March 1, 1966 R. W. COLLAR 3,237,814

DISPENSING GUN

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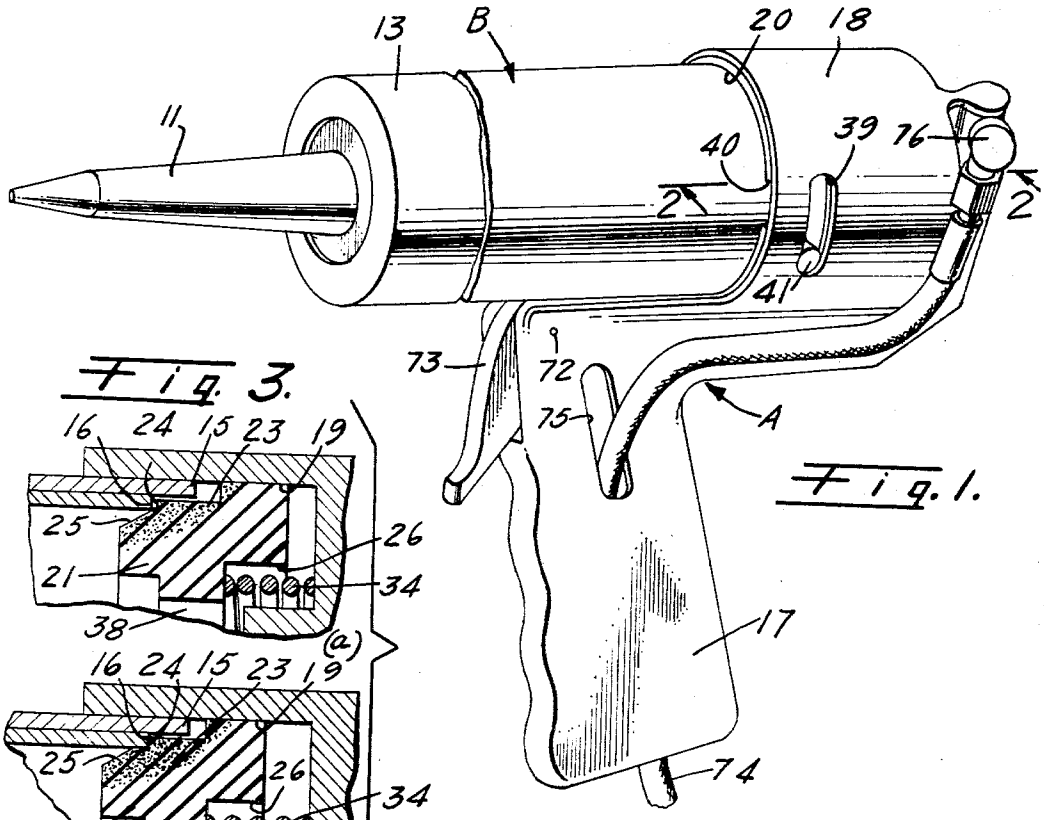


Fig. 1.

Fig. 3.

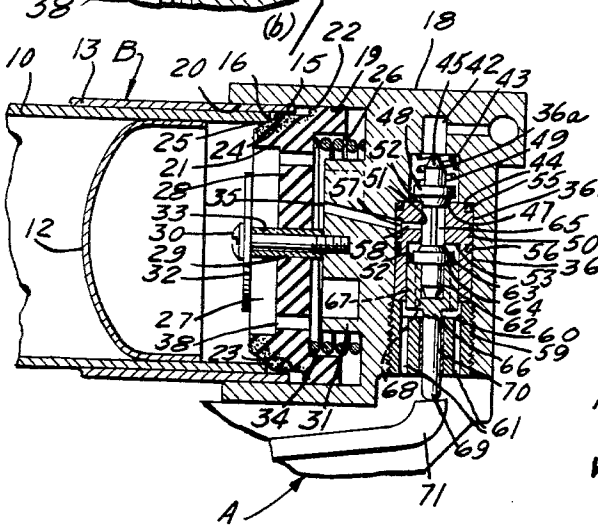


Fig. 2.

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DISPENSING GUN

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8 Claims. (Cl. 222—327)

The present invention relates generally to material dispensing devices and is more particularly concerned with dispensers of the "gun" type which are used for the dispensing of paste-like or semi-solid materials such at putty, glazes, plastics, caulking compounds, and the like.

Dispensable materials of the above character are commercially available in paper or other low pressure resistant cartridge packets in which the material can be stored until such time as it is desired to use it. The cartridges are normally sealed by an end closure which may vary as to its configuration and particular construction, but is so fabricated as to normally form a sealed end, but in use serves as a freely movable piston or dispensing plunger when the cartridge is enclosed in a high pressure resistant barrel or sleeve to which an actuating pressure-fluid is applied. Under the action of the pressure-fluid, the piston or plunger acts to force the dispensable material from the opposite end of the cartridge.

The so-called gun type dispenser has heretofore included an attachable hand-grip structure which could be attached to the cartridge packet and associated barrel or sleeve, the hand-grip structure including means for pressure sealing the packet end, and valve means for controlling the application of pressure-fluid. In the conventional hand-grip structures, as presently arranged, it has been difficult to properly seal the inner connection of the hand-grip structure with the cartridge packet and associated barrel in order to prevent leakage and provide a dependable and successfully reliable device in which the application of pressure-fluid could be dependably applied and controlled.

With the inherent disadvantages of present structures of this type in mind, it is one object of the present invention to provide improved sealing means between the attachable hand-grip structure and the cartridge packet assembly, which will be long lived, which embodies a sealing member which will be normally urged to an initial sealing position by a force of relatively low order, but during use will respond to the applied pressure to provide an augmented sealing pressure during the time that the pressure-fluid is being applied. Thus the sealing member is given an opportunity to relax between intervals during which high pressure sealing is required and at which time the sealing pressure will be automatically increased.

A further object is to provide a sealing member at the attached end of the cartridge packet which is free to rotate during the attachment of the hand-grip structure to the packet, and at which time the sealing member will be urged by a suitable spring to an initial sealing position, and wherein the spring further operates to provide a retaining force for the attached hand-grip structure and cartridge packet.

Still another object is to provide a sealing element of improved and unique construction for sealing the end of the cartridge unit in the hand-grip means, wherein the element is in general of rubber having greater hardness, for example, 80 shore, but in the sealing areas is integrally formed of rubber material having less hardness, for example, 30 shore.

Yet another object is to provide in a gun type dispenser improved hand-grip means of simple construction, and which contains an extremely effective and conveniently operable valving mechanism for controlling the application of an actuating pressure-fluid to the cartridge packet for dispensing the material therefrom.

Further objects of the invention will be brought out in the following part of the specification, wherein detailed description is for the purpose of fully disclosing the invention without placing limitations thereon.

Referring to the accompanying drawings, which are for illustrative purposes only:

FIG. 1 is a perspective view of a dispensing gun embodying the features of the present invention;

FIG. 2 is an enlarged fragmentary vertical sectional view showing details of the sealing and valve control mechanism; and

FIG. 3 is a composite view diagrammatically illustrating the action of the sealing element in its normal sealing position and when actuating pressure-fluid is applied.

Referring more specifically to the drawings, for illustrative purposes, the dispensing gun of the present invention is disclosed in FIG. 1 as embodying handle grip means A which are detachably connected with a reservoir mean B for the material which is to be dispensed.

The paste-like or semi-like materials, which may be used with dispensing guns of the character described herein, are available in containers or cartridges. These cartridges comprise generally a tubular container **10** as shown in FIG. 2, the container being constructed of any suitable material. It is customary to use a suitable paper or other material having low pressure resistant characteristics. One end of this tubular container may be provided with a discharge nozzle **11**, while the other end is usually sealed by means of a cupped closure member **12** which in use provides a movable piston against which fluid pressure may be applied to force the dispensable material from the nozzle **11**.

Since the container **10** material does not have the ability to withstand the fluid pressures required to dispense the material, the container is reenforced by a surrounding tubular barrel **13** constructed of a suitable metal such as steel or other material having relatively high pressure resistant characteristics. As shown in FIG. 1, the barrel **13** is provided with an outer end wall opening **14** through which the nozzle **11** may extend. At the rear end of the reservoir means, the barrel **13** terminates in an end edge **15** which projects beyond end edge **16** of the tubular container **10**, these edges being in stepped relation. As thus arranged, the edge margin at this end of the barrel **13** reenforces and rigidifies the end margin of the tubular container **10** so that reliable and efficient sealing engagement may be made with the end edge **16** when the reservoir means are connected with the handle grip means which are utilized for applying the actuating pressure-fluid as will hereinafter be explained.

As shown in FIG. 1, the handle grip means is fabricated as a unit structure from a suitable plastic or other material and comprises two main integrally formed parts. One of these parts is molded or otherwise formed to provide a pistol grip **17** which is connected at its uppermost end with an integrally formed laterally offset cylindrical head portion **18** adapted to be releasably attached to the reservoir means.

Referring to FIG. 2, the forward side of the head portion **18** is formed with a socket **19** which has an entrance opening **20** of a size to slidingly receive therein the rear end of the barrel **13** of the reservoir means.

Mounted within the socket **19**, as best shown in FIG. 2, is a sealing element **21** of generally cylindrical construction. The sealing element has a circumferentially extending cylindrical outer wall surface **22** which guidingly engages the inner wall surface of the socket **19** and supports the sealing element for axial movements within the socket. Forwardly of the wall surface **22** is a similar cylindrical surface **23** which is arranged to fit within the adjacent end of the barrel **13** with slight clearance between this surface and the inner wall of the barrel. The

sealing element is continued forwardly of the surface 23 and is formed with a circumferentially extending radial abutment shoulder surface 24, and from this surface the element extends in an inclined tapering circumferentially extending surface 25 to form a plug portion adapted to enter the adjacent end of the tubular container 10 and form sealing engagement therewith. The sealing element is of unitary construction, being formed in the present instance from a rubber compound in which the constituents are varied so as to provide in general a comparatively hard material, particularly in the portions having guiding relation with the interior wall of the socket. For example, such portion may have an 80 shore hardness, while the portions adjacent the end edges 15 and 16 which include the inclined surface 25 may have a hardness of approximately 30 shore.

The side of the sealing element 21, which faces the bottom of the socket, is provided with an axial recess 26 and the outer side an axial recess 27, the material between the recess bottoms providing a thinned wall partition 28 which is centrally apertured as shown at 29.

The sealing element 21 is retained within the socket 19, when the reservoir means are detached, by means of a retaining screw 30 which is threadedly supported in a projecting cylindrical boss 31 in the bottom of the socket 19. The screw 30 extends through the aperture 29 and at its head end carries a retaining disc 32, this disc being held against a spacer sleeve 33 which surrounds the shank of the screw 30. Thus, the sealing element 21 is supported for limited movement between the disc 32 and the outer end of the boss 31. The sealing element is normally urged to a direction towards the disc 32 by means of a compression coiled spring 34 which surrounds the boss 31, one end of this spring bearing against the adjacent bottom portion of the socket 19, and the other end of this spring bearing against the bottom of the axial recess 26.

Actuating pressure-fluid is supplied to the socket 19 through a fluid conducting passage 35, one end of this passage connecting with a valve compartment 36 and the other end with the bottom of socket 19 through an opening formed in the end surface of the boss 31. From the socket 19, supplied pressure-fluid is conducted from the socket side of the wall partition 28 to the connected end of the reservoir means by a plurality of inter-wall communicating passages 38. The sealing element 21 is constructed to have different effective areas on its opposite sides. For example, the area on the socket side will be greater than the area on the reservoir side, and as a consequence the application of fluid pressure will set up a differential pressure on the sealing element which acts in an outward direction to augment the normal urging force of the spring 34.

From a consideration of FIGS. 1 and 2, it will be apparent that when the reservoir means are inserted into the socket 19, the sealing element will be engaged and moved into the socket against the pressure of spring 34. Means are provided for detachably locking the reservoir means in connected position with the hand-grip means. As best shown in FIG. 1, the side wall of the socket is provided with diametrically opposite L-shaped slots 39—39 having entrance openings 40 respectively which will admit diametrically opposed locking pins 41 as the inserted reservoir means are pushed into the socket. The inner ends of the slots 39—39 circumferentially extend in a clockwise direction so that upon twisting the reservoir means in such direction, upon reaching a seated position, the pins 41—41 will be moved to a locked position, and forcefully held in this position due to the action of the spring 34. It will be observed that during the twisting movement of the reservoir means to locked seated position, the sealing element 21 will rotate and follow this movement. Abrasive and wearing action on the element is thus prevented.

In the seated and locked position of the reservoir means, the sealing element 21 assumes an initial sealing position in which it is urged only by the action of the spring 34. The initial sealing position is shown schematically in FIG. 3*a*. In this position, it will be observed that the end edge 16 is spaced from the abutment shoulder surface 24, and that there will be an initial sealing engagement of the end edge 16 with the inclined seating surface 25 resulting from the urging force of spring 34. During the initial sealing engagement, the engaged portion of the seal element will be substantially relaxed.

When pressure is applied to force material from the discharge nozzle 11, the application of actuating pressure-fluid will produce an additional differential pressure action upon the sealing element and augment the spring pressure. This differential pressure will force the sealing element to a final sealing position as shown in FIG. 3*b*. In this position, it will be observed that the edge 16 will be moved into sealed engagement with the abutment shoulder surface 24, and that the edge 16 will be forced against the inclined surface 25 so as to produce an increased sealing effect during the application of the pressure-fluid.

The valving mechanism for controlling the pressure-fluid is mounted within the valve compartment 36, as best shown in FIG. 2. The valve compartment is constructed at one end with a reduced bore portion 36*a* having communication at one end with an axial fluid inlet 42, a circumferentially extending shoulder 43 being formed at the junction therebetween. The other end of the bore portion 36*a* communicates with a larger bore portion 36*b*, an annular shoulder 44 being formed therebetween.

The bore portion 36*a* has a poppet inlet valve 45 supported therein for axial movement. This valve may be constructed of any suitable material such as rubber and is formed at one end with a tapered seating surface 47 at the inner end of which there is provided a peripheral flange 48. A compression coiled spring 49 surrounds the valve, one end of this spring abutting the shoulder 43 at the other end abutting the flange 48. This spring normally urges the valve towards a closed position as will hereinafter be described.

The valve 45 is retained by the inner end of a cylindrical retainer 50 having a contracted bore 51 and an enlarged bore 52 which are in communication, a seating shoulder 53 being formed at their juncture. The innermost end of the retainer has an end surface 54 which extends radially inwardly of the wall of bore 36*a* to provide a shoulder having valving relation with the seating surface 47 of the inlet valve 45, the seating surface 47 being normally retained in closed position with respect to the end surface 54 by the action of spring 49. The inner end of the retainer 50 is sealed by axially spaced groove seated sealing rings 55 and 56, and between these sealing rings there is provided a circumferentially extending surface groove 57 which connects with the fluid connecting passage 35. The groove 57 further is provided with bottom connections through one or more passages 58 with the contracted bore 51.

The retainer 50 is secured in its operative position within the bore portion 36*b* by means of an end plug 59 having threaded engagement with the outermost end of the bore portion 36*b*. The innermost end of the plug is provided with a recess 60 which connects in its bottom with diametrically positioned axially extending passages 61—61 for expelling exhaust pressure-fluid as it will hereinafter be explained. These passages at their outermost end openings provide means for receiving a suitable tool, such as a spanner wrench, by means of which the plug may be tightened or loosened.

A second poppet exhaust valve 62 is mounted within the bore 52 of the retainer 50, this valve being of similar construction to the valve 45, but being mounted in reversed relation. The valve 62 is provided at one end with a tapered seating surface 63 for valving action with respect to seating shoulder 53. At this end, the valve is

provided with a peripheral flange 64. The valves 45 and 62 are maintained in predetermined axial spaced relation by means of a push rod 65 which in section is of multi-legged construction.

The valve 62 is carried by an actuator member 66 which has an inner end cupped head portion 67 within which the valve is seated, the periphery of the head portion being provided with a plurality of axially extending surface grooves 68 for the flow of exhaust fluid. The head portion is guidingly supported in the bore 52, and has an axially extending projecting stem 69 which passes through an axial passage or bore 70 in the plug 59, the stem being of sufficient length to project beyond the plug and engage with a control level 71 which is swingably mounted on a pivot 72 and operatively actuatable about the pivot by means of a trigger member 73 which is positioned to be easily engaged by an operator's finger when the hand is grasped around the pistol grip 17.

Pressure-fluid is conducted to the inlet 42 through a flexible conduit 74 which is arranged to enter the bottom end of the pistol grip 17, and in the vicinity of the trigger member 73 passes outwardly through a slot 75 from whence it is carried along below the head portion 18 and attached thereto by means of a suitable fitting 76.

The valving mechanism, as thus arranged, will normally have the valves positioned as shown in FIG. 2. In this position, valve 45 will be closed, while valve 62 will be opened and connect the connected end of the reservoir means so that any residual pressure of fluid therein will be vented to atmosphere. Upon depressing the trigger 73, the control lever 71 will act upon the projecting stem 69 in a direction to begin opening valve 45 and start closing valve 62. In this position, full pressure is not conducted to the reservoir means. A portion of the inlet pressure-fluid will pass to atmosphere, but as the trigger is further depressed, the exhausted fluid will be gradually diminished and inlet fluid will be increasingly applied to the reservoir means and operate to move the closure member 12 in a direction to eject material from the nozzle 11. This ejection will continue so long as the trigger 73 is held in a depressed position. However, upon releasing the trigger, the spring 49 will act to close the inlet valve and open the exhaust valve and thus terminate the application of pressure to the reservoir means, whereupon further discharge from the nozzle ceases.

Various modifications may suggest themselves to those skilled in the art without departing from the spirit of my invention, and, hence, I do not wish to be restricted to the specific form shown or uses mentioned, except to the extent indicated in the appended claims, wherein various portions have been separated for clarity of reading and not for emphasis.

I claim:

1. A fluid-actuated dispenser, comprising:
(a) reservoir means adapted to contain a dispensable material, and having a discharge front end and an open rear end;
(b) pressure-fluid applying and control means including a socket for coaxially receiving the open rear end of said reservoir means and a fluid flow passage communicating with the rear end of the reservoir means;
(c) a sealing member supported within said socket for limited axial movement and being axially urged towards a sealing position with respect to the rear open end of said reservoir means; and
(d) valve means operable to control said passage.

2. A fluid-actuated dispenser, comprising:
(a) reservoir means adapted to contain a dispensable material, and having a discharge front end and an open rear end;
(b) pressure-fluid applying and control means including a socket for coaxially receiving the open rear end of said reservoir means;

(c) a rotatably mounted sealing member within said socket axially urged towards a sealing position with the rear open end of said reservoir means;
(d) means defining a fluid flow passage between the opposite sides of said sealing member for connecting the socket interior with the rear end of said reservoir means; and
(e) valve means operable to control fluid supply to the interior of said socket.

3. A fluid-actuated dispenser, comprising:
(a) reservoir means adapted to contain a dispensable material, and having a discharge front end and an open rear end;
(b) pressure-fluid applying and control means including a socket for coaxially receiving the open rear end of said reservoir means;
(c) a sealing member supported within said socket for rotational and limited axial movements therein, said member being engageable with the rear open end of said reservoir means so as to peripherally seal the same;
(d) a fluid flow passage connecting opposite sides of said sealing member to provide communication between the interior of the socket and the rear end of said reservoir means, whereby fluid pressure is transmitted to the rear end of the reservoir means;
(e) spring means normally urging said sealing member into peripheral sealing engagement with the rear end of said reservoir means; and
(f) valve means operable to control fluid supply to the interior of said socket.

4. A fluid-actuated dispenser, comprising:
(a) reservoir means adapted to contain a dispensable material, and having a discharge front end and an open rear end;
(b) pressure-fluid applying and control means including a socket for coaxially receiving the open rear end of said reservoir means, said socket being supplied with controlled pressure-fluid;
(c) a sealing member within said socket engageable with the rear end of said reservoir means, said member having a socket facing surface subject to the controlled pressure fluid of greater effective area than the effective area of its reservoir facing surface;
(d) a fluid flow passage for conducting pressure-fluid from the socket side of said sealing member to the reservoir side thereof; and
(e) a spring normally urging said sealing member towards a sealing position with the rear end of said reservoir means, the sealing pressure applied by said spring being augmented by the differential pressure on said sealing member resulting from the applied pressure-fluid.

5. A fluid-actuated dispenser according to claim 4, wherein the sealing member is comprised of a single unit of varied hardness, and in which the marginal surface portions engageable with the rear end of the reservoir means are of relatively less hardness.

6. A fluid-actuated dispenser, comprising:
(a) reservoir means adapted to contain a dispensable material, said means having a cylindrical wall extending between a discharge front end and an open rear end;
(b) handle grip means having a socket for coaxially receiving the end margin of said wall at the open rear end of said reservoir means;
(c) means for releasingly securing the reservoir means with said end margin of the wall in a seated position in said socket;
(d) a sealing member within said socket;
(e) a spring axially urging said sealing member towards a sealing position with said wall at the rear end of said reservoir means and opposing final movement of the end margin of the wall to its seated position in said socket;

(f) a fluid flow passage establishing communication between the interior of said socket and the rear end of said reservoir means; and

(g) valve means on said handle grip means operable to control the pressure of fluid in said socket.

7. A fluid-actuated dispenser, comprising:

(a) a relatively low pressure resistant tubular cartridge containing a dispensable material;

(b) a reenforcing tubular sleeve of relatively high pressure resistant material for receiving the tubular cartridge therein, said cartridge and sleeve coacting to provide reservoir means having a discharge front end an open rear end in which the end margin of the sleeve extends beyond the end margin of the tubular cartridge;

(c) handle grip means having a socket for coaxially receiving the open rear end of said reservoir means, and a fluid flow passage communicating with said socket;

(d) a sealing member within said socket axially urged to an initial seating position with the rear end of said reservoir means, said member having a circumferentially extending relatively hard cylindrical surface portion in guiding engagement with an inner wall of said socket, a circumferentially extending radial relatively softer surface adapted to initially enter the end margin of said sleeve to a position spaced from the end face of said cartridge end margin and an inclined circumferentially extending relatively softer surface adapted to engage the inner peripheral edge of the end face of the tubular cartridge end margin in the initial seating position of said sealing member;

(e) a communicating channel between the opposite sides of said sealing member; and

(f) valve means for controlling flow of pressurized operating fluid to said socket through said flow passage, said fluid acting to force said seating member to a final seating position with said radial surface abuting the end face of said cartridge.

8. A fluid-actuated dispenser, comprising:

(a) reservoir means adapted to contain a dispensable material, and having a discharge front end and an open rear end;

(b) handle grip means having a socket for coxially receiving the open rear end of said reservoir means, and a fluid flow passage communicating with the bottom of said socket;

(c) a sealing member supported in said socket for axial movement and being urged into sealing engagement with the rear end of said reservoir means, said member having a fluid flow passage between its opposite sides;

(d) a compartment adjacent said socket, one end of said compartment having connection with an actuating fluid source and the other end of said compartment having an exhaust connection;

(e) a pair of annular valve seats positioned in axially spaced relation between the compartment ends, the space between said seats being in communication with said fluid flow passage;

(f) a pair of connected poppet valves operable to alternately engage said seats to connect and disconnect said fluid flow passage with respect to said source and said exhaust;

(g) spring means normally urging said valves to a position disconnecting said passage from said source and connecting it with exhaust; and

(h) manually operable means for urging said valves in a direction against said spring to a position disconnecting said passage from exhaust and connecting it with said source, whereby to control dispensing of the material from the discharge front end of said reservoir means.

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