Sept. 20, 1966 P. J. O'NEILL, JR 3,273,607

METHOD AND APPARATUS FOR PACKAGING PAINT AND THE LIKE IN A PRESSURIZED DISPENSING CONTAINER

Filed June 16, 1964 2 Sheets-Sheet 1

FIG-1

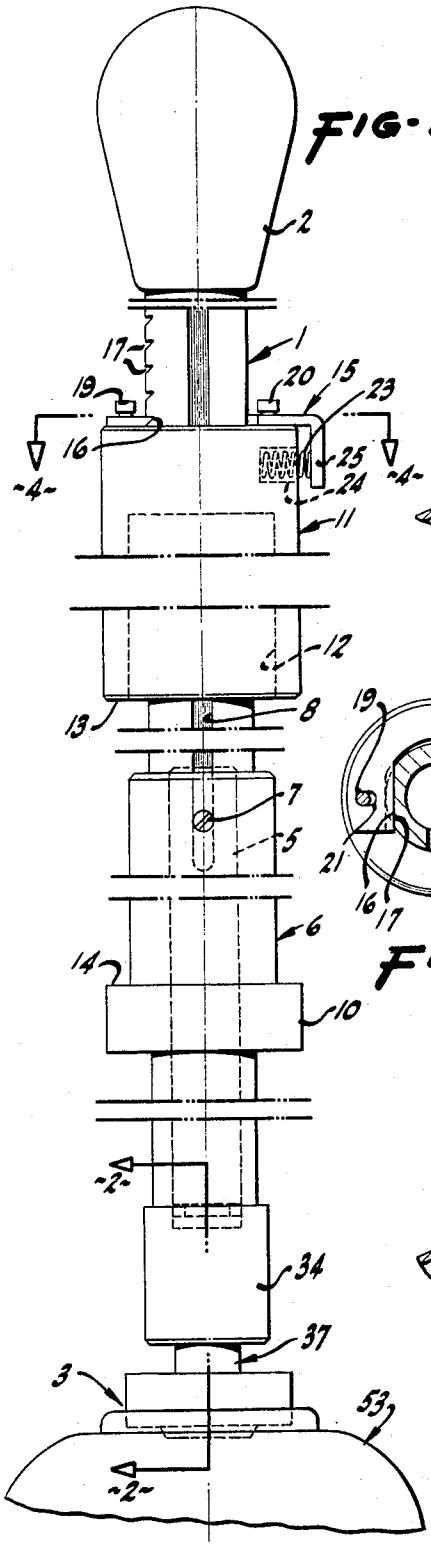


FIG-2

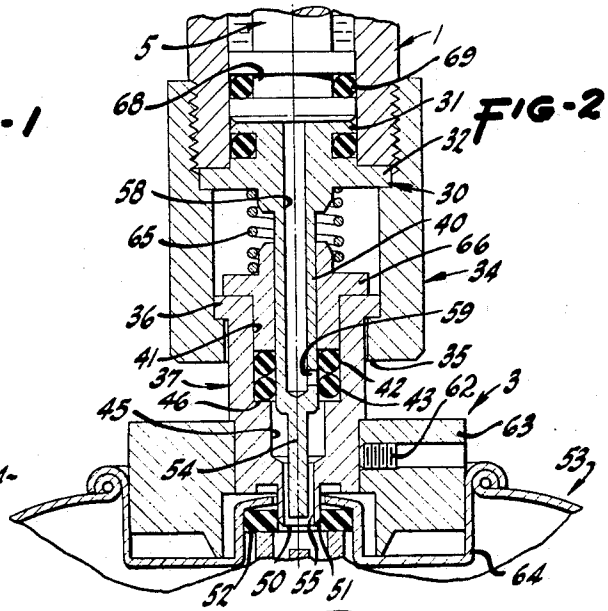


FIG-4

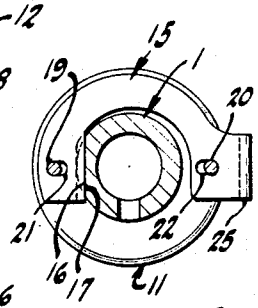


FIG-3

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METHOD AND APPARATUS FOR PACKAGING PAINT AND THE LIKE IN A PRESSURIZED DISPENSING CONTAINER

Filed June 16, 1964 2 Sheets-Sheet 2

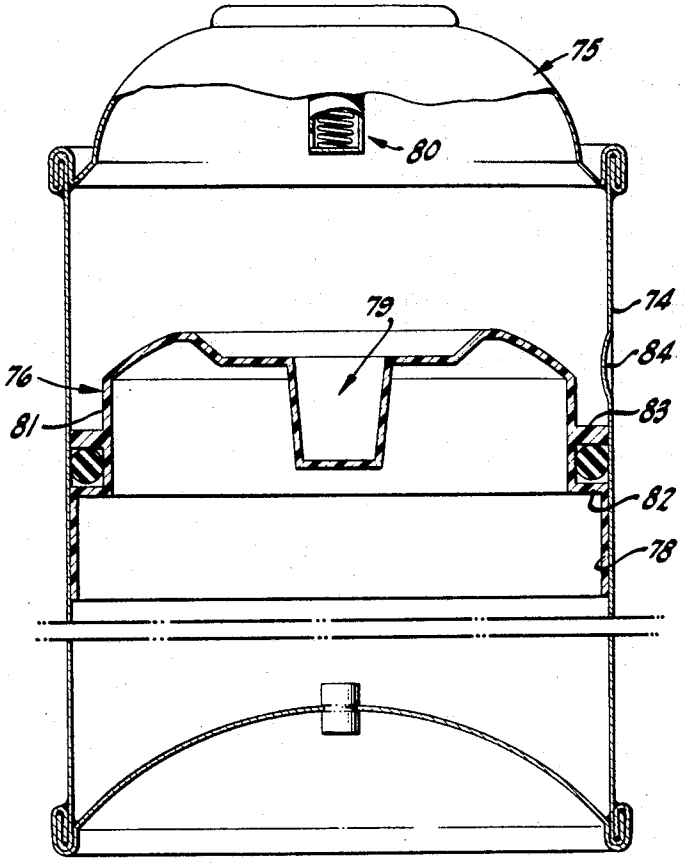


FIG-5

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United States Patent Office 3,273,607 Patented Sept. 20, 1966

3,273,607

METHOD AND APPARATUS FOR PACKAGING PAINT AND THE LIKE IN A PRESSURIZED DISPENSING CONTAINER

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Filed June 16, 1964, Ser. No. 375,563
7 Claims. (Cl. 141—3)

This application is a continuation-in-part of application Serial No. 233,721 filed October 29, 1962.

This invention relates to pressurized cans and more particularly to the type of pressurized cans used for dispensing liquids and which are commonly referred to as aerosols.

The invention disclosed in the present application is similar in many respects to that disclosed in the above mentioned pending application and this application may be considered as any improvement on the apparatus and method disclosed in said pending application.

The main object of the present invention is the provision of a method and apparatus for injecting a measured amount of colorant into a base paint which has already been packaged within a pressurized can. It is contemplated by the present invention that pressurized cans containing a base paint and a charge of propellant will be supplied to the paint retailer so that said retailer is in a position to provide whatever shade of color is desired by simply adding a measured amount of whatever additional colorant is necessary to achieve the desired color tint.

Another object of the invention is the provision of an improved colorant dispensing gun which is foolproof in operation and which has a sufficiently high degree of accuracy to ensure perfect operation.

Another object of the invention is the provision of a method of combining a base paint, a colorant, and a drier in such a manner as to obviate the undesirable results heretofore resulting from absorption of the drier by the pigment. In this connection it should be noted that in the case of fast drying oil-alkyd enamels the pigment tends to absorb the drier during prolonged storage so that such drier is unavailable to catalyze the drying and hardening of the finished paint film. By the present invention the drier is stored in a flushing solvent which is added to the base paint when the dispensing device is flushed after addition of the desired amount of colorant. In this manner the drier comes in contact with the pigmented final paint product only after the colorant has been added at the time of sale and close to the time of final use of the paint.

Still another object of the invention is to generally improve the method of dispensing fluids from pressurized dispensing containers. In this connection the invention provides a novel dispensing container construction which is more effective in operation and less vulnerable to injury than prior art pressurized containers.

Other objects and advantages of the invention will be apparent from the following specification and the drawings.

FIG. 1 is a side elevation of the measuring and dispensing device or "gun" of the present invention. Portions of this structure are broken away to reduce the longitudinal extent of the view. The dispensing device is shown in cooperation with a pressurized can of the type that may be employed to dispense the finished paint product.

FIG. 2 is an enlarged vertical cross sectional view of the device of FIG. 1 showing the same in cooperation with a dispensing container and prior to actuation of the device to permit communication between the cylinder of the device and the interior of the container.

FIG. 3 is a view similar to FIG. 2 but with the device in a position depressing the discharge valve of the container to permit the gun to be filled.

FIG. 4 is a cross section of the gun as taken in a plane indicated by lines 4—4 of FIG. 1.

FIG. 5 is a vertical cross section through a "free piston" type of pressurized container showing the novel construction of the piston of the present invention.

In detail, and first with reference to FIG. 1, the dispensing device or gun comprises an elongated cylinder generally designated **1** which is provided at one end with a handle **2** and at its other end with a nozzle assembly generally designated **3**. Reciprocally received within the cylinder **1** is a piston **5** which is connected at its inner end to a sleeve **6** by means of a pin **7**. The cylinder **1** is provided with an elongated slot **8** through which the pin **7** extends. The outer end of sleeve **6** is provided with a collar **10** and the sleeve **6** is adapted to be telescopically received within an outer sleeve **11** provided with a central bore **12**. The outer end **13** of sleeve **11** is adapted to be engaged by the adjacent side **14** of collar **10** when the inner sleeve **6** is in its extreme inner position relative to outer sleeve **11**.

The outer sleeve **11** is adapted to be fixedly but releasably secured to cylinder **1** by means of a detent plate generally designated **15**. Said plate **15** is generally semicircular and is provided with a radially inwardly directed edge **16** which is adapted to engage one of a plurality of parallel spaced apart grooves **17** formed on cylinder **1**. Grooves **17** may correspond to volume calibrations (not shown). Plate **15** is slidable on the inner end of outer sleeve **11** and is guided along a diametral path by means of a pair of pins **19, 20** which are received through elongated slots **21, 22** respectively in plate **15**. The edge **16** of plate **15** is urged into holding engagement with one of the grooves **17** by means of a helical compression spring **23** seated in a radially extending hole **24** in outer sleeve **11**. Plate **15** is provided with a flange **25** against which spring **23** is abutted and which flange **25** is adapted to be engaged by the thumb of the user to move the plate **15** against the urgency of spring **23** and release the edge **16** from whatever one of the grooves **17** it engages.

The outer end of piston **5** is adapted to abut the inner end of a nozzle stem structure generally designated **30** which includes a shallow cylindrical portion **31** received within the outer end of cylinder **1** and a large diameter flange **32** which engages the axially directed outer end of cylinder **1**. The stem structure **30** is secured in place relative to the cylinder **1** by means of a retaining cap generally designated **34** which is threadedly secured at its inner end to cylinder **1** and provided at its outer end with a reduced diameter annular portion **35** which in turn engages an enlarged diameter portion **36** of a nozzle housing generally designated **37**. With reference to FIGS. 2 and 3 it will be seen that the retaining cap **34** slidably supports the nozzle body **37** for movement of the latter from the outer or projected position of FIG. 2 to the inner retracted position of FIG. 3.

The nozzle body **37** is generally hollow to receive therethrough the elongated stem **40** of the stem structure **30**. The inner end of nozzle body **37** is provided with a large diameter bore **41** and a pair of O-rings **42, 43** are positioned in bore **41** in surrounding relationship with the outer periphery of the stem **40**. The nozzle body **37** is reduced in diameter outwardly of bore **41** to provide a smaller bore **45** and the O-ring **43** seats against the axially directed shoulder **46** between the bores **41, 45**.

The outer end of nozzle body **37** is formed to provide an annular tip **50** which is adapted to be received snugly

within the central aperture 51 of the annular sealing gasket 52 of the discharge nozzle structure of the pressure can generally designated 53. The outer end of stem 40 is reduced in diameter to provide a solid extension 54 which is adapted to pass through the bore 55 in tip 50.

The stem 40 is provided with an axially extending bore 58 which terminates at its outer end in a radially extending hole 59 positioned between the O-rings 42, 43 when the nozzle 37 is in its projected position of FIG. 2. However, as seen in FIG 3, when the nozzle is retracted to its inner position the radial hole 59 communicates with the cavity defined by bore 45 which in turn communicates with the bore 55 in the nozzle tip 50. As best seen in FIG. 3, when the extension 54 of stem 40 engages the central projection 60 of the valve 61 of the pressure can 53, said valve is moved away from the gasket 52 thus permitting the fluid in can 53 to pass inwardly through the bore 55 in tip 50 into the cavity formed by the bore 45, through radial hole 59 and into bore 58 in the stem 40 and thence into cylinder 1.

For the purpose of properly positioning the stem 40 relative to the valve 61 a relatively large diameter collar 63 is fixedly secured, as by screw 62, to the nozzle body 37. The outside diameter of the collar 63 is slightly less than the inside diameter of the mounting cover 64 of the can 53. By this structure the stem 40 is automatically positioned in coaxial alignment with the valve 61 of the pressure can.

The nozzle body 37 is yieldably urged outwardly to its projected position by means of a compression spring 65 extending between the fixed flange 32 of the stem structure 30 and a retainer 66 surrounding stem 40 and serving to retain O-rings 42, 43 in their proper position relative to the fixed stem 40 and the radial hole 59.

In operation, the gun is placed on the can 53 with the collar 63 received within the mounting cover 64 as shown in FIG. 2. If it is assumed that the gun is to be filled with material in can 53 the piston 5 will have then moved to its extreme outer position in abutment with the stem structure 30 reducing the volume of the cylinder to zero. The operator then presses downwardly on the handle 2 of cylinder 1 causing the nozzle body 37 to be moved inwardly against the urgency of spring 65 and resulting in the fixed extension 54 of stem 40 engaging the projection 60 of valve 61 and moving said valve away from the seat formed by the gasket 52. The fluid in can 53 is then permitted to pass inwardly of the nozzle as above described through the radial hole 59 in stem 40 and then through the central bore 58 of the latter into the cylinder 1 thus forcing the piston 5 inwardly of the cylinder until collar 10 carried by said piston engages the end 13 of sleeve 11. Assuming that the sleeve 11 has been positioned on cylinder 1 in a position corresponding to the quantity of fluid to be dispensed into gun 1, the pressure of the fluid from can 53 will automatically urge such a predetermined quantity into the cylinder 1. It is important to note that the dimensions of the passageway which is formed by the bore 58 in stem 40, the radial hole 59, the space between bore 45 and stem 40 and between the reduced diameter bore 51 of the tip and the stem extension 54 is extremely small and, for all practical purposes, is so minute as to be negligible.

If it is desired to inject the colorant within cylinder 1 into a conventional pressurized dispensing container the operation is the reverse of that above described. The gun is placed on the can in the same manner and the handle 2 is pressed downwardly to retract nozzle 37 and the outer sleeve 11 is then translated along cylinder 1 toward the can to be filled thus moving the inner sleeve 6 and the piston 5 outwardly to the extreme position of FIG. 2 at which time all of the fluid in the cylinder 1 is injected into the pressurized can to provide the correct proportions of base paint and colorant.

The usable life of the gun and the accuracy of its operation can be considerably enhanced by providing the piston shown with the construction illustrated in FIG. 3. Adjacent but spaced from the outer end of piston 5 an annular groove 68 is provided for receiving therein an O-ring 69 which cooperates with the inner wall of cylinder 1 to create a seal preventing flow of fluid past the O-ring. Inwardly of groove 68 the piston 5 is provided with a reduced diameter portion 70 providing an elongated annular space 71 between the piston and the inner walls of cylinder 1. An O-ring 72 is provided at the inner end of the reduced diameter portion 70 and between said inner end and the outer end of recess 71 said recess is filled with grease or other suitable lubricant so as to create a barrier between the outer end of the piston and the inner end thereof. In the event some fluid does escape past the outer O-ring 69 it is absorbed by the grease in the recess 71 and is thus prevented from hardening and impairing the operation of the gun. Furthermore, this structure overcomes the tendency of the O-ring to stick to the sidewalls of cylinder 1 after a long period of non-use. It has been found that the material of the O-ring tends to flow into the pores of the cylinder when the gun remains in the same position for a long period of time thus creating a relatively high breakaway friction when the piston is again moved relative to the cylinder. The structure of FIG. 3 incorporating the charge of grease in recess 71 completely eliminates such friction and reciprocation of the piston in fact creates a positive pressure on the grease to lubricate the O-rings 69, 72.

The improved pressure can construction of the present invention is illustrated in FIG. 5 wherein a typical conventional pressure can is shown having sidewalls 74 and a dome-like head generally designated 75. It will be understood that the fluid to be dispensed is in the space between the head 75 and the free piston generally designated 76. The propellant gas such as "Freon 12" is on the opposite side of the piston from the fluid to be dispensed.

The free piston of FIG. 5 comprises a cylindrical skirt portion 78 which is in slidable engagement with the sidewalls 74 of the pressure can. The upper end of free piston 76 is provided with an upwardly opening cavity 79 for receiving therein the discharge nozzle structure generally designated 80 of the pressure can. The particular shape of the free piston surrounding cavity 79 is not critical and is formed generally complementarily to the inner configuration of the head 75 so as to permit as much of the fluid as possible to be discharged. Between the upper end of the piston 76 and the skirt portion 78 there is provided a generally cylindrical portion 81 connected to the skirt portion 78 by an annular transverse section 82. Formed on the cylindrical portion 81 and integral therewith is an outwardly extending annular flange 83 which is substantially thicker than the thickness of the material forming the remainder of the piston. For example, if the wall thickness of the piston is about .030" the thickness of the flange 83 may be about .063" or substantially twice as thick. These dimensions are given assuming the sidewalls 74 of the can are made of aluminum of a thickness of .014". The function of the flange 83 is to provide a relatively rigid member which, coacting with the sidewalls 74, serves to remove any dents, such as dent 84, which may be formed in said sidewalls due to rougher than usual handling. In other words, if the sidewalls 74 of the can become dented so that leakage past piston 76 would normally occur the flange 83 serves to remove such dents by conforming the lighter metal of the sidewalls 74 to the true cylindrical shape of the skirt 78. The above dimensions of piston 76 are given assuming that the same is made of a molding grade of acetal resin.

By the present invention the method of carrying out the tinting of a base paint is as follows:

The paint retailer has on hand aerosol cans of base paint. It is contemplated that no more than three different kinds of base paint are required to achieve any tint desired by adding colorant to the base paint. The retailer

is also provided with a relatively small number of different colorants which, when added in the proper proportion, are adapted to combine with the base paint to provide the tint desired. The paint retailer is also provided with a drier which, although normally added to the base paint by the supplier, is, in this instance, not added until the colorant is injected into the base paint can by means of the above described gun. The tinting colorant is provided in a pressurized canister similar to that shown in FIG. 5 which contains a nonsettling, nonseparating, relatively heavy and viscous colorant. The vehicle employed in the colorant should be such as not to significantly retard tack free time nor adversely affect the sprayed film. The colorant should, of course, not dry at such a rate that it will clog the canister valve.

After the desired amount of colorant is added to the aerosol paint dispenser a predetermined quantity of drier proportional to the amount of paint in the pigment is added to the dispensing can by means of the above described gun. By the present invention the customary practice of incorporating the drier in the base paint is not followed so as to obviate absorption of the drier by the pigment. Instead the drier is incorporated in a predetermined quantity of solvent which is flushed through the dip tube of the dispensing container so as to completely clear said dip tube of all colorant. If this step were not followed unmixed colorant would, of course, be discharged from the dispenser when it is first used and, furthermore, the proper proportioning of the colorant and the base paint would not be achieved. It is, of course, not necessary to add much solvent but only enough to clear the dip tube. By incorporating the drier in the solvent the drier comes in contact with the pigmented final paint product at the time of sale and close to the time of final use of the paint thereby preventing absorption by the pigment.

The above specific description of the preferred form of the invention should not be taken as restrictive as it will be apparent to those skilled in the art that minor variations in design may be resorted to without departing from the scope of the following claims:

I claim:

1. The method of packaging a paint, which includes a base paint and a colorant, within a pressurized dispensing container having a discharge valve adapted to be opened to discharge the contents thereof, comprising the steps of:

providing a colorant under pressure within a closed vessel,

connecting said vessel with a colorant gun and injecting a measured quantity of colorant into said gun from said vessel by the internal pressure of said vessel,

providing a propellant and a base paint under pressure within said container,

connecting said gun with the discharge valve of said container and discharging said measured quantity of colorant into said container through said discharge valve, and simultaneously preventing escape of fluid from said container,

and thereafter discharging a measured quantity of a drier into said container while the latter is still pressurized.

2. The method of packaging a paint, which includes a base paint, a colorant and a drying agent, within a pressurized dispensing container comprising the steps of:

providing a colorant under pressure within a closed vessel,

connecting said vessel with a colorant gun and injecting a measured quantity of colorant into said gun from said vessel by the internal pressure of said vessel,

providing a propellant and a base paint under pressure within said container,

connecting said gun with the discharge valve of said container and discharging said measured quantity of colorant into said container through said discharge valve, and simultaneously preventing escape of fluid from said container, and thereafter

injecting a measured quantity of drying agent into said container through said discharge valve while said container is still pressurized for flushing the latter.

3. A gun for colorants and the like adapted to cooperate with a pressurized dispensing container of the type provided with a discharge structure including a discharge gasket formed with a central aperture and a discharge valve resiliently urged axially outwardly of said discharge structure and into sealing engagement with said gasket, said gun comprising:

an elongated cylinder provided with a longitudinally extending fluid receiving bore,

a piston slidably supported in said bore,

a discharge nozzle carried by one end of said cylinder and including an elongated stem fixedly secured relative to said cylinder and adapted at its outer end to axially engage said discharge valve,

said discharge nozzle also including a sleeve surrounding said stem and slidably supported relative to said cylinder and formed at its outer end with an annular tip adapted to be received in said aperture in sealing engagement with the sidewalls of said aperture,

spring means urging said sleeve axially outwardly of said discharge nozzle to a normal projected position at all times,

means carried by said sleeve engageable with said container at said discharge structure for positioning said discharge nozzle in a position with said discharge nozzle coaxial with said discharge structure,

whereby, when said cylinder is urged axially toward said discharge structure, said sleeve is urged inwardly of said stem to a retracted position and whereby said stem engages and depresses said valve,

said stem being formed with a longitudinally extending passageway communicating at one end with said bore and at its other end with said tip for conducting fluid into and out of said bore, said other end of said passageway being at a point closely adjacent said tip to reduce to a minimum the volume between said other end and said tip.

4. A gun according to claim **3** wherein closing means is provided in said sleeve for closing said other end of said passageway automatically when said sleeve is in said projected position.

5. A gun according to claim **3** wherein said sleeve is formed with an inner cavity communicating with said tip and in which said cavity a portion of said stem is disposed, said other end of said passageway being formed by a radially extending opening in said stem communicating with said passageway and said cavity when said sleeve is in said retracted position.

6. A gun according to claim **5** wherein said sleeve is provided with a seal adapted to register with said opening when said sleeve is in said projected position for closing the passageway.

7. A gun for colorant and the like adapted to cooperate with a pressurized dispensing container provided with a discharge structure including a discharge valve spring urged axially of said discharge structure to a closed position,

an elongated cylinder provided with a longitudinally extending fluid receiving bore,

a piston slidably supported in said bore,

a discharge nozzle carried by one end of said cylinder and including an elongated stem fixedly secured relative to said cylinder and adapted at its outer end to axially engage said discharge valve,

said discharge nozzle also including a sleeve surrounding said stem and slidably supported relative to said cylinder and formed at its outer end with an annular tip adapted to effect a seal with said discharge structure,

spring means urging said sleeve axially outwardly of said discharge nozzle to a normal projected position at all times,

positioning means carried by said sleve engageable with said container at said discharge structure for positioning said discharge nozzle in a position with the latter coaxial with said discharge structure,

whereby, when said cylinder is urged axially toward said discharge structure, said sleeve is urged inwardly of said stem to a retracted position and whereby said stem engages and depresses said valve,

said sleeve being formed with an inner cavity communicating with said tip and in which cavity a portion of said stem is disposed, a radially extending opening in said stem communicating with said cavity when said sleeve is in said retracted position,

said stem being formed with a longitudinally extending passageway communicating at its inner end with said bore and with said radially extending passageway at its outer end,

said sleeve being provided with a seal adapted to register with said opening when said sleeve is in said projected position for closing said passageway.

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