Oct. 27, 1925. 1,558,788

W. H. CAMPBELL

PUMP

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Fig. 2

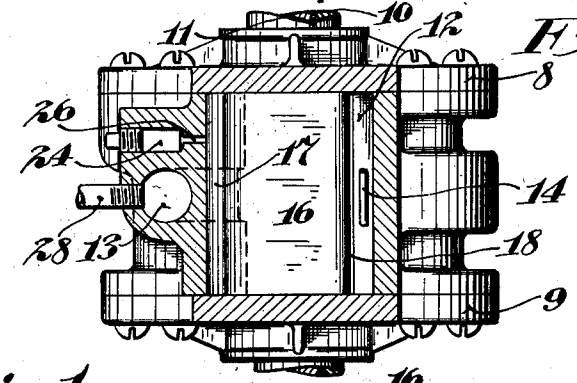
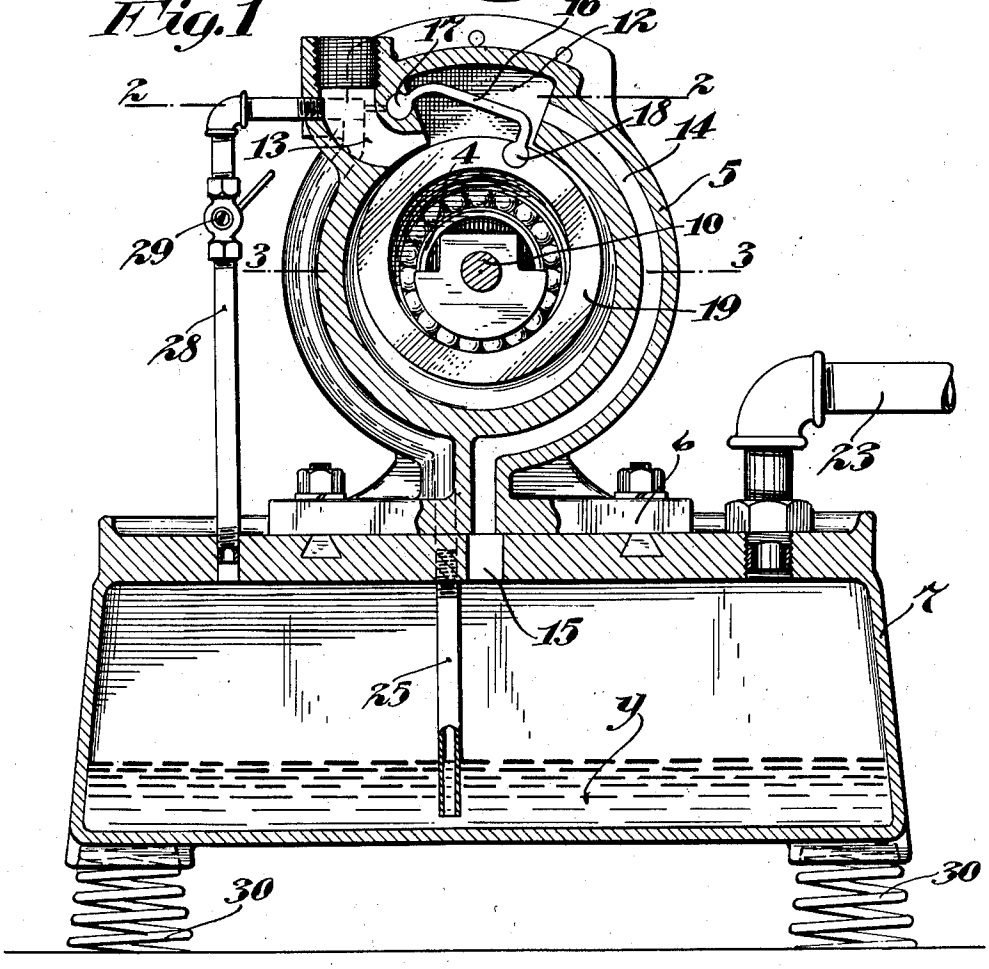


Fig. 1



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Fig. 3

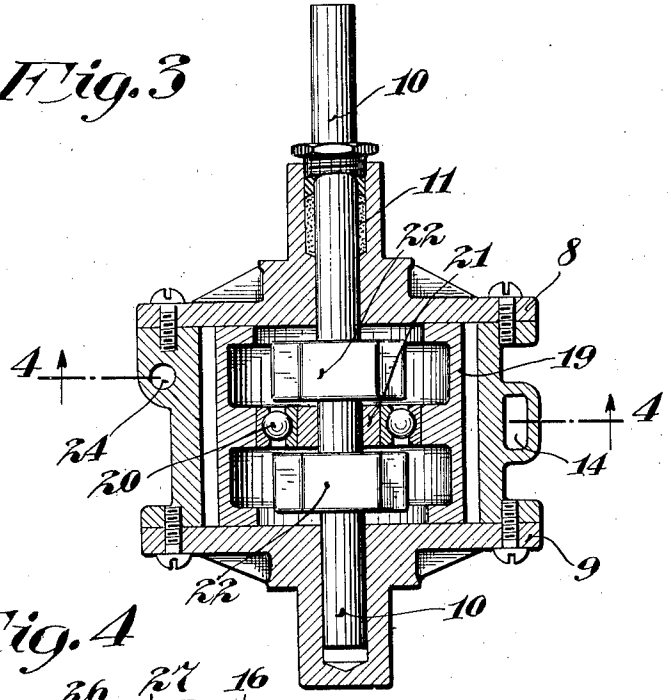
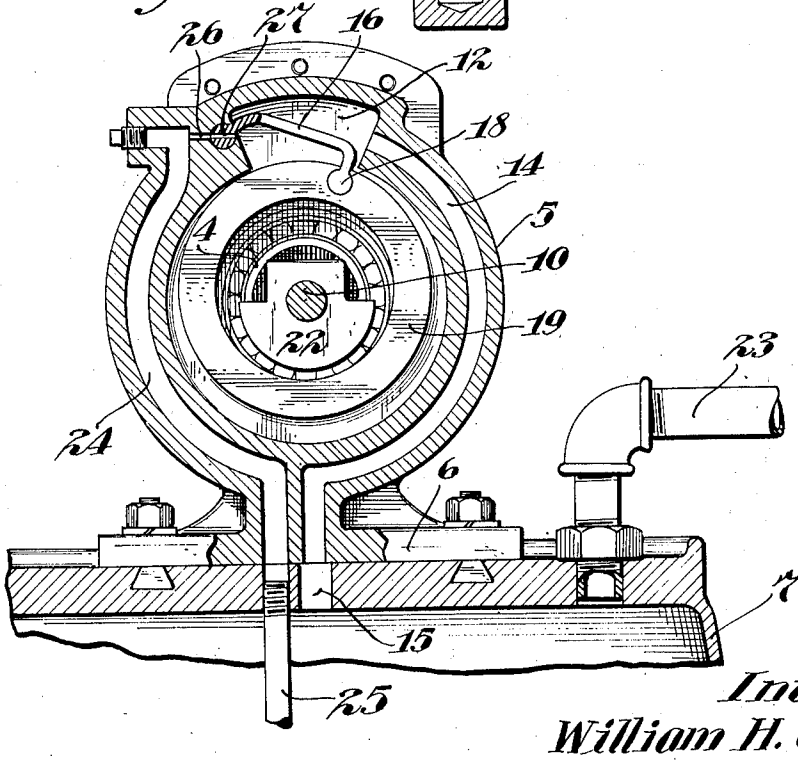


Fig. 4



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UNITED STATES PATENT OFFICE.

WILLIAM H. CAMPBELL, OF MINNEAPOLIS, MINNESOTA

PUMP.

Application filed September 13, 1924. Serial No. 737,495.

To all whom it may concern:

Be it known that I, WILLIAM H. CAMPBELL, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Pumps; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention provides an improved pump adapted for various different uses but especially well adapted for use as an air pump for hydro-carbon or oil burning systems.

To such ends, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a vertical section taken through the improved pump, some parts being shown in full;

Fig. 2 is a horizontal section taken approximately on the line 2—2 of Fig. 1;

Fig. 3 is a horizontal section taken on the line 3—3 of Fig. 1; and

Fig. 4 is a vertical section taken on the line 4—4 of Fig. 3.

The pump proper comprises a cylindrical shell 5 having a base flange 6 rigidly secured to the top plate of an underlying oil tank 7. The cylindrical shell 5 is provided with detachable heads 8 and 9 in which a shaft 10 is axially journaled. Cylinder head 9 is provided with a closed bearing hub for shaft 10 and head 8 is provided with a stuffing box 11. Cylindrical shell 5, in its top, is formed with an air chamber 12 and adjacent said air chamber with an air intake port 13 that is in constant communication with the lower portion of the chamber 12. The upper portion of the chamber 12 is connected to a long segmental exhaust port 14 formed in the cylindrical shell 5 and extended to the bottom and base flange thereof and communicates with the interior of oil tank 7 through a port 15.

Located in the chamber 12 is a blade-like oscillatory abutment 16 that is the full width of said chamber so that it closely engages the wall thereof, and at its edges is formed with nearly cylindrical flanges 17 and 18. Flange 17 is closely fitted into a seat formed in the shell 5 and opening into one extremity of the chamber 12. The other flange 18 is closely fitted into a seat formed in an annular piston 19 which, as will presently appear, does not rotate but is given a sort of gyratory motion. The interior of the annular piston 19 is eccentric to its exterior and by a ball bearing device 20 it is mounted on an eccentric 21 secured to shaft 10. The numeral 22 indicates counterweights secured to shaft 10 and working within annular piston 19, one on each side of the eccentric 21. Eccentric 21 and annular piston 19 have the same eccentricity; said piston 19 is of considerably less diameter than the interior of cylinder 5; and said eccentric and annular piston are so set in respect to oscillatory abutment 16 and other parts that when eccentric 21 is rotated, piston 19 will be gyrated and its cylindrical external surface will be caused to take a sort of rolling action which is nearly but not quite against the interior of cylinder 5. In fact, it is important that the said arrangement be such that the external surface of piston 19 will, at its nearest point of approach, be within a few thousandths of an inch (say from two to four thousandths of an inch) from the internal surface of cylinder 5. This small clearance is sufficient to prevent actual contact between the metallic parts of cylinder and piston and when oil is freely supplied to the oil film and the oil film will practically form a seal to prevent air from flowing from the cylinder to the piston at the closest point of approach.

Under rotation of the ecccntric and gyration of the piston the said close point of approach between the cylinder and piston will of course continuously travel in a rotary direction. In the arrangement shown, the said point of close approach will travel in a counter-clockwise direction in respect to Fig. 1 when shaft 10 and eccentric 21 are driven in a counter-clockwise direction. The shaft 10 may be rotated by any suitable means, but will usually be driven by a small electric motor, not shown.

When the moving parts of the pump are driven as just above stated, air will be drawn into the lower portion of chamber 12 through air intake port 13 and air will be forced from the upper portion of chamber 12 through exhaust port 14 and port 15 into oil tank 7 and from thence out through an air

exhaust pipe 23 that leads from the top of the oil tank. The air thus delivered through the oil tank 7 will produce pressure on the upper surface of the body of oil *y* contained in said tank, and this pressure is utilized to provide a forced circulation of oil through the pump. The preferred arrangement by which this is accomplished is as follows:

The cylinder 5 (see particularly Figs. 3 and 4) is formed with an oil intake passage 24, the lower extremity of which is connected to an oil supply pipe 25 (see Figs. 1 and 4) that depends from the top of the tank 7 into the oil *y* and terminates near the bottom of said tank. The upper extremity of oil passage 24 leads to a small port 26 that leads directly to the cylindrical flange 17 of oscillatory abutment 16 and is in communication with a diametrical port 27 formed in said flange. With this arrangement, the air pressure in tank 7 will tend to cause the oil to rise through pipe 15 and oil passage 24 so that each time that the lower portion of the chamber 12 is subjected to partial vacuum to draw air through port 13, a considerable amount of oil will be drawn into the lower portion of said chamber 12, and this oil will not only lubricate all of the moving parts but will form a film between the gyratory piston 19 and the cylinder 5. This oil film makes the joints practically air tight and is of very great importance especially when the pump is used as an air pump. The surplus oil will be carried with the exhaust air through the exhaust passage 14 and back into the oil tank.

One of the main uses of this pump will be to produce a forced blast of air in connection with oil burners, and such use does not require an air pressure more than three or four pounds. Such air pressure will not cause evaporation of oil, hence the oil will be used over and over.

The numeral 28 indicates an air pipe that leads from the top of the oil tank 7 and delivers to the air intake port 13. This pipe forms a by-passage for the air and is provided with a valve 29. When a maximum pumping capacity is desired, valve 29 will be closed but when said valve is open more or less, air will be short-circuited through the oil tank back to the air intake port and the pressure of the blast delivered through air pipe 23 will be decreased to a greater or less extent depending upon the extent to which valve 29 is open.

The oil tank 7 forms a base for the complete blower unit and when an electric motor is employed said motor would preferably be applied directly on said tank. To support the said tank so that the vibrations will not be transmitted to the floor, said tank is shown as supported on resilient legs in the form of short coil springs 30.

The device has been described as a pump but of course may be used as a motor. It is especially designed for use as an air pump but may be used to pump other fluids.

What I claim is:

1. A pump comprising a cylinder, an eccentric piston working in said cylinder, said cylinder having admission and exhaust ports, an oil chamber below said cylinder in which the exhaust port is connected, said oil chamber having an air discharge conduit leading back to the admission port, and an oil conduit leading from the lower portion of the oil chamber and delivering into the cylinder on the suction side of said piston, under which arrangement the surplus oil will be carried with the air back into the oil chamber and there separated from the air and redeposited in said chamber.

2. A pump comprising a cylinder, an eccentric working in said cylinder, a gyratory annular piston mounted on said eccentric and having a rolling action in respect to said cylinder, said cylinder having admission and exhaust ports and between said ports an air chamber, an oscillatory blade-like abutment pivoted to said cylinder and to said gyratory piston and working in said air chamber, an oil tank in which the exhaust port of said cylinder is connected, said tank having an air discharge conduit, an oil conduit leading from the lower portion of said tank and delivering into said cylinder on the suction side of said oscillatory abutment, and under which arrangement the surplus oil will be carried with the air back into said tank and there separated from the air and redeposited in said tank.

3. The structure defined in claim 2 in which said cylinder is mounted directly on said oil tank and has direct oil and air communication therewith.

4. The structure defined in claim 2 in further combination with a valve-equipped air by-passage leading from the upper portion of said tank and delivering into said cylinder on the suction side of said oscillatory abutment..

In testimony whereof I affix my signature.

WILLIAM H. CAMPBELL.