April 9, 1929. F. S. BARKS 1,708,781

DISPENSING DEVICE FOR LUBRICANTS AND THE LIKE

Filed Dec. 7, 1925

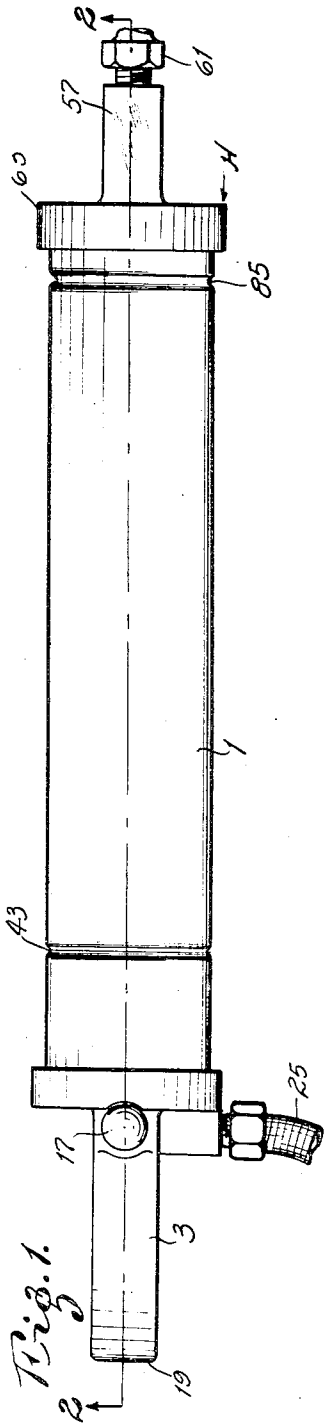


Fig. 1.

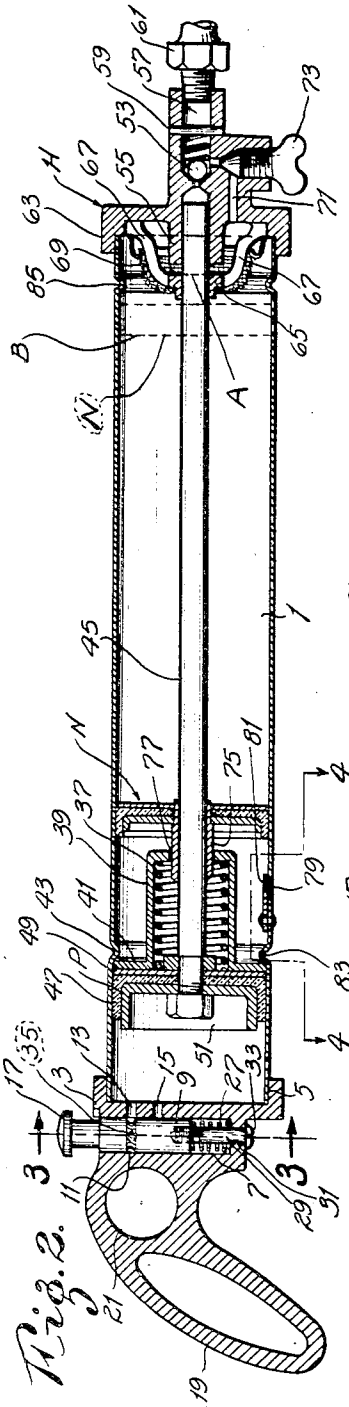


Fig. 2.

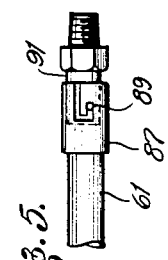


Fig. 5.

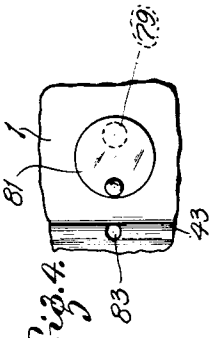


Fig. 4.

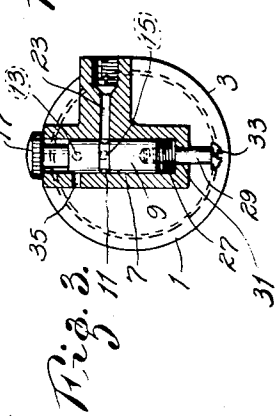


Fig. 3.

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UNITED STATES PATENT OFFICE.

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DISPENSING DEVICE FOR LUBRICANTS AND THE LIKE.

Application filed December 7, 1925. Serial No. 73,640.

This invention relates to dispensing apparatus and with regard to certain more specific features to grease guns and the like.

Among the several objects of the invention may be noted the provision of a pneumatically operable hand gun for eejcting predetermined quantities of material such as grease; the provision of a grease gun which is positively operable at high pressure in any position thereof; the provision of a grease gun of the type described which permits ready release of its delivery line from clogged and impassible oiling passages; the provision of a grease gun which provides means for removing grit and the like from delivered grease, and the provision of a device of the kind described which is simple in construction and not subject to ready derangement, light in weight and economical of manufacture. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structure hereinafter described and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which is shown one of various possible embodiments of the invention,

Fig. 1 is a top plan view of the gun;

Fig. 2 is a longitudinal vertical section taken on line 2—2 of Fig. 1;

Fig. 3 is a lateral vertical section taken on line 3—3 of Fig. 2;

Fig. 4 is a horizontal section taken on line 4—4 of Fig. 2; and

Fig. 5 shows the application of a grease line to a receiving head.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now more particularly to Fig. 1, there is illustrated a casing or cylinder 1 made preferably of drawn tubing or the like. The cylinder 1 has a relatively smooth bore for receiving slidable pistons. It is made fast, by means of a screw connection or otherwise, to a grip or handle casting 3. The grip casting 3 is provided with a proper counterbore 5 for receiving the cylinder 1.

The grip 3 is provided with a preferably vertical cylindrical passage 7, which passage is adapted to slidably but snugly receive a cylindrical plug or valve 9. The valve 9 is provided with a peripheral groove 11, which, as will be described more in detail hereinafter, is adapted to be alternately aligned with passages 13 and 15 formed in the grip casting 3. The passages 13 and 15 connect the counterbore 5 and the valve passage 7. A thumb head 17 on the valve 9 provides means for depressing the valve to operate it and means for limiting the valve travel downwardly. The head 17 is greater in diameter than the bore 7. It is clear from the drawings that the head 17 may readily be depressed by an operator's thumb when the handle 19 of the grip 3 is grasped. A hole 21 in the grip 3 is provided for insertion of the operator's pointer finger while his three remaining ones encircle the handle 19.

Returning to the construction of the valve 9, it should be noted that when it is depressed to its lowermost position (Fig. 3) that the head 17 encounters the grip 3. In this position the groove 11 aligns with said passage 15 and another inlet passage 23 formed in the grip 3 and in the plane of passage 15. The passage 23 is adapted to have a pressure air line 25 attached thereto (Fig. 1). Hence when the valve is fully depressed, air will flow into and from passage 23, through the groove 11, and through passage 15 to the interior of the cylinder 1.

A spring 27 is placed beneath the valve 9 to raise it when thumb or like pressure is taken therefrom. The upward travel of the valve is limited by means of a beaded guide 29 screwed into the valve longitudinally from the bottom and passing from the bore 7 by way of a smaller passage 31. The head 33 of the guide 29 limits the upward valve travel when the spring 27 acts. The said limitation is such as to bring the said groove 11 into alignment with the said upper passage 13 and an exhaust passage 35 formed in the same plane therewith. Hence, in the upper position of the valve, the inlet passage 23 is cut out of communication with the cylinder 1, while air may pass from said cylinder to the atmosphere by way of passage 13, groove 11, and exhaust passage 35.

The reason for leading compressed air into the head of the cylinder 1 is to press an operating piston P, which is fixed to a rod 45, outwardly from the head end of the cylinder against the pressure of a spring 37. The spring reacts from a socket or cup 39 which by means of a flange 41, abuts a rolled in ridge 43 on the inside of the cylinder 1.

The piston P is made fast to the head end of the piston rod or plunger 45 and comprises a leather sealing cup 47, a backing washer 49 and a buffer cup 51. These pieces are clamped to said rod 45 by means of a nut and collar clamping combination abutting a proper shoulder in the rod 45. It may be noted that the flange of cup 51 reaches out farther than the flange of the leather cup 47, thereby preventing the edge of the leather cup from striking the casting 3 when the operating piston is at the head or left end of its stroke.

It is clear that when the valve 9 is depressed (Fig. 3) that air may rush into the head end of cylinder 1, thereby driving the operating piston P to the right and compressing the spring 37. When the valve is released (Fig. 2) air may leave the cylinder and does so, due to its own expansive force, and is entirely cleared from the cylinder as the piston P is returned to the left under the expansive action of spring 37.

The rod or plunger 45 is adapted to force grease and the like from the forward portion of cylinder 1. In order to accomplish this end, a head H is screwed or otherwise made fast to the right or tail end of cylinder 1. This head H is formed to comprise a ball check valve 53, a hollow cylindrical portion 55 leading to the check valve and a hollow cylindrical portion 57 leading from the valve. The portion 57 is crossed by a pin 59 for holding in place the conventional ball and spring of the check valve. Fastened to the portions 57 is a grease or material line 61 formed either of flexible material or stiff material such as a length of flexible or stiff tubing.

Flanged to the portions of the head H above enumerated is the counterbored cup 63 which affords the means for fastening the head to the cylinder 1. Cast or otherwise formed with the cup 63 is a guide bearing 65. This bearing 65 is cast on legs or extensions 67 which are formed with the cup 63. By means of this construction a disc-like space is left between the bearing 65 and the cylindrical portion 55. As indicated in the drawings, the bearing 65 serves to guide the right-hand end of the plunger 45 into the bore of the cylindrical portion 55. When the piston P is at the left-hand end of its stroke, the end of the plunger 45 is located at the dotted line A within the bearing 65 (Fig. 2). When the piston is at the right-hand end of its stroke the plunger is in its full line position, that is, entered into the passage of portion 55. The plunger fits both the bearing 65 and the portion 55 snugly. When the plunger 45 is in its full line position an annular space is formed around said plunger and between the bearing 65 and portion 55. This fact serves a useful purpose to be made clear.

Fitted over the legs 67 is a straining cup 69.

A by-pass 71 leads from the outlet side of the check valve 53 back into the space enclosed by cylinder 1 and the head H. This passage is intercepted by a manually operable taper seating valve 73.

Referring again to the cylinder 1 proper, there is shown therein a loose piston N tightly fastened to a slidable bearing 75. The bearing 75 is slidable on the rod 45. The fit between the bearing and rod is such that grease between the two is not readily pushed out by relatively high air pressures.

The purpose of the loose piston N is to push grease (held in cylinder 1) to the right, as quantities are fed from the head H by the stroking of the plunger 45. As the plunger 45 moves to the right the piston N is also forced to the right by means of the compression of air behind the piston N. The compression takes place as the piston P quickly moves to the right, thereby raising the air pressure in the chamber between the two pistons. A small air bleeding passage 83 in said chamber serves purposes hereinafter to be described. Its size, however, is such that at the stated sudden rise in pressure in the chamber between the pistons, not enough air can escape to immediately lower the pressure to a substantial degree. It should be noted that the movement of the piston P to the right takes place quickly under action of the inrushing air from the line 25. A one-way leather check valve 79 between the pistons is forced shut at this time.

In the above described manner, at each stroke of the plunger 45, the piston N is caused to pack grease to the right end of cylinder 1, that is, to the point of ejection of the grease.

When air is released from the valve 9, the piston P is forced to the left by the spring 37. At this stage the built up pressure between the pistons may have dropped to that of the atmosphere, due to air leakage from the bleeder port 83. Hence, as the piston P recedes to the left air at atmospheric pressure is drawn in between the pistons by way of the leather check valve 79. By this means a new charge of air is drawn in to be compressed at the next pumping stroke and an evacuating action is prevented from taking place between the pistons. Hence the piston N has substantially no tendency to be drawn rearwardly. Of course the piston N is also more or less prevented from rearward movement by friction between it and the cylinder 1, and the fact that no air can enter the grease chamber to the right thereof.

As stated, the fit between the bearing 75 and plunger 45 is such that air cannot readily find its way through the bearing, though the air pressure to the rear of piston N may be relatively high at periods. By this means pockets of air are prevented from being blown in the grease of cylinder 1. These pockets, if permitted to form would gradually build up along the plunger 45, to finally

reach the chambers 55 and 57, whereat the gun would lose its prime. The present structure, as stated, avoids this difficulty.

It is believed that it is clear, that if the valve 9 is operated at quickly successive intervals that, although the air pressure between the pistons may not have had time to drop, yet this will not affect the perfect operation of the gun. At the return of piston P the air between the pistons will merely re-expand until the pressure drops to a point below that of the atmosphere whence the valve 79 will automatically open inwardly to supply air for maintaining atmospheric pressure.

It is clear that the piston N, as the gun empties itself of grease, will gradually approach the right-hand end of the cylinder 1. In order to prevent throwing of the piston N from the cylinder 1 by operation of the gun when the head H is removed, an integral ridge 85 blocks further movement of the piston N. A modified form of ridge may be employed. It may be rolled outwardly and a spring ring held therein. By this means the device is more readily disassembled for repairs and like operations.

Under the assumption that the loose piston N is in its dotted line position B, shown in Fig. 2, and that the head H is removed, the operation of the gun will be described. Under the stated conditions, the air valve 9 may or may not be depressed, although it is preferable that it be not depressed, whereby the piston P is at the left end of its stroke.

To fill the open gun, grease is merely forced into the right end of cylinder 1, whereat the loose piston N travels toward the cup 39 gradually forcing air out through the small bleeder opening 83. It moves with respect to the rod 45 and cylinder 1.

After the said operation, the head H with its strainer cup 69 is applied to the cylinder 1, the bearing 65 cooperating with the rod 45. The by-pass valve 73 is closed. Upon depressing the thumb valve 9, the rod 45 is moved to the right as described. Air and grease or pure grease (depending upon how much grease was forced into the cylindrical portion 55) is forced from the check valve 53 into the cylinder 57 and line 61 to be delivered to a bearing or holder.

The loose piston N, during this said operation, has been forced to the right, as described, to force grease through the strainer cup 61 and down around the rod 45 at the portion between the bearing 65 and portion 55.

Next, the valve 9 is manually released, whereupon the rod 45 returns to the left, under action of spring 37 and due to the exhausting of air from the valve 9. The ball check valve 53 closes automatically, and as the right-hand end of the rod 45 reaches its left-hand position A, grease rushes into the hollow cylinder 55 from all sides of the end thereof, that is, from its previously annular position or shape around rod 45 and into the cylinder 55. By means of the construction described it is evident that little friction is encountered by the grease in entering the exhausted cylinder 55. It pours in from all angles and not through a relatively restricted passage.

On its return stroke to the left the rod 45 does not move the loose piston N with it. This is because (*a*) air pressure between the pistons is at that of the atmosphere or over (*b*) no air can get in cylinder 1 to the right of the piston N, and (*c*) piston N has frictional contact with the cylinder 1.

Upon next depressing the valve 9 the operation is repeated except that upon all strokes after the first one, the operator is sure of receiving but little air with the grease ejection from the gun, that is if it were filled without excessive air pockets being in the grease. There are various obvious ways of so filling a gun.

If the gun is loaded with grease carelessly relatively large air pockets (more or less connected) will probably be formed. These pockets may readily be eliminated by completely opening the valve 73 and operating the gun one or more times. The piston N then acts compressively on the grease whereby the pocketed air is driven or pumped out by way of either or both branches of the passage 71. The action is similar to that which is had when the gun loses its prime except that the air is exhausted. When grease appears at the outlet of passage 71, the valve 73 may be replaced and the device is ready for operation.

The gun, as described, may be successfully filled and/or operated in any and all positions thereof. It should be noted that the volume of the cylindrical portion 55 is of a predetermined amount so that a predetermined weight of material is ejected at each stroke. By this means an operator may gage the amount of material being used by the number of strokes required for filling a device.

It is also evident that the ratios of the areas of the operating piston P and the end of the plunger or rod 45 are such that unit pressures are multiplied. Several thousand pounds pressure per square inch is attainable in the line 61 with only a nominal air pressure on the piston P, and this with a practicable proportional construction of parts such as indicated in the drawings.

The line 61 is usually provided with a bayonet slotted tip 87 for cooperation with the pin 89 of a grease receiving head 91. The head 91 is provided with a ball check valve also. The head 91 is of the type used in several commercial systems for greasing machinery.

At times the lines connected with the head 91 become clogged, so that if the tip 87 is applied and the above described gun operated, the high pressure engendered will prevent removal of the tip 87 from the head 91. This is because the pressure is not relieved by a flow of grease. To relieve such pressure for removal of the tip 87, it is only necessary to open the by-pass valve 73 whereupon the pressure forces grease back into the cylinder 1 by way of the passage 71. Pressure is thus relieved and the tip 87 may be removed. The valve 73 need not be completely removed.

It is to be understood that grease may be ejected directly from the passage 57 of the gun or from the line 61 without the use of tips such as indicated at numeral 87.

In view of the above, it is believed that the various features of this invention will be clear without further elaboration, and it will be seen that with the apparatus herein described, the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above construction without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A grease gun comprising a cylinder adapted to carry grease, a plunger therein adapted to be reciprocated, a head for said cylinder comprising a cylindrical portion into and out of which the plunger is adapted to travel, a check valve associated with said portion, an outlet passage from the valve and a manually operable valved by-pass leading from said outlet passage to the first-named cylinder, and means for opening the by-pass to the atmosphere from said manually operable means.

2. A grease gun comprising a cylinder adapted to carry grease, a plunger therein adapted to be reciprocated, means for reciprocating the plunger comprising an air operated piston thereon in said cylinder, a valve for admitting air against the piston and releasing air therefrom, and a spring adapted to return the piston when air is released, a head for said cylinder comprising a cylindrical portion into and out of which the plunger is adapted to travel, a check valve associated with said portion, an outlet passage from the valve and a valved by-pass leading from said outlet passage to the first-named cylinder, and means for opening the by-pass to the atmosphere.

3. A grease gun comprising a cylinder adapted to carry grease, a plunger therein adapted to be reciprocated to force grease from the gun, a grip on the cylinder whereby the gun may be grasped, means for reciprocating the plunger comprising an air operated piston thereon in said cylinder, a valve in the grip adapted to be operated by the hand on the grip for admitting and releasing air against and from the piston, and a spring adapted to return the piston when the air is released at the valve, a head for said cylinder comprising a cylindrical portion into and out of which the plunger is adapted to travel, a check valve associated with said portion, an outlet passage from the valve and a valved by-pass leading from said outlet passage to the first-named cylinder, and means for opening the by-pass to the atmosphere.

4. A grease gun comprising a cylinder for grease and the like, a reciprocating plunger for ejecting grease from the cylinder extending longitudinally through the cylinder, an operating piston on the plunger adapted to reciprocate the plunger, means for reciprocating said piston, a loose piston on the plunger for packing grease toward the point of ejection under the compressive action of said operating piston on air between the pistons, means for trapping air between the pistons when the operating piston moves to eject, an air inlet check valve adapted to feed air between the pistons to prevent an evacuating action when the operating piston moves to a non-ejecting position, said check valve being adapted to close as the operating piston moves to eject.

In testimony whereof, I have signed my name to this specification this 4th day of December, 1925.

FRANK S. BARKS.