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(54) **Closure assembly.**

(57) A closure assembly (15) for attaching a fluid dispensing device to a container (16) with a threaded neck (17). The closure assembly includes a sleeve member (26) received in a closure member which has a top portion and a depending skirt portion with threads to engage the neck portion of the container. In one embodiment the closure has a top portion with a central opening (24) and has a plurality of inwardly extending lugs or fingers (25) extending into the opening. The sleeve member with an upstanding collar (36) is received in the central opening and has a flange portion (27) abutting the underside of the lugs or fingers. The flange portion has a plurality of lug engaging means received between and adapted to engage the lugs or fingers to interlock the closure member and the sleeve member. The resulting closure assembly provides a substantially leakproof closure system which resists backoff in the event that forces are applied to the closure system inadvertently that would tend to loosen the closure from the container neck.

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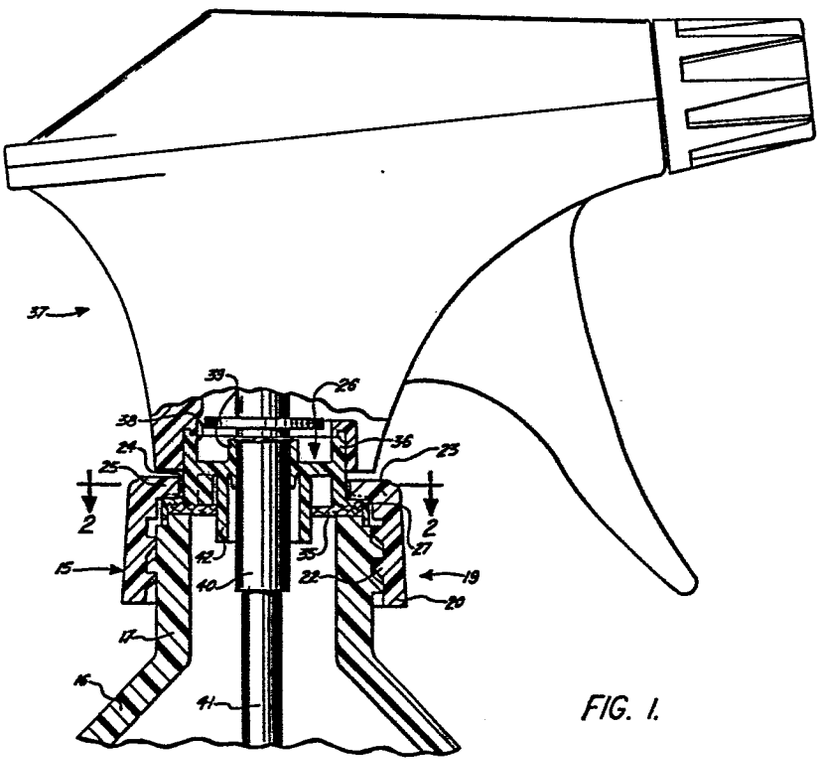

FIG. 1.

CLOSURE ASSEMBLY

The present invention relates to a closure assembly attaching a fluid dispensing device to a container. The closure assembly is particularly adapted for attaching pump sprayers to containers so that the sprayer resists accidental rotation which could cause back-off of the closure assembly and result in leakage of the product in the container.

Hand actuated fluid dispensers are generally attached to hand-held containers by means of closure caps which engage threads on the neck of the container and provide an opening in the central portion of the closure for retention of the fluid dispensing mechanism, such as a reciprocating finger pump or a trigger actuated pump. The reciprocating finger pump sprayer which is shown in U. S. patent 3,179,306 has a flange member on the pump body that is provided with teeth which engage teeth on the upper periphery of the neck of the container. A screw cap attaches the pump to the container neck. While the engaged teeth hold the pump against rotation to permit lock-down of the pump plunger for shipping or storage, the container closure can still

loosen during shipment and cause possible leakage because of backoff between the threads of the container and the neck closure.

Trigger pump sprayers of the type shown in U. S. patent 4,161,288 have been commercially successful since they can be utilized to dispense a wide variety of products. Further, the products to be dispensed are either in the form of a spray or a stream, depending upon rotation of the outlet nozzle cap. These trigger-type sprayers are sometimes subject to accidental rotation after the cap has been torqued down on the product container. Such rotation can sometimes cause backoff between the threads of the container cap and the closure which can result in leakage of the contents of the container, particularly when the dispenser package is in the shipping carton during transport or storage.

An improvement in the closure system used in the trigger pump shown in U. S. patent 4,161,288 is disclosed in U.S. patent 4,345,611 which shows a child-resistant closure for a trigger pump which utilizes a special neck finish on the bottle having a plurality of outwardly projecting teeth which are adapted to be engaged by detents, or projections, vertically oriented on the bottom inside surface of the skirt portion of the container closure member. Thus, when the cap is screwed down tightly on the bottle, the cap cannot be removed

without destroying it. Another child-resistant closure assembly for the foregoing pump is disclosed in U. S. patent 4,366,921 which provides a closure cap having an exterior, vertically reciprocal collar member which has teeth on its interior periphery that engages teeth provided on the neck of the container. Thus, this child-resistant closure can be attached so that the container can be refilled by an adult, yet the complexity of operation of the closure assembly will prevent a child from being able to remove the closure from the container.

Another type of child-resistant closure assembly for trigger pump dispensers is shown in U. S. patent 4,144,983. This pump assembly utilizes a closure cap provided with a plurality of teeth that project downwardly from the bottom of the skirt of the cap and are adapted to engage and interlock with detents, or matching teeth, carried by a flexible tab integrally molded on the neck of the bottle.

Other child-resistant closure cap devices which have a solid top which resist counterclockwise rotation once in place are shown in U. S. patents 3,891,110 which utilizes a flexible, outwardly extending flange on the lower end of the cap that engages teeth on the upwardly facing shoulder of the container; 3,900,123 which shows a cap with a flexible flange extending out from the bottom of the cap which flange has a plurality of

rectangular openings that are adapted to interlock with detents, or catch members, provided on the shoulder of the container; and 3,572,532 which discloses in one embodiment a two-piece child- resistant closure that has a cap member a plurality of teeth adjacent its top wall. These teeth engage with recesses provided on the upper periphery of the neck of the container to interlock the cap and container neck.

While many of the foregoing closure assemblies provide desirable child-resistant features, many of them are unduly complicated and expensive to manufacture. Further, many of these closure devices do not provide a simplified, inexpensive closure system whereby the dispensing device, i.e., a trigger sprayer can be securely locked down against the neck of the container thereby preventing counterclockwise rotation of the cap with resulting thread backoff that subsequently results in leakage of the contents of the container. Oftentimes during packaging and/or during shipment a trigger pump will be inadvertently twisted in a direction counterclockwise to the right-hand thread tightening direction which can produce loosening of the container closure and subsequent leakage of the products from the container while the dispenser assembly is either in storage or in transit in its packing case.

Thus, it can be seen that there is a real need for an inexpensive, simplified and effective closure system which can prevent counterclockwise rotation resulting in backoff between the cap threads and neck threads of a trigger pump closure system thereby preventing leakage of the contents of the container in event the dispenser device is inverted or placed on its side.

The present invention resides broadly in a closure assembly for attaching a fluid dispensing device to a container having a neck portion with threads thereon. The closure assembly includes an annular closure member having a top portion and a depending skirt portion with threads on its interior wall for engaging the threads on the neck portion of the container. The closure top portion has a central opening therein and an annular band section surrounding the opening. First engaging means are located on the annular band. A sleeve member is received in the central opening and has a flange portion for abutting the underside of the annular band. The flange portion has second engaging means adapted to engage the first engaging means on its upper surface to interlock the closing member and the sleeve member. Coupling means are provided on the sleeve member for coupling it to the fluid dispensing device.

The present invention is also described in a specific embodiment of a closure assembly for attaching a fluid dispensing device to a container having a threaded neck portion. The closure assembly includes an annular closure member having a top portion and a depending skirt portion with threads on its interior wall for engaging the threads on the neck portion of the container. The closure member top portion has a central opening therein and a plurality of lugs extending into the opening. A sleeve member is received in the central opening and has a flange portion abutting the underside of the lugs. The flange portion of the sleeve member has a plurality of lug-engaging means received between and adapted to engage the lugs to interlock the closure member and the sleeve member. Coupling means are provided on the sleeve member for coupling it to the fluid dispensing device.

The present invention also provides a trigger pump assembly which is adapted to resist backoff when attached to a container. The assembly includes a trigger pump for dispensing fluid upon actuation of its trigger. A sleeve member is attached to the lower end of the trigger pump. The sleeve member has an upstanding collar which has an integrally formed outward extending flange at the lower end thereof. The flange is provided on its upper service first engaging means.

The collar member also provides an inwardly extending transverse webb member which is integrally formed therewith and which supports and has integrally formed therewith a sealing annulus adapted for receipt of the conduit extending from the trigger pump into the container. A closure cap member has a depending skirt portion and a top portion with a central opening therein and an annular band section surrounding the opening, the closure cap being rotatably mounted on the sleeve member above the flange portion. The closure member has second engaging means located on the annular band section adapted to engage with the first engaging means to interlock the closure member and the sleeve member. The closure member is provided with theads on the inner wall of the skirt portion adapted to engage threads provided on the neck of the container whereby upon threading the closure member onto the neck of the container, the first engaging means will interlock with the second engaging means when the closure is torqued to the full desired torque, thereby resisting independent rotation of the trigger pump and attached sleeve member with the closure cap to prevent backoff of the trigger pump dispenser after it has been attached to the container neck.

The present invention also provides a specific embodiment of a trigger pump assembly which is adapted to resist backoff when attached to a container. The

assembly includes a trigger pump adapted to dispense fluid upon actuation of its trigger. The assembly also includes a sleeve member which is attached to the lower end of the trigger pump, the sleeve member having an upstanding collar member with an integrally formed outwardly extending flange portion at its lower end. The flange portion is provided on its upper surface with a plurality of detents each of which has one vertically extending engaging surface. The collar member also provides an inwardly extending transverse web member which is integrally formed therewith and which supports and has integrally formed therewith a sealing annulus for receipt of a conduit extending from the trigger pump into the container. A closure cap member is provided which has a central opening in its top surface and which is rotatably mounted on the sleeve member above the flange portion. The closure member has a plurality of radially, inwardly extending lugs each of which has a vertical surface adapted to inter-engage with the vertically extending surface on each of the detents on the flange portion of the sleeve member. The closure member is provided with threads on the inner wall of the skirt portion which are adapted to engage threads on the neck of the container. Upon threading the closure member onto the neck of the container the lugs will ride over the detents and interlock with the detents when the

closure is torqued to the full desired torque and will thereby resist independent rotation of the trigger pump and attached sleeve member with the closure cap to thereby prevent backoff of the trigger pump dispenser after it has been attached to the container neck.

The closure assembly of the present invention is particularly adapted for connecting dispensing devices, such as trigger pumps or vertically reciprocating finger pumps to hand-held containers for dispensing liquid products therefrom. However, the closure assembly may be utilized to connect other types of dispensing devices to the tops of containers to provide leakproof engagement between the dispensing mechanisms and the container.

The present invention will be more readily apparent from a further consideration of the following detailed description of the drawings and the preferred embodiments of the invention.

FIGURE 1 is an elevational view of the closure assembly of the present invention, portions being shown in broken section, with the closure assembly attaching a trigger pump to a container;

FIGURE 2 is a cross-sectional view of Figure 1 taken along the line 2-2;

FIGURE 3 is a top view of the sleeve portion of the closure assembly of the present invention;

FIGURE 4 is a cross-sectional view of Figure 3 taken along the line 4-4;

FIGURE 5 is an enlarged, broken, and sectional view of a portion of the flange of the sleeve member seen in Figure 4;

FIGURE 6 is an enlarged broken, perspective view of the top portion of the flange on the sleeve member showing one of the detents;

FIGURE 7 is a top view of the closure member of the closure assembly of the present invention;

FIGURE 8 is a cross-sectional view of Figure 7 taken along the line 8-8;

FIGURE 9 is a perspective view of a container having a spiral thread and a neck structure with upwardly projecting teeth adapted for use with the closure assembly of the present invention;

FIGURE 10 is an enlarged, broken, sectional view of a second embodiment of the closure member and the sleeve member of the present invention;

FIGURE 11 is an enlarged, broken, sectional view of a third embodiment of the closure member and sleeve member of the present invention;

FIGURE 12 is an enlarged, broken, sectional view of a fourth embodiment of the closure member and sleeve member of the present invention;

FIGURE 13 is an enlarged, broken, sectional view of a fifth embodiment of the closure member and sleeve member of the present invention;

FIGURE 14 is an enlarged, broken, perspective view of the top portion of the flange on the sleeve member of FIGURE 10;

FIGURE 15 is an enlarged, perspective, broken, view of the closure member of FIGURE 10;

FIGURE 16 is an enlarged, broken, perspective view of the closure member of FIGURE 11;

FIGURE 17 is an enlarged, broken, perspective view of the closure member of FIGURE 12; and

FIGURE 18 is an enlarged broken, perspective view of the closure member of FIGURE 13.

Referring now to Figure 1, the closure assembly of the present invention, designated generally by the numeral 15, is attached to a container 16. As seen more clearly in Figure 9, the container 16 is provided with a neck portion 17 which has an integrally formed spiral thread 18 on its exterior surface. The closure assembly includes an annular closure member, or cap, designated generally by the numeral 19. As seen in Figures 1, 7, and 8, the closure, or cap member 19, is provided with an annular depending side wall, or skirt, 20. The exterior surface of the skirt 20 is provided with a plurality of spaced apart splines, or ribs 21. These splines, or ribs, assist in attaching the closure member to the container, either by mechanical capping equipment or by manual closure by the user of the completed package. The interior of the side wall 20 of the closure is provided with a spiral thread 22 for engagement with the thread 18 on the container neck. The top wall 23 of the closure is a narrow, annular band integrally formed with and extending inwardly from the side wall of the closure, as can be seen in Figure 7. The top wall 23 of the closure is provided with a large, central opening 24. Integrally formed with the top wall of the closure are a plurality of inwardly extending fingers, or lugs 25, which project into the central opening 24 of the closure.

Referring now to Figures 1, 3, and 4, a sleeve member, designated generally by the numeral 26, is loosely received in the opening 24 in the top wall of the closure 19. The sleeve member is provided at its lower end with a radially extending annular flange 27. The top wall 28 of the annular flange is provided with a plurality of spaced apart, generally rectangular detents 29. As seen more clearly in Figure 6, each detent has a vertically extending front wall 30 and a ramp or top wall 31 which slopes upwardly from the top of the flange. Each detent is dimensioned so that it is received between two adjacent lugs 25-25 on the closure member, as can be seen in Figure 2.

The sleeve member is also provided with a short, downwardly extending skirt ring 32 at its periphery. As seen more clearly in Figures 4 and 5, the skirt ring 32 is provided on its inner wall with a plurality of downwardly extending teeth 33. The lower surface of the flange 27 may be provided with a grooved surface 34 as seen in Figures 4 and 5. This grooved surface can be utilized as a sealing means to seal the sleeve against the rim, or lip, of the top of the container to provide a liquid-tight seal. However, it is preferred that a gasket 35, as seen in Figure 1, is used to insure a seal between the sleeve and the lip of the container neck. Additionally, other forms of linerless seal rings may be

used on the underside of the flange portion of the sleeve to effect sealing between the closure assembly and the top of the container neck.

As seen in Figures 1 and 4, the sleeve member 26 is provided with an upstanding annular collar 36 integrally formed with the flange 27. Collar 36 is loosely received in the opening 24 of the closure and has its upper end attached to the lower end of a trigger pump, designated generally 37, as seen in Figure 1. The annular collar may be attached to the lower end of the trigger pump by any suitable means, i.e., sonic welding, spin welding, cementing, or other bonding techniques. The dispensing assembly attached to the closure assembly of the present invention may be any of the types known in the prior art. In particular, it is well adapted for connection to the trigger pump shown in U. S. patent 4,161,288, the disclosure of which is incorporated herein by reference. The collar 36 is provided with a transverse, internal annular web 38 which has an integral, upwardly extending guide member 39 formed thereon. The guide member provides a sliding seal for the hollow piston extension 40 which receives the upper end of the dip tube 41 that conveys fluid from the container to the piston cylinder (not shown) within the trigger pump 37. A downwardly extending annular collar

42 depends from the lower part of web 39 and serves to receive and retain the gasket 35 for proper positioning on the container neck as seen in Figure 1.

Referring now to Figure 9, the container neck 17 is provided with a plurality of upwardly projecting teeth 43. The teeth project upwardly from a recessed shoulder 44 formed adjacent the lip 45 of the container. An alternate arrangement for the teeth on the container is to provide the teeth on the periphery on the upper end of the container neck simply by providing tapering "V" shaped grooves in the pheriphery of the outer lip of the container to provide recesses which will receive the teeth 33 of the sleeve member. This type of construction for the teeth of the neck of the container is disclosed in U. S. patent 3,572,532 in Figures 7, 8, and 9, the disclosure of which is incorporated herein by reference.

The closure assembly of the present invention as described herein is assembled to the trigger pump 37 by placing the closure cap 19 over the sleeve member 26 and then attaching the collar 36 by spin welding or other suitable means to the lower end of the trigger pump. Dip tube 41 is then inserted in the piston extension 40 and the gasket 35 is placed around the collar 42 and the pump is then shipped to the packager for placing on the desired container which may be one of the type as

exemplified in the container 16 in Figure 1. After the container is filled with product, the trigger pump and closure assembly are placed on the neck of the container and the closure member 19 is rotated clockwise with conventional, automated capping machines to bring the gasket 35 into tight engagement with the lip 45 of the bottle. As this tightening occurs, the teeth 33 on the underside of the flange 27 mesh and mate with the teeth 43 provided on the neck of the container. During the final clockwise rotation of the closure 19, the fingers 25 guide up the incline ramp surface 31 of the detents 29 and snap over and engage the vertical face 30 on the detent immediately to the rear of the engaging lug member. The engagement between the teeth 33 on the collar member and the teeth 43 on the neck of the container prevents the collar member from rotating in either direction on the neck of the container. The engagement of the vertical face 30 of the detent members with the vertical face on the lug or finger members prevents counterclockwise rotation of the pump with respect to the closure member and the neck of the container. Thus, with the interlocking threads on the container neck and the underside of the flange on the collar member and the interlocking connections between the lugs on the closure member and the detents on the top surface of the collar member, a rigid unrotatable sealing system is achieved

by torquing down or clockwise rotation of the closure cap on the container neck. Thus, even if the trigger pump is acted on by some force tending to rotate it in a counterclockwise direction which would normally cause the container cap to loosen or back off, by virtue of the interlocking of the closure system of the present invention, counterclockwise rotation of the trigger pump and thus any loosening or relaxing of the seal between the gasket and the collar and lip of the container is prevented. Thus, it can be seen that the closure system of the present invention provides a superior system for guaranteeing against anti-backoff or counterclockwise rotation of a trigger pump or other dispensing device which may be coupled to the sleeve means, thus preventing thread backoff and leakage between the gasket and lip of the container or between the sealing surface on the underside of the sleeve in the event that no gasket is utilized.

Referring now to figures 6, 10 and 15, there is shown a second embodiment of the closure assembly which utilizes a closure or cap member 46 having a depending sidewall or skirt 47 and an integral, inturned top portion with an annular band section 48. The band portion surrounds and defines an opening 24 provided in the top wall of the closure. The cap member of this second

embodiment differs from that of the first embodiment in that it does not have the lugs or fingers extending inwardly into the opening in the top of the closure. Instead, the underside of the band section 48 of the closure 46 is provided with a plurality of generally rectangular recesses 49. The recesses are located adjacent the edge of the underside of the band section 48 of the closure member and have an opening 50 that opens into the annular opening 24 in the top portion of the closure 46. In operation, the closure 46 is threaded onto the container neck and the recesses 49 receive the detents 29 to lock the sleeve 26 and closure member 47 together so that the closure member cannot be rotated counterclockwise after the detent and recesses are engaged.

Referring now to Figures 11, 14 and 16, there is shown a third embodiment of the closure assembly in the present invention. The assembly includes a cap member designated generally 51 having a depending skirt portion 52, and a top portion with an annular band section 53 surrounding the opening 24. In this embodiment the sleeve 54 is provided with a integral, outwardly extending annular flange 55 which is provided with a plurality of general rectangular recesses 56 as can be seen in Figures 11 and 14. The underside of the annular band section 53 of the closure 51 is provided with a

plurality of spaced apart, generally rectangular detent members 57 integrally formed on its undersurface, as seen in Figure 16. The detents have a downwardly sloping top surface 58 and a vertical rectangular front face 59 which is similar to the construction of the detents shown in the first embodiment, i. e., that depicted in figure 6. However, the detents on the third embodiment described above are on the underside of the top of the section of the closure and are also reversed as to direction compared to those used in the first embodiment of the closure assembly. Thus, as the closure 51 is rotated, the sloping surface 58 of the detent 57 drops into the recess 56 on the flange 55 and their forward face 59 abuts the opposing wall of the recess to provide a interlocking engagement between the sleeve 54 and the cap member 51 which prevents counter-clockwise rotation to separate the closure member from the sleeve member.

A fourth embodiment of the invention is depicted in figures 6, 12 and 17. In this embodiment of the invention, the sleeve member 26 is the same sleeve member utilized in the first embodiment of the invention and depicted in Figures 4, 5 and 6. The sleeve member has a annular flange 27 with an upper surface 28 which is provided with detents 29 which are generally rectangular in shape as shown in Figure 6. This embodiment includes a

closure cap 59 with a downwardly depending skirt portion 60 which has a top portion having an annular band section 61. The annular band section is provided with a plurality of annular openings 62 which extend through the thickness of the band section. The openings are sized so that they will receive the detents 29 provided on the sleeve member when the enclosure 59 is rotated clockwise and the front wall 30 of the detent 29 will engage the abutting wall of the opening 62 to interlock the closure cap 59 to the sleeve member 26 to prevent counterclockwise rotation of the cap.

Referring now to Figures 6, 13 and 18, a fifth embodiment of the closure assembly of the present invention is depicted. The closure assembly includes the cap member 63 having a skirt portion 64 for threaded attachment to the neck of the container. The top of the closure cap has an annular band section 65 surrounding the opening 24 provided in the top section of the cap member. The underside of the annular band section 65 is provided with a plurality of generally rectangular recesses, 66 as seen in figure 18. As the closure member 63 is threaded on the container neck, the underside of the annular band 65 begins to make contact with the detent members 29 and moves over their upwardly inclined surface 31 until a detent member is snapped into a recess and the front vertical edge of the detent member

abuts the front wall of the recess 66 provided in the underside of the closure cap. Thus the engagement of the detent with the front wall of the recess 66 prevents any counterclockwise movement of the cap member independently of the sleeve member 24.

The closure assembly of the present invention can readily become a child-resistant closure assembly which can prevent opening of the container by a child once the contents have been sealed by factory application of torque to the closure cap member 19. By increasing the height of the vertical front wall 30 on the detent members, the force required to rotate the closure member in a counterclockwise direction and thus remove the closure and dispensing device from the container can be such that a child does not have sufficient strength to overcome the engaging force. If it is desired for the container to be refilled by an adult, simple experimental determinations can be made to define the height of the vertical wall 30 on the detent member which can be readily overcome by a counterclockwise rotation with the hand of an adult, yet which cannot be achieved by counterclockwise force applied by the hand of a child. Thus the container closure member of the present invention can function not only as an anti-backoff and secure seal system, but also becomes a child-resistant container closure assembly.

While in the embodiment shown in Figure 1, a trigger pump has been utilized as the fluid dispensing device for coupling to the anti-backoff closure assembly of the present invention, it is to be understood that other dispensing devices can be attached thereto. It is anticipated that the closure assembly of the present invention can be used for attaching any fluid conduit to the top of a container in such a manner as to resist backoff and to insure against leakage of the closure system. Such a closure system may require the connection of a conduit to a container which normally rests on the ground and where the conduit is attached to some fluid dispensing device or fluid delivery device at some remote location. The anti-backoff closure assembly of the present invention will insure that the closure does not leak or backoff in the course of its normal use.

The closure assembly of the present invention can be made from metal or plastic material, however, plastic material is preferred. The closure cap and sleeve components can be made by molding suitable plastic materials such as high density polyethylene, polypropylene, polystyrene, polycarbonate, nylon, polyvinyl chloride, SAN and the like. Preferably the component of the closure assembly carrying the dentents will be made from a plastic material having a sufficient degree of flexibility to permit the detents to be deformed slightly as

they are contacted by the other component just prior to locking engagement with the engaging means carried by the other component.

CLAIMS:

1. A closure assembly (15) for attaching a fluid dispensing device to a container (16) having a neck portion (17) with threads (18) characterized in that it comprises:

a) an annular closure member (19) having a top portion (23) and a depending skirt portion (20) with threads on its interior wall for engaging the threads on the neck portion of the container,

i) the closure top portion having a central opening (24) therein and an annular band section surrounding the opening,

ii) first engaging means (25) located on the annular band;

b) a sleeve member (26) received in the central opening and having a flange portion (27) for abutting the underside of the annular band,

i) the flange portion having second engaging means (29) adapted to engage the first engaging means on its upper surface to interlock the closure member and the sleeve member; and

c) coupling means on the sleeve member for coupling it to the fluid dispensing device.

2. The closure assembly of Claim 1 wherein the first engaging means (25) are a plurality of recesses in the underside of the annular band, and the second engaging means (29) are a plurality of detents adapted to be received in the recesses.

3. The closure assembly of Claim 2 wherein the recesses have an open side which faces the sleeve member.

4. The closure assembly of Claim 3 wherein the detents are provided with upwardly sloping surfaces (31) which are oriented in a clockwise direction when viewing the flange portion from the top.

5. The closure assembly of Claim 1 wherein the first engaging means are a plurality of openings in the annular band, and the second engaging means are a plurality of detents adapted to be received in the openings.

6. The closure assembly of Claim 1 wherein the first engaging means are a plurality of detents on the underside of the annular band, and the second engaging means are a plurality of recesses adapted to receive the detents.

7. The closure assembly of Claim 6 wherein the detents are provided with downwardly sloping top surfaces (31) adapted to cam the detents into the recesses.

8. The closure assembly of Claim 1 wherein the coupling means includes an integral cylindrical collar(36) extending upwardly from the flange portion of the sleeve member through the opening in the closure top portion for attachment to a fluid dispensing device.

9. The closure assembly of claim 12 wherein the flange portion of the sleeve member is provided with a plurality of downwardly extending teeth adjacent its periphery and the upper part of the neck portion of the container is provided with a plurality of upwardly facing recesses adjacent the lip that are adapted to receive the downwardly projecting teeth on the flange portion of the sleeve member to thereby interlock the sleeve member with the neck of the container.

10. The closure assembly of Claim 9 wherein the flange portion of the sleeve member has a downwardly depending peripheral skirt(32) which has integrally formed on its inner surface the downwardly extending teeth(33) of the flange portion.

11. The closure assembly of Claims 2 or 6, wherein the recesses and the detents are both generally rectangular.

12. A trigger pump assembly adapted to resist backoff when attached to a container characterized in that it comprises:

a) a trigger pump(37) for dispensing fluid upon actuation of its trigger;

b) a sleeve member (26) attached to the lower end of the trigger pump,

i) the sleeve member having an upstanding collar (36) which has an integrally formed outward extending flange (27) at the lower end thereof, the flange providing on its upper surface first engaging means, the collar member also providing an inwardly extending transverse web member which is integrally formed therewith and which supports and has integrally formed therewith a sealing annulus adapted for receipt of a conduit extending from the trigger pump into the container; and

c) a closure cap member (19) having a depending skirt portion (20) and a top portion with a central opening (24) therein and an annular band section surrounding the opening, the closure cap being rotatably mounted on the sleeve member above the flange portion,

i) the closure member having second engaging means located on the annular band section adapted to engage with the first engaging means to interlock the closure member and the sleeve member, the closure being provided with threads(22) on the inner wall of the skirt portion adapted to engage threads(18) provided on the neck of the container whereby upon threading the closure member onto the neck of the container the first engaging means will interlock with the second engaging means when the closure is torqued to the full desired torque and will thereby resist independent rotation of the trigger pump and attached sleeve member with the closure cap to thereby prevent backoff of the trigger pump dispenser after it has been attached to the container neck.

13. The trigger pump assembly of Claim 12 wherein the flange portion of the sleeve is provided with a plurality of downwardly extending teeth adjacent its periphery and the container to which the pump assembly is adapted to be attached is provided with a neck portion having an upper part that is provided with a plurality of upwardly facing recesses adjacent its lip that are adapted to receive the downwardly projecting teeth on the flange portion of the sleeve member to thereby interlock the sleeve member with the neck of the container.

14. The trigger pump assembly of Claim 12 wherein the first engaging means comprises a plurality of detents and the second engaging means comprises a plurality of detent receiving recesses.

15. The trigger pump assembly of Claim 12 wherein the first engaging means comprises a plurality of recesses and the second engaging means comprises a plurality of detents for receipt in the recesses.

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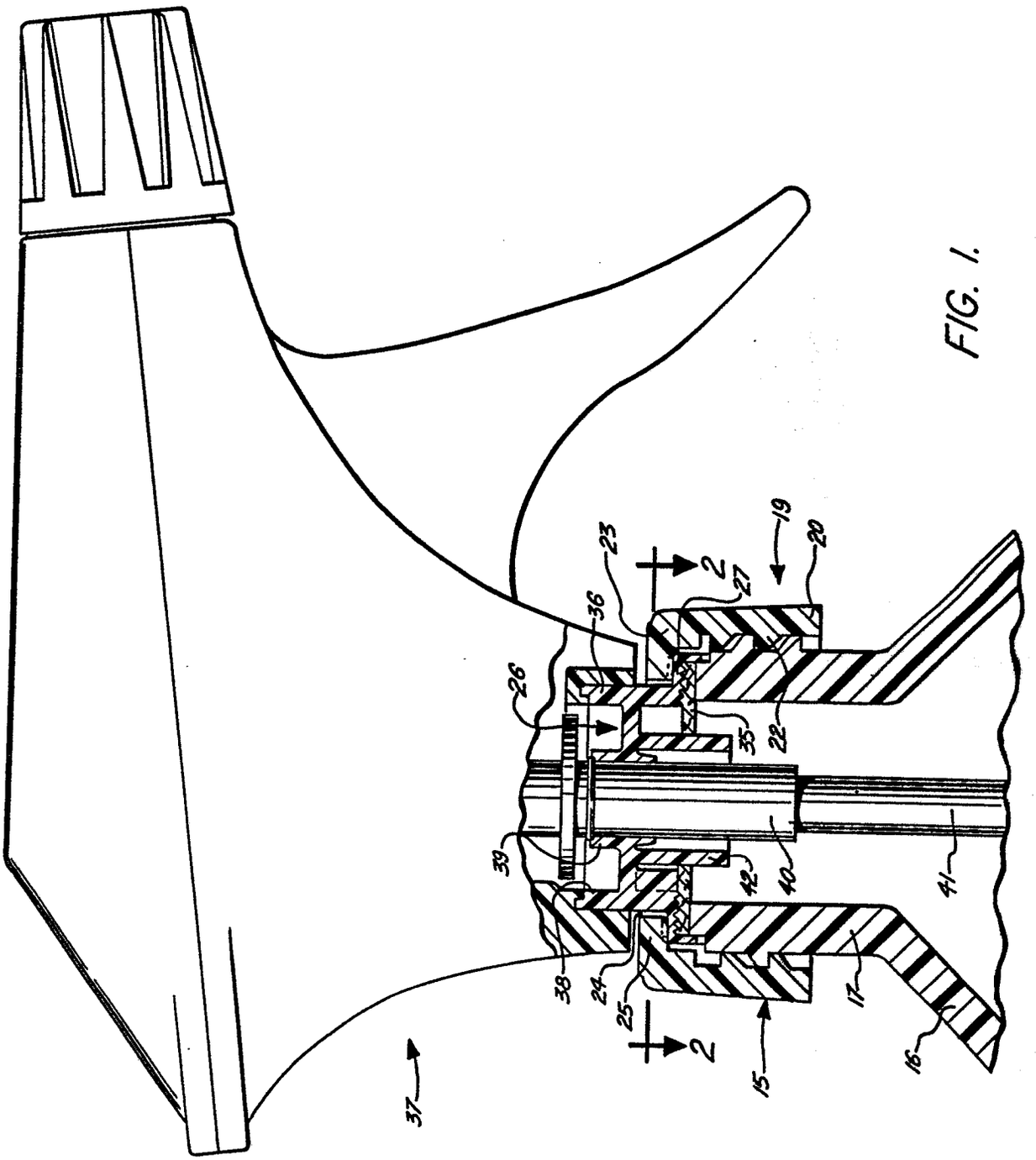

FIG. 1.

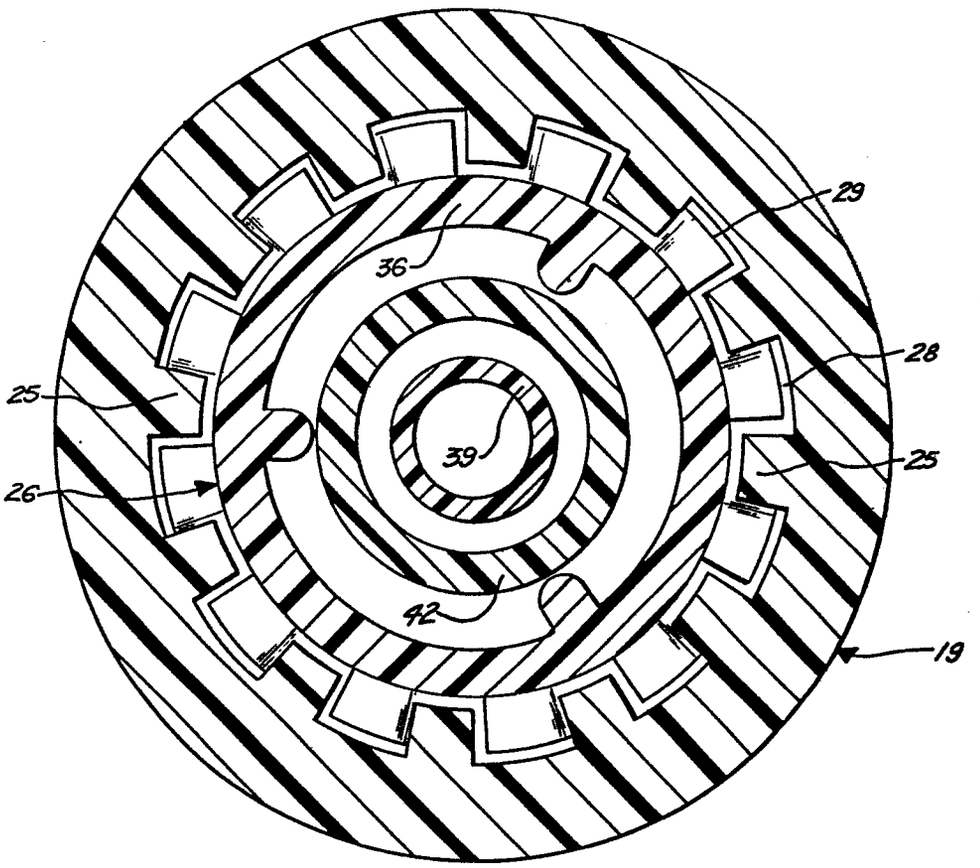

FIG. 2.

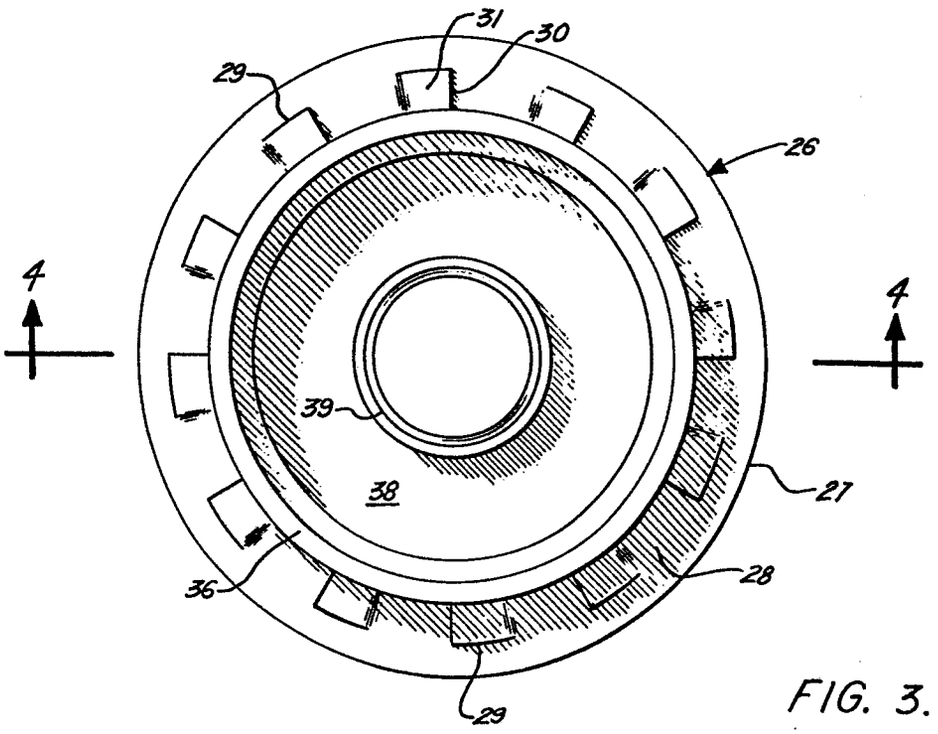

FIG. 3.

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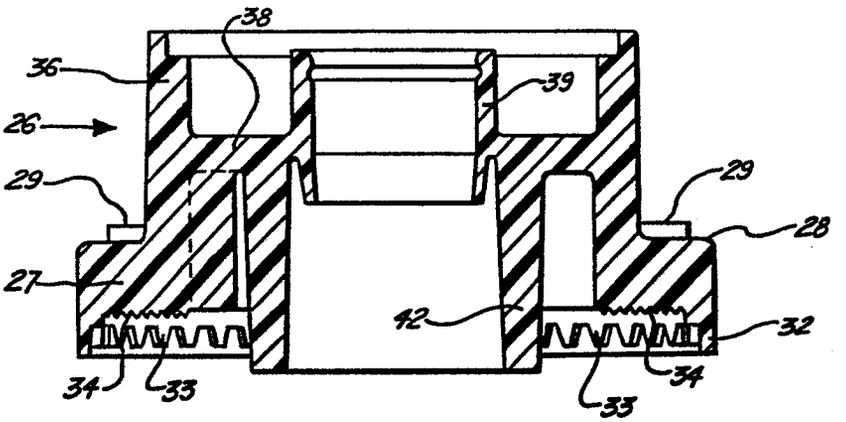


FIG. 4.

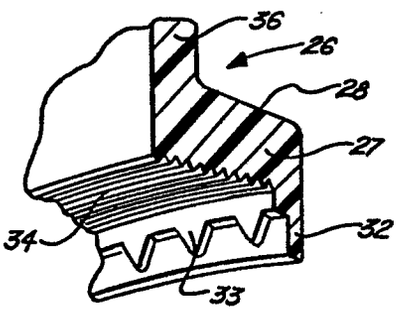


FIG. 5.

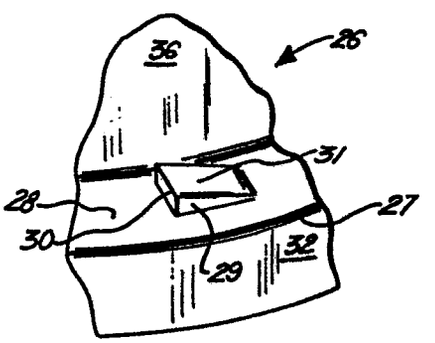
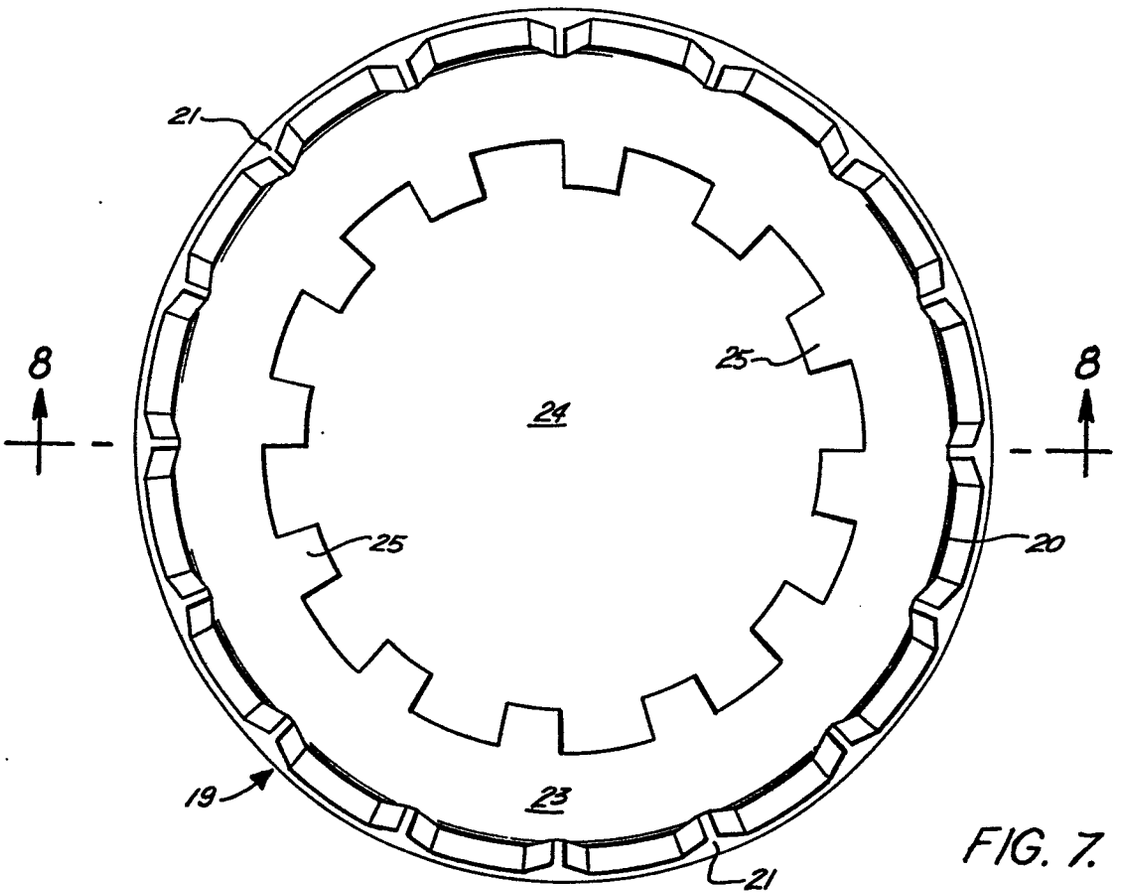


FIG. 6.



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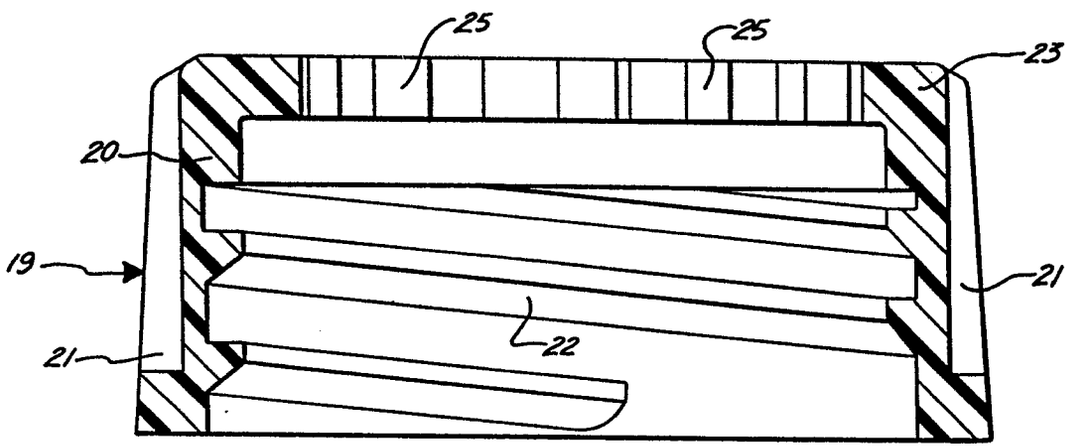

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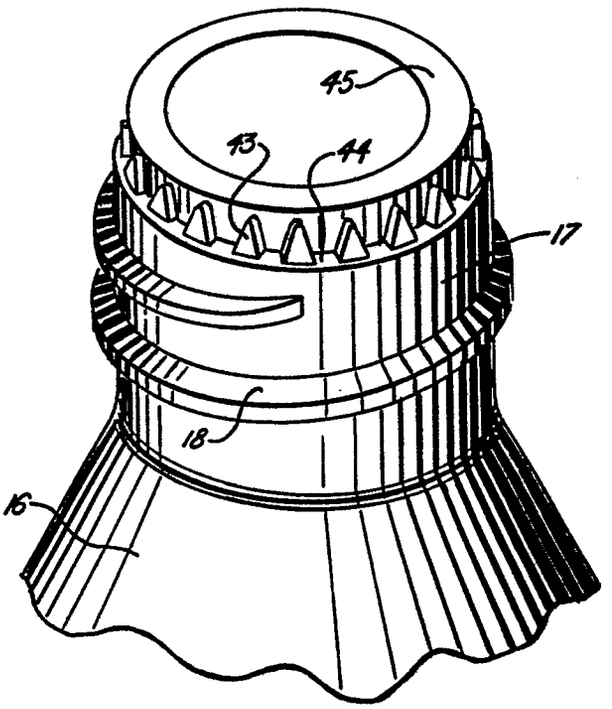

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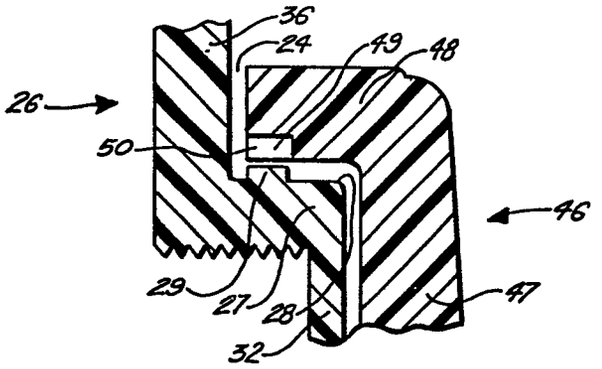

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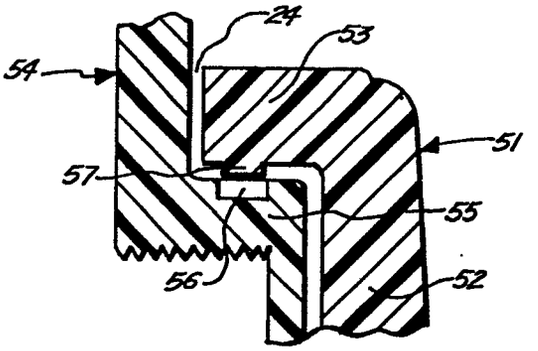
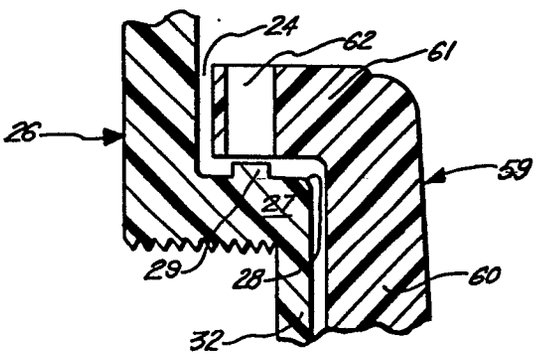


FIG. 11.



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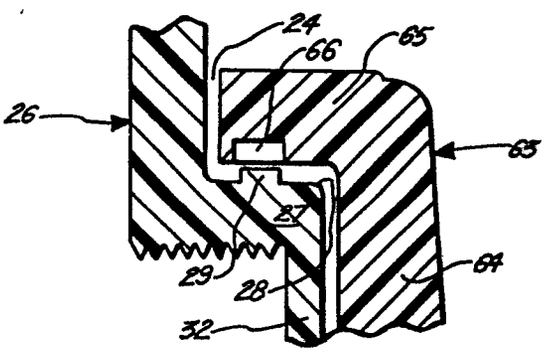


FIG. 13.

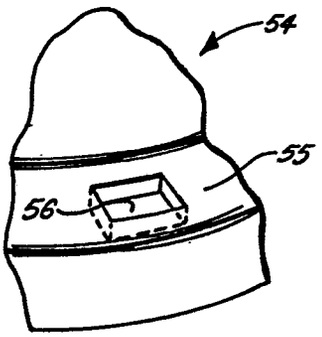
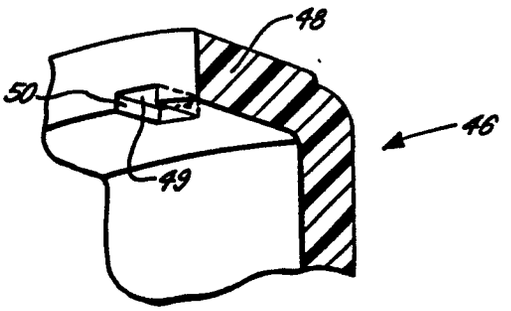


FIG. 14.



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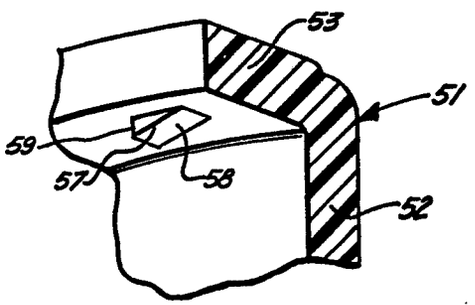
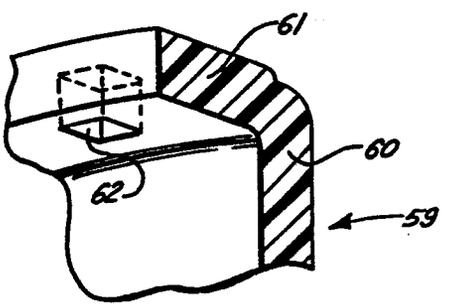


FIG. 16.



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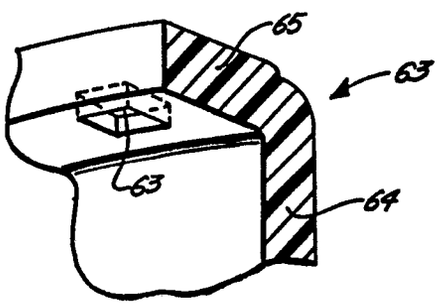

FIG. 18.