June 29, 1926. 1,590,830

S. JEWKES

PNEUMATIC LIFTING JACK

Filed March 14, 1925 2 Sheets-Sheet 1

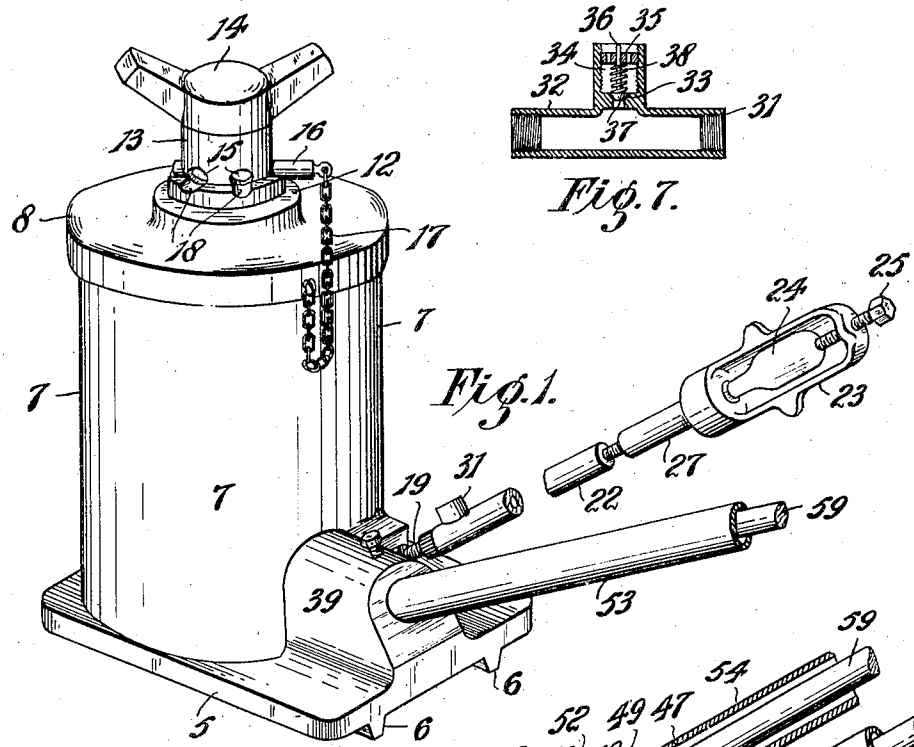



Fig. 1.




Fig. 7.



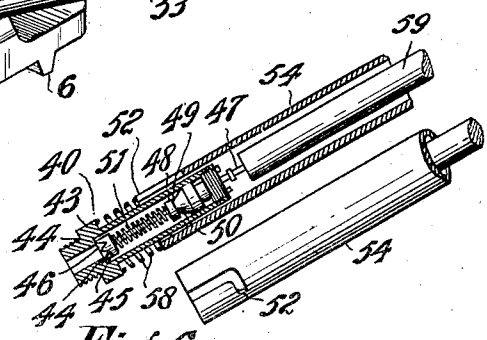




Fig. 6.

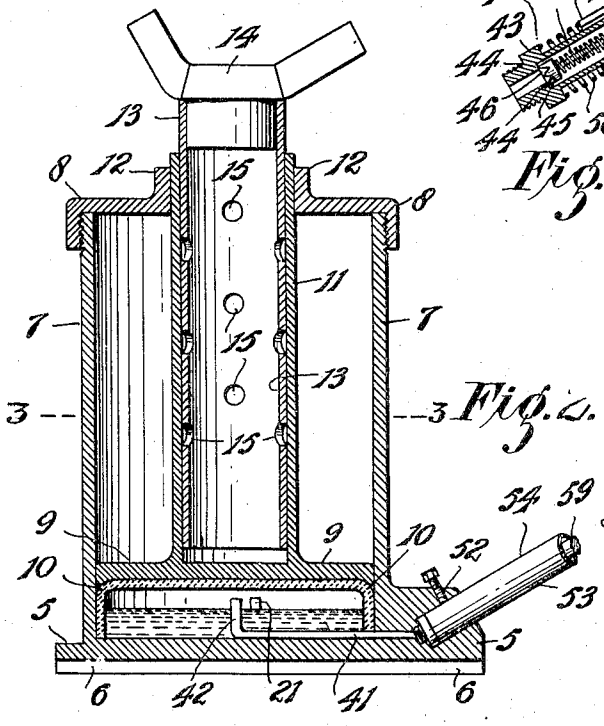
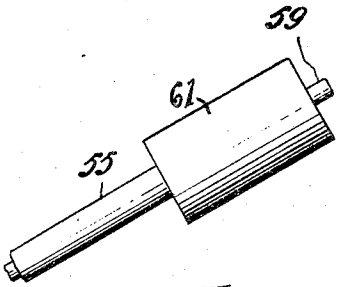



Fig. 2.




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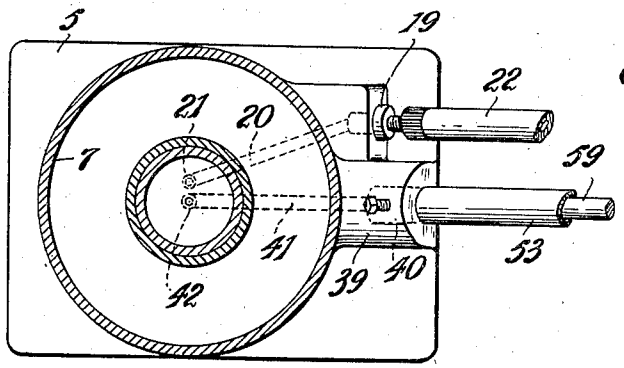



Fig. 3.

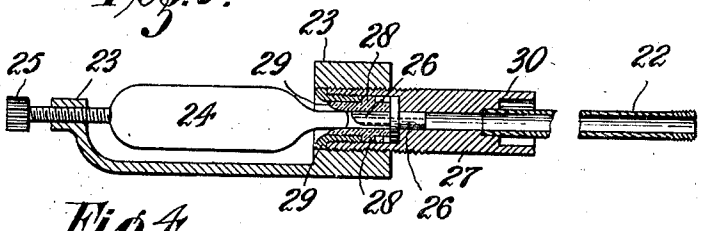



Fig. 4.

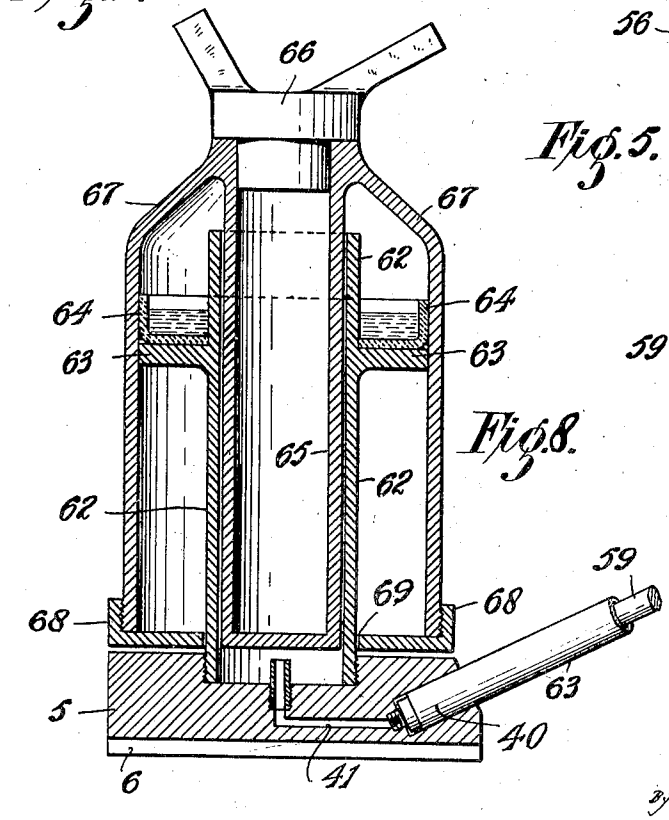
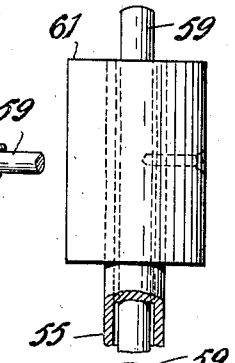



Fig. 8.



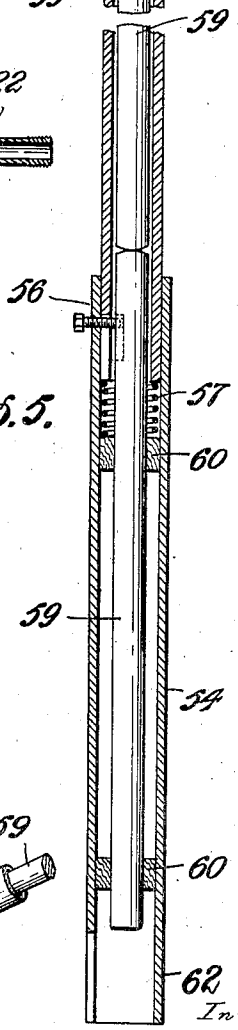




Fig. 5.

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# UNITED STATES PATENT OFFICE.

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## PNEUMATIC LIFTING JACK.

Application filed March 14, 1925, Serial No. 15,543, and in Australia March 20, 1924.

This invention relates to an improved pneumatically operated lifting jack particularly adapted for automobile use, whereby a vehicle can be conveniently raised to facilitate removal, repair or adjustment of its parts. The object of the invention is to provide a pneumatic lifting jack of relatively simple construction, which can be easily and rapidly operated and having improved means for gradually releasing the gas pressure, thus enabling a vehicle supported by the lifting jack to be slowly lowered without shock to its normal running position.

According to the invention I provide a lifting jack comprising a base having a cylindrical casing in which a piston is vertically slidable. This piston has a tubular piston rod wherein is fitted an adjustable ram having a jack head at its upper end. Fitted in the base of the lifting jack is a gas inlet valve, preferably of the nipple type, which is connected by a small gas inlet pipe to said cylindrical casing at a point beneath the piston. Said inlet valve is also connected by a flexible tube to a holder, which is adapted to accommodate a small compressed gas bulb, and has a piercer against which said gas bulb is forced by means of a pressure screw.

The lifting jack has a handle, preferably formed in detachable sections, in which a valve operating rod is mounted. This valve operating rod is arranged to actuate a slow release gas valve accommodated in the base of the lifting jack and connected to the cylindrical casing by a gas outlet pipe.

The lifting jack may be provided with a safety valve to automatically function under excessive gas pressure, and said safety valve is preferably arranged between the end of the flexible tube connected to the gas container holder and the gas inlet valve of the lifting jack.

The invention is illustrated in the accompanying drawings wherein:—

Figure 1 is a view in perspective of a representative form of my invention.

Figure 2 is a vertical cross-sectional view of the lifting jack seen in Figure 1.

Figure 3 is a horizontal cross-sectional view on line 3—3 of Figure 2.

Figure 4 is a sectional detail view of the holder for the compressed gas bulb and the associated means for piercing said gas bulb to supply gas under pressure beneath the piston.

Figure 5 is a sectional view illustrating the handle construction and the operating rod for actuating the gas release valve.

Figure 6 shows detail views of the gas release valve, and the lower end of the handle of the lifting jack.

Figure 7 is a sectional detail view of the safety valve for automatically releasing excessive gas pressure.

Figure 8 is a vertical cross-sectional view of a modified form of lifting jack within the invention.

In these views, 5 indicates the base of the pneumatic lifting jack which is preferably constructed of cast metal and has ribs 6 formed on its underneath surface to prevent the lifting jack from slipping or moving while it is in use. Formed integrally with said base is a vertical cylindrical casing 7 having a screwed cap or cover 8 fitted over its upper end.

Slidably mounted in the cylindrical casing 7 is a piston 9, which has a packing disc 10 formed of leather, rubber or like material to provide a gas-tight, but yet sliding fit between said piston and the surface of the cylindrical casing 7. The piston rod 11 is of tubular formation and is vertically slidable in a guide boss 12 formed on the cover 8.

Fitted in said tubular piston rod 11 is a ram 13, which is of tubular construction and has a jack head 14 detachably fitted into its upper end. This ram is vertically adjustable within the tubular piston rod 11, and for the purpose of retaining it in selected adjusted position it is provided with a series of oppositely disposed adjustment holes 15, through which a pin 16 can be readily passed. The pin 16 is attached to a chain 17 which is fastened to the cover 8, to prevent liability of misplacement. The upper end of the piston rod 11 is formed with a plurality of grooves 18 which register with the series of adjustment holes 15 in the ram 13 and which receive the pin 16 in order to prevent it from slipping while the lifting jack is in use.

Fitted in the base 5 of the lifting jack is a gas inlet valve 19, preferably of the nipple type, which is connected by a small gas inlet

pipe 20 to the cylindrical casing 7 at a point beneath the piston 9. The inner end of the gas inlet pipe 20 is upturned as at 21, and it projects above the surface level of a quantity of lubricating oil, such as castor oil, which is contained in the bottom of the cylindrical casing 7.

The gas inlet valve 19 is connected by a flexible tube 22 to a holder 23, which is adapted to detachably support a small compressed gas bulb 24, preferably of the "sparklet" type having a readily puncturable forward end. The gas container holder 23 has a pressure screw 25, which is adapted to exert pressure upon the rear end of the gas bulb 24 supported in said holder, and force the forward puncturable end of same against a grooved piercer 26, which is supported in a casing 27 connected to the flexible tube 22 and screwed into the end of the said holder 23.

Fitted in the casing 27 of the holder 23 and surrounding the piercer 26 is an annular washer 28 formed of rubber or like material, which is adapted to form a gas-tight fit against the forward puncturable end of the gas container 24, when same is pressed against the piercer 26 by the pressure screw 25. The annular washer 28 and the piercer 26 are both held tightly in position within the casing 27 by means of a screwed nipple 29. The casing 27 has a tubular end 30 which, by allowing free circulation of air around the end of the flexible tube 22, prevents freezing of the escaping gas from the gas container 24, and thus prevents any blockage of the tube 22.

Between the flexible pipe 22 and the gas inlet valve 19, there may be arranged a safety relief valve 31, which is adapted to automatically release excessive pressure of gas within the tube 22 and prevent damage being caused to the integers of the lifting jack. This relief valve, which is illustrated in detail in Figure 7, comprises a valve casing 32 having a valve seat 33 and an internally screw-threaded valve chamber 34. Slidably mounted in a nut member 35 screwed into said valve chamber is a valve stem 36 having a valve head 37 bearing against said valve seat 33. A coiled spring 38 surrounds the valve stem 36, and it bears against the nut member 35 and the valve head 37 to maintain the latter closed against the pressure of the gas in the flexible pipe 22. By rotating the nut member 35, the tension of the coiled spring 38 can be readily adjusted at will, thus enabling the gas pressure at which the safety valve will automatically operate to be conveniently controlled as required.

Screwed into a housing 39 formed on the base 5 of the lifting jack is a gas release valve 40 which is connected to the cylindrical casing 7 at a point beneath the piston 9 by means of a gas outlet pipe 41 having an upturned inner end 42 arranged adjacent to the end 21 of the gas inlet pipe 20. Said gas release valve 40, which is illustrated particularly in Figure 6, comprises a casing 43 formed with a shoulder 44, against which is seated a block 45 having angular gas passages or grooves 46. Slidably fitted in said block 45 is a valve-stem 47, upon which is fixedly secured a valve head 48 that is adapted to close against a valve seat 49 provided upon a sleeve 50 having central gas passages or grooves (not shown). A coiled spring 51 encircles the valve stem 47, and it normally maintains the valve head 48 closed against the valve seat 49.

Fitted into the valve housing 39 on the base 5 by means of a bayonet connection 52 is a handle 53, which consists of two tubular sections 54 and 55 detachably connected together by a bayonet connection 56 having a coiled locking spring 57. The lower end of the handle section 54 fits over the end of the valve casing 43—see Figure 6—and it also has a coiled spring 58 bearing against its end to maintain the bayonet connection 52 in correct locking position.

Arranged within the tubular handle sections is a valve operating rod 59 that is formed in two sections slidably mounted in guide blocks 60. The lower end of said valve operating rod 59 abuts against the end of the valve stem 47 while its upper end functions as a press button by projecting outwardly from a hand grip 61 which is fitted to the end of the upper handle section 55.

When the lifting jack is required for use, the handle 53 and other detachable parts are fitted onto the lifting jack, and the jack is then arranged in correct position by means of said handle 53 beneath the axle or other integer of an automobile to be raised. The ram 13 is then adjusted within the tubular piston rod 11, so that the jack head 14 is arranged in position against and beneath the vehicle axle or other part, when the pin 16 is inserted through a convenient adjustment hole 15 to retain said ram in adjusted position.

A gas bulb 24 of the type described and containing carbon-dioxide gas or other suitable gas under high pressure is then fitted into the holder 23 and the pressure screw 25 is operated to cause the forward puncturable end of said gas bulb to be forced tightly against the annular rubber washer 28, thus forming a gas-tight fit around the end of said gas bulb. Continued operation of said pressure screw 25 then causes the forward end of the gas bulb 24 to be punctured by the grooved piercer 26, thus allowing gas under pressure to escape from said container and pass through said grooved piercer 26 into the casing 27. The escaping gas then

passes through the flexible tube 22 to the gas inlet valve 19 and thence through said valve along the gas inlet pipe 20 into the cylindrical casing 7 at a point beneath the piston 9. Any excessive gas pressure within the flexible tube 22 is automatically released by means of the safety relief valve 31.

Gas under pressure entering into the cylindrical casing 7 through the gas inlet pipe 20 exerts pressure upon the flexible packing disc 10, and causes the piston 9 and said packing disc to slidably move upwardly within the cylindrical casing 7. The tubular piston rod 11 is thus also slidably moved upwardly within the guide boss 12 on the cover 8 and it causes the ram 13 and the jack-head 14 to rise and thus raise the vehicle to desired height for adjustment, removal or repair of its parts.

When it is required to release the gas pressure within the lifting jack to enable a vehicle supported thereby to be again lowered to correct running position, the valve operating rod 59 is depressed by exerting finger pressure on its projecting button end, causing the valve stem 47 of the gas release valve 40 to be moved downwardly against the influence of its coiled spring 51. The valve head 48 is thus moved away, from the valve seat 49 allowing the gas under pressure in the cylindrical casing 7 to pass through the gas outlet pipe 41 and through the gas passages or grooves 46 in the block 45 into the valve casing 43, whence it passes through the valve seat 49, and escapes through the central passage in the sleeve 50 into the tubular handle 53. The release valve 40 is of the slow acting type and allows the gas to escape very gradually so that the vehicle supported by the lifting jack is slowly lowered to its normal running position without any shock.

During the operation of the lifting jack, the packing disc 10 distributes the lubricating oil contained in the lower end of the cylindrical casing 7 over the interior surface of said casing and over the surfaces of the piston 9, thus effectively lubricating the lifting jack and also providing a gas-tight seat which prevents escape of the compressed gas from said casing. When the lifting jack is not required for use, the flexible tube 22 is unscrewed from the gas inlet valve 18, the handle 53 is detached and its sections 54 and 55 are dismantled for convenience in storage.

In the modified form of the invention illustrated by Figure 8, a tubular member 62 is screwed into the base 5 of the lifting jack over the ends of the gas inlet and outlet pipes 20 and 41, respectively, and said tubular member is formed with a flange 63, upon which is fitted a packing disc 64. Slidably mounted in said tubular member 62 is a ram 65 of hollow construction, which has a jack head 66 fitted into its upper end. This ram 65 is formed integrally with a cylindrical casing 67, which is slidable on the flange 63 and the packing disc 64, and it has a cap 68 fitted to its lower end. This cap has a central guide aperture 69, through which passes the tubular member 62. The packing disc 64 is designed to hold a quantity of lubricating oil, which serves to lubricate the lifting jack during use.

In this arrangement, when gas under pressure is admitted into the lifting jack through the gas inlet pipe 20, it exerts pressure against the closed end of the ram 65 and also passes upwardly through the space between said ram and the tubular member 62 into the cylindrical casing 67 arranged above the flange 63 and the packing disc 64. The gas thus causes said ram 65 and the cylindrical casing 67 to be forced upwardly, sliding upon the tubular member 62, thus bringing the jack head 66 into engagement with the axle or other part of the vehicle and raising the vehicle to a required height for the purpose that is necessary.

A lifting jack according to this form of the invention is furnished with a gas bulb holder and a flexible connecting tube similar to the construction illustrated in Figures 1 to 7 and it also has a detachable handle having means for operating the gas release valve.

It is to be understood that in a pneumatic lifting jack according to the invention, the gas bulb means herein described for supplying compressed gas to the cylindrical casing of the lifting jack may be dispensed with, and in lieu thereof an inflating pump may be employed or alternatively means may be provided whereby compressed air can be supplied from storage containers such as are provided in garages and like establishments.

What I do claim is:—

1. A pneumatic lifting jack, comprising a casing provided with a gas inlet; a piston slidable vertically in the casing; a jack head movable with the piston; means for supplying gas under pressure to said inlet; a gas release valve connected to said casing; an elongated tubular handle fitting over the release valve; and a rod slidable in said handle for operating said valve.

2. A pneumatic lifting jack, comprising a casing provided with a gas inlet; a piston slidable vertically in the casing; a jack head movable with the piston; means for supplying gas under pressure to said inlet; a gas release valve connected to said casing and embodying a valve casing, a spring-loaded stem movable therein and provided with a head, and a seat in the valve casing against which the valve head is normally held; an elongated tubular handle fitting over said valve casing; and a rod slidable

in said handle and bearing against said valve stem to operate the same.

3. A pneumatic lifting jack, comprising a casing provided with a gas inlet; a piston slidable vertically in the casing; a jack head movable with the piston; means for supplying gas under pressure to said inlet; a gas release valve connected to said casing and embodying a valve casing, a spring-loaded stem movable therein and provided with a head, and a seat in the valve casing against which the valve head is normally held; an elongated tubular handle fitting over said valve casing; and a rod slidable in said handle and bearing at its inner end against the valve stem to operate the same, the outer end of said rod projecting beyond the handle to form an exposed push-member.

4. A pneumatic lifting jack, comprising a casing provided with a gas inlet; a piston slidable vertically in the casing; a jack head movable with the piston; means for supplying gas under pressure to said inlet; a gas release valve connected to said casing; an elongated tubular handle fitting over the release valve; and a rod slidable in the handle and having its inner end operatively related to said valve, the outer end of said rod projecting beyond the handle to form an exposed push-member.

In testimony whereof I affix my signature.

SPENCER JEWKES.