C. H. FOX.

PUMP.

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1,189,085. **Patented June 27, 1916.**

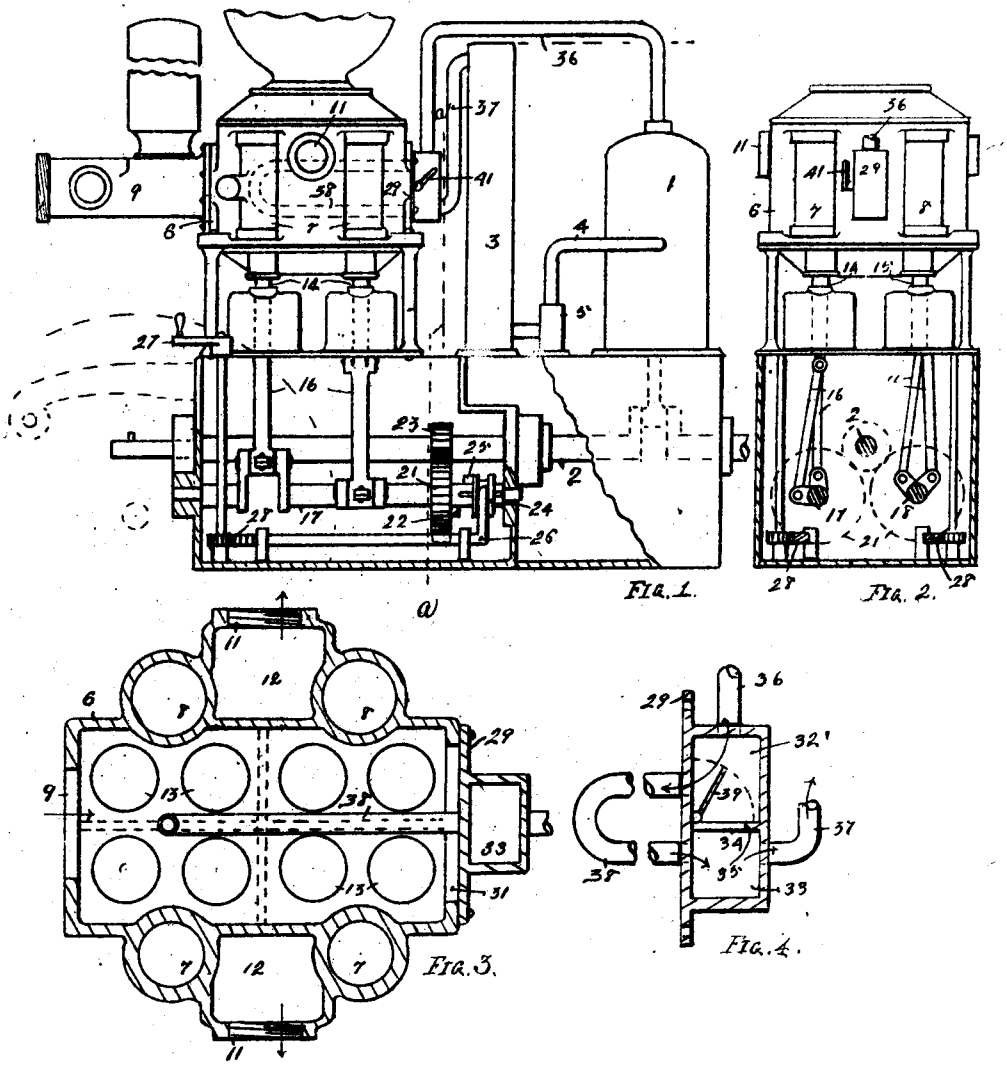


FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

WITNESSES.

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PUMP.

1,189,085. Specification of Letters Patent. Patented June 27, 1916.

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To all whom it may concern:

Be it known that I, CHARLES H. FOX, a citizen of the United States, residing at Cincinnati, Ohio, have invented a new and useful Improvement in Pumps, of which the following is a specification.

My invention relates to pumps of the multiplex double acting class adapted to the use of self propelled fire engines or for other suitable purposes, and the objects of my improvements are to provide selective means for detachably engaging the plungers in groups with the driving mechanism; to provide means for operating the pumps with their plungers in such successive order as to lessen the pulsations in the force chamber and secure a more continuous and less undulating discharge therefrom; to provide means for regulating the volume of the discharge to meet different requirements; to provide a cooling device within the suction chamber for cooling the water from the jacket of the explosive engine; to provide the radiator with a valve controlled auxiliary cooling mechanism with the suction chamber for use when the vehicle is stationary, and to provide such construction and assemblage of the coöperating members as to secure facility of operation and increased efficiency of action. These objects may be attained in the following described manner, as illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation with parts broken away of an auto fire engine provided with my improved pump; Fig. 2 a transverse vertical section on the broken line *a—a;* Fig. 3 a horizontal section through the suction chamber, and Fig. 4 a vertical section of the valved tubular connections from the engine jacket with the tubes within the suction chamber.

In the drawings, 1 represents the jacket of the explosive engine, 2 the crank shaft, 3 the radiator, 4 the tubular connections including the gear pump 5, from the jacket therewith, all being constructed and arranged in the ordinary manner.

The pump casing 6 is formed with pairs of cylinders 7 and 8 preferably of different size and with suction and discharge openings 9 and 11. The discharge openings communicate with the passages 12 which extend on each side of the pump between the force chambers in the usual manner. The usual valves 13 lead from the suction to the corresponding pulsation chambers of each cylinder. The plungers 14 and 15 for each pair of cylinders are actuated by means of the connecting rods 16 from the corresponding crank shafts 17 and 18. The cranks on each shaft are set quartering or at right angles and one shaft is arranged with the cranks thereon one-eighth of a turn in advance of those on the other. The gears 21 each formed with a single clutch tooth 22, are mounted to turn on the respective pump shafts and continuously engage with the pinion 23 secured on the engine shaft. Clutch members 24 each formed with a single clutch tooth 25 are splined on the respective pump shafts. Shifter yokes 26 for said respective members may be actuated independently by means of the hand levers 27 and the rack and pinion connections 28 therewith.

The cap 29 secured over the opening 31 to the suction chamber is formed with chambers 32 and 33 which communicate through an opening 34 in the partition 35. Said chambers have respective tubular connections 36 and 37 with the jacket and the radiator. One or more tubes 38 formed with return bends are extended within the suction chamber and communicate at their ends with the respective said chambers. A damper valve 39 provided with a handle 41 serves to close the opening 34 for directing the flow of water through the tubes or to close the tubes for directing the flow through said opening as desired.

In operation, during the action of all the plungers under sufficient power, the pump will deliver its greatest volume of water. The successive action of the plungers in the order of every one-eighth turn of the crank shafts serves to produce a steady or slightly undulating instead of intermittent discharge of the water from the force chambers. Where force instead of volume may be required, either of the crank shafts may be disconnected and the full power exerted on the other shaft with its group of plungers. When the cylinders of one group differ in size from those of the other group the respective groups will deliver different volumes of water and with different force.

When the pump is in action, the water from the jacket may be cooled in its circulation through the tubes within the suction chamber or the water in the suction chamber warmed as desired.

Having fully described my improvements, what I claim as my invention and desire to secure by Letters Patent of the United States is:

1. The combination of the water jacket of an explosive engine, a closed water circulating circuit therefor, a pump chamber independent of the circuit and inclosing a portion of its length, and a valve controlled by-pass for the circuit located without the chamber.

2. The combination of a water jacket for an explosive engine, a closed conduit including the jacket and a pump, a cooling chamber independent of the conduit encircling a portion of its length, and a valve controlled by-pass for the conduit located without the chamber.

3. The combination of a pump chamber, a closed water circulating system including an engine jacket and a pump and having a portion of its length inclosed within the chamber without communicating therewith, and a valve controlled by-pass therein located without the chamber.

4. The combination with an explosive engine provided with a jacket, a vehicle and a force pump arranged to be driven alternately thereby, a pump chamber, a conduit arranged therein, tubular connections from the conduit with the jacket, a by-pass between said connections, and a hand actuated valve for regulating the relative flow of water therethrough and through the conduit within the chamber.

5. The combination with an explosive engine, a jacket therefor, a pump, a suction chamber therein and detachable driving connections from the engine with the pump, of a conduit leading from the jacket through the chamber and a by-pass for said conduit.

6. The combination of an explosive engine, a jacket therefor, a pump actuated by the engine, a chamber within the pump, a conduit located within the chamber, connections therefrom communicating with the jacket, a by-pass for said connections between the jacket and the chamber, and a hand actuated valve for directing the flow of water alternately through the by-pass and the chamber.

7. The combination with an explosive engine, a pump, and detachable driving connections from the engine therewith, of a plurality of chambers formed with a passage between them, and tubular connections from the respective chambers with the engine jacket, a tubular passage between said chambers and extending within a chamber of the pump, and a valve arranged to alternately control the said passages.

8. The combination of a pump chamber, a water jacket for an engine, a closed water circulating circuit including the jacket and having a portion thereof inclosed within the chamber, a by-pass located outside of the chamber for the conduit, and a valve for controlling the relative flow of the water therethrough and through said portion of the conduit within the chamber.

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Witnesses:
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