

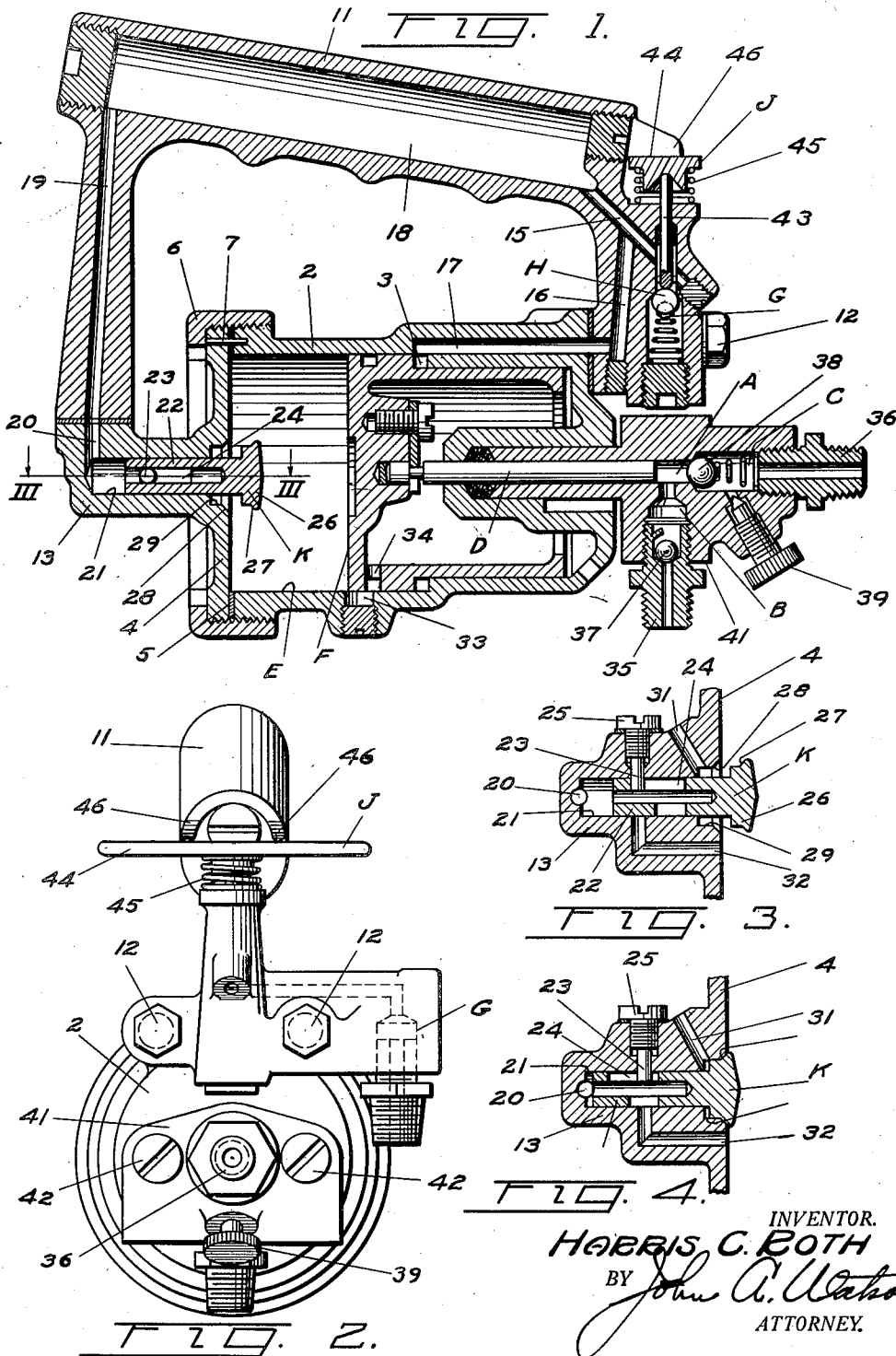
Nov. 3, 1936.

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2,059,708

MOTOR FOR LUBRICATING PUMPS

Filed July 22, 1932



UNITED STATES PATENT OFFICE

2,059,708

MOTOR FOR LUBRICATING PUMPS

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Application July 22, 1932, Serial No. 623,943

4 Claims. (Cl. 121-156)

This invention relates to improvements in lubricating devices and more particularly to fluid operated lubricant guns such as may be used to deliver lubricants under pressure into lubricant receiving nipples, fittings or other lubricant receiving members.

An object of the invention is to provide a fluid operated lubricant gun wherein a succession of lubricant charges under high pressure may be automatically discharged from the gun during the entire time in which the manually operable gun trigger is depressed.

Another object is to provide in a fluid operated lubricant gun, a novel and simple automatic fluid control valve for controlling the operation of the fluid motor.

A further object is to provide a fluid operated lubricant gun wherein operation of both the automatic control valve and the fluid motor piston is accomplished by fluid pressure, thereby eliminating the necessity for having a spring or other device for returning the piston to its initial position.

Other objects, the advantages and uses of the invention will be, or should become apparent after reading the following description and claims and after consideration of the accompanying drawing, in which:

Fig. 1 is a sectional elevation of an air operated lubricant gun constructed in accordance with the invention;

Fig. 2 is an end elevation of the gun of Fig. 1;

Fig. 3 is a sectional view of the control valve along the line III-III of Fig. 1; and

Fig. 4 is a view similar to Fig. 3 illustrating the control valve in another operative position.

In general, the air operated lubricant gun selected for illustration herein comprises, a lubricant pressure cylinder A having an inlet port B and a discharge port C, a high pressure piston D mounted for reciprocation in the cylinder A, an air motor cylinder E of relatively large diameter, an air motor piston F within the cylinder E coupled to the high pressure lubricant piston D, an air inlet port G, an air valve H operable through a double acting trigger J for controlling the admission of air through the port G and an automatic air motor valve K for automatically charging and exhausting the cylinder E of the air motor.

With particular reference to Fig. 1, the lubricant gun illustrated therein comprises a body casting 2 within which the cylinder E is formed. The forward portion of the cylinder E is of reduced diameter to accommodate the forward and

diametrically reduced portion of the piston F. This arrangement provides an annular space 3 between the rearward portion of the piston F and its cylinder wall which, when air under pressure is admitted thereto, may expand through rearward or return movement of the piston F. The cylinder E is sealed at its outer end by a cylinder head 4 and gasket 5 secured to the body casting 2 by a screw threaded ring 6. A pin 7 may be employed to lock the head 4 against rotation relative to the body 2 and adjacent positions of the gun structure.

A tubular hand grip 11 for manually supporting the gun is secured to the body casting 2 at its forward end by screws 12 and at its rearward end upon a rearwardly extending portion 13 of the head 4 within which the valve K is disposed. The inlet air valve H and the trigger mechanism J may be entirely built in and supported upon the hand grip member 11 as shown.

Air passages 15, 16 and 17 are provided in the adjoining portions of the hand grip 11 and body 2 for establishing communication between the valve H and the annular space 3, between the piston F and the adjacent walls of the cylinder E, and similarly, air passages 18, 19, 20 and the passage 15 serve to establish communication between the valve H and the cylinder 21 within which the valve K is disposed.

The valve K is of the piston type and comprises a cylindrical tubular body 22 slidably disposed in the cylinder 21 and limited against longitudinal movement therein by the introduction of a pin 23 through a slot 24 formed in the side wall of the valve body. The pin 23 may be formed upon the outer end of a screw 25 extending through the side wall of the valve cylinder 21 as shown. The outer end of the valve body 22 is formed with an enlarged head 26, the inner side 27 of which is fashioned to engage with a valve seat 28 formed at the mouth of an enlarged portion 29 of the cylinder 21 provided to receive the head 26 of the valve. An exhaust passage 31 is provided for establishing communication between the enlarged portion 29 of the valve cylinder bore and atmosphere, so that, when the valve K is in the position shown in Figs. 1 and 3, air within the cylinder E may be exhausted through the valve and thus relieve pressure at the rear of the piston F permitting it to be forced rearwardly by air under pressure in the annular space 3 at such times as when the valve H is open. The valve K at this time will maintain the position shown in Figs. 1 and 3 by vir-

tue of air under pressure admitted through the passages 15, 18, 19 and 20 to the cylinder 21 at the rear of the valve body to urge the valve outwardly of the cylinder. An air inlet passage 32 is provided between the air motor cylinder E and the valve cylinder 21, one end of which is closed by the valve body 22 when the valve K is urged outwardly of its cylinder as shown. Upon the end of the return stroke of the piston F under influence of air in the annular space 3 the head of the piston F will engage with the head 26 of the valve K to push the valve to the position shown in Fig. 4 simultaneously shutting off the exhaust passage 31 and uncovering the mouth of the air inlet passage 32. Air under pressure may thereupon enter the air motor cylinder E and urge the piston F forwardly upon a power stroke. The valve K must remain in the position of Fig. 4 so long as air pressure upon its opposite ends remains the same because of the increased area of the head 26. When the piston F moves to the position shown in Fig. 1, air is by-passed about the piston through a recess 33 in the cylinder wall, formed by closing one end of a bore through the cylinder wall, and a passage 34 provided through the wall of the piston.

The forward end of the cylinder E is provided with an opening to atmosphere so that pressure within the cylinder E is quickly reduced an amount sufficient to cause air pressure at the rear of the valve K to move the valve to exhaust position as shown in Figs. 1 and 3. In this manner the piston F of the air motor may continue to reciprocate in the cylinder E so long as the valve H remains open and to drive the high pressure lubricant piston D within the cylinder A.

Both, inlet and outlet, ports of the cylinder A may be provided with screwthread connector studs 35 and 36 respectively by means of which a lubricant feed hose and a high pressure discharge hose may be connected to the gun. An inlet check valve 37 may be incorporated in the connector stud 35 and a spring pressed check valve 38 provided within the discharge port C to assure proper lubricant pumping function. An air or lubricant relief valve 39 may be provided to establish communication at will between the port C and atmosphere.

In order to facilitate construction and assembly and to simplify repair or replacement, the entire lubricant pump mechanism except the piston D is contained within a separate body casting 41 clamped to the body casting 2 by draw screws 42 and an annular packing is interposed between the bodies 2 and 41 about the piston D to provide a seal between the piston D and cylinder A.

The double acting trigger mechanism J includes a push rod 43 adapted to bear upon the movable element or ball of the valve H, a finger engaging trigger 44 lying in a plane perpendicular to the push rod 43 and urged, under force of a spring 45 upwardly against a pair of spaced apart ears 46 on the hand grip 11, one on each side of the center of the trigger 44 or point of engagement with the push rod 43. This arrangement serves to translate pivotal movement of the trigger 44 selectively upon the ears 46 into right line movement of the push rod 43 to depress the movable element or ball of the valve H.

It is to be understood that the above described embodiments of the invention are for the purpose of illustration only, and various changes may be made therein without departing from the spirit and scope of the invention.

I claim:

1. In a fluid operated lubricant pump, a fluid motor comprising, a cylinder, a piston mounted for reciprocation in said cylinder, said piston having a portion of limited area on one side thereof subjected during operation to constant fluid pressure, means for admitting and exhausting fluid to and from said cylinder on the opposite side of said piston including a valve adapted to open by engagement of said piston therewith and to be held open by fluid pressure within said cylinder, means for subjecting the valve at all times during the operation of the motor to fluid pressure tending to close the valve, and means for reducing fluid pressure in said cylinder upon the termination of the pressure stroke of said motor piston whereby said fluid pressure tending to close the valve may become effective to close the valve.

2. A fluid motor comprising, a cylinder, a piston mounted for reciprocation in said cylinder, yielding means on one side of said piston for urging the piston inwardly of said cylinder, means for admitting and exhausting fluid to and from said cylinder on the opposite side of said piston including a valve adapted to open by engagement of said piston therewith and to be held open by fluid pressure within said cylinder, means for subjecting the valve at all times during the operation of the motor to fluid pressure tending to close the valve, and means for reducing fluid pressure in said cylinder upon the termination of the pressure stroke of said motor piston whereby said fluid pressure tending to close the valve may become effective to close the valve.

3. In a fluid operated lubricant pump, a fluid motor comprising, a cylinder, a piston mounted for reciprocation in said cylinder, and means for admitting and exhausting fluid to and from said cylinder including a control valve of the piston type having portions at opposite ends of differential areas disposed with that end of greater area subjected to fluid pressure within the cylinder and the end of lesser area subjected at all times during the operation of the motor to fluid pressure from a source of fluid pressure supply, said portion of greater area being arranged for engagement by said motor piston at the limit of its return stroke to cause the valve to shift to open position and means controlled by the piston for reducing the pressure in said cylinder when the piston is at the limit of its working stroke.

4. A fluid motor comprising, a cylinder, a piston mounted for reciprocation in said cylinder, said piston having a portion of limited area subjected at all times during motor operation to fluid pressure tending to urge the piston inwardly of the cylinder, valve means including a member extending within the cylinder operable to admit fluid to said cylinder upon movement of said member by said piston during the latter portion of the retractile stroke of the piston, said valve member being constructed and arranged to move inwardly of the cylinder in response to a differential in pressure, between the operating pressure of said fluid and the pressure of the fluid within said cylinder, to exhaust fluid from said cylinder, and means providing a pressure relief port for said cylinder arranged to open upon the arrival of said piston at the end of its pressure stroke thereby to establish a differential between fluid operating pressure and fluid pressure within the cylinder.

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