

Sept. 30, 1952

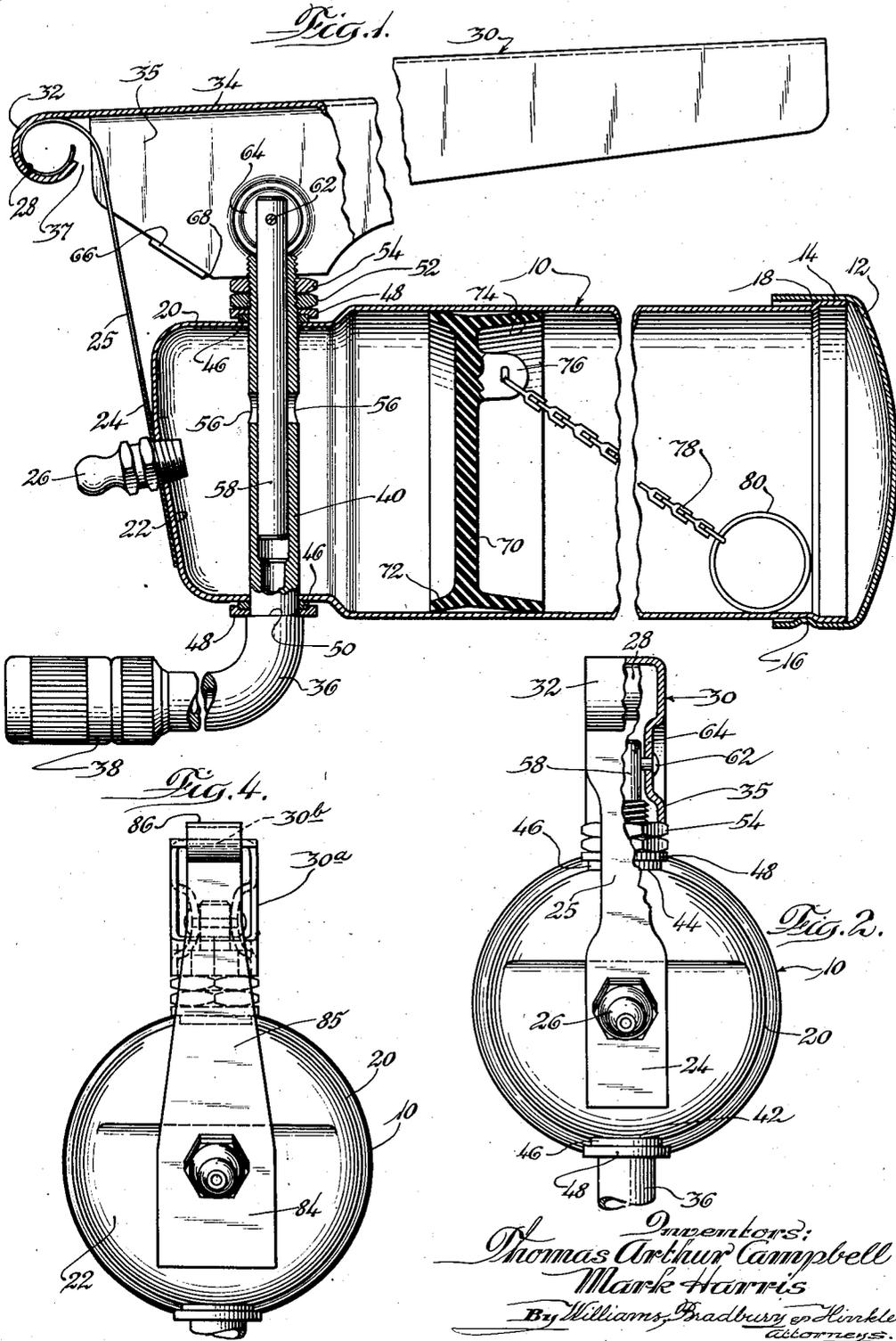
T. A. CAMPBELL ET AL

2,612,296

COMBINED GREASE PUMP AND RESERVOIR

Filed March 22, 1946

3 Sheets-Sheet 1



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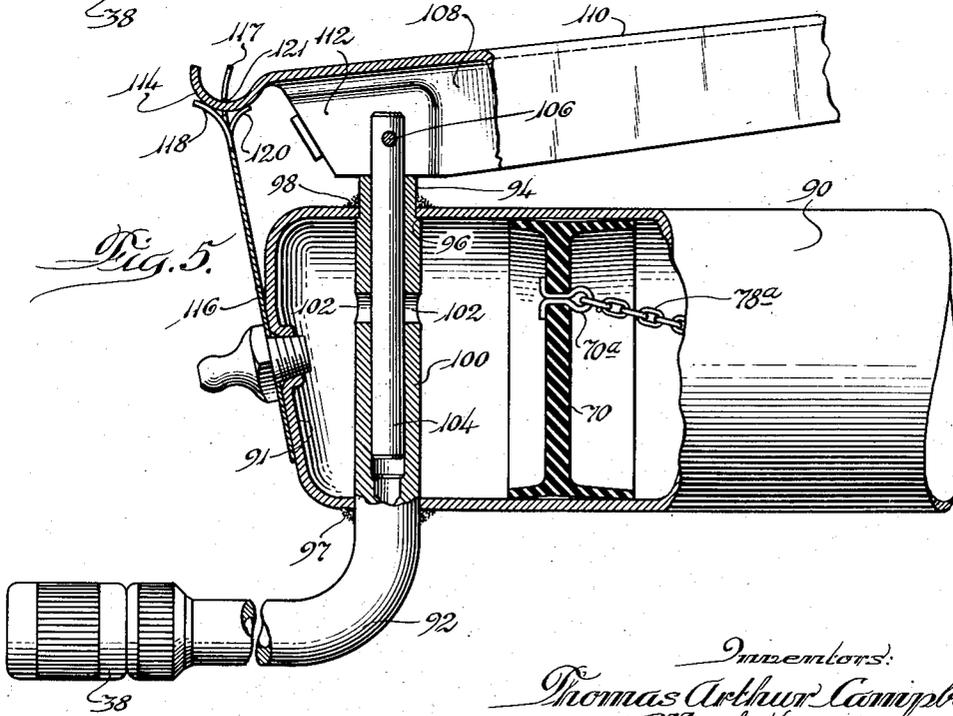
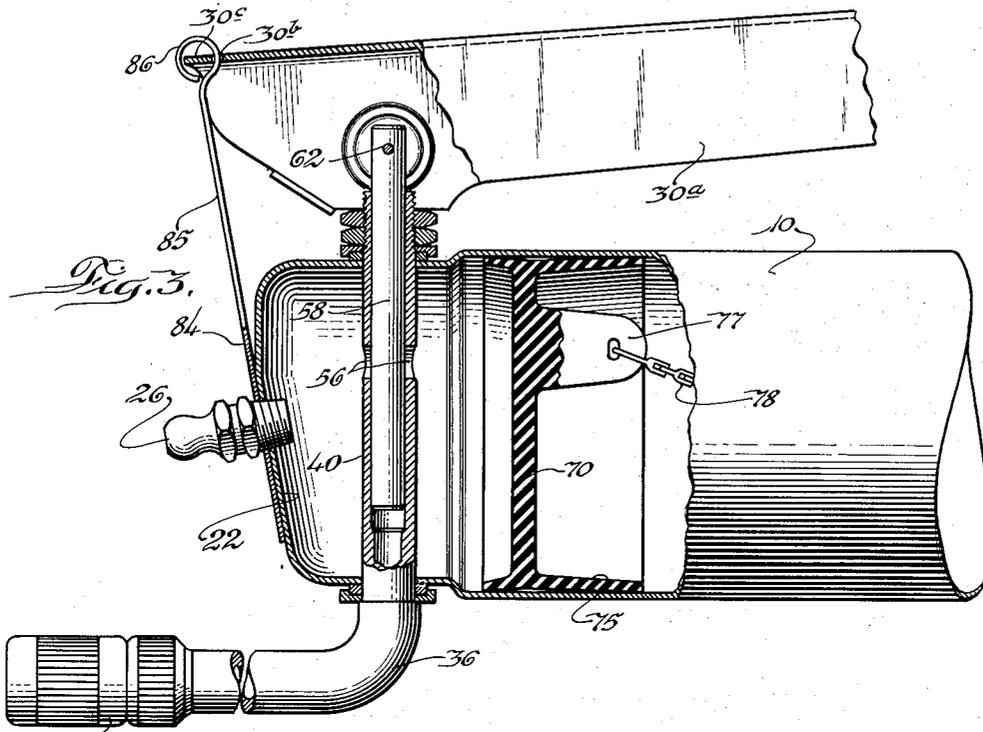
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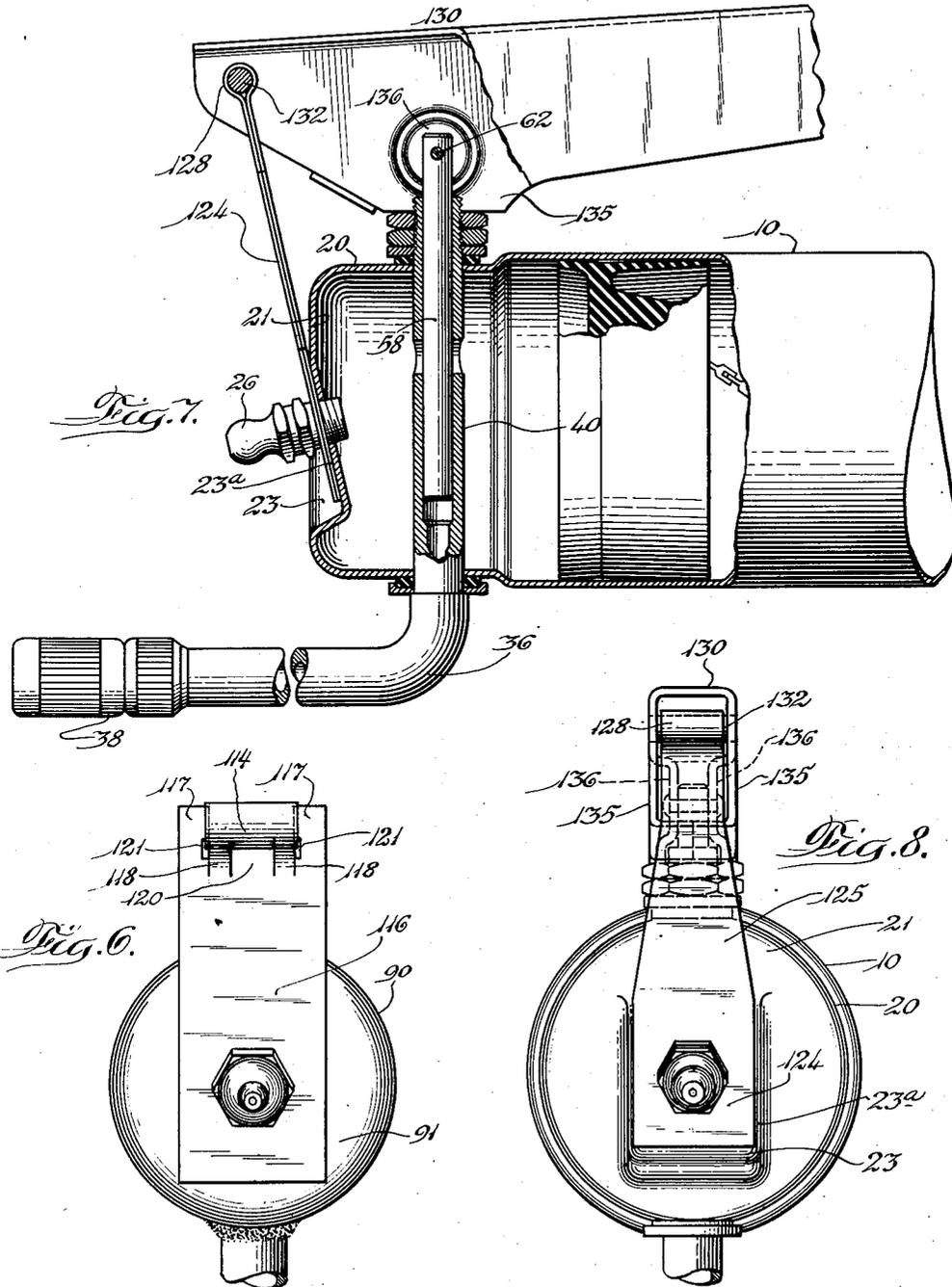
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Filed March 22, 1946

3 Sheets-Sheet 3



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# UNITED STATES PATENT OFFICE

2,612,296

## COMBINED GREASE PUMP AND RESERVOIR

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Application March 22, 1946, Serial No. 656,312

12 Claims. (Cl. 222-385)

1

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This invention relates to portable lubricant compressors of the type commonly referred to as grease guns and arranged to be operated manually for forcing lubricant into bearings under pressure.

One object of the invention is to provide a grease gun of the lever type designed for economical manufacture and comprising a relatively small number of parts.

Another object of the invention is to provide a grease gun of the lever type constructed almost entirely of sheet metal parts formed for simple and rapid assembly.

More specifically, it is an object of the invention to provide a grease gun of the lever type in which a movable fulcrum for the operating lever is formed as a part of a flexible or spring member secured rigidly to the barrel of the gun, thereby avoiding more complicated linkage and additional pivotal joints.

It is also an object of the invention to provide a grease gun in which the high pressure cylinder is formed integrally with the delivery tube as a means of simplifying construction and reducing the number of parts.

Other objects and advantages of the invention will appear from the following description taken in connection with the drawings, in which:

Fig. 1 is principally a longitudinal vertical section of the grease gun embodying this invention, taken axially with respect to the barrel thereof and with portions of the barrel and lever broken out to condense the view;

Fig. 2 is an end elevation of the structure shown in Fig. 1 with parts broken away and shown in section;

Fig. 3 is a fragmentary side elevation partly in section showing modified construction;

Fig. 4 is an end elevation of the structure shown in Fig. 3;

Fig. 5 is a fragmentary side elevation partly in section showing another form of the invention;

Fig. 6 is an end elevation of the structure shown in Fig. 5;

Fig. 7 is a fragmentary side elevation partly in section showing a further modification of the invention;

Fig. 8 is an end elevation of the structure shown in Fig. 7.

In the form of the invention illustrated in Figs. 1 and 2, the grease gun includes a sheet metal barrel 10 having a removable closure cap 12 at one end. Said cap fits over the slightly enlarged rim portion 14 of the barrel 10 and is yieldingly retained thereon by inwardly project-

ing bosses 16 formed in the flange of the cap 12 in position to engage against the shoulder 18 at the junction of the portion 14 with the remainder of the barrel. At the opposite end the barrel includes a portion 20 of slightly reduced diameter having an integral end wall 22, a portion of which is slightly inclined to a plane perpendicular to the axis of the barrel 10 and has secured against it, as by spot welding or otherwise, one end of a flat spring arm 24. A filling nipple 26 extends through the arm 24 and is screwed into the end wall 22. The free end of the arm 24 is curled into cylindrical form at 28 to serve as a pivotal fulcrum bearing for the operating lever 30 which is of channel-shaped cross section and has a terminal portion 32 of its web 34 similarly curled to fit around the part 28 of the arm 24.

The delivery tube 36 is shown with a suitable terminal coupling 38, and the opposite end of said tube is slightly reduced to serve as the high pressure cylinder 40 which extends diametrically through the reduced end portion 20 of the barrel. The barrel is slightly flattened at 42 and 44 adjacent the cylinder 40 to form bearing surfaces for gaskets 46 and their cupped washers 48 which serve to seal the cylinder portion 40 of the tube in the barrel. One of the washers 48 is stopped against the shoulder 50 which is formed by the slight reduction of the diameter of the tubing 36, and the other washer 48 is clamped in position by a nut 52 and lock nut 54 secured on the threaded end of the cylinder 40 outside the barrel. This arrangement allows the delivery tube to be swivelly adjusted about the axis of the cylinder portion 40 to facilitate application of the coupling 38 or actuation of the plunger.

The cylinder 40 is provided with inlet ports 56, and a plunger 58 is slidable within the bore of the cylinder 40 which is a slight enlargement of the bore of the original tubing 36. At the upper end the plunger 58 is connected to the lever 30 by means of a pivot 62 secured in the side flanges 35 of the lever 30, said flanges being preferably formed with inwardly extending circular bosses 64 between which the end of the plunger is snugly fitted. The side flanges of the lever also are provided with inwardly extending lugs 66 formed on the lower edges of said flanges at positions intermediate the pivot 62 and the fulcrum portion 32 so that the edges 68 of said lugs will engage the side of the plunger 58 when the lever 30 is swung upwardly to withdraw the plunger, and said lugs will thus act as stops to check the lever movement and limit the outward

stroke of the plunger 58 at a position in which its lower end has uncovered the ports 56.

In a grease gun of this type it is usual to provide a piston or follower for the quantity of grease in the barrel 10 to prevent the suction produced in the cylinder 40 from drawing air through the grease when the barrel 10 is partially empty. In the present structure the follower is in the form of a piston 70, preferably of synthetic rubber or like material, having a short flange 72 extending toward the end of the barrel which contains the high pressure cylinder, and the longer flange 74 extending in the opposite direction. An eccentrically disposed lug 76 has attached to it a chain 78 with a terminal ring 80 so that when the charge of grease in the barrel 10 is substantially exhausted and the follower 70 has been drawn by the suction toward the end of the barrel containing the high pressure cylinder 40, the follower can be readily returned to the outer end of the barrel 10 by removing the cap 12 and pulling on the chain 78. Owing to the eccentric position of the lug 76 the pull on the chain will operate to tip the follower 70 out of its normal position perpendicular to the axis of the barrel and will thus break its sealing relation to the barrel so as to facilitate its removal and replacement in the outer end portion of the barrel 10. This may be done after the new charge of grease has been introduced through the end of the barrel uncovered by removal of the cap 12 or the barrel may be refilled through the fitting 26 after the follower 70 has been set up in the outer end thereof and the cap 12 replaced in the position shown in Fig. 1.

It will be noted that the simple pivotal connection between the plunger 58 and the lever 30 at 62 requires this portion of the lever to move in a straight line as the plunger is reciprocated, and the required accommodation of the fulcrum 28 is provided by the flexibility of the arm 24 which may be somewhat increased by reducing the width of the arm at 25, as seen in Fig. 2. It also may be noted that the lever 30 and its supporting arm 24 may be readily assembled because the curled portion 32 of the web 34 extends beyond the side flanges 35 and is slightly spaced therefrom at 37, thus permitting the curled portion 28 of the arm 24 to be slid axially into the curled portion 32 of the lever.

In the modified structure shown in Fig. 3, the barrel 10 is similar to that of Fig. 1 and the cylinder 40 and its plunger 58 also are similar to those corresponding parts shown in Fig. 1. The follower 70 closely resembles the follower of Fig. 1 except that its flange 75 is somewhat longer than the flange 74 and its lug 77 is made correspondingly longer but also is eccentrically positioned and operates in the same manner when the chain 78 is pulled for removing the follower.

The design of the lever 30a is quite similar to that of the lever 30, but the fulcrum of the lever differs somewhat from that already described. A flexible arm 84 is secured to the end wall 22 of the barrel 10 and its free end is curled in the form of an eye 86 which is looped through a slot 30b in the web of the lever 30a and near the end thereof. The extreme end portion 30c of the lever extends diametrically within the eye 86 so that the lever is fulcrumed substantially at the axis of said eye while the flexibility of the arm 84 provides the necessary accommodation for the movement of the lever when the plunger 58 is reciprocated thereby. Preferably, the upper end portion 85 of the lever is tapered as shown in

Fig. 4 to increase its flexibility and also to fit the eye portion 86 within the width of the channel-shaped lever 30a.

Figs. 5 and 6 represent a further modification in which the barrel 90 is not reduced in diameter at the end which contains the high pressure cylinder and is not even flattened at the areas through which the cylinder protrudes. Instead, the full diameter of the outlet tube 92 extends through an opening in the lower side of the barrel and a slightly reduced terminal portion 94 of the tube extends through an opening in the upper side of the barrel with its shoulder 96 abutting the inner surface of the wall of the barrel. Welding or brazing metal is applied externally at 97 and 98 for securing the tube firmly in the barrel so that the portion 100 thereof within the barrel shall constitute the high pressure cylinder of the grease gun. This portion is provided with the usual inlet ports 102 and is fitted with a plunger 104 connected by a pivot pin 106 to the side flanges 108 of the operating lever 110. As shown, said flanges may have the areas 112 pressed inwardly to engage opposite sides of the plunger 104.

The terminal portion of the web of the channel-shaped lever 110 extends beyond the side flanges 108 and is arcuately curved at 114 to form the fulcrum portion of the lever. The flexible supporting arm 116 which is secured to the end wall 91 of the barrel 90 is split inwardly from its upper end to separate the middle portion of the arm from the two lateral portions 117, 117 which are left standing in the main plane of the arm 116. The middle portion is subdivided into a pair of tongues 118, 118 and a middle tongue 120. As seen in Fig. 5 the middle tongue 120 is bent out of the plane of the arm 116 at one side of said plane and the other two tongues 118, 118 are bent in the opposite direction so that the three tongues form a cradle for the arcuate terminal 114 of the lever 110. The inwardly facing edges of the lateral portions 117, 117 are notched at 121 to engage the lateral edges of the arcuate terminal 114 so as to retain it upon the support provided by the tongues 118, 120. Thus when the lever 110 is actuated the arcuate portion 114 merely rides through the notches 121 and over the end portions of the tongues 118 and 120, swinging substantially about the axis of its arcuate form, and the required shifting of the fulcrum incident to the straight line reciprocation of the plunger 104 is permitted by the flexibility of the arm 116. Incidentally, in this modification the chain 78a is shown attached to the follower 70 by means of a metallic eye 70a formed with tongues which extend through the web or diaphragm portion of the follower 70 and are bent over to anchor the eye therein.

Figs. 7 and 8 show a structure in which the barrel 10 has a reduced end portion 20 and in which the end wall 21 is formed with a recess 23 providing a flat surface 23a against which the flexible arm 124 is secured. The outlet tube 36 and the high pressure cylinder 40 are substantially like those shown in Fig. 1 and are similarly secured to the reduced portion 20 of the barrel 10. The plunger 58 is pivoted at 62 to the lever 130, the side flanges 135 thereof having circular indentations 136 which snugly embrace the plunger. As shown, the flexible arm 124 is tapered at 125 and is of double thickness, being bent to form an eye 128 at its upper end to serve as a fulcrum bearing for the pivot 132 mounted in the flanges 135 of the lever 130. In this con-

5

struction as in those already described, the flexibility of the arm 124 provides the necessary accommodation of the fulcrum bearing to the straight-line movement of the plunger 58.

Customarily a grease gun of the type disclosed herein includes a check valve at the outlet end of the high pressure cylinder. While such a valve could be provided at that position in each of the structures shown in the drawings, it is considered preferable, in the interest of simplified manufacture, to embody a simple form of spring-pressed ball check valve in the coupler fitting 38, and no detailed illustration of such a valve will be required by those skilled in the art.

It will be seen that the grease gun construction herein disclosed, together with the several modifications thereof as to detail, provides for relatively economical manufacture utilizing stamped or drawn sheet metal parts wherever possible and providing for relatively simple assembly operations but without any sacrifice in the efficiency of the device itself for its intended purpose. While we have shown and described herein several forms of the invention each including its principal features, it will be understood that the invention is not limited thereto or thereby but may assume various other forms and includes all modifications, variations, and equivalents coming within the scope of the appended claims.

We claim:

1. In a lever type grease gun, a barrel, a unitary cylinder extending transversely in the barrel near one end thereof, a plunger reciprocable in the cylinder, an operating lever pivoted directly to the plunger, and a fulcrum support for said lever comprising a flexible arm secured to the barrel and extending laterally therefrom, said arm having a curled end portion and the lever having a curled terminal portion fitted thereto in pivotal engagement therewith.

2. In a lever type grease gun, a barrel, a unitary cylinder extending transversely in the barrel near one end thereof, a plunger reciprocable in the cylinder, an operating lever pivoted directly to the plunger, and a fulcrum support for said lever comprising a flexible arm secured to the barrel and extending laterally therefrom, said arm and lever being pivotally connected by means of a terminal eye on one of them engaged in a transverse slot in the other near the end thereof.

3. In a lever type grease gun, a barrel, a unitary cylinder extending transversely in the barrel near one end thereof, a plunger reciprocable in the cylinder, an operating lever pivoted directly to the plunger, and a fulcrum support for said lever comprising a flexible arm secured to the barrel and extending laterally therefrom, said lever having an arcuately curved terminal portion and said arm being split to form tongues curved away from the plane of the arm at both sides thereof providing a cradle for said arcuate terminal of the lever with upstanding lateral guard tongues having inwardly facing notches engaging the edges of said arcuate part to retain it on said cradle mounting in pivotal relation thereto.

4. In a lever type grease gun, a barrel, a unitary cylinder extending transversely in the barrel near one end thereof, a plunger reciprocable in the cylinder, an operating lever of downwardly open channel form embracing the outer end of the plunger between its flanges and pivoted directly to said plunger, a fulcrum support for said lever comprising a flexible arm of flat stock doubled upon itself to form an eye, the flat end portions of

6

the arm being secured to the end wall of the barrel and the eye being disposed between the flanges of the lever with a fulcrum pin extending through said eye and said flanges.

5. In a lever type grease gun, a barrel, a cylinder extending transversely in the barrel near one end thereof, a plunger reciprocable in the cylinder, an operating lever of downwardly open channel form embracing the outer end of the plunger between its flanges and pivoted directly to said plunger, a fulcrum support for said lever comprising a flexible arm secured to the barrel and extending laterally therefrom into pivotal engagement with said lever, and a stop lug bent inwardly from one of said flanges of the lever at a point between its fulcrum and its pivotal connection to the plunger to abut the plunger for limiting the outward swing of the lever.

6. In a lever type grease gun, a barrel, a cylinder extending transversely in the barrel near one end thereof, said cylinder being secured in sealed relation with said barrel for swiveling movement about its own axis, a plunger reciprocable in the cylinder, an operating lever pivoted directly to the plunger, and a fulcrum support for said lever comprising a flexible arm secured to the barrel and extending laterally therefrom into pivotal engagement with said lever.

7. In a lever type grease gun, a barrel, a cylinder extending transversely in the barrel near one end thereof, said cylinder being secured in sealed relation with said barrel for swiveling movement about its own axis, a plunger reciprocable in the cylinder, an operating lever pivoted directly to the plunger, and a fulcrum support for said lever comprising a flexible arm of flat stock secured against the end wall of the barrel and extending laterally therefrom into pivotal engagement with said lever.

8. In a lever type grease gun, a barrel, a cylinder extending transversely in the barrel near one end thereof, said cylinder being secured in sealed relation with said barrel for swiveling movement about its own axis, a plunger reciprocable in the cylinder, an operating lever pivoted directly to the plunger, and a fulcrum support for said lever comprising a flexible arm of flat stock disposed against a flat area of the end wall of the barrel, and a fitting having a shank adapted to extend through said arm and to be fixed in said end wall.

9. In a lever type grease gun, a barrel, a cylinder extending transversely in the barrel near one end thereof, said cylinder being secured in sealed relation with said barrel for swiveling movement about its own axis, a plunger reciprocable in the cylinder, an operating lever of downwardly open channel form embracing the outer end of the plunger between its flanges and pivoted directly to said plunger, a fulcrum support for said lever comprising a flexible arm secured to the barrel and extending laterally therefrom into pivotal engagement with said lever, and a stop extending between the flanges of the lever at a point between its fulcrum and its pivotal connection to the plunger to abut the plunger for limiting the outward swing of the lever.

10. In a grease gun, a barrel forming a lubricant reservoir, a tubular body member extending transversely of said barrel and having its opposite ends projecting through the side walls thereof, means for effecting a leakproof seal between the projecting ends of the tubular body member and the barrel adapting said body member for swiveling movement upon an axis transverse to the

barrel, said tubular body member forming a pump cylinder open at one end and having an inlet within the barrel and terminating adjacent the other end in an outlet, a plunger reciprocable in said cylinder through the open end thereof, and a rigid delivery tube means extending radially from the outlet end of said tubular body member.

11. In a grease gun, a barrel forming a lubricant reservoir, a tubular body member having a reduced portion adapted to extend through diametrically opposed apertures in the side wall of said barrel and terminating in a threaded outer end and a shoulder adjacent the opposite end, said tubular body member forming a pump cylinder having an inlet within the barrel and an outlet in said shouldered end, means for securing said tubular body member with respect to said barrel including lock nut means adapted to be engaged upon said threaded tip and sealing and gasket washer means adapted to be interposed between said shoulder and the wall of said barrel at one of said apertures and said lock nut means and the wall of said barrel at the other of said apertures for effecting a fluidtight seal between said barrel and tubular body member when said lock nut means is tightened adapting said tubular body member for swiveling movement upon an axis transverse to the barrel, and a plunger reciprocable in said cylinder and adapted to project from the open end thereof.

12. In a grease gun, a barrel forming a lubricant reservoir, a tubular body member having a reduced portion adapted to extend through diametrically opposed apertures in the side walls of said barrel and terminating in a threaded outer end and a shoulder adjacent the opposite end,

said tubular body member forming a pump cylinder having an inlet within the barrel and an outlet in said shouldered end, means for securing said tubular body member with respect to said barrel including lock nut means adapted to be engaged upon said threaded tip, and sealing and gasket washer means adapted to be interposed between said shoulder and the wall of said barrel at one of said apertures and said lock nut means and the wall of said barrel at the other of said apertures for effecting a fluidtight seal between said barrel and tubular body member when said lock nut means is tightened, and a plunger reciprocable in said cylinder and adapted to project from the open end thereof.

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