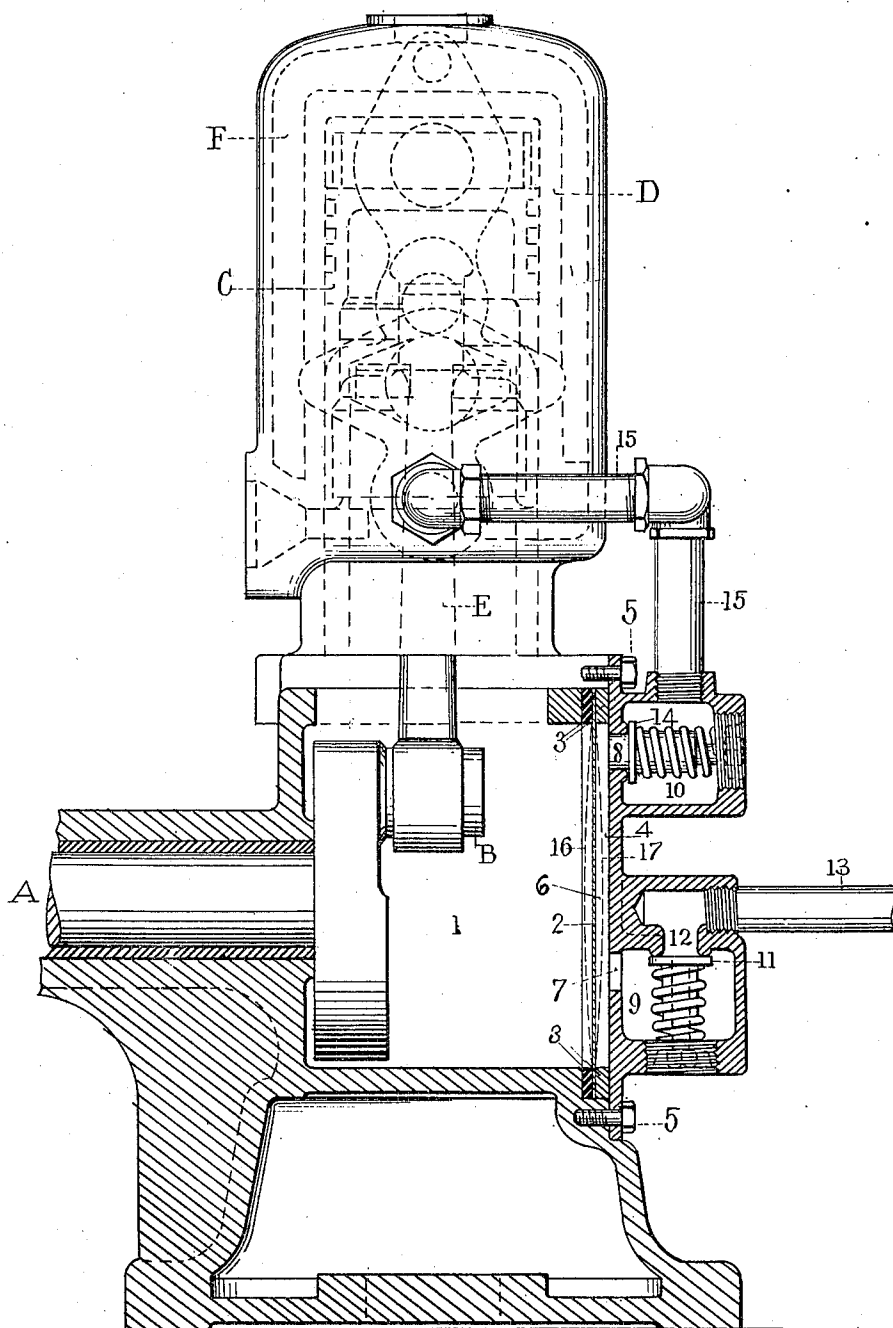


No. 851,334

PATENTED APR. 23, 1907.

G. J. ALTHAM.
DIAPHRAGM PUMP.
APPLICATION FILED JULY 17, 1905.



Witnesses:
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UNITED STATES PATENT OFFICE.

GEORGE JOHN ALTHAM, OF SWANSEA, MASSACHUSETTS, ASSIGNOR TO AERO AND MARINE MOTOR COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

DIAPHRAGM-PUMP.

No. 851,334.

Specification of Letters Patent.

Patented April 23, 1907.

Application filed July 17, 1905. Serial No. 269,914.

To all whom it may concern:

Be it known that I, GEORGE JOHN ALTHAM, a citizen of the United States, residing at Swansea, in the county of Bristol and State of Massachusetts, have invented a certain new and useful Diaphragm-Pump, of which the following is a specification.

My invention relates to diaphragm pumps, and it has for its general object the provision of a pump which is simple in construction, and which when combined with an internal combustion motor, may be operated most successfully, and with a very small amount of power, for continuously pumping water, for example through the water jacket of the cylinder of the motor, for the purpose of cooling the cylinder.

Figure 1 is a vertical section showing my invention when used in connection with an internal combustion motor.

In the drawings illustrating the principle of my invention, and the best mode now known to me of embodying that principle in operative means, is shown an internal combustion motor, having the usual shaft A, crank B, piston C, cylinder D and connecting rod E connecting the piston C, and crank B. The cylinder has a water jacket F.

Forming a portion of crank chamber 1 is a diaphragm 2, preferably of spring brass. It is mounted and clamped as for example between two packing rings 3 which are secured in any well known way to the wall portion of the crank chamber, as by pump casing 4, and bolts 5. A pump chamber 6 is formed between the diaphragm 2 and pump casing 4, the latter of which has two openings 7, 8, therein; one 7, leading from an inlet valve chamber 9 into the pump chamber 6; and the other 8, leading from the pump chamber 6, into the outlet valve chamber 10. An inlet valve 11 controls an opening 12 leading from a source of water supply 13; while an outlet valve 14 controls the opening 8 leading to the pump chamber 10, from which a pipe 15 leads, as to the water jacket F of the cylinder D. The construction of the valves, and their operations are so obvious from an inspection of the drawings that a description is omitted.

The operation of my invention will now be plain. The crank chamber 1 being closed, the succeeding up and down strokes of the

piston C, cause alternate rarefactions and compressions of the atmosphere in the crank chamber 1; consequently the diaphragm 2 moves to and fro, and assumes positions 16, and 17, which are exaggerated, for the sake of clearness. When the diaphragm 2 moves to position 16, there is a tendency to form a vacuum in the pump chamber 6; atmospheric pressure in the supply pipe 13 forces open the inlet valve 11, and water rushes into the inlet valve chamber 9, and the pump chamber 6 until equilibrium between the liquid on each side of the inlet valve 11 results; the outlet valve 14 during the rarefaction in the pump chamber 1 always closing the outlet opening 8. The moment the piston C begins to descend, the atmosphere in the crank chamber 1 becomes more compressed, and pushing outwardly against the diaphragm 2, tends to move it to position 17. This pressure acting against the water in the pump chamber 6, forces open the outlet valve 14, and the water rushes into outlet valve chamber 10, and hence through the outlet pipe 15, into the water jacket F, until equilibrium is restored between the pressure in the pump chamber 6 and that in the outlet chamber 10; the inlet valve 11 of course, during the down stroke of the piston C, closing the opening from the inlet valve chamber 9 to the source of water supply 13. In fine, the continuous alternate up and down strokes of the piston C cause in the crank chamber 1, alternate rarefactions and compressions of the air in the crank chamber 1, and the diaphragm responding to these changes and producing similar changes in the pump chamber 6, causes valves 11, 14, to permit water to be drawn from the source of supply and forced to the place where the water is desired.

While my invention is extremely useful when it is used in connection with an internal combustion motor, as for the purpose of cooling the cylinder of the motor, yet obviously, the outlet pipe may be carried to any place other than the water jacket. Further, by connecting the supply pipe with the outlet of the water jacket, and when necessary, providing means to remove the heat of the water after leaving the water jacket, one may have a continuous circulation through the pump and the water jacket.

I have found my invention very useful

when applied to motors for driving boats, but I do not wish to limit it to any particular use, for it may be combined with all kinds of internal combustion motors, whatever be the purpose for which they may be employed.

While my invention may be embodied in many forms, I do not wish to limit my invention to the particular construction shown and described, but desire to protect it in the broadest manner legally possible.

What I claim is:—

In an internal combustion motor, a casing having a crank chamber; a metallic diaphragm forming one side of said crank chamber, and closing and rendering said chamber air tight; a pump casing formed in one piece of metal, and, when combined with the diaphragm, forming an air tight pump chamber; means for securing said diaphragm and

said pump casing to said crank chamber casing and forming thereby said air tight crank chamber and said air tight pump chamber; said pump casing having formed therein, an inlet valve chamber; an outlet valve chamber; openings leading from said valve chambers into said pump chamber; an inlet to said inlet valve chamber; and an outlet from said outlet valve chamber; an inlet valve to control said inlet to said inlet valve chamber; and an outlet valve to control the opening leading from the pump chamber to the outlet valve chamber.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE JOHN ALTHAM.

Witnesses:

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