

G. J. SPOHRER.
AUTOMATIC PUMP.
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1,081,784.

Patented Dec. 16, 1913.

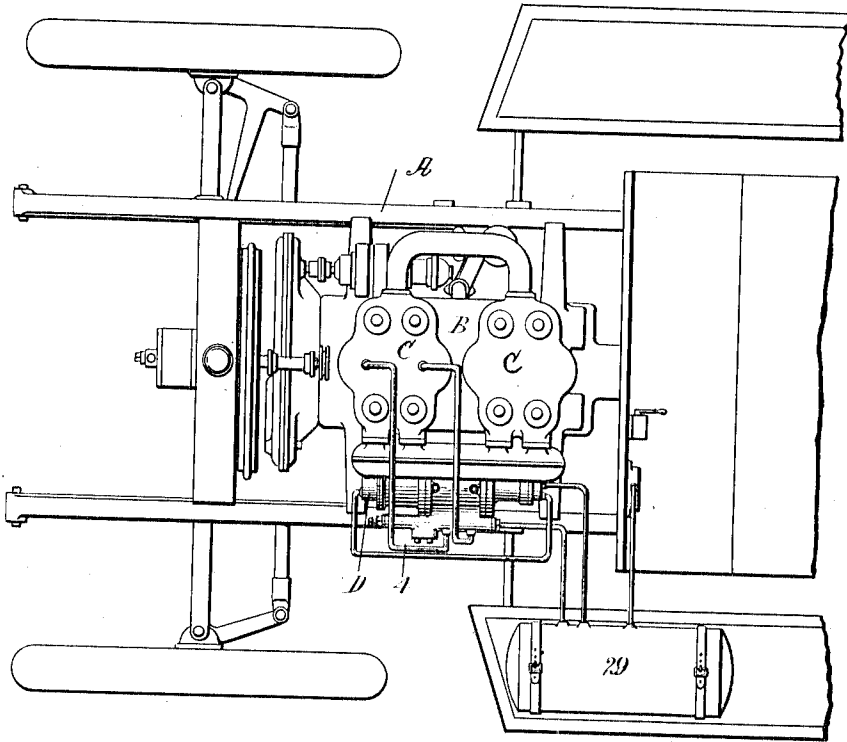


Fig. 1.

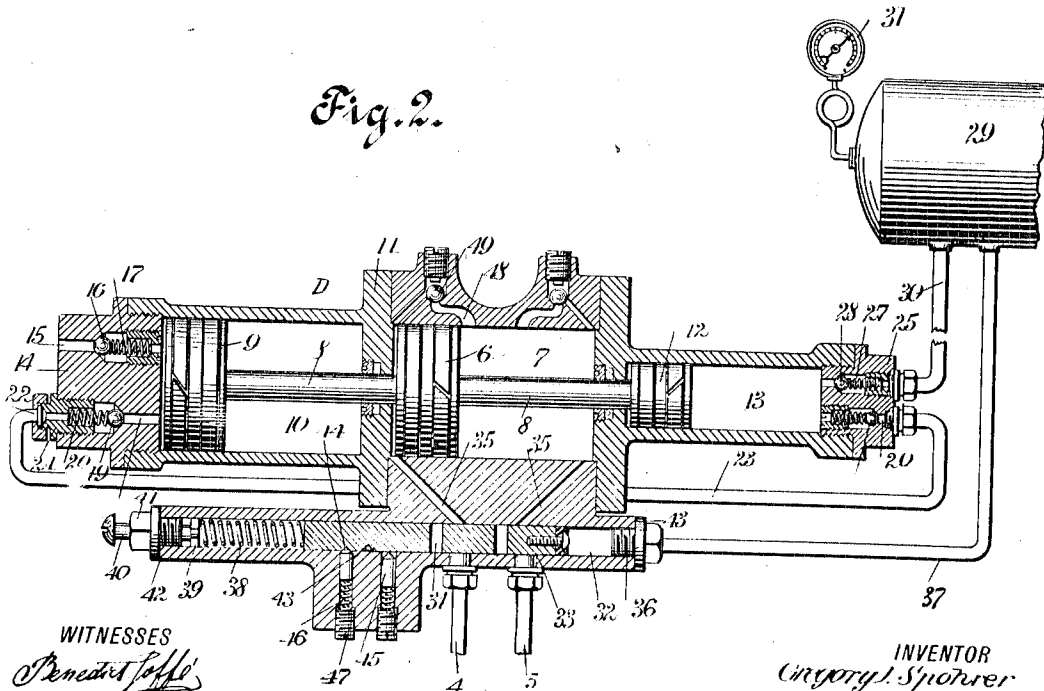


Fig. 2.

WITNESSES
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AUTOMATIC PUMP.

1,081,784.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GREGORY J. SPOHRER, a citizen of the United States, and a resident of Franklin, in the county of Venango and State of Pennsylvania, have invented a new and Improved Automatic Pump, of which the following is a full, clear, and exact description.

My invention relates to a new and improved form of automatic pump and more particularly pertains to a pump adapted to work with an internal combustion engine and more particularly adapted to supply compressed fluid to an automobile, for the purpose of supplying energy to actuate an engine starter or to supply a source of power for any other purpose.

An object of my invention is to provide a simplified pump actuated by the pressure of the explosive discharge.

A further object of my invention is to provide a pump simple in construction and automatic in its action, comprising relatively few parts that might get out of order.

A further object of my invention is to provide a device to automatically control the connection between the pump and the engine, so that when the pressure of the air in the compressed air tank falls below a predetermined minimum point, the pump will be automatically brought into fluid connection with the engine, and when the pressure in the tank has reached a predetermined maximum point, the pump will be automatically disconnected from the engine.

I attain the above outlined objects by disposing three separate cylinders in longitudinal alinement, each cylinder having a head therein, all of said heads having a piston rod common thereto. Pressure from the engine cylinder is admitted to the motor cylinder to reciprocate the piston rod, to draw air under normal atmospheric pressure into one chamber, and to exhaust from this chamber to a smaller chamber at the opposite end of the pump, from which it is forced into the compressed air tank. The connection between the engine and the pump is controlled by a sliding valve disposed in a chamber, which valve is pressed in one direction by a compressed spring and in the opposite direction by the pressure of the air in the tank. The tension on the spring may be varied, so as to regulate the point of pressure at which

it is desired to open the communication between the pump and engine.

With the above and other objects in view, as will more fully hereinafter appear, the present invention consists in certain novel details of construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings and more particularly pointed out in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, and in which—

Figure 1 is a plan view looking down upon the front part of an automobile shown in outline, having a preferred embodiment of my invention attached thereto; and Fig. 2 is a vertical longitudinal sectional view taken through a preferred embodiment of my invention, showing the compressed air tank in elevation.

Described more in detail, I have shown an automobile A of any common construction, mounted upon which is an engine B, comprising combustion chambers or cylinders C, and disposed to one side of said engine is a pump D, which pump forms the subject-matter of my invention.

Leading from one side of the piston head of one of the combustion cylinders C, is a supply pipe 4, and leading from the opposite side of said piston head is another supply pipe 5. These supply pipes lead to the opposite sides of the piston head 6 of a central cylinder 7 of the pump D. The piston rod 8 carrying the head 6 extends through the central chamber 7 in opposite directions, and has attached to one end a head 9 moving in an air-receiving cylinder 10 in prolongation of the cylinder 7 but separated therefrom by a partition 11. The opposite end of the piston rod 8 has an air compression head 12 reciprocating in an air compression cylinder 13 disposed in axial alinement with the cylinders 7 and 10 but of a smaller diameter than these two cylinders. The outer end of the cylinder 10 is open, into which opening is threaded a plug 14, said plug having an air inlet 15 controlled by an inwardly-moving ball valve 16, normally closing the air inlet 15 by means of a compression spring 17. Also disposed in

the plug 14 is an outlet 18, normally kept closed by a ball valve 19 actuated by a compression spring 20. The outer end of the compression spring 20 is carried by a nipple 21, secured to which nipple is one end 22 of a pipe 23 leading outside the pump to an inlet 24 disposed in a plug 25 closing the outer end of the cylinder 13. The inlet 24 is controlled by a ball valve 26 similar in construction to the valve 19.

Leading from the cylinder 13 is a normally closed outlet 27 controlled by an outwardly-moving ball valve 28, to which outlet 27 is connected a compressed air tank 29 by means of a pipe connection 30. The pressure in the compressed air tank is indicated by any form of pressure indicator 31.

Instead of leading directly to the cylinder 7, the supply pipes 4 and 5 terminate in a cylinder 32, in which cylinder moves a slide 33 having spaced apertures extending therethrough, these apertures being adapted to register with the outlets of the pipes 4 and 5 and the passageways 35 leading into the cylinder 7 on opposite sides of the head 6. It will be seen that when the ends of the supply pipes 4 and 5 and the apertures 34 and passageways 35 are in alinement, communication is established between the pump and combustion chambers of the engine. One end 36 of the cylinder 32 is connected to the compressed air tank 29 by means of a pipe 37. The tendency of the compressed air in the tank 29 will be of course to force the slide 33 to the left, as shown in Fig. 2, to thereby close the communication between the engine and the pump. Acting in the opposite direction to restore the apertures 34 into alined position with the passageways 35, is a spring 38 positioned in the cylinder 32, one end of which bears against the slide 33, the opposite and outer end of which bears against the head 39 of a bolt 40, which bolt is in screw-threaded engagement with a cap 41 closing the end 42 of the cylinder 32. It will be seen that by rotating the bolt 40, the tension on the spring 38 may be increased to force the slide 33 against the head 43 closing the opposite end of the cylinder 32, to bring the apertures 34 into alinement with the ends of the pipes 4 and 5 and with the passageways 35. By this construction, it will be noted that when the pressure of the air in the tank 29 is sufficient to overcome the action of the spring 38, the slide 33 will be forced into the position shown in Fig. 2, thereby disconnecting the engine from the pump.

In order to retain the slide 33 somewhat permanently either in the position shown in Fig. 2 or in the position in which the apertures 34 are in alinement with the pipes 4 and 5, there is positioned in the lower side of the slide 33, a pair of spaced recesses 43, in one of which recesses is adapted

to be disposed the nose 44 of one of a pair of pins 45, which pins are controlled by a compression spring 46, the tension of which spring is regulated by a screw cap 47. It will be seen by this construction that the slide 33 is held in one of two positions until the spring 38 or the pressure from the tank 29 is sufficient to overcome the action of the spring 46, to force the slide 33 in the other of its two positions.

Tracing out the cycle of movement from the position of the members shown in Fig. 2, the exploded gas under pressure from the engine will be admitted through the pipe 4 into the left side of the head 6, forcing this head to the right through the chamber 7. This will carry the head 9 in the same direction and will of course tend to create a vacuum to the left of the head 9. The external air pressure will then be sufficient to overcome the pressure of the spring 17, opening the valve 16, and air will be admitted through the air inlet 15 into the cylinder 10. At this time of course the outlet will be closed, due to the reverse position of the valve 19 with reference to the valve 16. The piston rod 8 moves synchronously with the piston rod of the engine, and as the rod 8 reverses to move back to the position shown in Fig. 2, the air in the cylinder 10 will be forced out through the opening 18, which movement will also close the air inlet 15, and this air will be forced through the pipe 23, through the inlet 24 into the compression cylinder 13. The next stroke of the piston rod 8 will force the air from the cylinder 13 through the outlet 27, through the connection 30 into the compressed air tank 29, and this cycle of operation is repeated until the desired compression as denoted by the indicator 31 is obtained in the tank 29; then by reversing the slide 33, the pump is disconnected from the engine. The compressed air in the tank 29 may be used for any purpose, but in this particular case has been designed to actuate an engine starter described in detail in a co-pending application. In order to slow down the head 6 as it approaches the end of its stroke, there is disposed in the side of the cylinder 7, a pair of spaced passages 48 controlled by ball valves 49, said passages being positioned adjacent the center of the cylinder, so that as the piston moves to the left, for example, and uncovers the adjacent passages as it approaches the end of the stroke, the actuating fluid in the cylinder 7 will flow through this passage past the valve 49 therein, and thence through the auxiliary passage 50 leading from the valve back to the cylinder between the piston and the adjacent cylinder head, thereby forming a cushion preventing the piston head 6 from striking the end of the cylinder.

Having thus described my invention, I

claim as new and desire to secure by Letters Patent:

1. The combination with a cylinder and a piston therein, of a control valve comprising a casing having a pair of longitudinally spaced inlets, a pair of similarly disposed outlets diametrically opposite to said inlets, and leading to the opposite ends of said cylinder from said casing, whereby motive fluid received from said inlets in alternation may be delivered to and act upon the opposite ends of said piston in alternation, a slide having a pair of spaced apertures extending therethrough, said slide being movable longitudinally in said casing, one extreme position of said slide placing said inlets in communication with said outlets, a spring housed within said casing and bearing on one end of said slide, and a compressed fluid inlet at the end of the casing opposite said spring.
2. In a device of the character set forth, the combination with a cylinder and a re-

ciprocating piston therein, of a control valve for the cylinder comprising a casing having a pair of spaced inlets on one side, pipes leading to said inlets from independent sources, said casing having on its opposite side a pair of ports leading to opposite ends of the cylinder, and a slide movable in said casing and having a pair of passageways serving in one position of the slide to cause registry between said inlets and said passageways each to each whereby communication may be had from said pipes to the opposite ends of the cylinder, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GREGORY JOHN SPOHRER.

Witnesses:

WINIFRED JOHNSON,
N. F. OSMER.