

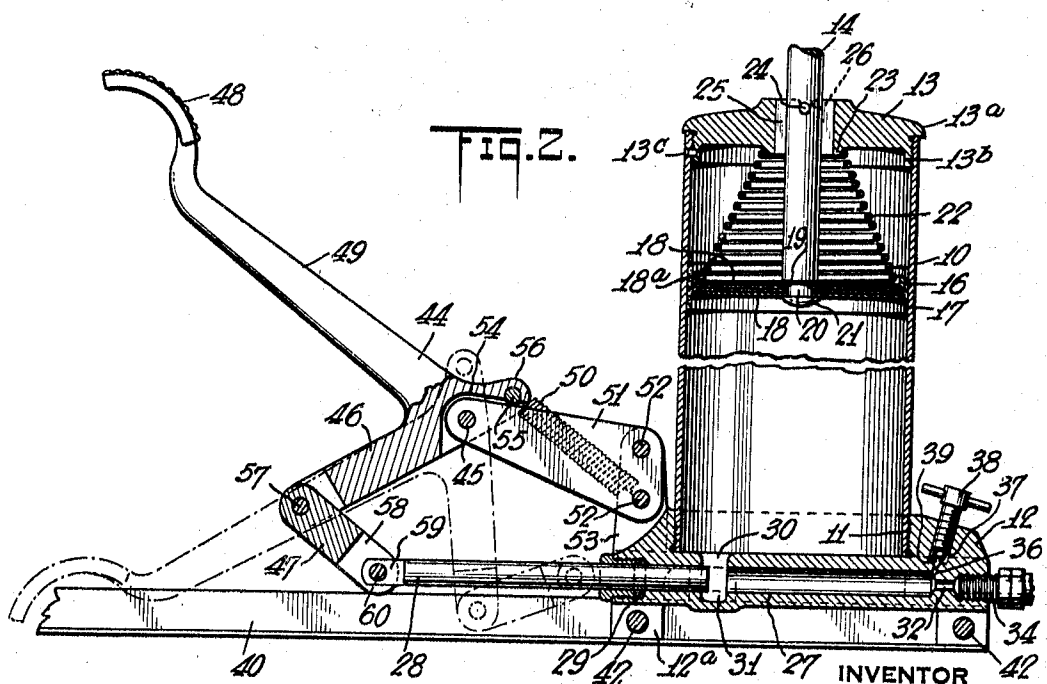
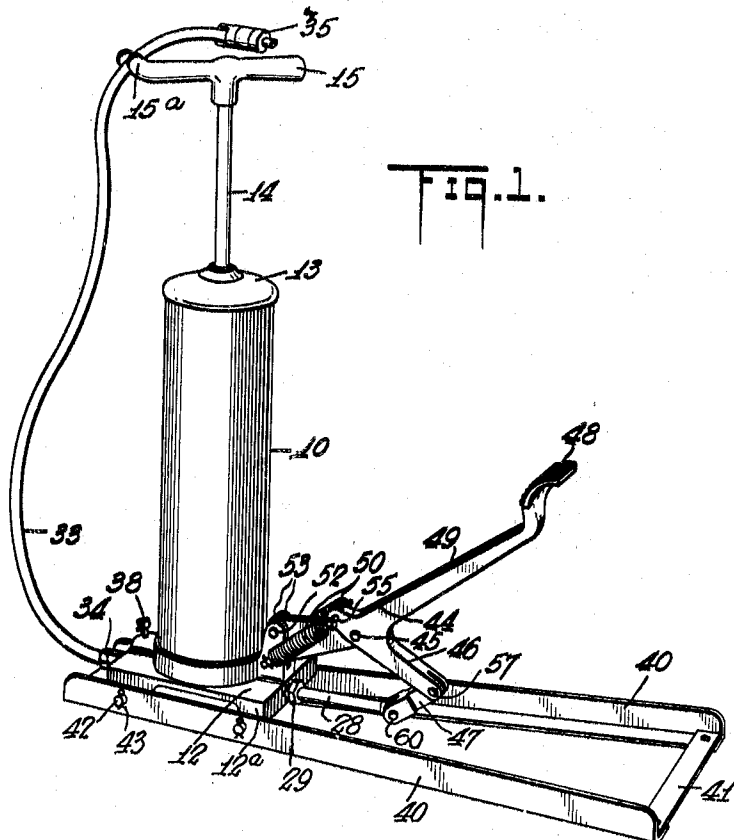
May 12, 1931.

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1,804,731

HIGH POWER PEDAL OPERATED GREASE GUN

Filed Jan. 7, 1929



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HIGH POWER PEDAL-OPERATED GREASE GUN

Application filed January 7, 1929. Serial No. 330,803.

The grease gun of the present invention is designed to supply oil or grease to bearings, gear housings, universal joints, etc., either directly or through grease cups or

through detachable couplers and fittings, which are used in place of grease cups in accordance with force feed lubricating systems after the manner described in the British patent to Alley, et al., 21,893 of 1906.

It includes a force feed reservoir supplying grease to a single acting high pressure pump, somewhat as in my Patents Nos. 1,389,186 and 1,686,309, but more exactly as in my application Ser. No. 190,726, filed May 12th, 1927, in which latter, a small capacity, high pressure plunger is arranged in a cylinder integral with the base which carries the reservoir that supplies grease to the pump. The pump is of the valveless type in which the pump cylinder inlet is opened and closed by the pump piston, and the pump cylinder being arranged horizontally below the supply reservoir, grease from the latter flows directly into the pump cylinder on the retraction stroke of the piston, this piston on its working stroke forcing the grease through a valveless outlet, into the usual flexible conduit whence it passes to the bearings. The plunger is operated by a down-stroke lever system and the base of the reservoir is detachably secured to a stable base adapted to sustain the operating down pressure so that it will not cause upset of the reservoir.

The present invention is particularly concerned with the provision of an improved operating mechanism for the pump plunger, this mechanism being designed for utilizing a manual or pedal pressure parallel with the reservoir to effect a slow, powerful forward thrust of the pump piston and release and automatic rapid return stroke thereof. The mechanism is also designed to give a substantial maximum thrust on the piston at the end of its expelling stroke, when it is most needed; also in a direction and at a time when the most powerful lateral thrust on the free end of the plunger will be least effective for bending or breaking it. It includes a foot operated lever or treadle, the

range of movement of which is relatively small and approximates vertical so that it can be conveniently rapidly pedally depressed without tiring the operator and without need for any special care in the manner of applying the foot pressure.

The operating mechanism is of especially rugged and durable construction, involving no movable fulcrum and designed to minimize bending or twisting stresses on the pump plunger during the high pressure part of its forward stroke. Neither careless handling of the apparatus nor the accidental dropping of heavy articles upon it is apt to injure the device. Such mechanism represents a material improvement over the operating means shown in my above mentioned pending application, wherein there is a compound movement of a manually operated lever arranged to swing from initial outward, horizontal movement to a final vertical movement, so that only the latter part of the movement could be accomplished by down-pressure of the foot. Such part manual, part pedal operation was more awkward and in certain positions imposed undesirable bending stresses on the pump piston. Moreover, the great angular swing of the lever necessitated a floating or link fulcrum for the lever, exposing the plunger to direct transverse or bending stresses applied directly downward from the lever throughout its stroke.

The device of the present invention facilitates simple, rapid, down pressure operation, requires less careful manipulation and is in other respects better suited for the rough and careless handling to which such apparatus is very apt to be subjected in an ordinary garage.

The invention may be more fully understood from the following description in connection with the accompanying drawings, wherein

Fig. 1 is a perspective view of a high powered grease gun embodying the invention;

Fig. 2 is a broken view mainly in longitudinal section through the apparatus.

In the drawings the grease reservoir is shown as screwed into a suitably thread-

ed socket 11 formed in a cast base 12. The top of the reservoir is closed by a screw cap 13 including an outwardly extending flange portion 13a abutting the top of the cylinder 10 and downwardly extending threaded flange portion 13b having threaded engagement with the cylinder and removably secured in place as by a blind rivet 13c.

Mounted to slide in a central opening in the cap 13 is a piston rod 14 having an operating handle 15 at its upper end and a piston at its lower end. The latter may conventionally comprise oppositely directed cup leathers 16 and 17 held between clamping plates 18. This piston is secured to the rod 14 in any suitable manner as by forming the latter with a shoulder 19, a reduced shank 20 which passes through the piston and a head 21 which is riveted over to clamp the piston against the shoulder.

The piston is normally pressed downwardly by a coiled conical spring 22 having its smaller end centered about a pendent boss 23 on the cap 13 and its lower end centered by an upstanding marginal flange 18a on the upper clamping plate 18.

The piston may be retracted, compressing the spring, by means of the handle 15, when the projecting ends of pins 24 are in registry with slots 25 in the cap 13. After the handle has been drawn upwardly a sufficient distance so that the pins 24 clear the cap, the handle may be rotated to move the pins out of registry with the slots 25 whereby the piston will be held in its fully retracted position. To prevent accidental rotation of the piston in this position, locking notches 26 may be provided as seats for the pins.

With the pins thus seated as in Fig. 2, the rod 14 is locked to the head 13 and since the head is permanently locked to the cylinder by the rivet 13c, the latter may be unscrewed from the base 12 by using the handle 15 as a wrench. The cylinder may then be packed with grease through its open end and again screwed to the base.

Integral with the base 12 is the horizontal pump cylinder 27 in which slides the plunger rod 28 working through a stuffing box 29 at one end of the cylinder 27. The grease passes from the reservoir 10 into the pump cylinder 27 through an inlet port 30 flared outwardly at its top and communicating with a passage 31 extending completely around the cylinder 27 so as to permit the supply of grease to this cylinder from all sides as soon as the end of the piston 28 starts to clear the wall of the port 30 on the retraction stroke of the piston.

On the working stroke of the piston the grease which has entered the cylinder 27 is pressed forwardly through a reduced bore 32 into a flexible conduit 33 preferably of

metal and adapted to sustain very high internal pressures.

This conduit is provided with a nipple 34 screwed into the base 12 and a fitting 35 to be attached to the fitting on the machine to be lubricated.

In the event that the conduit 33 is very short, it is important that the passageway 32 should be considerably restricted. This construction of course requires a slow forward stroke of the piston, but prevents much grease from flowing back on the rapid retraction stroke of the piston and relieving pressure in the hose.

Where the conduit 33, however, is fairly long and the grease is fairly heavy, there will be such a strong frictional resistance to return flow of grease to the pump cylinder during the quick retraction stroke of the piston that the size of the passage 32 becomes less important and in fact may in some instances be substantially as large as the cross section of the pump cylinder itself without materially impairing the efficiency of the apparatus or the pressure which may be built up in the conduit 33.

The handle 15 may have a bifurcated end 15a to conveniently hold the hose 33 or the fitting 35 on the end of the hose, so that the hose will not be dragged about the floor and stepped on when the device is not in use.

At its outer end, the pump cylinder 27 communicates through a priming outlet or vent 36 with a bore 37 into which is screwed plug 38 having a reduced inner end terminating in a conical point which normally projects into the upper end of the passage 36 at the conical lower end of the bore 37. At one side of the bore 37 there is an opening 39 (indicated in dotted lines) through which air or lubricant forced past the conical plug 38 may be vented.

To afford a suitable support for the reservoir and to prevent tilting of this device when pressure is applied to the foot lever to operate the pump piston, as will be later described, the base 12 includes a flat portion with forwardly converging sides and with legs 12a at its corners. The flat portion of the base is removably fitted into an anti-tilting secondary base structure which includes diverging angle iron members 40 connected at their divergent ends by a cross-piece 41 and at their convergent ends substantially fitting the tapered portion of the base 12 and secured thereto by rods 42 extending through openings in the legs 12a and in the upright flanges of the angle irons 40, these rods being held in place in any suitable manner as by the cotter pins 43 which are passed through openings in their ends.

The apparatus as thus far described is in many respects quite similar to the disclosure

in my prior application above referred to, the present invention being more especially concerned with the arrangement and construction of the pedally operated mechanism for reciprocating the pump plunger 28.

This mechanism includes a bell-crank lever 44 pivoted on a fixed fulcrum 45 and having its shorter end 46 connected by link 47 to the piston rod 28. This is a notable improvement over my prior device in which necessary offset relation of the fulcrum is obtained by floating it on the end of link. The irregularity of the bell-crank lever 44, the lateral offset of its fixed fulcrum and the length of the link are so related that the working stroke of the piston may be effected by stepping on the pedal 48 at the free end of the longer arm 49 of the lever. The retraction stroke of the pump piston is automatically effected by the coiled springs 50.

While the fixed fulcrum 45 might, if desired, be made as an integral part of the base casting 12, I have in the present instance elected to show a rearwardly extending rigid plate 51. This plate is fixedly secured to the casting by rivets or pins 52 which hold the forward end of the plate in position between a pair of upstanding ears 53 at the rear end of the casting 12. The longer arm 49 and the shorter arm 46 of the lever 44 are disposed at approximately 45° angles relatively to each other and at the elbow of the lever the latter is recessed as at 54 to accommodate the rearwardly extending end of the plate 51 and is connected to such plate end by the fulcrum pin 45 above referred to.

The walls of the slot 54 are operative, as will be apparent from Fig. 2 to limit movement of the lever 44 under the influence of foot pressure on the pedal 48 or under the influence of the restoring springs 50. These springs are anchored to the ears 53 and to the projecting ends of a pin 55 carried by a projection 56 at the elbow of the angular lever 44. Downward movement of the lever is preferably limited by its pedal portion striking the ground or the cross bar 41 of the base.

Link 47 which connects arm 46 and piston 28 is relatively short and sturdy. One end of this link is pivoted as by pin 57 between the bifurcated end of the shorter arm 46 of the lever and the other end of the link is in turn bifurcated as at 58 to receive the reduced end 59 of the piston 28 which is pivoted between the furcations by pin 60.

In practice the construction may be such that with the piston 28 in its fully retracted position under the influence of springs 50, the longer arm of the lever 49 will assume an angle of say 45° to the horizontal and the pedal 48 may be, say, 10½ inches above the base frame 40.

When the pedal is in this position, at the beginning of the forward stroke of piston, the link 47 is at an angle of about 30° to the horizontal and not at the most effective angle for exerting a direct forward thrust on the piston 28. But, at this time and for a considerable part of the initial movement of the lever arm 49 toward the depressed position, the inlet port permits free reverse flow of grease, so that piston 29 encounters little resistance and by the time the port is closed and the piston 28 meets a strong resistance, the link 47 will have straightened out into substantial axial alignment with the piston and will be exerting its most effective thrust.

Toward the end of the piston stroke, link 47 again is disposed at a slight angle to the axis of the plunger, but by this time practically all of the plunger will be within and laterally supported by the cylinder 27, and the end of the plunger remaining outside will be so short and stubby that the lateral component of even the most powerful thrust will not exert strains on the plunger sufficient to spring it, bend it or cause leakage around it.

There is never at any stage of the movement any tendency to exert a direct upward prying stress or transverse bending strain on the pump piston and the power for operating the piston is transmitted when most needed in a very effective manner.

It will be seen that this apparatus, particularly the operating mechanism, is of such rugged and durable type and is so arranged that accidentally stepping on it at the wrong place or dropping a heavy weight upon it will do nothing more than depress the lever and force the plunger in. Contrary to the device of my prior application no compound swinging and depressing movement is necessary for operation and any force applied to the lever 49 which has a downward component in it will be effective to operate the mechanism.

In practice the piston 28 will be about one-half an inch in diameter and the part 32 may be, say, one-quarter inch in diameter. By rapid oscillation of the lever 49 pressures up to say 10,000 pounds per square inch or more may be built up in the conduit 33 as above described and yet but little power is required to effect the return stroke of the pump piston. This piston in its retraction stroke can only draw about three pounds of vacuum, so that the springs 50 need not be particularly powerful.

What I claim is:

1. In a grease gun of the character which includes a base, an upright reservoir thereon, a substantially horizontal pump cylinder formed in said base having an intake receiving grease from the reservoir and a plunger working horizontally in the cylin-

der, foot-operated power multiplying means for actuating the plunger including an angular lever, a fulcrum for the elbow of the lever laterally offset from but fixed relatively to the base and a link connecting one end of the lever to the pump plunger, the arms of the lever being disposed at an acute angle to each other and spring means normally holding the lever with its power receiving arm disposed at approximately 45° to the horizontal.

2. In a grease gun of the character which includes a base, an upright reservoir thereon, a substantially horizontal pump cylinder formed in said base having an intake receiving grease from the reservoir and a plunger working horizontally in the cylinder, foot-operated power multiplying means for actuating the plunger including an angular lever, a fulcrum for the elbow of the lever laterally offset from but fixed relatively to the base and a link shorter than the distance of said offset connecting one end of the lever to the pump plunger, spring means urging the lever to plunger-retracting position and means limiting the plunger-retracting movement of the lever so that the upper arm thereof is normally disposed at a convenient angle to be pedally depressed.

3. In a grease gun of the character which includes a base, an upright reservoir thereon, a substantially horizontal pump cylinder formed in said base having an intake receiving grease from the reservoir and a plunger working horizontally in the cylinder, pedally operated power multiplying means for actuating the plunger including an angular lever, a fulcrum for the elbow of the lever laterally offset from but fixed relatively to the base and a link connecting one end of the lever to the pump plunger, the lever including a relatively long arm and a relatively short arm, the longer arm of the lever being disposed uppermost and carrying a pedal at its free end and the shorter arm of the lever being connected to the link.

4. Apparatus as set forth in claim 3 and wherein the link is relatively short and is moved into axial alignment with the plunger which it operates during the power stroke of the lever.

5. In a grease gun of the character which includes a base, an upright reservoir thereon, a substantially horizontal pump cylinder formed in said base having an intake receiving grease from the reservoir and a plunger working horizontally in the cylinder, pedally operated power multiplying means for actuating the plunger including an angular lever, a fulcrum for the elbow of the lever laterally offset from but fixed relatively to the base and a link connecting one end of the lever to the pump plunger, the lever in the region of its elbow being recessed and

stop means coacting with the walls of the recess to limit the throw of the lever.

6. In a grease gun of the character which includes a base, an upright reservoir thereon, a substantially horizontal pump cylinder formed in said base having an intake receiving grease from the reservoir and a plunger working horizontally in the cylinder, pedally operated power multiplying means for actuating the plunger including an angular lever, a fulcrum for the elbow of the lever laterally offset from but fixed relatively to the base and a link connecting one end of the lever to the pump plunger, coiled contractile springs anchored to the base and engaging the lever in the region of its fulcrum to normally move the latter to plunger-retracting position.

7. In a grease gun of the character which includes a base, an upright reservoir thereon, a substantially horizontal pump cylinder formed in said base having an intake receiving grease from the reservoir and a plunger working horizontally in the cylinder, pedally operated power multiplying means for actuating the plunger, including ears on the base, a plate fixed between the ears and projecting in a substantially horizontal direction, an angular lever fulcrumed on the end of the plate and a link connecting one end of the lever to the pump plunger.

Signed at New York, in the county of New York and State of New York, this 5th day of January, A. D. 1928

HERMAN ALBERTINE.