

March 17, 1970

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3,501,063

PLUNGER ASSEMBLY FOR MULTILOADING HAND GREASE GUNS

Filed April 5, 1968

2 Sheets-Sheet 1

FIG. 1

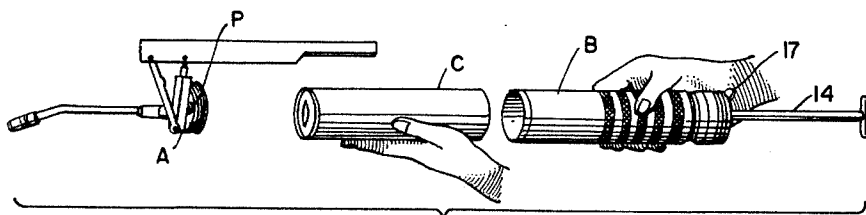


FIG. 2

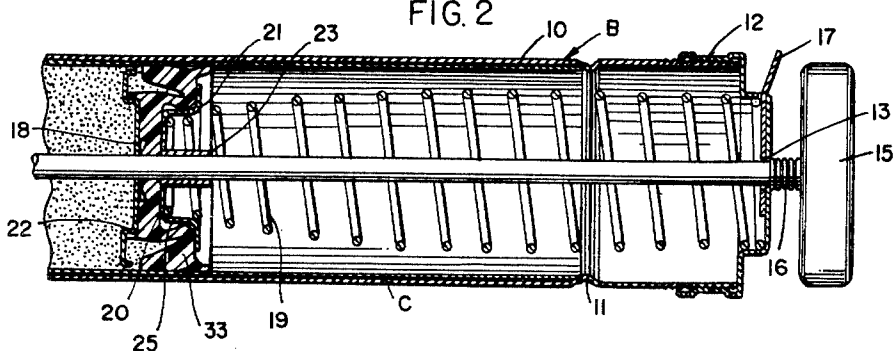


FIG. 3

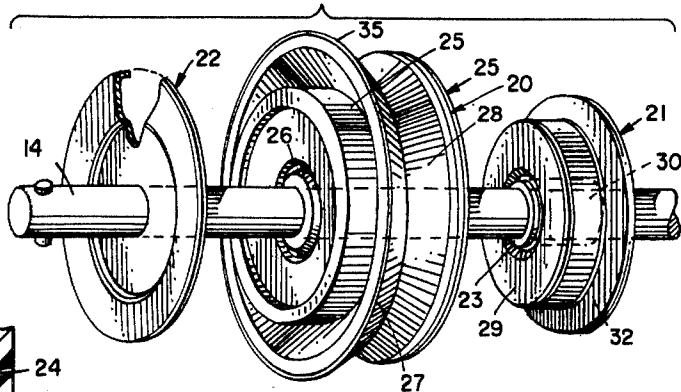
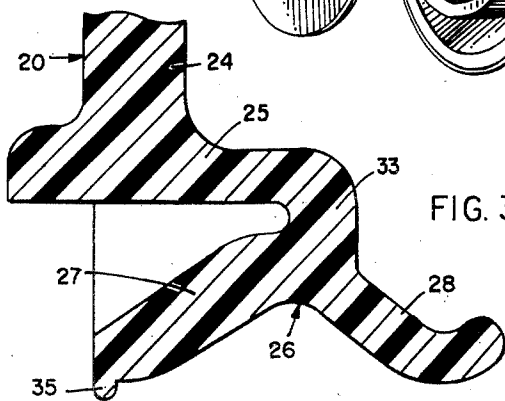


FIG. 3A

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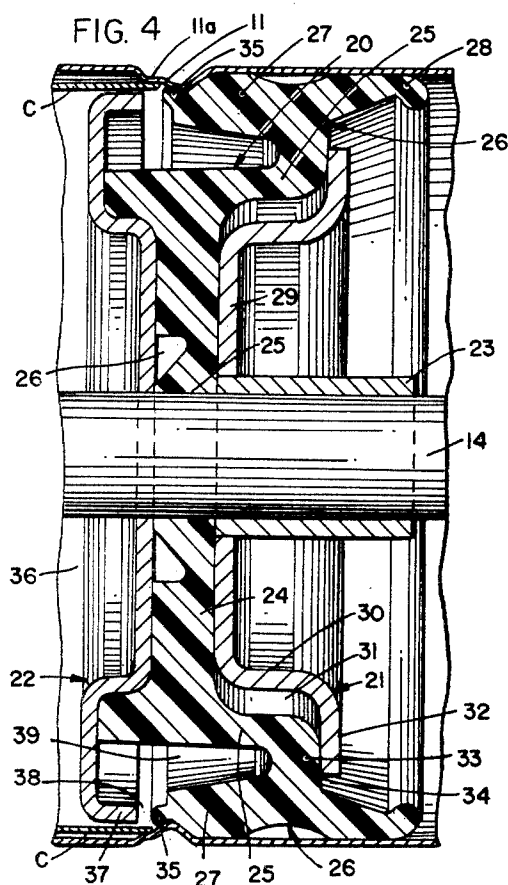
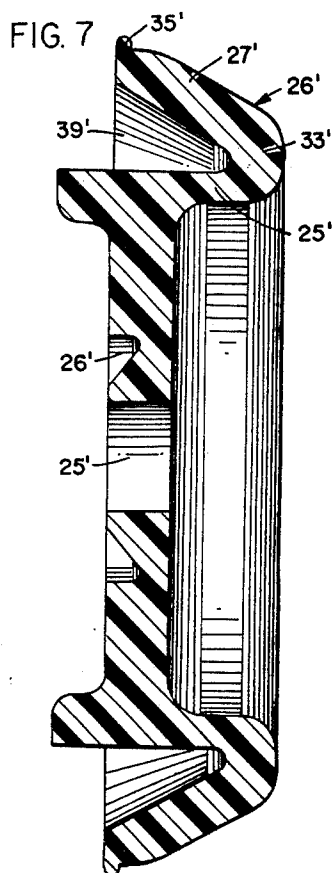
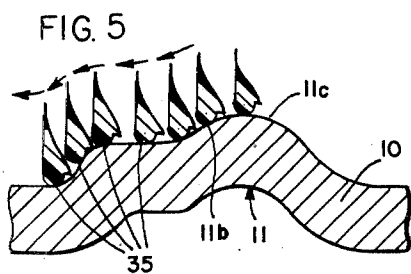
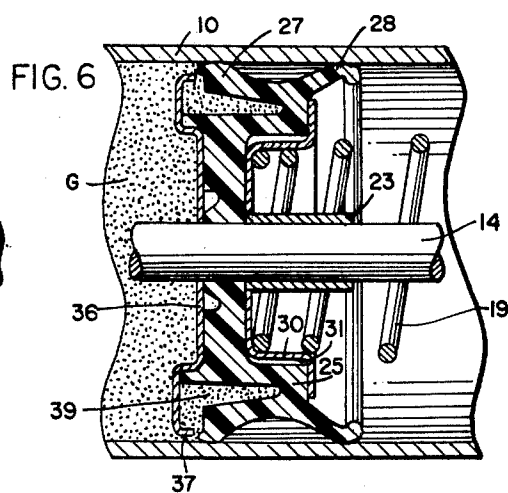
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2 Sheets-Sheet 2



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PLUNGER ASSEMBLY FOR MULTILOADING HAND GREASE GUNS

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7 Claims

ABSTRACT OF THE DISCLOSURE

A plunger assembly is provided for hand grease guns intended for use with both cartridge-packaged greases and bulk-loaded greases, particularly pressure filling or both pressure and suction filling. The assembly utilizes an integral molded plunger which is characterized by an annular flexing section projecting rearwardly from the peripheral portion of the web section and carrying sealing section means providing at least one annular lip inclined outwardly and forwardly. The assembly also includes a rear washer of cup-shaped configuration with a forward transverse wall rigidly supporting the plunger web section, and an annular wall spaced inwardly from the plunger flexing section to permit the flexing section to yield as the sealing section means adapts to a range of diameters. Where the barrel or grease container of the gun provides an inwardly-formed portion toward the rear thereof for contracting the plunger to assist insertion in a grease cartridge, the plunger also preferably provides a relatively thin annular fin at the outer forward end of the forwardly projecting lip, the fin maintaining sealing engagement with the container inwardly-formed portion. Other operational features are provided by the specific design and cooperation of the front and rear washers with the molded plunger.

BACKGROUND

In order to provide hand grease guns which are adapted for a variety of methods of loading, there has been a continuing effort to develop a truly universal hand grease gun, which performs satisfactorily with all methods of loading, including cartridge loading, pressure loading, suction filling, and hand packing. As a minimum, the gun should be adapted for use with cartridge-packaged greases, and also for pump filling under pressure from a bulk grease container. Suction filling and hand packing are less frequently used at the present time, but are still important to a substantial number of users.

One of the first hand grease guns adapted for all methods of loading is shown in my prior Patent 3,059,819, entitled, "Optional Loading Grease Gun." This gun utilized a molded plunger having generally symmetrical rearwardly and forwardly-extending cup portions providing, respectively, forward and rearward sealing blades or lips. The web portion of the plunger is sandwiched between and firmly engaged by front and rear discs or washers. The rearward portion of the barrel or grease container includes an inwardly-formed section, which contracts the plunger as it is withdrawn into or through the indented section, thereby assisting in inserting the plunger in the open rear end of a grease cartridge, the end being positioned immediately in front of the indented portion. In the commercial use of this grease gun, certain problems have developed, which have made it desirable to improve the construction and operation of the plunger assembly.

Since the plunger assembly of multiloading grease guns must adapt to a range of diameters while maintaining good sealing engagement, for example, at the diameter of the inside of the barrel and at the lesser diameter of

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the inside of a grease cartridge, the plunger assembly must be readily yieldable under all conditions of use. In the pressure filling of grease, particularly toward the end of the fill, there is a tendency for the grease to be forced past the plunger and into the rear of the grease gun. A related problem is the passage of the plunger assembly into or through the indented portion of the barrel, where sealing engagement may temporarily be lost, permitting grease to pass the plunger in pressure filling.

In my prior Patent 3,286,887, a plunger assembly is shown which is adapted only for cartridge-packaged greases and suction-filled greases. However, this plunger assembly includes some desirable features, which it has been desired to incorporate in a more universal plunger assembly. While this plunger assembly is excellent for suction filling and provides a forward guide cup for cooperation with the inside of the grease cartridge, the grease pressure tends to contract rather than expand the plunger assembly, as contrasted with the grease guns of my prior Patent 3,059,819, or Neuman Patent 2,985,495.

SUMMARY

By substantially changing the design of the molded plunger, and designing the front and rear washers for cooperation therewith, the foregoing problems and difficulties have been substantially overcome. In particular, by providing an annular flexing section projecting rearwardly from the peripheral portion of the plunger web, and providing clearance between the annular sides of the rear washer and the flexing section, the contraction and expansion of the plunger over a range of diameters is facilitated without sacrificing sealing engagement. The sealing section of the plunger is carried by the rearward end portion of the flexing section and projects outwardly therefrom. This section provides at least one annular lip, and preferably two annular lips, one lip being inclined outwardly and forwardly, and the other outwardly and rearwardly. Where the plunger assembly is used with a barrel having an indented rearward portion, as may be preferred, a special flexing fin is provided to maintain sealing engagement as the plunger is withdrawn into or through the inwardly-formed portion of the barrel. This thin annular fin is provided at the outer forward end of the forwardly-extending lip, and projects outwardly from the lip for maintaining sealing engagement by a wiping action as it follows the contours of the inwardly-formed portion of the barrel without at the same time interfering with the more extensive sealing engagement between the forwardly-extending lip and the inside of the barrel or the inside of the grease cartridge during normal conditions of use. Further, the wiping fin because of its relative thinness and flexibility does not interfere with the insertion of the plunger assembly in the open rear end of the grease cartridge. Other features of the desired cooperation between the molded plunger, and the front and rear washers will be set forth subsequently.

DRAWINGS

This invention is shown in illustrative embodiments in the accompanying drawings, wherein—

FIGURE 1 is a perspective view of a grease gun of the kind with which the present invention may be employed, the dispensing head and barrel being shown in separated relation with a grease cartridge in position for insertion in the barrel;

FIG. 2 is an enlarged axial sectional view showing a portion of the grease gun barrel or container with the plunger assembly of this invention inserted within a grease cartridge;

FIG. 3 is an enlarged perspective view showing the elements of the plunger assembly in separated relation;

FIG. 3A is an enlarged fragmentary sectional view

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f the annular flexing section and sealing section of the molded plunger;

FIG. 4 is an enlarged fragmentary sectional view showing the plunger assembly withdrawn to the rearward portion of the barrel behind the inwardly-formed portion s it would appear just prior to insertion in the rear ad of a grease cartridge;

FIG. 5 is an enlarged fragmentary schematic view illustrating the sealing-wiping action of the fin portion of the plunger assembly as it passes through the indented or portion of the barrel;

FIG. 6 is an enlarged fragmentary section showing the barrel and plunger assembly as they would appear in use with a bulk-filled grease; and

FIG. 7 is an enlarged sectional view of a modified molded plunger, which may be employed where suction filling is not desired.

DETAILED DESCRIPTION

Looking first at FIG. 1, there is shown a grease gun having a dispensing head assembly A, a barrel assembly B, and a grease cartridge C, the components being shown in separated relation. The head assembly A is substantially the same as that shown in my prior Patent 3,059,819, including an attachment cap, a lever actuated high pressure cylinder, an outlet check valve, and an applicator tip. Since these elements do not form a part of the present invention, it is not believed it will be necessary to further describe them herein. This invention is concerned with the barrel assembly B, and more particularly with the cooperation of the plunger assembly therein with the barrel assembly. FIGURE 1 shows the grease cartridge C being inserted in the open front end of the barrel assembly B, but, from what has been previously said, it will be understood that the grease gun is adapted for pressure loading or hand bulk filling, and preferably so for suction filling. As is well known in the art, a removable threaded plug P can be provided in the head assembly A, which plug is removed for introduction of the grease under pressure with the assembly A attached to the assembly B.

Shown more clearly in FIG. 2, the barrel assembly includes an elongated cylindrical grease container 10, which is adapted to receive the grease cartridge C, or alternatively bulk-filled grease. In the illustration given, barrel 10 has an inwardly formed portion 11 toward the rear thereof, which is positioned so as to be immediately behind the rear end of the grease cartridge when fully inserted, and which serves the function of restricting or contracting the plunger assembly to assist its insertion in the grease cartridge.

As shown in FIG. 2, a rear cap 12 is threadedly connected to the rear end of the barrel, and includes a central opening 13 through which projects the rear end of the plunger rod 14. The projecting end of the plunger rod is provided with a handle 15 and with a stop spring 16, which maintains a space between the handle and the rear cap 12.

There is also provided a plunger rod latch 17, which operates with plunger rod 14 to latch it in a withdrawn position, as described in my copending application Ser. No. 676,432 filed Oct. 19, 1967 now Patent No. 4,141,170, entitled, "Latch Assembly for Grease Gun Plunger Rod." It will be understood that the plunger rod may be withdrawn as shown in FIG. 1 to withdraw the plunger assembly into the rearward portion of the barrel,

which will be subsequently described in greater detail. In the withdrawn position, the latch 17 will serve to lock the plunger rod, thereby facilitating the introduction of the grease cartridge C. Alternatively, the grease cartridge loading method described in my Patent No. 3,341,084 can be employed.

Also shown in FIG. 2 is the plunger assembly 18, to which this invention is particularly directed, which is

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urged toward the forward end of the grease gun by a compression coil spring 19, the forward end of which bears against the rear of the plunger assembly 18, and the rear end of which bears against the inside of the cap 12. The plunger assembly 18 includes an integrally molded plunger designated generally by the number 20, a cup-shaped rear washer 21 and a front washer 22. The rear washer 21 is assembled with a guide sleeve or bushing 23, the forward end of bushing 23 being press fitted into a central opening of rear washer 21, and slidably receiving the plunger rod 14. The forward washer 22 also provides a central opening slidably receiving the plunger rod, and the plunger rod extends through a central opening in the plunger 20, which is designed to slidably and sealingly engage the plunger rod.

Referring now to FIGS. 3, 3A and 4, the details of the molded plunger can be more clearly seen. It will be understood that the plunger should be formed of a flexible resilient grease-resistant material, such as synthetic rubber. The plunger 20 provides a transversely-extending web section 24 which provides the central opening 25 for receiving the rod 14, the opening 25 being provided in the central portion of the web section 24. To provide greater resiliency, an annular recess 26 can be provided on the front side of the web section adjacent the opening 25, as shown more clearly in FIG. 4.

In accordance with the present invention, there is provided an annular flexing section 25 projecting rearwardly from the peripheral portion of the web section 24. Sealing section means designated generally at 26 is carried by the rearward end portion of the flexing section 25 and projects outwardly therefrom for selective engagement with the inside of the cylinder 10 or the grease cartridge C. The sealing section means 26 provides at least one annular lip 27, the lip being inclined outwardly and forwardly from the flexing section rearward portion, as shown more clearly in FIGS. 3A and 4. The sealing section means 26 can also provide a second annular lip 28, the second lip being inclined outwardly and rearwardly from the flexing section rearward portion.

The plunger assembly 18 also includes a rear washer 21 of cup-shaped configuration with a forward transverse wall 29 and a rearwardly-extending annular wall 30. As shown more clearly in FIG. 4, the transverse wall 29 is opposed to the plunger web section 24 and provides a rigid support therefor. The annular wall 30 extends along the inside of the plunger flexing section 25 at an inwardly spaced distance therefrom to permit the flexing section to yield inwardly as the sealing section means adapts to a range of diameters. The desired clearance is indicated by the number 31 in FIG. 4.

In the embodiment shown, the rear washer 21 also provides an annular flange 32 which extends outwardly from the rear of the washer annular wall 30. Flange 22 supportingly engages the rear of the outwardly-extending portion 33 of sealing section 26 while permitting inward and outward sliding movement of outwardly-extending portion 33 of sealing section 26 which permitting inward and outward movement of the flexing section 25. To facilitate this method of functioning, the outer end of flange 32 should terminate at an inwardly spaced distance from the inside of rear lip 28, the clearance 34 corresponding in transverse width to the clearance 31. FIG. 2 shows the compressed condition of portions 25 and 33 when the plunger assembly is within a grease cartridge.

When the plunger assembly is utilized with a grease gun having an inwardly formed portion in the barrel toward the rear thereof, such as portion 11, the front lip portion 27 of the plunger is preferably provided with special means for maintaining the sealing engagement between the plunger and the inside of the grease cartridge as the plunger is withdrawn through the indented portion 11. As shown more clearly in FIG. 3A, the outer forward end of the forwardly-extending portion 27 is provided with a relatively thin annular fin 35 which projects outwardly therefrom.

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The method of functioning of the fin 35 is illustrated diagrammatically in FIG. 5. There a sequence of positions of the fin is shown as it moves over the indented portion 11 of the barrel 10. In the illustration given, the indented portion 11a is adapted for concentrically receiving the rearward end of the grease cartridge C, as shown in FIG. 4, while the portion 11b acts as a stop for the end of the grease cartridge. The inwardmost portion 11c causes the plunger to retract to a diameter slightly smaller than the inner diameter of the grease cartridge for insertion therein. The fin 35 in its rearwardmost position will therefore be withdrawn at least to the indented portion 11c, as indicated in FIG. 5, and shown in FIG. 4. The fin 35 will follow the contours of the inwardly formed portion 11, which may include the portions 11a, 11b and 11c, as shown in FIG. 5. This maintains a sealing engagement where otherwise the lip 27 might not maintain a full and effective sealing engagement as it moves through the indented portion 11, especially under pressure filling conditions where the plunger is being forced back by the grease pressure against the increasing resistance of the spring 19.

Front washer 22 provides a transverse portion 36, as shown in FIG. 4, for supporting engagement with the front side of plunger web 24. Preferably, front washer 22 also provides a rearwardly-extending annular portion 37 which overlies the outermost portion of lip 27 which terminates out of sealing engagement therewith. The annular flange portion 37 is dimensioned so that its exterior has a slightly smaller diameter than the interior of the grease cartridge C, the clearance being sufficient to permit grease to flow around the sides of flange 37, while at the same time serving to guide the plunger within the grease cartridge, smoothing any wrinkles or creases in the cartridge, and in general improving the cooperation of the plunger assembly with the grease cartridge. Preferably, a slight clearance 38 is provided between the rearward end of flange 37 and the forwardmost portion of lip 27, as shown in FIG. 4. This permits the grease, whether cartridge-packaged grease, or bulk-filled grease, to enter the annular recess 39, thereby exerting a hydraulic pressure against the inside of lip 27, causing it to be urged outwardly by the grease pressure, as the spring 19 urges the plunger assembly 18 forwardly in the barrel under grease dispensing conditions. Substantially, the same condition exists when the plunger assembly is within the barrel 10 which has been filled with bulk grease, no cartridge being used. This condition is illustrated in FIG. 6. The front washer 36 is shown as being in contact with the grease G which is passed around the flange 37 into the recess 39 and thereby urges the lip 27 outwardly against the inside of container 10.

As also shown in FIG. 6, the flexing section 25 is moved outwardly to somewhat increase the clearance 31, thereby maintaining the sealing engagement between the lips 27 and 28. The seal with lip 28 is particularly important for suction filling of grease, where the grease is being sucked into the container 10 by the withdrawal of the plunger assembly.

Where suction filling is not desired, the molded plunger can be modified, as illustrated in FIG. 7, where corresponding parts have been given the same numbers, except that the numbers have been primed. As will be noted, the rearwardly-extending lip has been omitted, but the construction of the plunger is otherwise substantially the same, including the rearwardly-extending flexing section 25' and the sealing section means 26', which includes the outwardly-extending portion 33' and the outwardly and forwardly-extending lip 27'. For use with a grease gun having an indented rearward portion, as previously described, the forward end of lip 27' can be provided with the wiping fin 35'.

What is claimed is:

1. In a hand grease gun of the kind including a cylindrical grease container with a forward end and a rear-

ward end, and a rod extending along the central axis thereof, said grease gun being adapted for both cartridge-packed and bulk-filled greases, wherein the improvement comprises a plunger assembly, said assembly being characterized by an integrally molded plunger having:

- (a) a transversely-extending web section with an opening in the central portion for receiving said rod;
- (b) an annular flexing section projecting rearwardly from the peripheral portion of said web section; and
- (c) sealing section means carried by the rearward end portion of said flexing section and projecting outwardly therefrom for selective engagement with the inside of said cylinder or the inside of a grease cartridge,

said sealing section means providing at least one annular lip, said one lip being inclined outwardly and forwardly from said flexing section rearward end portion; and thereby providing an annular, forwardly facing recess in said plunger; said assembly also including a rear washer of cup-shaped configuration with a forward transverse wall and a rearwardly-extending annular wall, said forward wall being opposed to the rear side of said plunger web section and providing a rigid support therefor, said washer annular wall extending along said plunger flexing section at an inwardly spaced distance therefrom to permit said flexing section to yield inwardly as said sealing section means adapts to a range of diameters.

2. The improvement of claim 1 wherein said sealing section means also provides a second annular lip, said second lip being inclined outwardly and rearwardly from said flexing section rearward portion.

3. The improvement of claim 1 wherein said grease container provides an inwardly-formed portion toward the rear thereof for contracting said plunger to assist insertion in a grease cartridge, and said plunger is characterized by also providing a relatively thin annular fin at the outer forward end of said one lip projecting outwardly therefrom for maintaining sealing engagement with said container inwardly-formed portion.

4. The improvement of claim 1 in which said assembly also includes a front washer having a transverse portion for supporting engagement with the front side of said plunger web section and a rearwardly-extending annular portion overlying the outermost portion of said one lip but terminating out of sealing engagement therewith.

5. In a hand grease gun of the kind including a cylindrical grease container with a forward end and a rearward end, and a rod extending along the central axis thereof, said grease gun being adapted for both cartridge-packages and bulk-filled greases, said grease container providing an inwardly-formed portion toward the rear thereof for contracting said plunger to assist insertion in a grease cartridge, wherein the improvement comprises a plunger assembly, said assembly being characterized by an integrally molded plunger having:

- (a) a transversely-extending web section with an opening in the central portion for receiving said rod;
- (b) an annular flexing section projecting rearwardly from the peripheral portion of said web section; and
- (c) sealing section means carried by the rearward end portion of said flexing section and projecting outwardly therefrom for selective engagement with the inside of said cylinder or the inside of a grease cartridge,

said sealing section means providing at least one annular lip, said one lip being inclined outwardly and forwardly from said flexing section rearward end portion,

said sealing section means also providing a relatively thin annular fin at the outer forward end of said one lip projecting outwardly therefrom for maintaining sealing engagement with said container inwardly-formed portion;

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(d) a rear washer of cup-shaped configuration with a forward transverse wall and a rearwardly-extending annular wall,

said forward wall being opposed to the rear side of said plunger web section and providing a rigid support therefor, and said washer annular wall extending along said plunger flexing section at an inwardly spaced distance therefrom to permit said flexing section to yield inwardly as said sealing section means adapts to a range of diameters; and

(e) a front washer having a transverse portion for supporting engagement with the front side of said plunger web section and a rearwardly-extending annular portion overlying the outermost portion of said one lip but terminating out of sealing engagement therewith.

6. The improvement of claim 5 wherein said sealing section means also provides a second annular lip, said second lip being inclined outwardly and rearwardly from said flexing section rearward portion.

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7. The improvement of claim 6 wherein said rear washer also provides an annular flange extending outwardly from the rear of said washer annular wall, said flange supportingly engaging the rear of an outwardly-extending portion of said sealing section while permitting an inward and outward sliding movement of said outwardly-extending portion with respect therein as said flexing section moves inwardly and outwardly.

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92—249