J. R. McCONNELL.

EXPLOSION PUMP.

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1,054,302.

Patented Feb. 25, 1913.

Fig. 1.

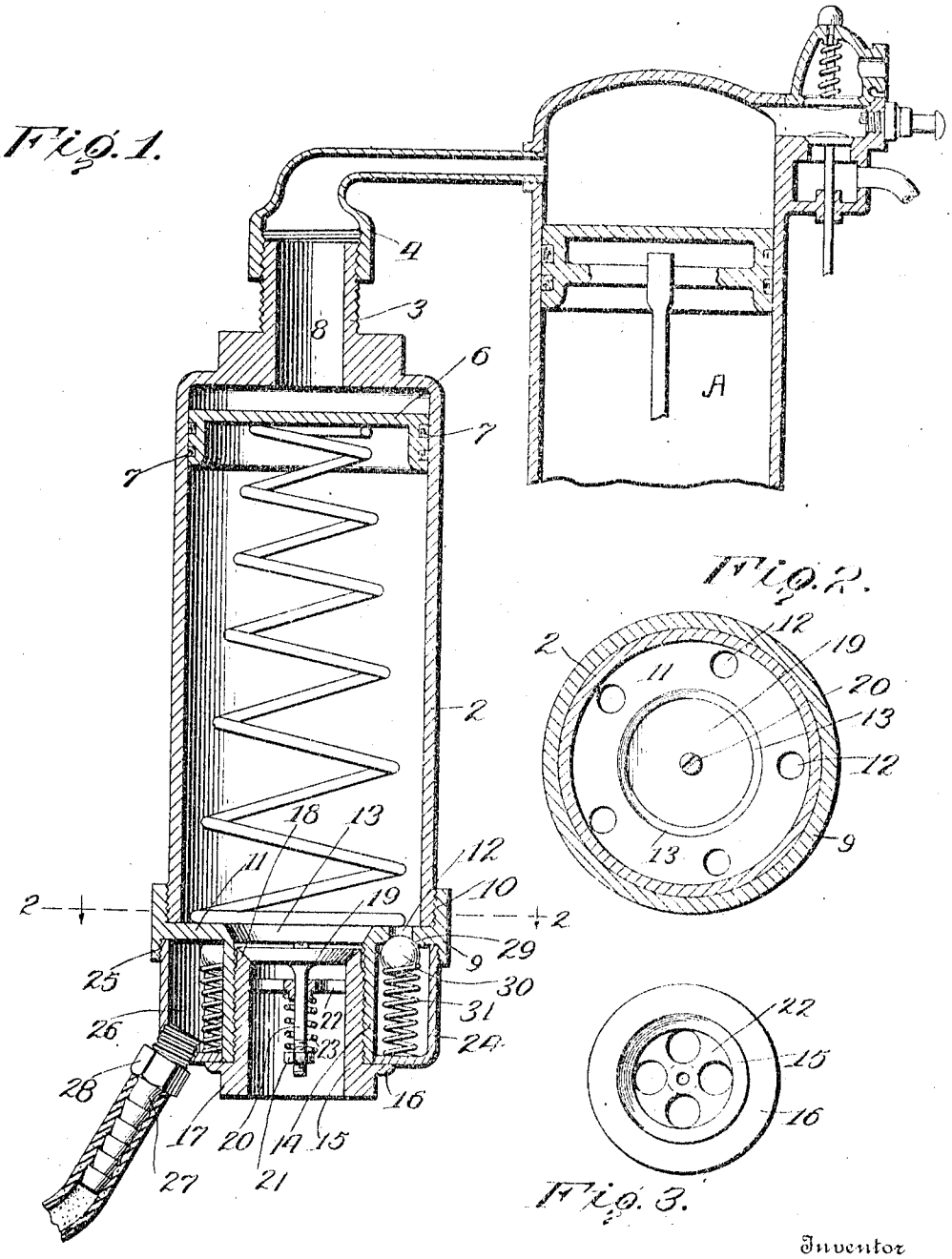

Fig. 2.

Fig. 3.

Witnesses

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EXPLOSION-PUMP.

1,054,302. Specification of Letters Patent. Patented Feb. 25, 1913.

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To all whom it may concern:

Be it known that I, JOHN R. McCONNELL, citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Explosion-Pumps, of which the following is a specification.

My invention relates to pumps and its primary object is to provide a very simple form of pump particularly adapted to pumping air, gas or like fluids, in which the piston of the pump is reciprocated by the explosions of a charge in an internal combustion engine.

Another object of the invention is to provide a pump of this character in which the piston is operated by the direct action of the exploding charge.

A further object is to provide a pump of this character which is particularly adapted for use on automobiles and which may be used for pumping air either to an air brake system, if such is used, pumping air into the tires, or for compressing air to be used in forcing gas into the lamps in an illuminating system.

Still another object is to provide a very simple form of valve mechanism for the pump as above referred to, and providing means whereby the valves may be readily removed, replaced or repaired or the valve seats reground.

An embodiment of my invention is illustrated in the accompanying drawings wherein:—

Figure 1 is a vertical section through my improved pump, the pump being shown as connected to an internal combustion engine, the cylinder of which is shown in section. Fig. 2 is a transverse section on the line 2—2 of Fig. 1. Fig. 3 is an end view of the valve sleeve 15.

Corresponding and like parts are referred to in the following description and indicated in all the views of the accompanying drawings by the same reference characters. Referring to these drawings, it will be seen that essentially my improved pump includes a pump cylinder 2 having a uniform bore and provided at one end with a screw threaded nipple 3 whereby it may be connected, as by the pipe 4, with the explosion chamber A of an internal combustion engine. In the drawings the internal combustion engine is illustrated diagrammatically as my invention does not relate to any of the details thereof.

Operating within the cylinder 2 is a piston 6 which is shown as a trunk piston but may be of any suitable form, this piston having packing rings 7. The end of the cylinder 2 opposite to the outlet passage 8 in the nipple 3 is closed by a head in which are located suitable outlet and inlet valves, the inlet valve controlling the inlet of air or gas into the interior of the cylinder, while the outlet valve permits the outlet of air to any suitable reservoir or point of application while preventing a reverse movement of the air from the reservoir into the pumping cylinder. Preferably the valve head of the cylinder is constructed in three sections. One section consists of a collar 9 interiorly screw threaded as at 10 for engagement with the end of the cylinder 2, this collar 9 being provided with an inwardly projecting annular flange 11. This flange is formed with a series of spaced ports or perforations 12 which are disposed just inside of the inner face of the cylinder 2, and with a central opening 13 having flared walls. Surrounding the opening and formed integral with the flange 11 is the annular wall 14 which is interiorly screw threaded for engagement with a valve sleeve 15, this sleeve being exteriorly screw threaded and provided at its outer end with a shoulder 16 and a head 17 whereby it may be operated. The upper end of the sleeve or tubular section 15 is formed with a valve seat 18 upon which the puppet valve 19 normally rests. This valve is attached to a spindle 20 whose lower end is provided with a nut 21. The valve stem passes through a spider 22 formed integral with the sleeve or tubular member 15, this spider being perforated at a plurality of points. Between the spider 22 and the nut 21 is located the coil spring 23 which acts to draw the valve 19 down upon the seat 18 and hold it in this position but yields to permit an inward movement of the valve when pressure is relieved within the cylinder 2. The valve 19 is the inlet valve for the pump, while the perforations 12 in the flange 11 form outlet ports.

Attached to the collar 9 in any suitable manner, as by screw threads, is an annular chamber 24 which is bowl shaped in general form, the edge of the bottom wall of the annular chamber having screw threaded engagement with the sleeve 15 as at 25. The

chamber 24 is provided with an outlet opening 26 to which an outlet nozzle 27 is secured. Preferably, this outlet opening 26 is screw threaded and the outlet nozzle is in the form of a screw threaded nipple engaging the screw threaded opening. The nozzle is provided with a many sided head 28 whereby it may be turned and the body of the nozzle is preferably formed with corrugations whereby it may be attached to a flexible pipe by which the air or other fluid compressed within the pump may be carried to any desired point of application or to a storage reservoir. Disposed within the chamber 24 and held in any suitable manner yieldingly against the valve seats 29 surrounding the ports 12 are a plurality of outlet valves 30. As shown, these valves are in the form of balls and each valve is held in place by a coil spring 31. Any other desired means may be provided for holding the valves in place and I do not wish to limit myself to this particular from of valve, though I regard it as preferable.

The operation of my invention will be obvious. Upon an explosion of a charge within the combustion chamber A of the gas engine, the force of the explosion acts directly upon the piston 6 to force it outward, thus compressing the air between the piston and the outlet end thereof. The compressed air or gas forces open the valves 30, passes outward through the ports 12 and is forced out through the outlet opening 26. As soon as the pressure on the other side of the piston is relieved, as upon the suction stroke of the engine, the piston will be drawn back to its initial position, thus relieving the pressure on the valves 30 which will close, and also relieving pressure upon the valve 19 which will open, allowing gas or air to enter the cylinder. While I do not wish to limit myself to this, I may provide a spring 31 located within the cylinder and acting upon the piston to force it toward the nipple 3. This spring of course will be compressed by the force of the explosion and when this force is relieved, as upon the suction stroke of the engine, the spring will act to return the piston to its initial position. It is obvious that by removing the head at the lower end of the cylinder 2, the spring may be removed and replaced or repaired.

The pump is to be used preferably for compressing air, either in a storage chamber (not shown) or within the tires of the automobile, or it may be used in many different ways, and in order to cut the pump off from the combustion chamber, I preferably provide the connection 4 with a valve 32 which may be operated either to establish communication between the cylinder 2 and the combustion chamber A, or to cut off said communication.

My invention is simple and has been found thoroughly effective in practice. It may be operated in combination with any explosive engine, for compressing air or gas for any purpose and may also be used for pumping liquids where desired. Its main use, however, will be as an auxiliary to an explosive automobile engine.

What I claim is:

1. A pumping mechanism of the character described including a pumping cylinder, a piston freely operating in the cylinder, a head closing the other end of the cylinder, said head comprising a collar having an inwardly extending perforated annular flange, a tubular wall carried by the flange and forming an inlet passage, a valve operating in the inlet passage and yieldingly held to its seat, and a chamber detachably engaging said collar and wall and having an outlet passage, valves in said chamber yieldingly held against the perforations in the flange on the collar and springs disposed between the head and the piston, said piston spring being removable through the head.

2. A pumping mechanism of the character described, including a pumping cylinder, a piston freely movable in the chamber, a head closing the other end of the cylinder, said head comprising a collar engaging the exterior of the cylinder and having an inwardly extending annular flange, the flange being perforated to provide outlet ports, a tubular wall carried by the flange and forming an inlet passage, and an annular chamber detachably engaging said collar and wall and having an outlet opening, an inlet valve located in the inlet passage and opening upon a reduction of pressure in the interior of the cylinder, outlet valves located in the chamber and closing against the outlet perforations, said valves being yieldingly held to their seats and opening upon an increase of pressure in the chamber, and springs disposed between the piston and the head, said head and piston being removable through the end of the cylinder closed by the head.

3. In a pumping mechanism of the character described, a pumping cylinder, a piston freely movable in the pumping cylinder, a spring beneath the piston and urging it in one direction, a head supporting the outer end of the spring and closing one end of the cylinder and comprising a collar engaging the exterior of the cylinder having an inwardly extending annular flange, the flange being perforated to provide outlet ports, the inner edge of the flange being formed with a tubular wall extending parallel to the axis of the cylinder and forming an inlet passage, said wall being screw threaded, an annular chamber engaging the collar at its upper end and at its other end engaging the outer end of the screw threaded wall, said chamber being formed with a nipple extending therefrom, a sleeve having screw

threaded engagement with the inlet passage and provided with a spider and formed with a valve seat, a spring actuated puppet valve mounted in the chamber and resting against said seat, and valves disposed within the chamber and yieldingly held in position to close the outlet valve openings in the flange.

4. In a pumping mechanism of the character described, a pumping cylinder, a piston freely movable in the cylinder, a head closing the cylinder and comprising an annular collar engaging the exterior of the cylinder and having an inwardly extending annular flange disposed between the ends of the collar, the flange being perforated to provide outlet ports, the inner edge of the flange being formed with a tubular wall extending parallel to the axis of the cylinder but in a direction away from the cylinder and forming an inlet passage, said wall being interiorly screw threaded, the inner face of the collar above the inwardly extending flange being screw threaded for engagement with the pumping cylinder, an annular chamber having screw threaded engagement at its upper end with the collar below the flange and at its other end bearing against the outer end of the screw threaded wall, said chamber being formed with a nipple extending therefrom, a sleeve having screw threaded engagement with the inlet passage and formed at one end with a valve seat and provided upon its exterior face with a shoulder bearing against the end of the chamber, a spring actuated puppet valve mounted in the sleeve and resting against said seat, said valve having a less diameter than the exterior diameter of the sleeve, valves disposed within the chamber and housed thereby and yieldingly held in position to close the outlet openings in the flange, and a spring disposed between the head and the piston, said piston and spring being removable through the head end of the cylinder.

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

JOHN R. McCONNELL. [L. S.]

Witnesses:

M. N. WATSON,

B. F. EWING.