C. STEPHENS.

PNEUMATIC JACK AND PUMP.

APPLICATION FILED APR. 17, 1920.

1,375,332. Patented Apr. 19, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

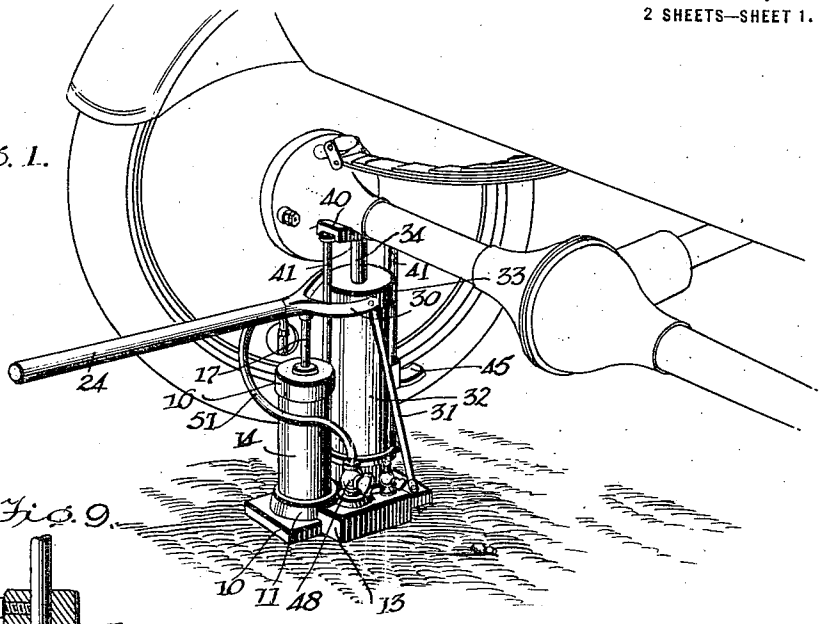


Fig. 9.

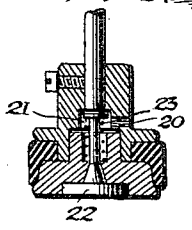


Fig. 2.

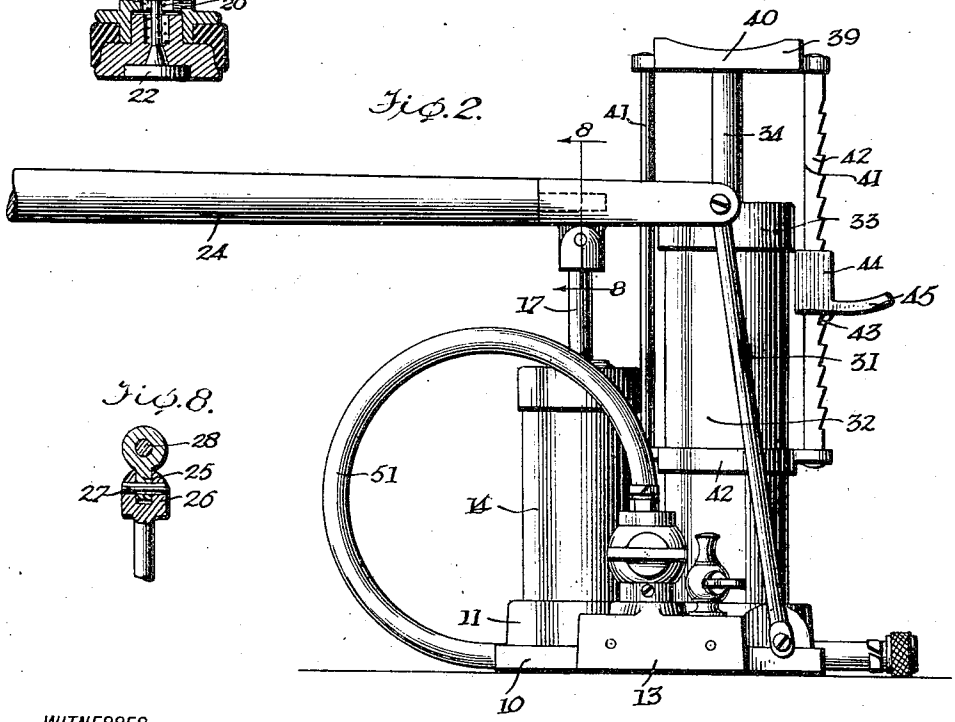


Fig. 8.

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 3.

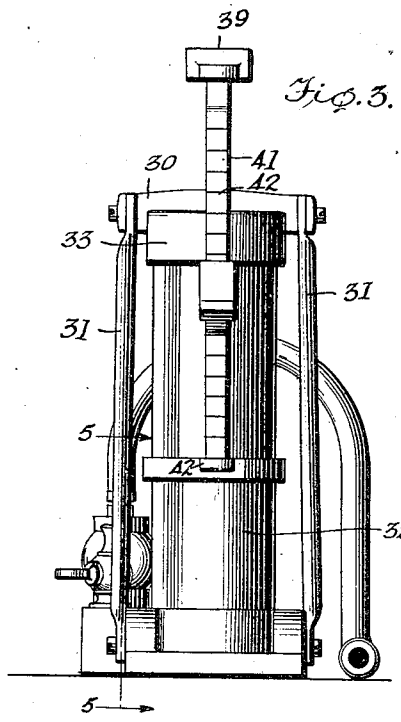


Fig. 4.

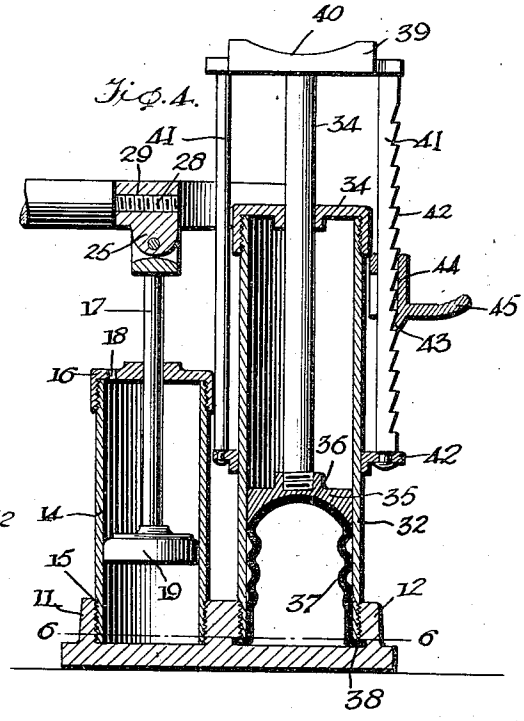


Fig. 5.

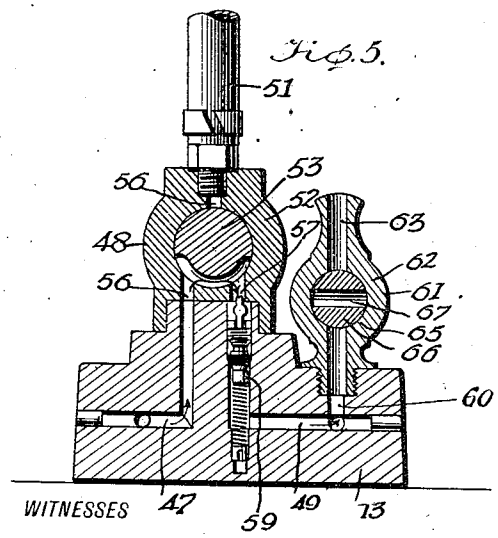


Fig. 6.

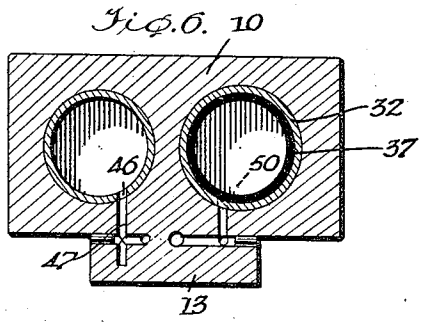
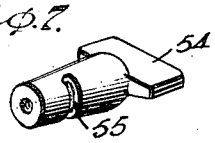


Fig. 7.



WITNESSES

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UNITED STATES PATENT OFFICE.

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PNEUMATIC JACK AND PUMP.

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Application filed April 17, 1920. Serial No. 374,608.

To all whom it may concern:

Be it known that I, CLYDE STEPHENS, a citizen of the United States, and a resident of Rosendale, in the county of Andrew and State of Missouri, have invented certain new and useful Improvements in Pneumatic Jacks and Pumps, of which the following is a specification.

My invention relates to a combination pneumatic jack and pump, and more particularly to an improved combination jack and pump particularly adapted for use with automobiles.

An object of my invention is to provide a device of this character in which the pump may be used to supply fluid pressure to the jack or by a single manipulation may be adapted for use as a pump for inflating a tire or for general purposes.

Another object is to provide a device of this character of simple and durable construction, reliable in operation and comparatively easy and inexpensive in operation and comparatively easy and inexpensive to manufacture.

Other objects and advantages reside in certain novel features of the construction, combination and arrangement of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming part of this specification, and in which:

Figure 1 is a perspective view of my improvement, showing it in use with an automobile;

Fig. 2 is a side elevational view of the invention;

Fig. 3 is an end elevational view of the jack end;

Fig. 4 is a view in vertical section, taken on a plane centrally and longitudinally of the device;

Fig. 5 is a sectional view through the valve block, valve and associated structure, on line 5—5 of Fig. 3;

Fig. 6 is a horizontal sectional view, on line 6—6 of Fig. 4;

Fig. 7 is a detail perspective view of the turning plug of the controlling valve; and

Fig. 8 is a detail sectional view on the line 8—8 of Fig. 2.

Fig. 9 is a detail view in section of the pump piston, parts being shown in elevation for the sake of illustration.

Referring to the drawings, it will be seen that my invention contemplates a base 10 having on its upper surface a pump cylinder boss 11 and a jack cylinder boss 12. A valve block 13, preferably integral with the base 10 is provided in its interior with suitable ducts which serve to establish communication between the pump and the jack, the pump and the tire or the like, or the jack and the atmosphere, as will be hereinafter more fully described.

A pump cylinder 14, preferably of metallic construction has its lower end externally threaded and engaged with the internal threads formed on the boss 11. The upper end of the cylinder is also externally threaded to coöperate with the internal threads of the cap 16. The cap is centrally apertured to permit passage therethrough of the plunger rod 17 of the pump and this cap is also provided with a port 18 for admission of the air. The rod 17 carries a plunger 19 of the pump, which is reciprocated in the cylinder 14. This plunger 19 may be of conventional construction which embodies the usual leather washer on the plunger which permits the air to flow past the plunger on the upstroke, but prevents the air from passing the plunger on the down stroke, but it is preferred to construct the plunger with a radial bore 20 communicating with the cylinder on the upper side of the plunger and an axial bore 21 which communicates with the radial bore and with the cylinder on the lower side of the plunger, as shown in Fig. 9. The axial bore receives a piston valve 22, the stem of which carries a coil spring 23 which tends to seat the valve. It is obvious that on the down stroke of the plunger the valve will be seated, whereas on the upstroke the atmospheric pressure will open the valve to permit air to flow to the lower side of the plunger.

A handle 24 has a depending apertured ear 25 received between the spaced apertured ears 26 formed on the upper end of the plunger rod 17. These apertures are alined and receive a pin 27. If desired this handle may be formed in two parts detachably secured together by a threaded shank and socket 28 and 29, respectively, as shown in Fig. 4. Integrally formed with the handle is a yoke 30, the arms of which are pivotally secured at their outer ends to the upper ends of parallel links 31 which links have their lower end pivotally secured to the base 10. The handle serves to recipro-

cate the plunger in the pump and due to the pivotal connection of the handle to the plunger rod and the pivotal connection to the forwardly inclined links 31 the handle gains in leverage as the piston descends, consequently the leverage is greatest when the compression is greatest.

The pneumatic jack cylinder 32 has its lower end externally threaded, and engaged with the internal threads formed on the boss 12. A cap 33 closes the upper end of the jack cylinder and is provided with a central opening to slidably receive the piston rod 34 of the jack. The piston rod 34 carries at its lower end a piston 35 which is freely movable within the jack cylinder both longitudinally thereof and rotatably with respect thereto. In order to obtain this freedom of movement without loss of pressure the working face of the piston is not exposed directly to the action of the fluid pressure but is concaved, as shown at 36. A flexible bag 37 which is preferably constructed of material having properties of flexibility, strength and elasticity and impermeability to fluid pressure, has a flange 38 formed at its lower end and secured between the base, the boss and the lower end of the jack cylinder. The upper end of the bag is closed but the lower end is open as shown in Fig. 4. This bag is adapted to expand or be collapsed under the influence of the pressure delivered thereto and in expanding it communicates motion to the piston 36 of the jack to elevate the same, and as long as the bag is expanded it will retain the piston in elevated position. The upper end of the piston rod 34 carries a cross head 39 which has a bearing surface 40 formed on its upper side whereby the cross head 39 may function as the lifting foot of the jack. The extremities of the cross head support depending bars 41 and the lower end of these bars carry a guide collar 42 slidable on the jack cylinder. The guide collar is adapted to a working fit on the surface of the jack cylinder so that while it constrains the cross head and piston rod to rectilinear motion and braces and reinforces the cross head, it does not interfere with the free and ready rotary or other adjustment of the cross head to desired position with respect to the jack cylinder. One of the depending bars 41 is provided with a ratchet surface 42 with which the dog 43 carried by the body 44 of the lifting foot 45 coöperates. The lifting foot 45 may be canted on the depending bar so as to swing the dog 43 out of engagement with the ratchet surface 42 to lower the foot or it will be automatically canted when the foot is elevated.

The lower end of the pump cylinder is provided with a port 46 which communicates with an eduction duct 47 of the valve block. The eduction duct 47 extends first horizontally and then vertically to the top of the valve block, as shown in Figs. 5 and 6. The controlling valve, indicated generally at 48, is mounted on the valve block adjacent the eduction duct 47 and also adjacent the induction duct 49 which leads to the port 50 in the lower end of the jack cylinder. The induction duct 49 extends vertically, and then horizontally in the valve block to the port 50 of the jack cylinder, as shown in Figs. 5 and 6.

The controlling valve 48 is adapted to establish communication between the pump and the jack but to cut off communication between the pump and the jack and establish communication between the pump and the flexible pipe 51, which may be connected to the tire or to the point where the pressure is desired. This valve comprises a casing 52 in which is rotatably mounted a turning plug 53 having a handle 54 preferably integrally formed therewith. The periphery of the turning plug is provided with a circumferential groove 55. This groove is adapted to establish communication between the inlet port 56 of the valve casing and the outlet port 57 of the valve casing which ports communicate respectively with the eduction duct 47 and induction duct 49. Again the turning plug 54 may be revolved within the casing so that a solid portion of the plug seals the ports 57 and thereby shuts off communication between the eduction duct 47 and induction duct 49. In this position the valve establishes communication between the eduction duct 47 and a second outlet port 56 which outlet port communicates with the pipe 51. A spring actuated check valve 59 is disposed in the eduction duct 49 and permits flow of the fluid through the induction duct to the jack cylinder but prevents back flow therein.

For relieving the pressure within the jack to lower the same, I provide a vent 60 which communicates with the induction duct 49 intermediate the port 50 and the check valve 59. A valve 61 controls this vent so as to establish communication between the vent and the atmosphere or cut off such communication as desired. This valve comprises a casing 62 having a bore 63 therethrough and a cavity 65 in communication with the bore 63. A turning plug 66 is rotatably mounted in the cavity and is provided with a diametric bore 67, which may be turned to register with the bore 63, and thus establish communication between the induction port 49 and the atmosphere or it may be turned at right angles to the bore 63 to cut off communication between the induction duct 49 and the atmosphere.

In practice, if it is desired to use the invention as a pump and jack, as for instance in the replacing or repairing of a tire of an automobile on the road, it may be placed be-

neath the axle of the automobile, as seen in Fig. 1. In this instance it is usually desired to use the cross head or the lifting foot of the jack and the cross head being freely movable may be readily adapted to the exigencies of the particular case. The handle 54 of the valve 53 is then turned so that communication between the eduction duct 47 and induction duct 49 is established and the handle 24 is reciprocated. The pressure then builds up in the jack cylinder expanding the bag 37 and forcing the piston upwardly elevating the jack. The tire may then be removed and replaced or removed, repaired and replaced, and if necessary, may be inflated while in elevated position, this latter being accomplished simply by turning the valve 53 so as to establish communication between the eduction duct 47 and the pipe 51, the pipe 51, of course, being connected with the valve stem of the tire. Further reciprocation of the handle 24 serves to inflate the tire. After the tire has been inflated the valve 66 may be turned to lower the jack.

My invention is capable of numerous other uses and advantages, which will be apparent to those skilled in the art.

I claim:

1. In a device of the character described, a base, a pump having its cylinder mounted on said base, a pneumatic jack having its cylinder mounted on said base adjacent said pump cylinder, means for establishing communication between said pump cylinder and the lower end of said jack cylinder, a flexible bag having its upper end closed and its lower end open and secured to the lower end of the jack cylinder to receive the pressure from said pump cylinder, a piston engaging said bag and actuated thereby, a piston rod connected to said piston, a cross head mounted on said piston rod, depending bars carried by said cross head, a guide collar carried by the lower end of said bars and slidable on the periphery of said jack cylinder, and a jack foot adjustably mounted on one of said bars.

2. In a device of the character described, a base, a pump having its cylinder mounted on said base, a pneumatic jack having its cylinder mounted on said base adjacent said pump cylinder, means for establishing communication between said pump cylinder and said jack cylinder, a piston mounted in said jack cylinder, a piston rod connected to said piston, a cross head mounted on said piston rod, depending bars carried by said cross head, and a guide collar carried by the lower ends of said bars and slidable on the periphery of said jack cylinder.

3. In a device of the character described, a base, a pump having its cylinder mounted on said base, a pneumatic jack having its cyinder mounted on said base adjacent said pump cylinder, means for establishing communication between said pump cylinder and said jack cylinder, a piston mounted in said jack cylinder, a piston rod connected to said piston, a cross head mounted on said piston rod, depending bars carried by said cross head, a guide collar carried by the lower ends of said bars and slidable on the periphery of said jack cylinder, and a jack foot adjustably mounted on one of said bars.

4. In a device of the character described, a pneumatic jack having a cylinder, a piston mounted in said jack cylinder, a piston rod connected to said piston, a cross head mounted on said piston rod, depending bars carried by said cross head, and a guide collar carried by the lower ends of said bars and slidable on the periphery of said jack cylinder.

5. In a device of the character described, a base, a pump having its cylinder mounted on said base and provided with a port at its lower end, a pneumatic jack having its cylinder mounted on said base adjacent said pump cylinder and provided with a port at its lower end, a valve block formed on said base intermediate said cylinders and having spaced horizontal ducts therein communicating respectively with said ports and having vertical ducts communicating with said horizontal ducts and leading to the top of said valve block, a valve casing mounted on said valve block and embracing said vertical ducts and having ports communicating therewith and having a third port, a turning plug arranged in said valve casing and having a circumferential groove therein adapted to establish communication between the ports communicating with said ducts or between one of said ports and said third port and a flexible pipe connected to said third port of said valve casing whereby communication may be established between said pump and said pipe or between said pump and said jack.

CLYDE STEPHENS.