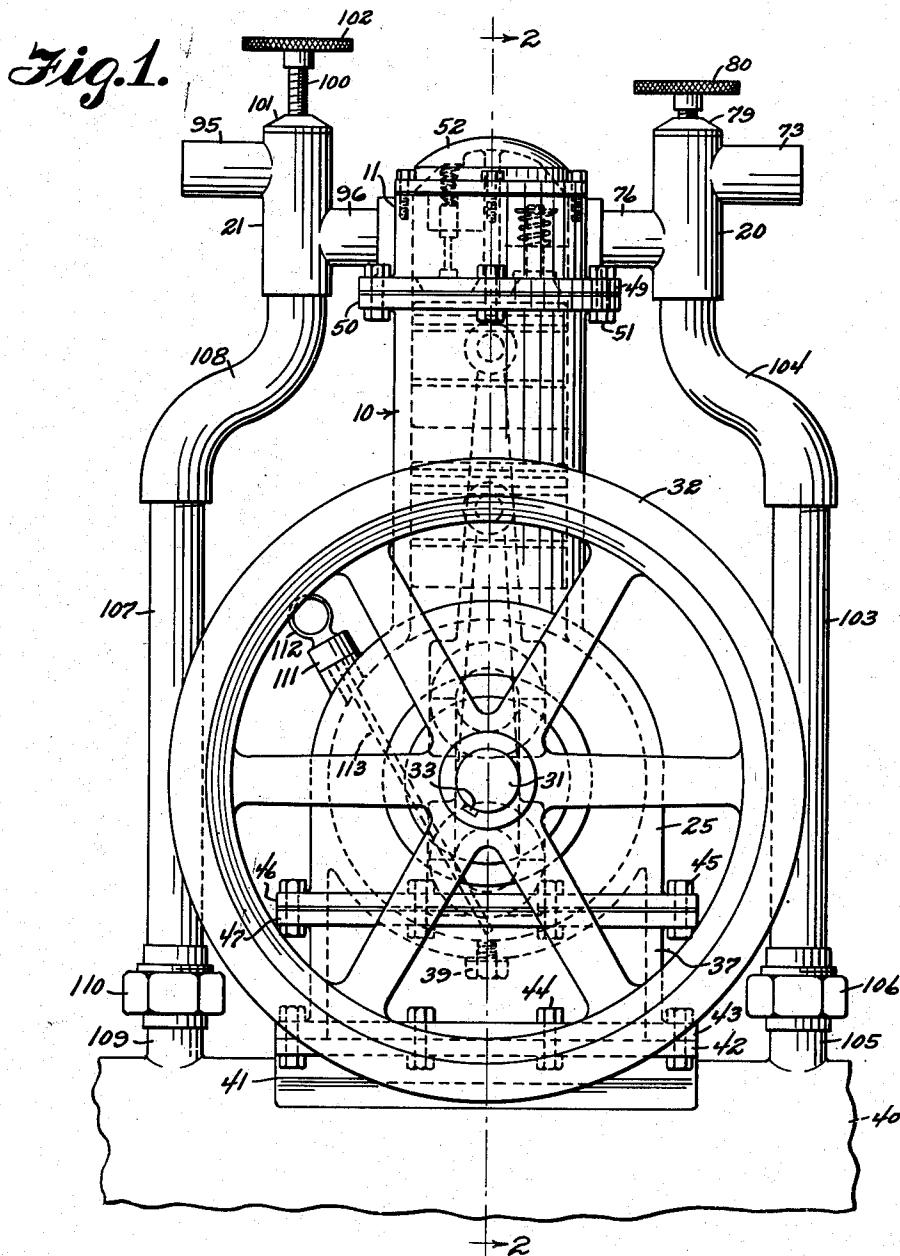
N. D. SHURSON

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COMBINATION VACUUM AND COMPRESSION PUMP

Filed March 3, 1950

3 Sheets-Sheet 1



INVENTOR.

Norman D. Shurson

BY *Victor J. Ensmurker*

ATTORNEYS

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N. D. SHURSON

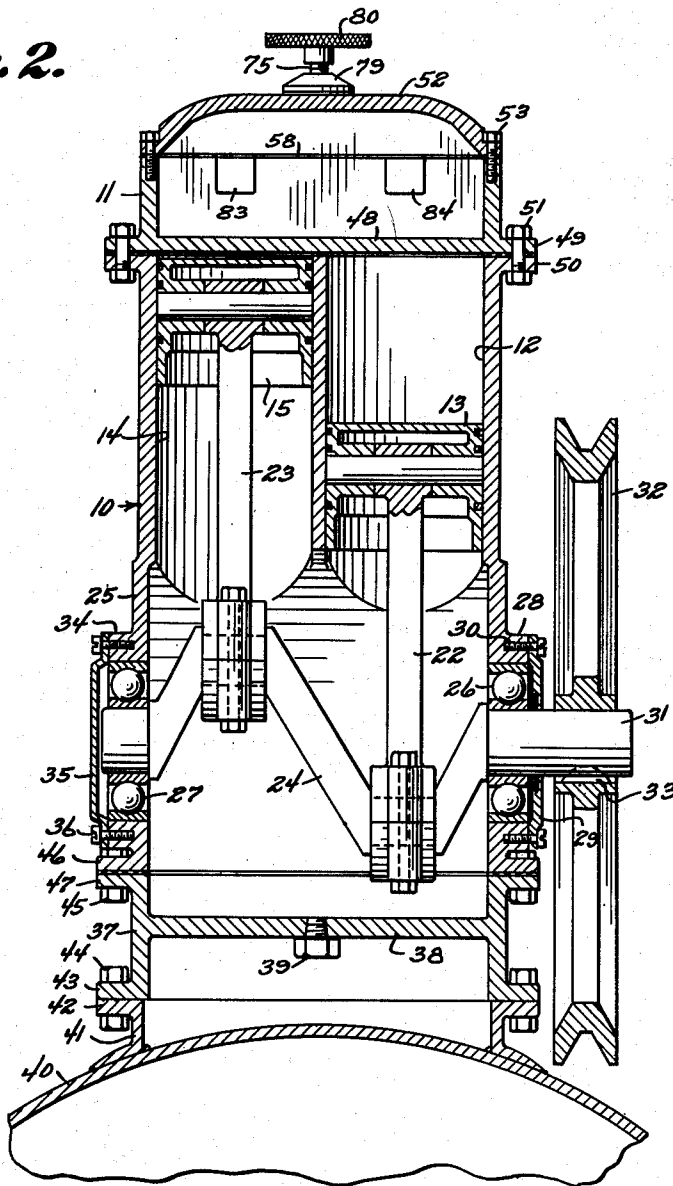
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Fig. 2.



INVENTOR.

Norman D. Shurson

BY *Victor J. Evans & Co.*

ATTORNEYS

UNITED STATES PATENT OFFICE

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COMBINATION VACUUM AND COMPRESSION PUMP

Norman D. Shurson, Sandwich, Ill.

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1 Claim. (Cl. 230—42)

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This invention relates to a utility pump particularly adapted for milking machines, or supplying water under pressure or for general farm and other uses, and in particular the invention relates to a pump having a cylinder with a piston therein and in which an arrangement of valves in a cylinder head makes it possible to set the pump for suction or compression whereby by setting the valves the pump functions as a compressor or vacuum pump.

The purpose of this invention is to provide a general utility unit particularly adapted for farm use so that the same pump may be set to provide vacuum for some farm equipment, and compression for other equipment.

Various types of pumps and compressors have been provided for farm and other uses but separate and independent units are required for supplying vacuum and compression and as the small farmer seldom has use for pumps and compressors it is necessary to maintain two pieces of equipment, both of which remain idle most of the time. With this thought in mind this invention contemplates a common unit, the cost of which is substantially equivalent to either one of the units and which by manipulation of valves therein is adapted for use as either a compressor or vacuum pump.

The object of this invention is, therefore, to provide means for arranging valves in combination with the head of a pump whereby the same pump cylinder is adapted for use as a vacuum pump or compressor.

Another object of the invention is to provide a combination vacuum pump and compressor in which the connections for vacuum and compression are provided through the same elements.

A further object of the invention is to provide a combination vacuum pump and compressor which is of a simple and economical construction.

With these and other objects and advantages in view the invention embodies a pump unit having a cylinder with a crank case and a piston actuated by a crank shaft in which a head positioned on the cylinder is formed with a dividing partition with intake valves on one side of the partition and compression valves on the other and in which connections through the sides of the cylinder head may open the respective sides of the head to the atmosphere or connect the head to a tank or the like.

Other features and advantages of the invention will appear from the following description taken in connection with the drawings, wherein:

Figure 1 is an end elevational view of the com-

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bination vacuum pump and compressor showing vacuum and compression connections extended from opposite sides of the head to a tank.

Figure 2 is a vertical section through the pump illustrated in Figure 1 being taken on line 2—2 thereof.

Figure 3 is a plan view of the pump with part broken away showing the interior of one end of the head.

Figure 4 is a cross section through a cylinder head taken on line 4—4 of Figure 3 and showing the valve connections extended from opposite sides of the head.

Figure 5 is a cross section taken on line 5—5 of Figure 3 showing the compression valves.

Figure 6 is a similar section taken on line 6—6 of Figure 3 showing the vacuum valves.

Referring now to the drawings wherein like reference characters denote corresponding parts the combination vacuum and compression pump of this invention is formed with a cylinder block 10 having a head 11 with the block provided with a cylinder 12 having a piston 13 therein and a cylinder 14 having a piston 15 therein, and the head is provided with vacuum valves 16 and 17 in one side and compression valves 18 and 19 in the other, and the vacuum side of the pump is provided with a control valve 20 with a similar control valve 21 on the compression side.

The pistons 13 and 15 are connected by connecting rods 22 and 23, respectively to a crank shaft 24 which is journaled in a section 25 at the lower end of the cylinder block by bearings 26 and 27. The bearing 26 is mounted in a hub 28 and a cover plate 29 is secured to the outer end of the hub by screws 30. The end 31 of the crank shaft extends through the bearing 26 and a driving pulley 32, which is secured to the shaft by a key 33, is carried by the outer end of the shaft. The bearing 27 is mounted in a hub 34 on the opposite side of the section 25 of the crank case and a cover plate 35 is secured to the outer end of the hub 34 by screws 36.

The crank shaft section of the cylinder block 10 is mounted on a flanged spacing element 37, a web 38 of which, is provided with a drain plug 39. The element 37 is mounted upon a tank 40 on a rim 41 having a flange 42 around the upper end thereof and a corresponding flange 43 of the element 37 is secured to the flange 42 by bolts 44. The upper end of the spacing element 37 is secured to the lower end of the crank shaft section of the cylinder block by bolts 45 that are positioned in flanges 46 and 47 of the cylinder block and spacing element, respectively.

The cylinder head 11 is provided with a base 48, the edge of which extends outwardly providing a flange 49 by which the head is bolted to a flange 50 on the upper end of the cylinder block by bolts 51. The cylinder head is provided with a cover plate 52 that is secured to the peripheral wall of the head by bolts 53.

The cylinder head is provided with a longitudinally disposed centrally positioned partition 54 that divides the head into two complementary chambers with the vacuum valves 16 and 17 positioned in a chamber 55 positioned on one side of the partition and with the compression valves 18 and 19 positioned in a chamber 56 on the other side of the partition. The cover plate is also provided with a centrally disposed partition 57, the lower edge of which registers with the upper edge of the partition 54 and with a gasket 58 positioned between the abutting surfaces of the cylinder head and cover plate the connection between the two elements is sealed.

As illustrated in Figure 6 the vacuum valves 16 and 17 are provided with stems 59 and 60, respectively and the stems are slidably mounted in and extend upwardly through webs 61 and 62 in the cylinder head. The valves are held upwardly by springs 63 and 64 with washers 65 and 66, respectively secured on the ends of the stems 59 and 60 by pins 67 and 68. By this means the vacuum valves are resiliently held upwardly in the valve seats 69 and 70 with the valves closed and as the piston 13 starts downwardly the valves are drawn away from the valve seat so that air or other fluid may be drawn into the cylinder 12 through the control valve 20 provided the valve element 71 is positioned against the seat 72 in the lower part of the valve, as shown in Figure 4. With the valve in this position air or other fluid is drawn inwardly through an inlet connection 73 with the air passing through an opening 74 around the threaded stem 75 of the valve element and through the connection 76 and the chamber 55 from which it passes into the cylinder. The opening 74 is provided in an intermediate partition 77 and a valve seat 78 that coats with the upper surface of the valve element 71 is formed in the lower surface of the partition.

The valve element 71 is carried on the lower end of the threaded valve stem 75 and the stem 75 is threaded in a plug 79 which is threaded in the upper end of the control valve 20. The stem 75 is provided with a knurled head or disc 80 by which valve element 71 may be moved from the seat 72 to the seat 78 when it is desired to use the device as a vacuum pump.

The compression valves 18 and 19 are provided with stems 81 and 82, respectively and the stems are slidably mounted in lugs 83 and 84 in the cylinder head. The valves are resiliently held downwardly against valve seats 85 and 86 by springs 87 and 88, respectively, the upper ends of the springs being held in sockets 89 and 90 on the under surface of the cover plate 52. The lugs 83 and 84 are provided with slots 91 and 92, respectively through which flat sections 93 and 94 on the valve stems pass in assembling the valves in the head.

The control valve 21 that extends from the side of the chamber 56 is provided with an inlet connection 95 and a connection 96 on the opposite side thereof extends into the open chamber 56, as shown in Figure 4. The valve is provided with a valve element 96' similar to the valve element 71 and the valve element is positioned to seat against a valve seat 97 in a partition 98 when the device

is used as a compressor, and against the valve seat 99 in the lower part of the valve casing when the device is used as a vacuum pump wherein the control valve 21 is used as an exhaust for the vacuum. The valve element 96' is carried on the lower end of a threaded valve stem 100 and the stem is threaded in a plug 101 of the control valve 21. The upper end of the valve stem 100 is provided with a knurled disc or head 102 by which the stem is rotated to adjust the position of the valve element.

The control valve 20 is connected, through the lower end thereof to the tank 40 by a tube 103 that is connected to the control valve 20 through a pipe bend 104, and to a nipple 105 on the tank, through a union 106.

The control valve 21 on the opposite side of the pump is connected to the tank 40 by a tube 107 with the upper end of the tube connected to the valve by a pipe bend 108 and with the lower end of the tube connected to the tank through a nipple 109 with a union 110.

With the parts positioned as illustrated in Figures 2 and 4 and with the pump driven by a belt on the wheel or pulley 32 the air is drawn inwardly with the down strokes of the pistons, the air passing through the connection 73, the opening 74 and the connection 76 into the vacuum chamber 55 from which it is drawn into one of cylinders, and with the up stroke of the piston the pressure of the air opens one of the valves 18 or 19 whereby the air is forced through the connection 96, into the tank 40 through the tube 107. With the valves in this position the device functions as a compressor, drawing in air from the atmosphere and compressing the air in the tank 40.

With the positions of the valves 71 and 96 reversed whereby the valve element 71 is positioned against the seat 78 and the valve element 96 is positioned against the seat 99, downward movement of either piston draws one of the valves 16 or 17 downwardly whereby air, or other fluid is drawn through the tube 103, passing through the opening in the valve seat 72 and through the connection 76 into the chamber 55 and the suction opens one of the valves 16 or 17 whereby air is drawn from the tank 40 into one of the cylinders 12 or 14. With the upward movement of the piston the air or other fluid is forced upwardly through one of the valves 18 or 19 and into the chamber 56 from which it passes to the atmosphere, the valve element 96' being positioned upon the valve seat 99 in the lower part of the valve.

The improved combination of compressor and vacuum pump of this invention may be placed directly on a tank and by setting the valves in one position air and other fluid may be withdrawn from the tank to provide a partial vacuum in the tank, or by setting the valves in another position air may be compressed in the tank.

The crank case is provided with an oil filler plug 111 with a gage 112 thereon and a tube 113 extends from the plug as shown in dotted lines in Figure 1.

It will be understood that modifications may be made in the design and arrangement of the parts without departing from the spirit of the invention.

What is claimed is:

In a combination vacuum pump and compressor the combination which comprises a cylinder block having a plurality of cylinders therein, a crank shaft journaled in the cylinder block, pistons in the cylinders, connecting rods connecting the pistons to the crank shaft, a cylin-

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der head positioned on the cylinder block having a longitudinally positioned partition separating the cylinder head into chambers, a cover plate positioned on the cylinder head and also having a longitudinally disposed partition registering with the partition of the cylinder head, intake valves positioned in the cylinder head and providing communicating means with the cylinders, means resiliently holding the intake valves in closed position whereby the valves open with suction in the cylinders, said intake valves positioned in one of the chambers of the cylinder head, exhaust valves positioned in the other chamber of the cylinder head and also providing communicating means with the cylinders, resilient means holding the exhaust valves in closed position whereby the exhaust valves open with compression in the cylinders, a first control valve having a separate inlet connection and a separate outlet connection which outlet connection is connected to the intake valve chamber, a second control valve having a separate outlet connection

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and a separate inlet connection which inlet connection is connected to the exhaust valve chamber, valve elements in said control valves positioned to open and close the separate connections of the first and second control valves, alternately and means rotating the said valve elements to control the pump to exhaust and compress the fluid.

NORMAN D. SHURSON.

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