

Sept. 2, 1924.

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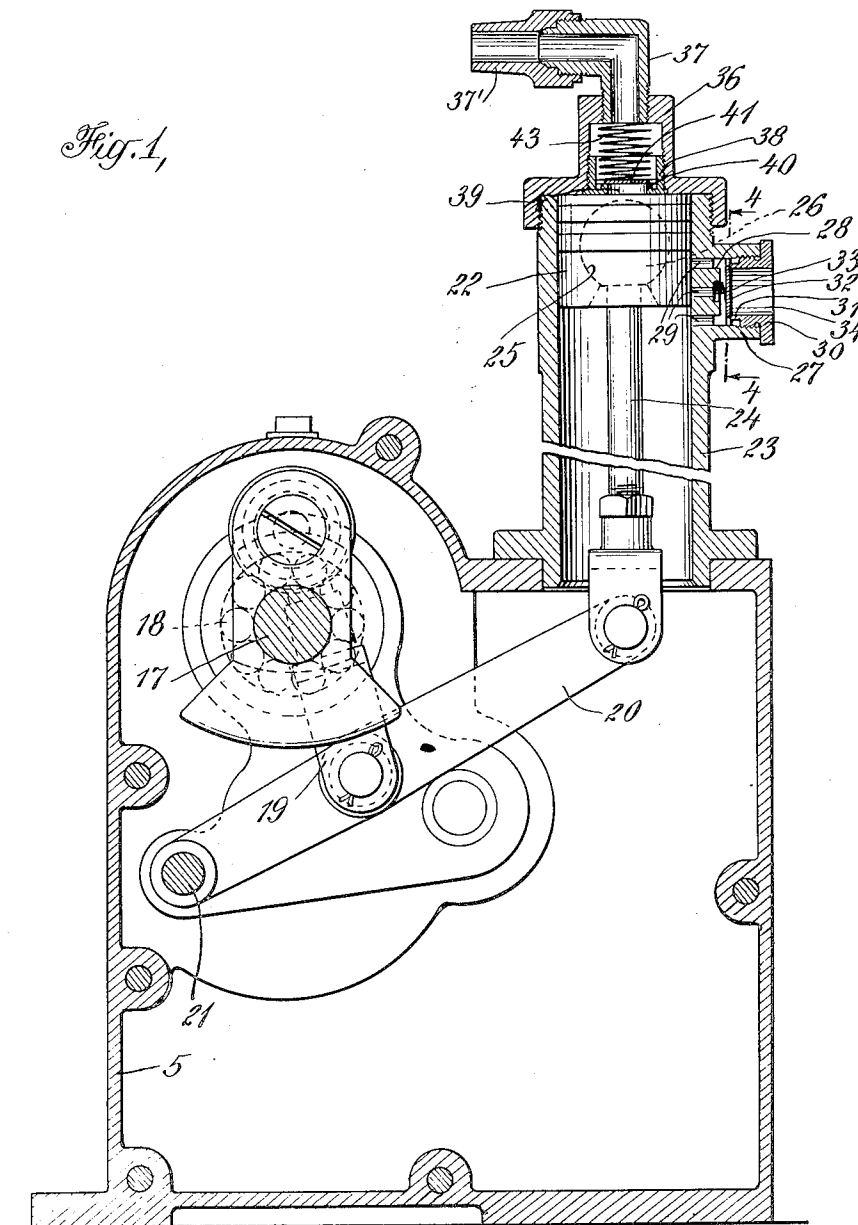
G. J. SPOHRER

PUMP

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3 Sheets-Sheet 1

Fig. 1,



INVENTOR

Gregory J. Spohrer

BY

Permie Davis Maum & Edwards
his ATTORNEYS

Sept. 2, 1924.

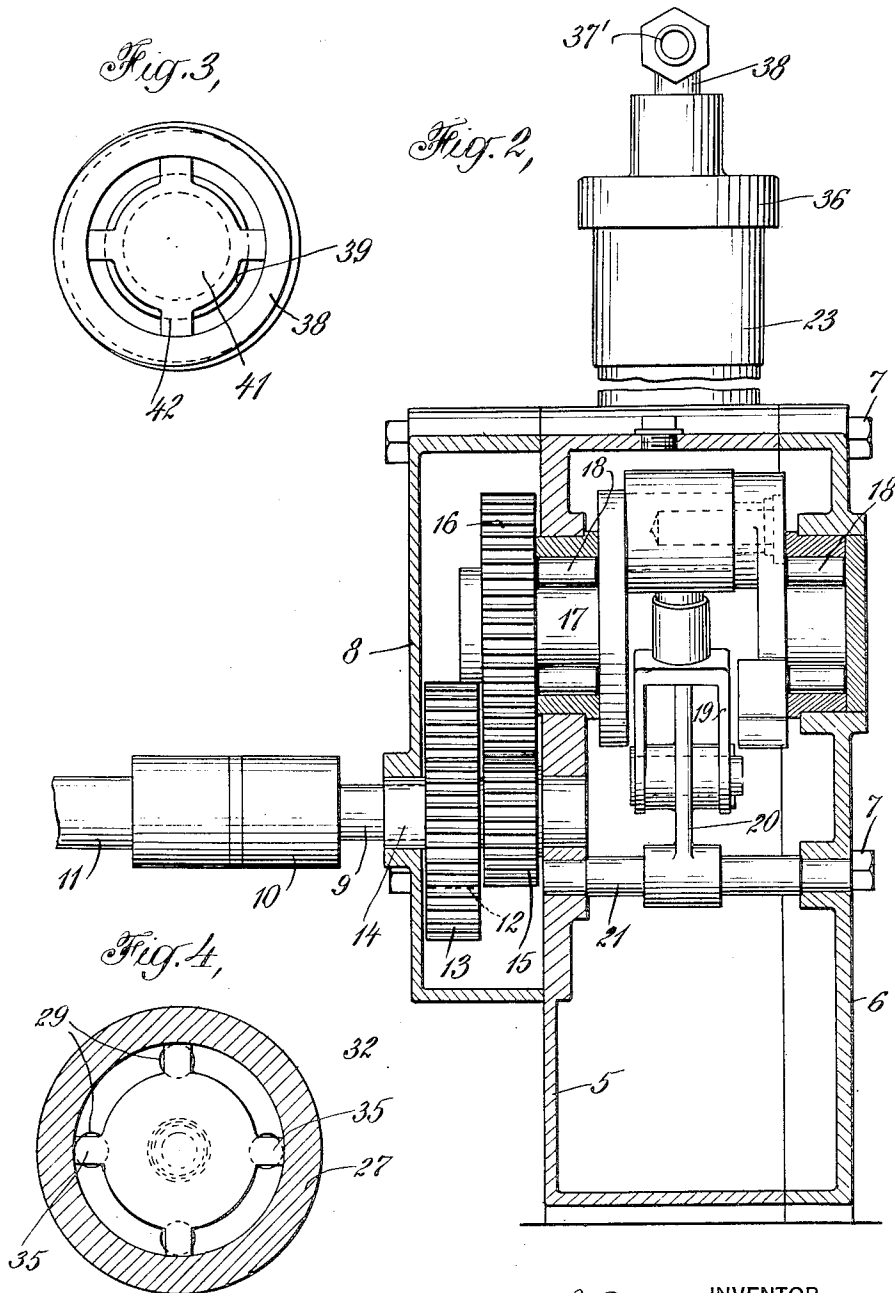
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Gregory J. Spohrer INVENTOR
BY
Perrine Davis Mason & Edwards
ATTORNEYS

Sept. 2, 1924.

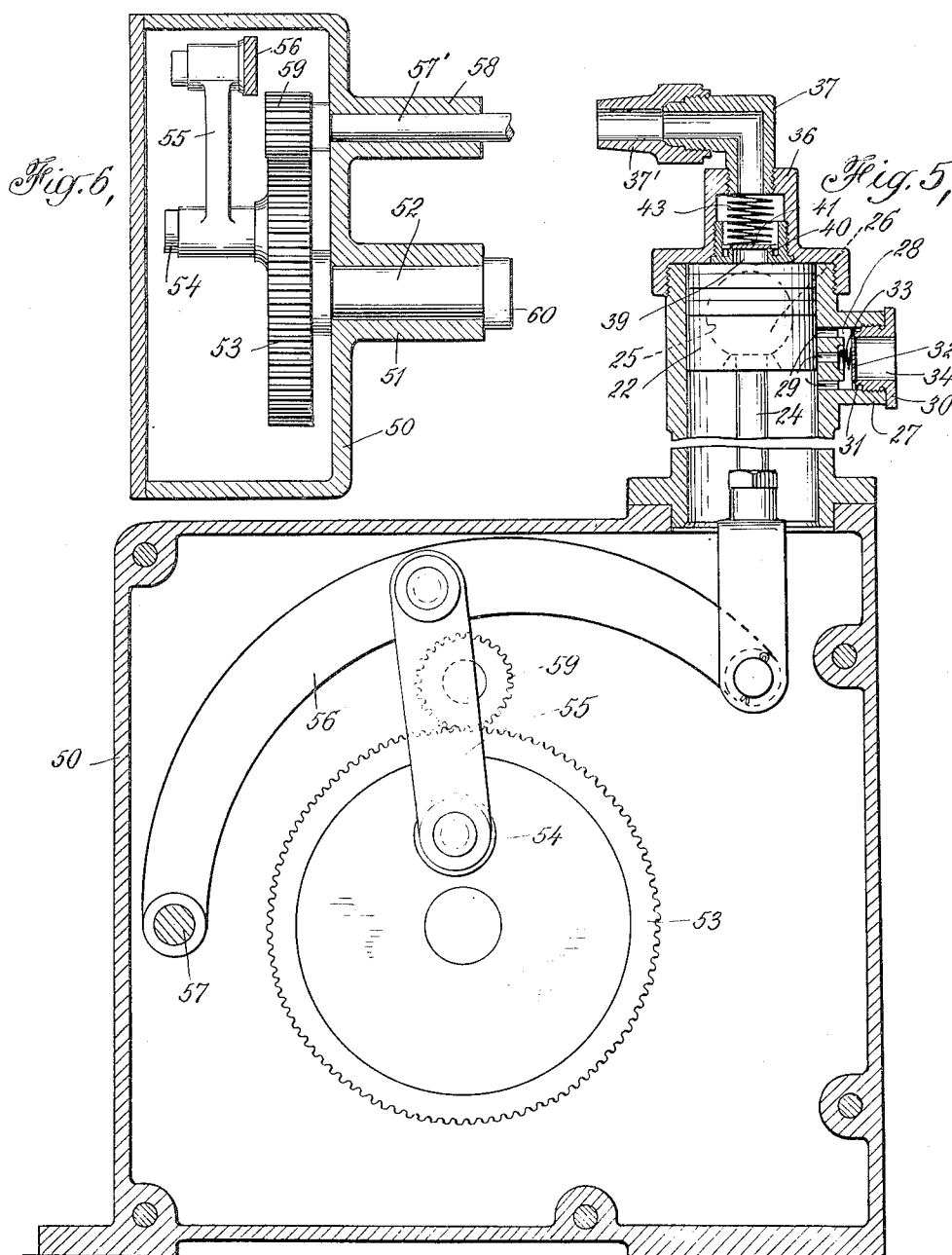
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3 Sheets-Sheet 3



Gregory J. Spohrer Inventor
By his Attorneys
Clemens Davis Mawin & Edwards

UNITED STATES PATENT OFFICE.

GREGORY JOHN SPOHRER, OF EAST ORANGE, NEW JERSEY.

PUMP.

Application filed July 9, 1919. Serial No. 309,537.

To all whom it may concern:

Be it known that I, GREGORY JOHN SPOHRER, a citizen of the United States, residing at East Orange, in the county of Essex, State of New Jersey, 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.

This invention relates to garage pumps such as are employed in inflating pneumatic tires or maintaining a supply of air under pressure for this purpose.

Such a pump, to permit successful and continued operation, should be relatively simple in construction, with its working parts enclosed to exclude dirt. The valves should be of an inexpensive, easily operable and readily accessible type. Preferably a long stroke piston of comparatively small cross sectional area is employed.

Among the objects of the present invention is the provision of a compact pump, having the desirable characteristics above enumerated and which is operable at maximum efficiency and without attention.

Further objects and advantages of the invention will be apparent as it is better understood by reference to the following specification when read in connection with the accompanying drawing, in which,—

Fig. 1 is a vertical longitudinal section through the pump;

Fig. 2 is a vertical transverse section through the pump;

Fig. 3 is an enlarged plan view of the outlet valve;

Fig. 4 is a section on the line 4—4 of Fig. 1;

Fig. 5 is a vertical, longitudinal section through another form of my invention; and

Fig. 6 is a transverse section through the structure illustrated in Fig. 5.

In carrying out my invention I propose to enclose the operating mechanism within a suitable casing, so that the mechanism is fully protected from the dirt which would otherwise render the device worthless in a short time. I prefer to use a long stroke piston which has manifest advantages in a pump of this character. To reduce the size of the enclosing casing, I propose to operate the piston from a suitable crank, of short radius, through the intermediary of a

pivoted lever to which both the crank and piston are connected.

Flat disc valves are preferably employed for controlling the inlet and outlet passages of the pump cylinder. These valves are sensitive, and are capable of quickly opening and closing a passage of relatively large area for the gas. Such valves may be cheaply constructed by stamping the disc from sheet metal, and the assembly of the valves with the cylinder is very simple, and lends itself peculiarly to the requirements of a pump of the character described.

With this brief description of the purpose and advantages of the structure, I shall refer, for a more detailed description, to the drawings, in which, 5 indicates a shell closed by a cover 6, to form a casing. The cover is secured to the shell by bolts 7 so that the cover may be readily removed, when access to the working parts is desired. A gear casing 8 is secured to the shell on the side thereof opposite the cover 6. A shaft 9 is journaled in the gear casing 8 and shell 5 and is connected by a coupling 10 to the shaft 11 which may be driven from any suitable source of power, such as an electric motor, (not shown).

The shaft 9 is provided with a pinion 12 meshing with a gear 13, fast to a jack-shaft 14, which is journaled in the gear casing 8 and shell 5. A pinion 15 on the shaft 14 meshes with a gear 16 on a crank shaft 17, journaled in roller bearings 18, supported in the shell 5 and cover 6. A forked link 19 connects the crank shaft 17 to a lever 20, which is secured to a pivot shaft 21 mounted in a shell 5 and cover 6, adjacent one end of the shell. The lever 20 is adapted to oscillate under the actuation of the crank shaft and to impart a long stroke to the piston 22, the stroke being materially longer than the diameter of the crank circle. Obviously a crank, to directly impart a corresponding stroke, would require the interposition of a connecting rod and cross head to permit travel of the piston in the cylinder. The shell would have to be correspondingly enlarged to enclose the parts. The reduction in size of the shell, which is possible with my invention is a material advantage.

The piston 22 operates in a cylinder 23 secured to the shell 5 and is connected to the lever 20 by a piston rod 24. The connection between the piston rod 24 and piston 22 is

preferably a ball and socket joint, a socket 25 being formed in the piston, to receive the ball 26, on the end of the piston rod. Oscillation of the piston rod, as it moves back and forth under the actuation of the lever 20, is thus permitted, and binding of the piston in the cylinder is effectually prevented.

To provide an inlet to the cylinder a valve casing 27 is formed thereon. The valve casing is annularly counter-bored at 28 and a plurality of inlet ports 29 are bored through the wall of the cylinder. An annular cap 30 is threadedly or otherwise secured in the valve casing 27 and is provided with a lip 31 against which a disc valve 32 is normally held by a spring 33. Ingress of air through the inlet 34 and ports 29 is thus prevented during the up strokes of the piston, the valve 32 being held against the lip 31 by the pressure of the air in the cylinder as well as by the spring 33. The disc valve 32 is provided with a plurality of ears 35, which engage the walls of the valve casing 27, and maintain the valve in proper operative relation to the lip 31.

The cylinder 23 is closed at its upper end by a cap 36, carrying the discharge pipe 37 and hose connection 37'. A valve seat 38 is threadedly or otherwise secured in the cap 36 and is provided with an outlet port 39 and a lip 40 surrounding the port. A disc valve 41 having ears 42, which maintain it in operative position, is normally caused to engage the lip 40, by a spring 43 arranged within the cap 36 above the valve. The disc valve 41 closes the port 39 at the beginning of the downward stroke of the piston, so that return of the compressed air to the cylinder is prevented. The pressure of this air on the disc valve 41 assists the spring 43 in holding the disc valve closed.

In the operation of the pump, the rotation of the crank shaft 17 under the actuation of a suitable motor (not shown) causes the lever 20 to oscillate, thus reciprocating the piston 22. On the downward stroke of the piston air is drawn into the cylinder through the inlet ports 29. At the commencement of the upward stroke the inlet ports are closed and the valve 41 is opened to permit the air to pass into the discharge pipe 37. It will be noted that the inlet and outlet ports have a comparatively large cross sectional area ensuring a full charge of air and complete discharge thereof at every stroke. Maximum efficiency of the pump is thus secured, even when the latter is operated at comparatively high speed.

In Figs. 5 and 6 of the drawing I have illustrated a form of my invention which is somewhat more compact than the form hereinbefore described and, therefore, especially desirable where a very compact form of pump is required. Referring to the draw-

ing, 50 indicates a shell in which the operating mechanism of the pump is enclosed. The pump and parts thereof are identical with the structure hereinbefore described and corresponding reference numerals are accordingly applied to the respective elements thereof.

Supported in a suitable bearing 51 in the shell 50 is a shaft 52 carrying a gear 53. A crank pin 54 projecting from the gear 53 is connected by a link 55 with an arm 56 which is pivoted on a pin 57 projecting from a wall of the shell 50. The opposite end of the arm 56 is connected to the piston rod 24 of the pump, so that as the gear 53 rotates the piston 22 of the pump is actuated. A shaft 57' is supported in a suitable bearing 58 projecting from the shell 50 and a pinion 59 is mounted thereon to mesh with the gear 53. The shaft 57' is adapted to be connected in any suitable manner with a source of power as, for example, an electric motor (not shown) to drive the gear 53 and actuate the piston 22 of the pump. It may be desirable, under certain conditions, to omit the shaft 57'. Thus, when the pump is mounted on a motor driven vehicle, the shaft 52 may be driven directly from a moving part of the driving gear of the vehicle and the shaft 52 is, for this purpose, provided with a projecting end 60 which may be coupled with the driving mechanism of the vehicle. When the pump is to be thus used, the shaft 57' and pinion 59 may be withdrawn and the bearing 58, therefore, may be broken away, the opening for the shaft 57' being plugged in any suitable manner.

The mechanism as illustrated in Figs. 5 and 6 is obviously much more compact than that illustrated in connection with the preceding embodiment of my invention. The number of parts and cost of manufacture is materially reduced without destroying the effectiveness and utility of the pump. All of the essential characteristics of the pump as illustrated in Figs. 1 to 4 of the drawing are preserved in the simplified form thereof, it being my purpose to provide in the embodiment of my invention illustrated in Figs. 5 and 6, a pump which may be manufactured and sold at relatively low cost to trade demanding this class of apparatus.

From the foregoing description it will be apparent that I have devised a compact pump, of simple and inexpensive construction, which may be utilized and maintained in continuous operation, under conditions which would result in the rapid destruction of many pumps, now known or used. Because of the simple construction and the protection afforded for the parts, the pump requires little attention and will continue to operate at maximum efficiency for long periods even if neglected. While my invention has been described particularly with

reference to its utilization for compressing air to be used in pneumatic tires, it is to be understood that the pump may be used for other purposes, to which it is readily adapted.

Various changes may be made in the form, arrangement and construction of the parts without departing from the invention or sacrificing any of its advantages, the form hereinbefore described being merely the preferred embodiment thereof.

I claim:

1. In a pump, the combination with the piston rod and the crank shaft, of connections between the piston rod and the crank shaft such that the stroke of the piston is materially lengthened without increase in the throw of the crank, and wherein lateral play of the piston rod is substantially eliminated, said connections comprising a lever pivoted at one end to a fixed support and connected at the other end to the piston rod, and a link pivoted to the lever and operatively connected to the crank shaft whereby in

normal operation the lever oscillates and the movement of the end of the lever connected with the piston rod is amplified in the direction of the axis of the piston.

2. In a pump, the combination with the piston rod and the crank shaft, of a connection between the piston rod and the crank shaft such that the stroke of the piston is materially lengthened without increase in the throw of the crank, and wherein lateral play of the piston rod is substantially eliminated, the connection comprising a lever pivoted at one end to a fixed support and connected at the other to the piston rod, the crank being pivoted to the lever intermediate the ends thereof whereby the movement of the end of the lever connected with the piston rod is amplified in the direction of the axis of the piston, said lever being curved longitudinally and arranged with its convex edge upward.

In testimony whereof I affix my signature.

GREGORY JOHN SPOHRER.