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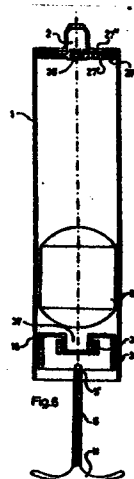
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54 **Process and device to maintain separate within a container until the moment of use and then to mix, two different substances particularly two-component resins.**

57 The device, according to a preferred embodiment, comprises a container (1) with rigid or flexible walls containing one or two resin components and a container (26) of thin glass or fragile synthetic resin containing the other component. Container (26) at the moment of use is broken either by manually compressing container (1) or inserting a rod (5) provided with handle (11) through guide piston (39) and through said container (26) until reaching disk (27) to which the rod is screwed or fastened by flexible teeth, a disk that serves as a mixing piston to mix the two components, distributing them through output (2).



Description

Process and device to maintain separate within a container until the moment of use and then to mix, two different substances particularly two-component resins.

This invention has as its object a process to maintain separate until the moment of use, within a cartridge, container, tube of the like, two different substances that are liquid, paste or solid, in powder or granular form and particularly two-component resins, to mix them at the moment of use and distribute them.

It also relates to a device for embodying the process.

It does not appear to the applicant that processes and devices according to the invention are known.

The process is characterized by the characterizing part of claim 1, the device is characterized by the characterizing part of claim 2.

The accompanying drawings represents:

- in fig. 1 the axial section of a first preferred embodiment of the device in question, in a nonlimiting, nonbinding way;
- in figg. 2 to 5 some variants of said first embodiment;
- in fig. 6 a second embodiment of the device;
- in figg. 7 to 13 some variants of said second embodiment.

The device according to the first embodiment, applied to any cartridge, tube or container 1 (fig. 1), with an output opening 2 that can be closed by cap 3, makes it possible to create two separate chambers 6, 7 in each of which is contained a substance different from the other, for example, two components of a resin, i.e. resin 6 and hardener 7, which must be kept separate until the moment of use and, when it is desired to use them, must be intimately mixed and then distributed by opening 2 after cap 3 and rod 5 are removed.

To obtain this, the device comprises membrane 4 which is easy to perforate, made, for example, of synthetic resin or sheet metal, exhibiting annular periphery 4' reinforced, i.e., thickened to allow sliding along the inside walls of container 1.

During storage of all the material, membrane 4 keeps the two substances separate.

At the moment of use, by acting on handle 11 of rod 5 in the direction of arrow 12 and optionally also be causing rotation in the direction of arrow 17, membrane 4 is perforated by points 8 solid with disk 14.

By repeatedly moving the unit made up of perforated membrane 4 and disk 14 in both directions, axially along container 1, the two liquids 6, 7 are drawn from one chamber 6, 7 to the other until the mixing is complete, after which, with cap 3 and rod 5 removed, the mixture is made to come out of opening 2, optionally screwing a flexible distribution tube on the threads of the cap.

Annular periphery 4' of membrane 4 exhibits O ring 16 made, for example, of teflon (polytetrafluoroethylene), neoprene, etc., while ribbing 4'' inside ring 4', ribbing which is inserted in complementary annular groove 15 of disk 14, assures the dragging of the entire unit.

Disk 14 exhibits holes 13 that work with holes 10 made in membrane 4 by points 8 to allow the passage of the two liquids contained in chamber 6, 7 from one chamber to the other.

-Figure 2 illustrates a variant according to which rod 5 is introduced tight from bottom 18.

Said bottom 18 slides also in a tight manner along the inside walls of cartridge, tube or container 1, driven by an ejection piston (not shown) or with compressed air in the direction of arrow 19, after rod 5 is removed.

Perforation points 8 can be replaced by any other means suitable for perforating membrane 4 according to small disks that disappear in the mixture of the two substances 6, 7. Rotation of rod 5 makes it possible also to cut the rings of the membrane by points 8.

Rod 5 can have a polygonal section and exhibit a side pin to be able to insert it like a bayonet into disk 14 and pull it out when it is necessary to distribute the mixture from opening 2.

Figures 3, 4, 5 represents a variant according to which rod 5 is shaped to a point 5' and exhibits an annular groove 25 that restrains piston 21 with annular projections 23 and finned, preferably made of a plastic, provided with openings 22 (fig. 4). The unit of the rod and piston serves either to break membrane 4 or to mix the two substances.

Separation of the two different substances and in particular of the two different resin components can also be obtained by introducing at the moment of making (filling) of the cartridge, container, tube or the like, a container that is spherical, cylindrical or in any other shape, having walls that are easy to tear or break (for example, of glass), a container holding one of the two substances or components to be mixed, while the other substance or component placed in the container is outside said tearable or breakable container.

Rod 5 (fig. 3), sharpened to a point at 5', able to be unstened from piston 21 by groove 25 working with projection 23 of piston 21, is provided to break said container, while joined to piston 21 provided with openings 22 contributes to the mixing.

The membrane 4 can be a simple piece with annular part 4' or the whole can be made in two different parts, joined together.

The thickness of membrane 4 and that of annular part 4' are made on the basis of the size (diameter) of tube or container 1 and the aggressiveness of substances 6, 7 contained in container 1.

Disk 14 can be made, for example, of metal or synthetic resin.

The position of membrane 4 with disk 14 can be located at any height along the axis of container 1.

According to the second embodiment (figg. 6 to 13) the device comprises a container that is spherical, cylindrical or in any other shape, having easily tearable or breakable walls, containing one of the two substances or components to be mixed,

while the other substance or component placed in the container is outside said tearable or breakable container. Means are provided to tear or break said container while a piston or equivalent makes it possible to mix the two components at the moment of use and to distribute them mixed from the output opening of the container.

Said means for tearing and breaking said container consist of a threaded rod or rod provided with flexible teeth. The rod is preferably pointed at its front end and provided with a handle, at its back end. The rod is axially introducible in the cartridge container or the like perforating the diaphragm or the cap that closes said container and is guided by a guide piston that can slide in said cartridge, container, tube or the like, breaking said container, if necessary, and screwing on the threading or inserting its teeth into complementary recesses of a stirring disk or equivalent that serves for mixing the two components.

According to a preferred embodiment, said container is made of glass or fragile synthetic material and is free or bound, i.e., supported by said guide piston, while the parts of the cartridge, container or the like are of a flexible material so that breaking of the container can also be performed by manually or mechanically compressing said flexible cartridge.

With reference to figures 6, 7, 8, the device comprises cartridge, container, tube or the like 1 preferably of rigid or flexible resins, or aluminum, inside of which is placed container 26 of glass or fragile synthetic resins, so that its walls can be easily broken either by manually or mechanically compressing the walls of cartridge 1, or by running rod 5 through hole or diaphragm 35 of piston 39, and causing container 26 to be passed through by said rod, breaking it.

Container 26 contains, for example, one of the components of the two-component resin, while the outside of container 26 is occupied by the other component.

With container 26 being broken at the moment of use, the two resin components are mixed and distributed by opening 2.

Rod 5, provided with handle 11, is preferably pointed and threaded at its front end 5', so that at the end of travel it can be screwed into threading 28 of disk 27.

At the end of rod 5 there can be, as a substitute for the threading, 3 or 4 fine, flexible circular teeth which are deformed when rod 5 is thrust into or removed from threading 28 of disk 27 or complementary recesses.

The teeth are supposed only to resist the agitation force (the resistance is less than that of machine grease) and should be deformed by a jerk of the hand.

This disk can act as a piston to mix the two components, especially when they are not fluid, i.e., are gelatinous or pasty.

When they are fluid, the agitation can occur simply by shaking cartridge 1, and disk 27 can also be absent.

The disk is provided with reinforcing fins 27' and 27'' (fig. 6 and 8) and holding lips 27''' as shown in

fig. 7, or simply provided with numerous holes, or screened. Underlying piston 39 to which perforable cap 33 is screwed, in this case acts as a guide for rod 5.

Rod 5 can be provided at end 5' with deformable blades or capillaries either to facilitate introduction and extraction of piston 39 through the hole or to obtain a forced agitation.

In the variant shown in figure 9, container 26 is provided with an externally threaded neck 26' which is screwed into the complementary threading of the coaxial hole of piston 39.

In this case, piston 39 acts as a support for container 26, and cap 33, perforable by rod 5, closes the opening of container 26.

Figure 10 shows a further variant, similar to the preceding one, but with cap 33 in a different shape, which can be seen better in figure 11.

In this case, piston 39 is provided, for perfect sealing, with a flexible widening 39' and a V gasket 30, 30' replacing a normal O ring.

In figures 12 and 13 is provided a perforable diaphragm 35 which closes the opening of the neck of container 26 when cap 33 is put in place.

Other variants are possible, in a manner compatible with what has been claimed, without going outside the scope of protection of the invention.

Claims

1. Process to maintain separate until the moment of use, within a cartridge, container, tube or the like, two different substances that are liquid, paste or solid, in powder or granular form, and particularly two-component resins, to mix then at the moment of use and distribute them, characterized by placing in the container a means for separating the two substances, a means that is easy to perforate or tear or break at the moment of use by a perforating or tearing or breaking device, after which provision is made for mixing of the two substances by agitation or by a mixing device placed beforehand in the cartridge, container, tube or the like and for the subsequently distribution of the mixture from said cartridge, container, tube or the like.

2. Device to embody the process according to claim 1, characterized by a mean for separating the two substances, a means easy to perforate or tear or break placed in the cartridge, container, tube or the like, a device for perforating or tearing or breaking of said separation means and a device for mixing of the two substances.

3. Device according to claim 2, wherein the separation device consists of a membrane (4) (fig. 1 and 2) located inside cartridge, container, tube or the like (1) so as to divide it into two separate chambers (6, 7) to maintain the two substances separate until the moment of use, a membrane fastened to a fluidtight peripheral ring (4'), said device for perforating or tearing of

the membrane and mixing at the moment of use comprises a disk (14) provided with one or more points (8) and fastened (4'', 15) to the annular periphery (4') of membrane (4), operated like a piston, by sliding (arrow 12) or rotation (arrow 17) of a rod (5) coming out tight from cartridge, container, tube or the like (1) to allow the intimate mixing of the two substances and expulsion of the mixture from closeable (3) output opening (2) of the container.

4. Device according to claim 3, wherein said annular periphery (4') of the membrane exhibits on the outside at least an O ring (16) tight with respect to the walls of the container and on the inside an annular projection (4'') which is inserted in a complementary groove (15) of disk (14), this latter being perforated (13) to allow drawing of the two substances (6, 7) at the moment they are mixed.

5. Device according to claim 3, 4, wherein piston rod (5) is introduced tight through cap (3) of the container (fig. 1) which closes distribution opening (2) of the two mixed substances.

6. Device according to claims 3, 4, wherein piston rod (5) is introduced tight from the bottom of cartridge, tube or container (1) (fig. 2).

7. Device according to claim 3, 4, 5, 6, wherein the means for perforating membrane (4) are such as to perforate it, tear it or cut it by pressure or rotation of rod (5).

8. Device according to claim 2, wherein said means for perforating or tearing or breaking and mixing (fig. 3, 4, 5) consist of a rod (5) that can be fastened to and unfastened from (23, 25) a piston (21) exhibiting openings (22) that allow the intimate mixing of the two components once said rod (5) has torn or broken membrane (4) separating the two components.

9. Device according to claim 2, wherein separation of the two substances and in particular of the two resin components is obtained by introducing, at the moment of making, i.e., of filling the cartridge, container, tube or the like, a container that is spherical, cylindrical or in any other shape, having walls that are easy to tear or break, a container holding one of the two substances or components to be mixed, while the other substance or component placed in the container is outside said tearable or breakable container; means (5, 21) being provided to tear or break (5) said container and mix (21, 22) the two components at the moment of use and to distribute them mixed from the output opening (2) of the container.

10. Device according to claim 2, wherein tearing or breaking of said tearable or breakable container and mixing of the two substances is performed with strong movements or shakings of the cartridge, container, tube or the like.

11. Device according to claims 3, 4, 5, 6, 7, 8, 9, 10, wherein bottom (18, fig. 1, 2) of the cartridge, tube or container (1) can slide in said

cartridge, tube or container to be able to be driven (arrow 19) by an ejection piston or compressed air expelling the mixture through output hole (2) at cap (3), replaced, for example, by a flexible tube that carries the mixture to the point of use.

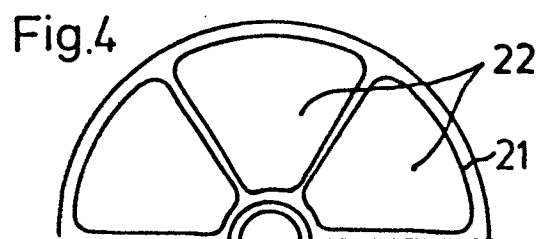
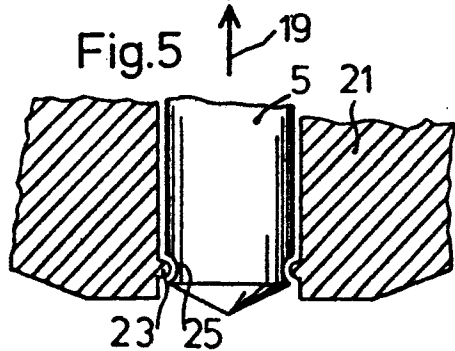
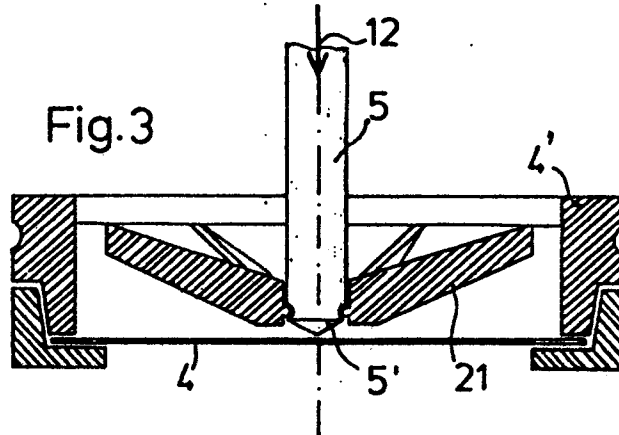
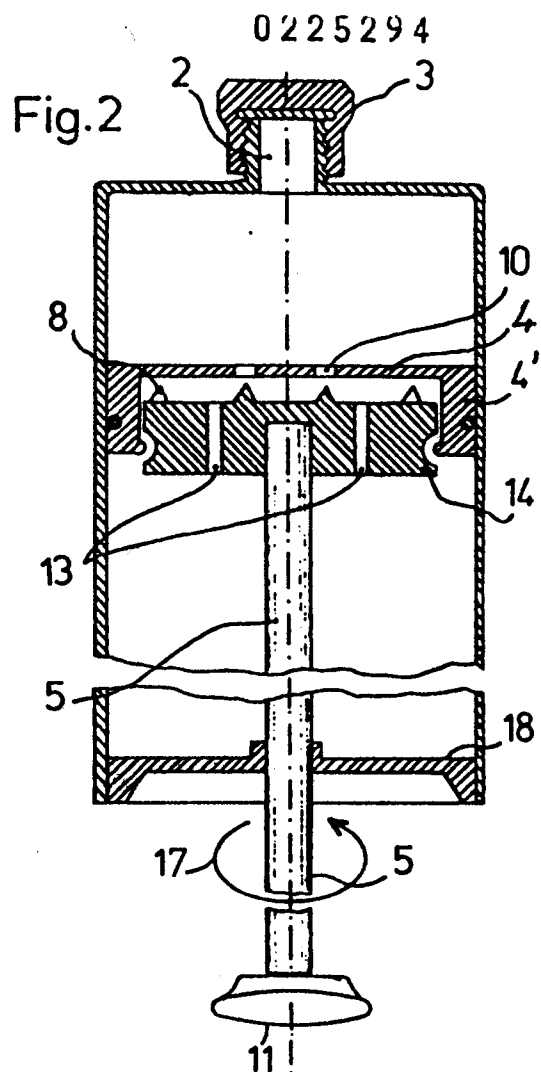
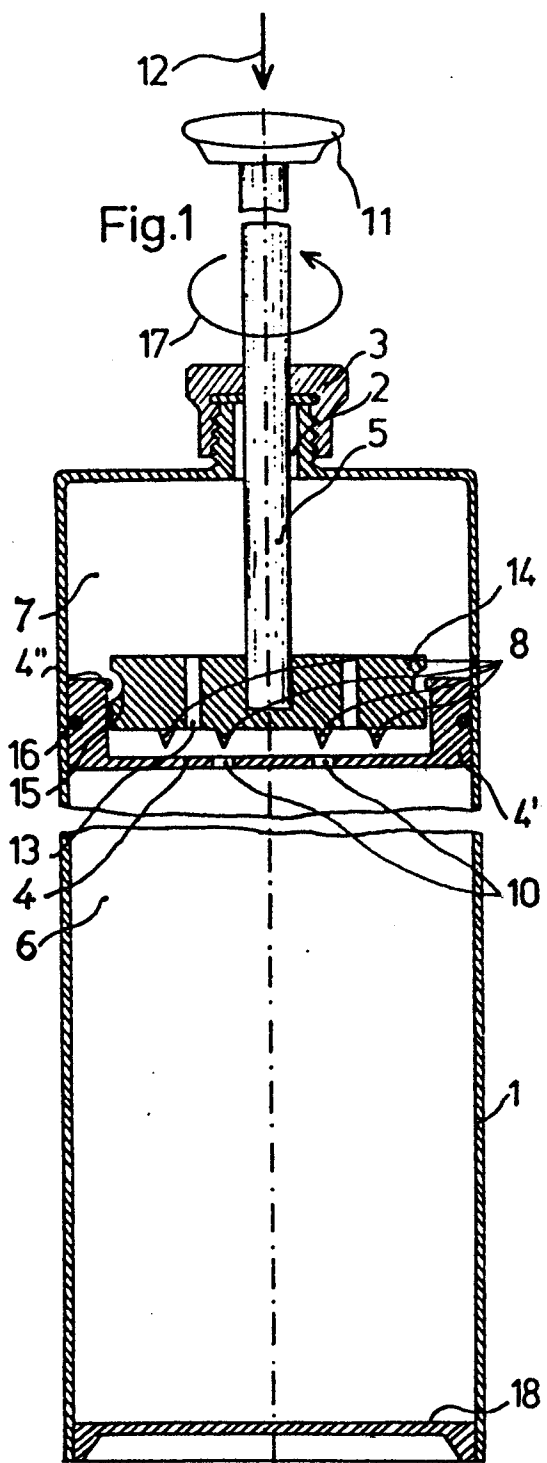
12. Device according to claim 2 comprising a container that is spherical, cylindrical or in any other shape having easily tearable or breakable walls, a container containing one of two substances or components to be mixed, while the other substance or component placed in the container is outside of said tearable or breakable container; means being provided to tear or break said container while a piston or equivalent makes it possible to mix the two components at the moment of use and distribute then mixed at the opening of the container output.

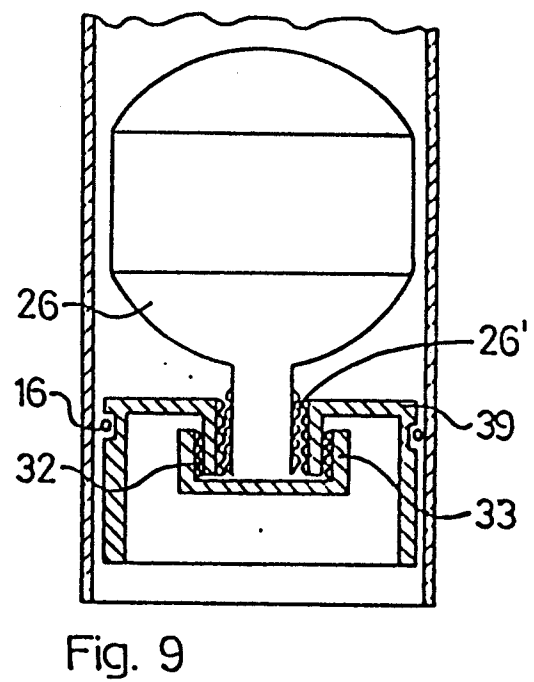
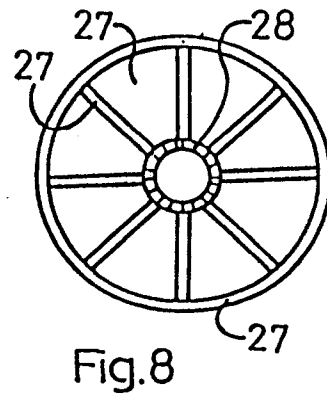
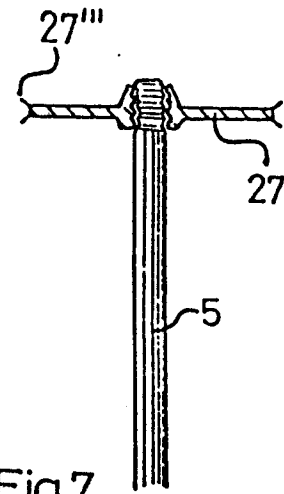
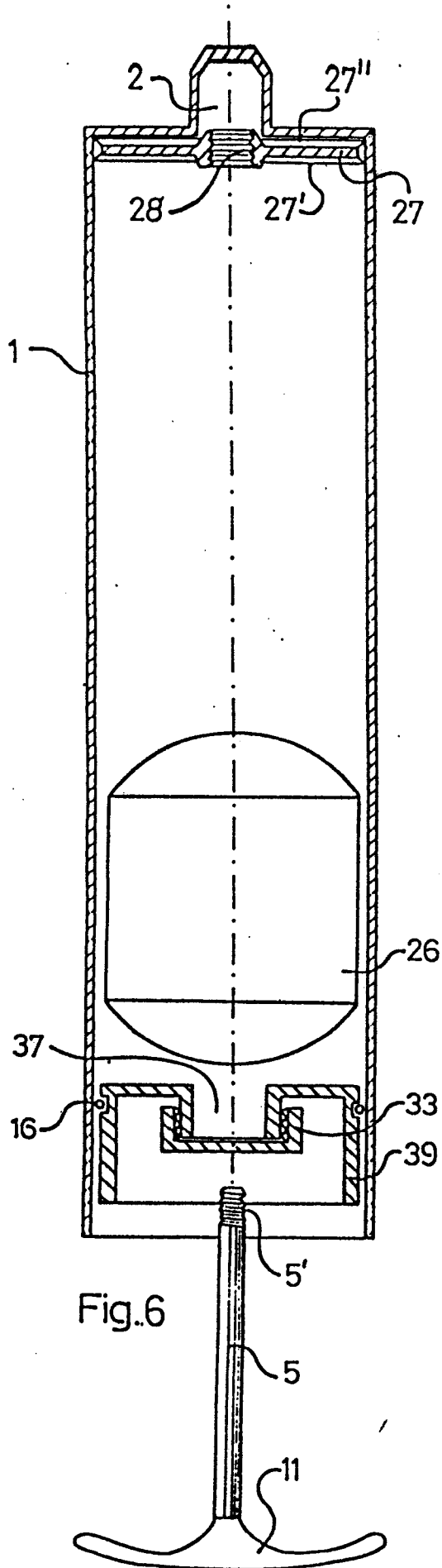
13. Device according to claim 12, characterized in that said means for tearing or breaking said container (26) consist of a rod (5), threaded or provided with flexible teeth (5'), and preferably pointed at its front end and provided with a handle (11) at its back end, a rod that can be axially introduced into cartridge, container or the like (1) by perforating diaphragm (35) or cap (33) which closed said container, rod (5) guided by a guide piston (39) can slide in said cartridge, container, tube or the like (1), breaking said container (26), if necessary, and screwing (fig. 2) on threading (28) or inserting its teeth (5') in complementary recesses of an agitation disk or equivalent (27) that serves to mix the two components.

14. Device according to claim 13, wherein said container (26) is of glass or a fragile synthetic material and is free or bound, i.e., supported by said guide piston (39), while the walls of said cartridge, container or the like (1) are of a flexible material so that breaking of container (26) to facilitate the task of rod (5) can also be performed by manually compressing said flexible cartridge.

15. Device according to claims 13 and 14, wherein container (26) exhibits an externally threaded neck (26', fig. 6) that is screwed into a complementary threading of an axial hole (37) of guide piston (39), a piston provided at the front with a gasket (39' fig. 6) widening toward the outside to provide the sealing and at least a V gasket (30, 30') placed in peripheral groove (36) of the piston in which the O ring is normally placed.

16. Device according to claims 13, 14, 15, wherein the open end of externally threaded neck (26') of the container is closed by a diaphragm (35) which can be perforated by said rod (5) or a removable cap (33) or by both.





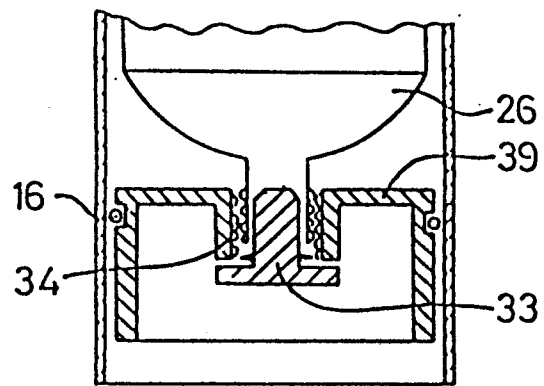


Fig. 10

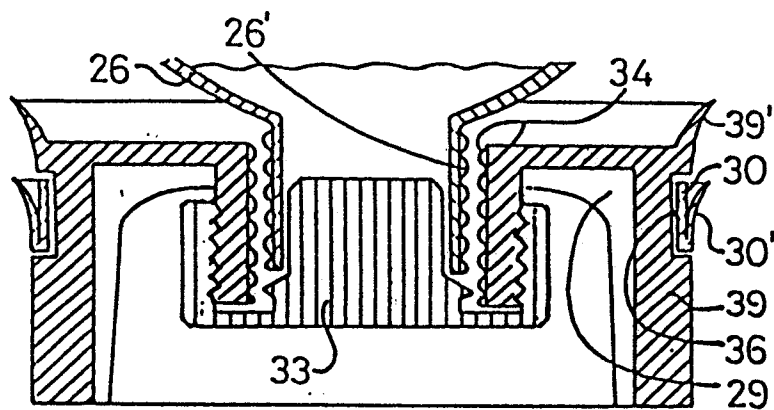


Fig.1.1

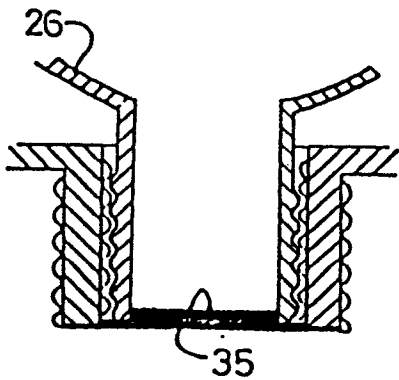


Fig. 12

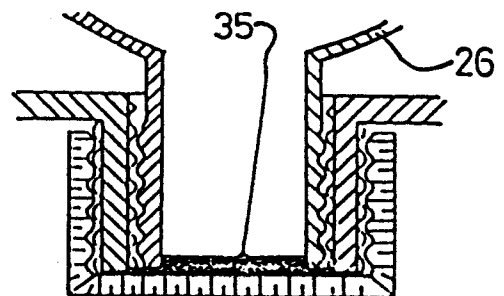


Fig.13