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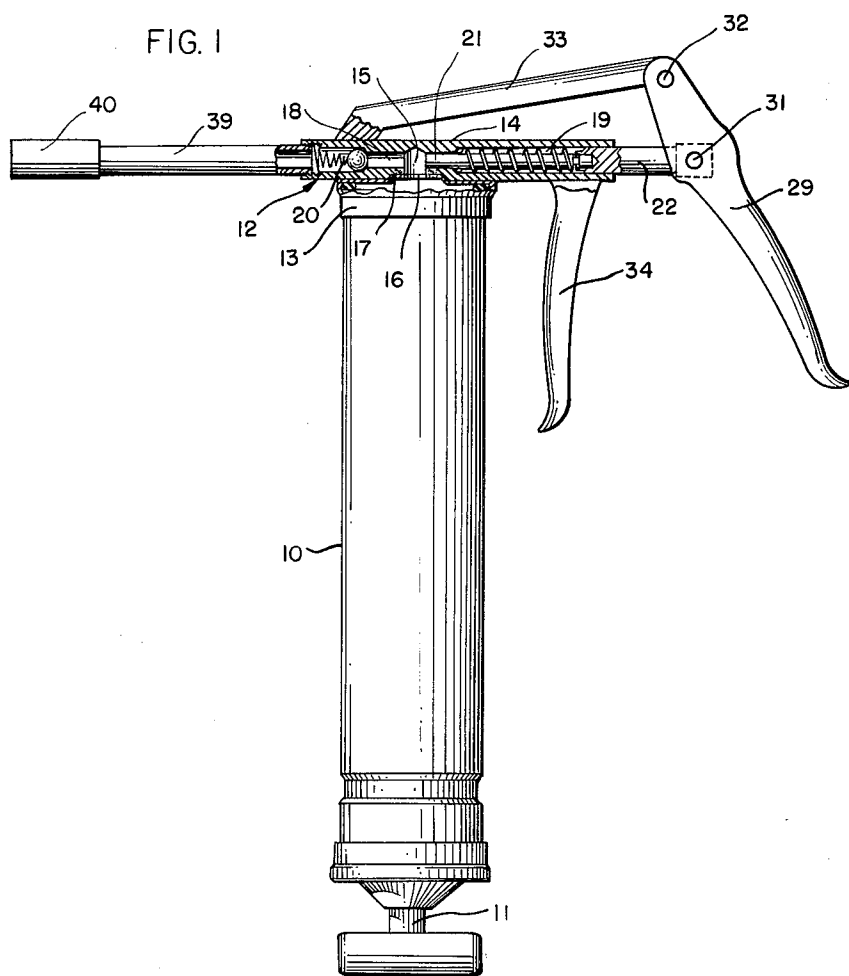
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HAND-OPERATED GREASE GUN HEAD

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HAND-OPERATED GREASE GUN HEAD

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This invention relates to a hand-operated grease gun head, and more particularly to the construction of a high pressure cylinder and piston for such a grease gun head.

Grease guns of the kind which include a handle or lever for manual operation are commonly referred to as hand-operated grease guns. Such grease guns as presently manufactured and sold includes three principal components or assemblies; namely, a barrel or grease container for holding the supply of grease, a rod and plunger assembly which includes a cap for attachment to the rear of the barrel, and a dispensing head providing a high pressure cylinder and including a cap for attachment to the front end of the barrel. According to present day standards, the high pressure cylinder of the dispensing head should be capable of developing from 8,000 to 10,000 p.s.i. pressure, depending to some extent, of course, on the strength of the operator. In order to develop and maintain such pressures, it will be apparent that the bore of the high pressure cylinder must be accurately machined, and that the piston cooperating with the cylinder bore must be machined to a very close tolerance. Furthermore, in the assembly of the dispensing head, the piston must be designed to operate on the exact axis of the cylinder bore to prevent binding with resultant wear and leakage.

The design objectives stated above can be rather easily achieved where the bore of the high pressure cylinder extends to the outer end of the body or block which provides the cylinder, and where the piston extends outwardly beyond the bore. However, when the cylinder bore is to be located entirely within the confines of the body or block, a much more difficult problem arises. If the cylinder bore is connected to the outer end of the block by a bore of a different diameter, it is desirable to form the cylinder bore and the outer connecting bore with different drilling operations, but when this is done the axes of the two bores may not precisely coincide.

Another related problem involves the manufacturing cost of the piston. For convenience of manufacture, it is desirable to employ pre-ground and polished rod stock, which can be cut to length to form the high pressure piston. However, if the piston must operate in a cylinder bore which terminates within the confines of a cylinder block or body, the piston may have to be much longer than is necessary for merely cooperating with the cylinder bore. The added length of the piston to permit its actuation from the exterior of the cylinder body can substantially increase the cost of the grease gun head, since pre-ground and polished rod stock is considerably more expensive than ordinary screw machine rod or bar stock.

It is therefore a principal object of the present invention to provide a novel high pressure cylinder and piston construction for a grease gun head which construction substantially overcomes the problems and difficulties described above. More specifically, it is an object of this invention to provide a dispensing head for a grease gun wherein the high pressure cylinder is located within the confines of the cylinder body and terminates at a spaced distance from the actuating end of the body, while at the same time employing only a minimum length of pre-ground rod stock to form the piston for the cylinder. Another object is to provide a construction of the kind described wherein the piston is permitted to adjust automatically to the axis of the high pressure cylinder, thereby

minimizing binding, wear, and resultant leakage. Further objects and advantages will be indicated in the following detailed specification.

The invention is shown in an illustrative embodiment in the accompanying drawings, in which—

FIG. 1 is a side elevational view of a grease gun having the novel head construction of the present invention, part of the head being shown in section to more clearly illustrate the construction;

FIG. 2 is an enlarged sectional view showing part of the grease gun head of FIG. 1;

FIG. 3 is a side elevational view of the piston and piston guide assembly employed in the construction of the preceding figures; and

FIG. 4 is a side elevational view of the same piston and piston guide, showing the parts in separated relation with the inner end of the guide being shown in section, as in FIGS. 1 and 2.

Looking first at FIG. 1 there is shown a hand-operated grease gun having the usual barrel 10 for holding a supply of grease. Within the barrel there is provided a plunger assembly, such as the one described in copending application Serial No. 18,709, filed March 30, 1960, now Patent No. 3,059,980 and entitled "Grease Gun Plunger Assembly." Since the particular plunger assembly does not form a part of the present invention, it is not believed that it will be necessary to further describe it herein. Its function is to assist in moving the grease toward the dispensing head on the front end of the barrel. The grease gun of FIG. 1 also includes the usual handle-equipped rod 11 which cooperates with the plunger assembly, as also described in the cited copending application.

The present invention is concerned with the construction of the dispensing head which is designated generally by the number 12. As shown, the dispensing head includes a front end cap 13 which is threadedly connected on the front end of barrel 10. The head also includes an elongated tubular body 14 which extends across the outside of cap 13 and is secured thereto by welding or other suitable procedure. For example, cap 13 and body 14 may be fused by resistance welding, such as projection welding, around the juncture between the intake port 16 in the wall of body 14 and the connecting opening 16 through cap 13. The weld zone is indicated in FIG. 1 by the number 17.

As shown more clearly in FIG. 2, the body 14 has a first bore 18 which is intermediately positioned within the confines of the body. Intake port 15 communicates with bore 18 for supplying grease to the high pressure cylinder which is provided by the bore 18. In the illustration given, body 14 is formed of cylindrical screw-machine stock, but square bar stock can also be used.

In accordance with the present invention, body 14 has a second bore 19 of larger diameter than the first bore 18. It will be noted that bore 19 extends inwardly from the actuating end 14a of body 14 to the adjacent end of bore 18. In the illustration given, bore 19 is substantially longer than bore 18, and bore 18 is spaced from end 14a by a distance greater than the length of bore 18.

In the illustration given, body 14 provides a third bore 20 which extends inwardly from the dispensing end 14b of the body to the adjacent end of bore 18. Bore 20 is also of larger diameter than bore 18.

In the machining of body 14, the larger bores 19 and 20 will ordinarily be formed first by a suitable drilling operation. Thereafter, bore 18 will be formed by extending a smaller drill through either bore 19 or 20. As a final step, bore 18 will be reamed to provided a smooth finish and a close tolerance. In this procedure, it is difficult to be certain that the axis of bore 18 coincides exactly with the axis of bore 19. While bore 19 will have approximately the same axis as bore 18, the axes

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may be slightly offset with respect to each other or at a slight angle. With the construction described herein, however, this slight variation in axial alignment causes no difficulty.

In one preferred manufacturing procedure, bore 20 is drilled from end 14b and bore 19 from end 14a. Bore 18 is then drilled from end 14b, the bore being the closest to this end. After body 14 has been secured to cap 13 by welding, the bores 18, 19 and 20 are reamed. A step reamer can be used for part or all of these reaming operations. Thereafter, a broach can be passed through bore 18 to complete the finishing of the inside of the bore, and to provide the exact desired diameter.

Continuing the description of the figures and referring particularly to FIG. 2, it will be noted that a piston 21 is received in bore 18 for reciprocating therein, and that piston 21 extends into bore 19. There is also provided a piston guide 22 which is received in bore 19 for reciprocation therein. Guide 22 extends outwardly beyond end 14a to permit actuation thereof. The diameter of the outer end of piston 21 is of size relative the diameter of the inner end of piston guide 22 and these inner and outer ends are so engaged end to end that in operation free transverse movement is permitted therebetween, and so that the piston 21 can conform to a different axis of reciprocation than the piston guide 22. As shown more clearly in FIG. 4, the inner end of piston guide 22 provides a cylindrical recess 23 which has an annular lip 24 around the mouth thereof. As can be seen in FIG. 2, the outer end of piston 21 is loosely received in recess 23. The outer end of piston 21 provides an annular groove 25 (see FIG. 4) which is positioned opposite and beneath lip 24 when the end of piston 21 is inserted in recess or socket 23, as shown in FIG. 2.

In the preferred embodiment as illustrated in the drawing, lip 24 is pressed or formed into groove 25 to unite piston 21 and guide 22 for reciprocation while permitting piston 21 to conform to a slightly different axis of reciprocation than that of the guide. The diameter of recess 23 is larger than the diameter of the outer end of piston 21, and they are engaged to permit a significant transverse movement therebetween. In other words, piston 21 and guide 22 are connected by means of a universal joint, which within limits, permits the axis of piston 21 to be disposed at an angle with respect to the axis of guide 22. The type of relative movement which is permitted between these parts is indicated in FIG. 3 where one extreme inclination of the piston 21 is indicated by the dotted line 21' and another extreme inclination by the dotted line 21". The approximate range of movement is indicated by the arrows at the inner end of piston 21 in FIG. 3.

The foregoing construction is adapted for spring-biasing of the piston, and also permits an auxiliary seal to be employed. As shown in FIG. 2, body 14 provides an annular shoulder 25 at the inner end of bore 19 surrounding the outer end of bore 18. An O-ring 26, formed of a flexible, resilient material such as synthetic rubber, is received on piston 21 for bearing against the face of shoulder 25. A compression spring 27 is also received on piston 21 outwardly from O-ring 26. The inner end of spring 27 bears against O-ring 26 and urges it into contact with shoulder 25. This assists in maintaining a seal at that point. The outer end of spring 27 bears against the inner end of piston guide 22, thereby biasing piston 21 and piston guide 22 toward the actuating end 14a of the body 14.

In one preferred embodiment piston 21 is formed of pre-ground and polished rod stock. It is also preferred to form piston guide 22 of ordinary screw-machine stock. In the illustration given, the outer end of guide 22 has a square cross-section, and is of essentially the same dimensions as the cross-section of the original bar stock. The outer end portion 28 cooperates with an operating handle 29. The inner body portion 30 of the guide has

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a cylindrical cross-section, as does piston 21. It will be understood that bores 18, 19 and 20 are also of cylindrical cross-section. Since guide portion 30 does not have to form a seal with bore 19, the tolerance between these parts can be considerably greater than between piston 21 and bore 18.

As shown more clearly in FIG. 1, handle 29 at an intermediate point 31 is pivotally connected to the outer end 28 of guide 22. The upper end of handle 29 is pivotally connected at 32 to a link 33 which has its other end pivotally connected to body 14. The method of attaching link 33 to body 14 is more fully described in my copending application Serial No. 192,396, filed May 4, 1962 and entitled "Grease Gun Head Assembly." Since it does not form a part of the invention claimed herein, it is not believed it will be necessary to present a more detailed description herein.

In the illustration given, there is also provided a fixed handle 34 which is rigidly secured to body 14 by any suitable procedure such as welding. In the operation of the dispensing head, the hand of the operator is used to grasp the handles 29 and 34. By squeezing these handles, piston 19 is moved inwardly through bore 18 while compressing spring 27. The grease supplied to bore 18 through port 15 is forced toward outlet end 14b under pressures of the order of 8,000 p.s.i. In the illustration given, a ball valve 35 is positioned at the outlet end of bore 18, the ball 35 being urged against an annular shoulder 36 by a spring 37. Spring 37 has a spiral form, and the outer larger turns engage the threads 38 at the outer end of bore 20. This engagement holds the spring in position.

As the grease is forced from bore 18 by the action of piston 21 it displaces ball 35 from shoulder 36 so that the grease flows around the ball and spring 37 into an outlet pipe 39. As indicated in FIG. 1, the outlet pipe 39 may be provided with an appropriate coupler 40.

With respect to the foregoing description, it will be understood that the various parts will be formed of steel or other suitable material. Preferably body 14 and piston guide 22 are formed of a free machining steel, such as a sulfur-containing steel, thereby facilitating the machining of these parts. As previously indicated, piston 21 is preferably formed of a pre-ground and polished rod stock, and the stock will normally be a suitable steel.

While in the foregoing specification this invention has been described in relation to a specific embodiment thereof and many details have been set forth with respect to this embodiment, it will be apparent to those skilled in the art that the invention is susceptible to other embodiments and that certain of the details set forth herein can be varied considerably without departing from the basic principles of the invention.

I claim:

1. In a hand-operated grease gun head, the combination comprising an elongated tubular body having a first bore spaced from one end thereof to provide a high pressure cylinder, the wall of said body around said first bore having a grease intake port communicating with said cylinder, said body having a second bore of larger diameter than said first bore extending from said one end of said body to said first bore on approximately the same axis as that of said first bore, said body forming an annular shoulder at the inner end of said second bore a piston received in said first bore for reciprocation therein and extending into said second bore, and a piston guide received in close fitting engagement in said second bore for reciprocation therein and forming a seal for said piston and extending outwardly beyond said one end of the body to permit actuation thereof, the inner end of said piston guide having a recess therein, and providing an annular lip around the mouth of said recess, the diameter of said recess in said piston guide being larger than the diameter of the outer end of said piston

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and said outer end being received in said recess and engaged to permit a significant transverse movement therebetween, and providing an annular groove beneath said annular lip, said lip being formed into said groove to unite said piston and guide for reciprocation and allow articulated movement between said piston and said guide while permitting said piston to conform to a slightly different axis of reciprocation than that of said guide, and a means to retract said piston and piston guide having one end associated with said piston guide in outwardly biasing relationship, and a second end associated in operative engagement with said tubular body.

2. In a hand-operated grease gun head, the combination comprising an elongated tubular body having a first bore spaced from one end thereof by a distance greater than the length of said first bore, said first bore providing a high pressure cylinder, said body having a second bore of larger diameter and greater length than said first bore extending from said one end of said body to said first bore on approximately the same axis as that of said first bore, a piston received in said first bore for reciprocation therein and extending into said second bore, said piston being formed of pre-ground and polished rod stock, and a piston guide received in close fitting engagement in said second bore for reciprocation therein forming a seal means for said piston and extending outwardly beyond said one end of said body to permit actuation thereof, the inner end of said piston guide having a recess therein, and providing an annular lip around the mouth of said recess, the diameter of said recess in said piston guide being larger than the diameter of the outer end of said piston and said outer end being received in said recess and engaged to permit a significant transverse movement therebetween, and providing an annular groove beneath said annular lip, said lip being formed into said groove to unite said piston and guide for reciprocation and allow articulated movement between said piston and said guide while permitting said piston to conform to a slightly different axis of reciprocation than that of said guide.

3. In a hand operated grease gun head, the combination comprising, an elongated tubular body having a first bore spaced from one end thereof to provide a high pressure cylinder, the wall of said body around said bore having a grease intake port communicating with said cylinder, said body having a second bore of larger diameter than said first bore extending from said one end of said body to said first bore on approximately the same axis as that of said first bore, a piston received in said first bore for reciprocation therein and extending into said second bore, and a piston guide received in close

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fitting engagement in said second bore for reciprocation therein and forming a seal for said piston and extending outwardly beyond said one end of said body to permit actuation thereof, the outer end of said piston having a diameter of size relative the diameter of the inner end of said guide and said outer and inner end being operatively engaged end to end to permit free transverse movement therebetween, thereby permitting said piston to conform to a different axis of reciprocation than that of said guide, and a spring means to retract said piston and said piston guide associated with said piston guide and in operative engagement with said tubular body.

4. In a hand operated grease gun head, the combination comprising, an elongated tubular body having a first bore spaced from one end thereof to provide a high pressure cylinder, the wall of said body around said bore having a grease intake port communicating with said cylinder, the wall of said body around said bore having a grease intake port communicating with said cylinder, said body having a second bore of larger diameter than said first bore extending from said one end of said body to said first bore on approximately the same axis as that of said first bore, said body providing a shoulder at the inner end of said second bore surrounding the outer end of said first bore, a piston received in said first bore for reciprocation therein and extending into said second bore, a piston guide received in close fitting engagement in said second bore for reciprocation therein forming a seal means for said piston and extending outwardly beyond one end of said body to permit actuation thereof, the outer end of said piston having a diameter of size relative the diameter of the inner end of said piston guide and said outer and inner end being operatively engaged end to end to permit free transverse movement therebetween, thereby permitting said piston to conform to a different axis of reciprocation than that of said guide, and a compression spring disposed about said piston and completely enclosed in said second bore having one end bearing against said shoulder and the other end positioned in outwardly biasing engagement with said piston.

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