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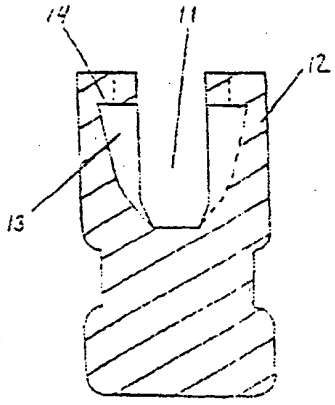
(54) Title: Self-Destructing One - Use Syringe

(57) Abstract:

The invention relates to an injection syringe for one-time use. Said syringe comprises a cylinder which has, on the bottom thereof, an outflow to the cannual and has, on the top end thereof, a collar. Said collar serves as a finger grip when using the syringe. The cylinder comprises two or more offset inner projections or bulges (20) which interact with recesses (17) of the piston shaft. The syringe also comprises a stopper with a slit (11) that is surrounded on all sides by one or more stopper sides (12), whereby, during filling, the inner projection (14) of the stopper walls interacts with the extreme tip (19)of the piston shaft by virture of the fact that the extreme tip (19), during emptying, forces the stopper to rotate when the tip (19)of the piston shaft meets the slanted surface (15)of the stopper. The piston shaft and the stopper are, at the latest when emptying is ceased, mechanically and permanently separated from one another. The invention is characterized in that the stopper is provided with a non-circular cylindrical upper inner part comprised of at least two stopper sides (12) with a cavity (13) which, together, form an inner projection (14) for interacting with the extreme tips (19) of the piston shaft during filling, whereby the stopper walls are discontinued by a slit (11).



(56) Documents Cited: US 5624408; DE 19518807

The present syringe relates to syringe for single use, and comprising a cylinder having at its bottom portion an outlet for a needle, and having at its open end a collar which functions as a fingergrip when handling the the syringe, and which cylinder internally comprises two opposite pointing beads, and comprising a piston of rubber elastic material, and comprising a piston rod with an axe shaped tip, which piston rod coacts with said piston during filling and emptying of the syringe in a way that the syringe is only to be filled and emptied one single time, in that the piston coacts mechanically with the piston rod via the piston's upper inner projection and the piston rod's axe shaped tip during filling of the syringe, and in that the said axe shaped piston rod tip forces the piston and its inner projection 90 degrees around and away from said axe shaped piston rod tip's outer tips, whereas mechanical coupling of piston rod and piston ceases during emptying of the syringe.

It is commonly known that the most efficient way to avoid disease spreading, is to use a syringe for only one injection. There are, however several circumstances, which can motivate the users to reuse the syringes, amongst others the costs related to buying the syringes which in connection with for instance vaccination campaigns of larger population groups in poor areas can lead to that one neglects the risk of disease spreading.

The syringe of the initially mentioned kind, can not be reused after one emptying, because that the piston which coacts with the piston rod by action in the direction of the bottom portion of the cylinder, is forced 90 degrees around and away from the position, where it coacted mechanically with the piston rod's tip during filling of the syringe. It is thus during emptying that piston and piston rod are configured into a new position without a mutual mechanical coupling. The piston rod is via the cylinder's two opposite beads fixed in relation to horizontal movement (turning), opposite the piston, which can turn freely inside the cylinder, when it is vertically affected by the pressure from the piston rod's axe shaped tip.

The known syringes of this type have the general drawback that they are far more complex and thereby more costly to manufacture than conventional syringes. Besides, known syringes of this type are able to be filled and emptied in several stages, until the total volume has been utilized, which is a major drawback. The syringe according to the invention can only be filled once, in that action of the piston rod in direction towards the bottom portion of the cylinder renders the syringe unusable after final emptying.

An example of the known syringes is described in US-A-5,624.408. The preamble of claim 1 corresponds to the publication of said document.

It is the objective of the syringe of the present invention to show a for single use secured syringe which lets itself manufacture with minor extra costs compared to a conventional non secured syringe. Therefore the invention takes its starting point in a conventional insulin syringe with an integrated needle. By modifying partly the piston and the piston rod, as described in claim 1, one has succeeded by small means in changing a conventional single use syringe into a secured syringe.

By the syringe according to the invention the piston fig. 1 is characterized by having an open slit 11, which slit is created by two piston sides 12 pointing against each other, which piston sides internally are comprised with a specially shaped cavity 13, by which there is created an inner projection 14, which coacts with the outer tips 19 of the piston rod during filling of the syringe. The cavities 13 of both piston sides are provided with a slanted surface 15, inclined towards the left and turning towards the slit 11. The piston sides 12 and thereby the slanted surfaces 15 mutual position create a rotation of the piston, because the piston rod's outer tips 19 during emptying will meet with and follow the slanted surface 15 and thereby force the piston to rotate during emptying of the cylinder. This can only take place because the piston rod is not to be rotated, since it is prevented from horizontal movement (turning) due to the two opposite pointed beads 20 in the cylinder. After a final rotation of 90 degrees the piston and the piston rod is permanently mechanically uncoupled.

By the syringe according to the invention the piston rod fig. 4 is characterized by being produced in plastic in a mould with an even partition, which piston rod is provided with four left open areas 17 in the essential length of the piston rod, and provided with an axe shaped tip 18, who's outer tips 19 are mechanically coupled with the piston 14 during filling of the syringe. The piston rod's 18 rounded shape enables mounting of the piston rod into the piston after the piston fig. 1 is mounted in the bottom of the cylinder. When the tip 18 of the piston rod is viewed from above, fig. 6a., the tip 18 appears in a rectangular shape, as when it is seen from below fig. 6b. is rounded to ease and comply with the piston's rotation during emptying of the syringe. Two of the four left open areas 17 function as mechanical couplings with the two opposite pointing beads fig. 7, 20 to eliminate horizontal movement (turning) of the piston rod.

By the syringe according to the invention the cylinder is conventional except from the two mentioned beads fig. 7, 20 which after mechanical mounting of piston and piston rod are established by heating and embossing of the cylinder at the position of the beads. The design of the syringe according to the invention is peculiar in that :

- the cylinder is essentially unchanged
- the piston is able to turn during emptying as a function of the design/action of the piston rod
- opposite other syringes of the secured type there is the same number of components as in a conventional, non secure syringe.

The invention shall be described more thoroughly while refering to the drawing on which:

Fig. 1 shows sectional view of piston

Fig. 2 shows sectional view of piston from above

Fig. 3 shows inner portion of the piston

Fig. 4 shows bottom of the piston rod with the axe shaped tip.

Fig. 5 shows sectional view of piston rod with left open areas seen from above.

Fig. 6a shows the piston rod's axe shaped tip seen from above.

Fig. 6b shows the piston rod's axe shaped tip seen from below

Fig. 7 – fig. 10 shows filling-emptying sequence.

Fig. 1 shows a sectional view of the piston which is produced in rubber elastic material as for instance thermoplastic, or silicone rubber. The piston is provided with a slit 11 surrounded by two piston sides 12. The piston sides 12 are provided with two opposite pointing cavitys 13 in between which the upper area and by the piston's projection 14 is created the largest inner diameter of the piston. The cavity's 13 inner diameter is reduced in direction towards the bottom of the piston. Furthermore the cavity 13 is shaped in a way, so that an inner slanted surface 15 is created in each piston side 12. The slanted surfaces

15 of the piston sides incline towards the left and coact with the piston rod during emptying of the syringe. The piston sides inner projection 14 coacts with the piston rod during filling of the syringe. Fig. 2 shows sectional view of the piston seen from above, with the piston sides 12, slit 11, and cavity 13. Fig. 3 shows sectional view of the piston seen perpendicular to the slit's 11 longitudinal direction with slanted surface 15, cavity 13 and inner projection 14. Fig. 4 shows the piston rod 18 with its outer tips 19 who's mutual diameter is minimum of the same value of the piston's largest inner diameter, and which tips coact with the piston sides inner projection 14 before and after filling of the syringe. Fig. 5 shows a sectional view of the piston rod in its longitudinal direction above 18 and in the direction of the fingergrip, with left open areas 17 which coact with the cylinder's inner opposite pointing beads 20 during filling and especially emptying of the syringe, so that the piston rod is fixed in relation to horizontal movement (turning). Fig. 6a shows the piston rod seen from above, and fig. 6b shows the piston rod seen from below with its rounded corners 21 who coact with the slanted surface 15 of the piston during emptying of the syringe, creating a rotation of the piston.

Fig. 7 shows a fully assembled single use syringe according to the invention. The syringe Is mechanically assembled and in the same process the two opposite pointing beads 20 are established to eliminate horizontal movement of the piston rod. The syringe is ready for filling. Fig. 8 and fig. 9 show filling of the syringe, and fig. 9a shows how piston and piston rod are configured horizontally during the filling sequence. Fig. 10 shows an ongoing emptying sequence where the piston is forced into rotation by the axe shaped tip of the piston rod and has turned 90 degrees towards the right, and fig 10a shows the same in a horizontal plane.

CLAIMS

1. Injection syringe for one-time use, comprising a cylinder which has on the bottom thereof an outflow to the cannula and has, on the top and thereof a collar serving as a finger grip when using the syringe, the piston shaft and the piston are mechanically during filling connected by coupling means, and whereby an extreme tip of the piston shaft when emptying the syringe forces the piston to rotate, when the tip (19) forces the piston by pressure onto slanted services (15) of the upper part of the piston to rotate the piston whereby the cylinder comprises two or more offset inner projections or bulges (20) which interact with two or more offset recesses (17) of the piston shaft **characterized** in that the piston is provided with a cavity (13) in an upper inner part which is separated by a slit (11) in at least two piston sides (12) whereby the slanted surfaces (15) are provided in said cavity (13) and the two or more offset projections or bulges (20) of the cylinder are positioned after assembly of piston and piston shaft by heating and/or embossing at the cylinder in order to prevent a horizontal rotation of the piston shaft and a pullout of the cylinder thereof and which is permanently separated from the piston at the latest when emptying is ceased.

2. **Syringe according to claim 1,**
characterized in that the upper inner part is circular cylindrical or non-circular cylindrical.

3. **Syringe according to claim 2,**
characteri zed in that the non-circular cylindrical upper inner part comprises a slit (11) passing through by which the piston sides (12) are separated.

4. **Syringe according to claim 1 to 3,**
characterized in that the piston's cylindrical area in coaction with the internals of the cylinder gives a friction coefficient, which requires more than 300 kpa pressure on the needleside to move the piston towards the opening of the cylinder.

5. **Syringe according to claim 1 to 4,**
characterized in that the piston rod (fig. 4) is provided with an axe shaped

tip (18) who's outer tips (19) are mechanically coupled with the piston (14) during filling of the syringe.

6. **Syringe according to claim 1 to 5,**

c h a r a c t e r i z e d in that the axe shaped tip (18) is rectangular or roughly rectangular seen from above fig. 6a, and who's diameter from tip to tip is equal to the largest inner diameter of the piston, and seen from below (fig. 6b) the axe shaped tip is provided with rounded corners (21) to ease the rotation of the piston.

Fig. 1.

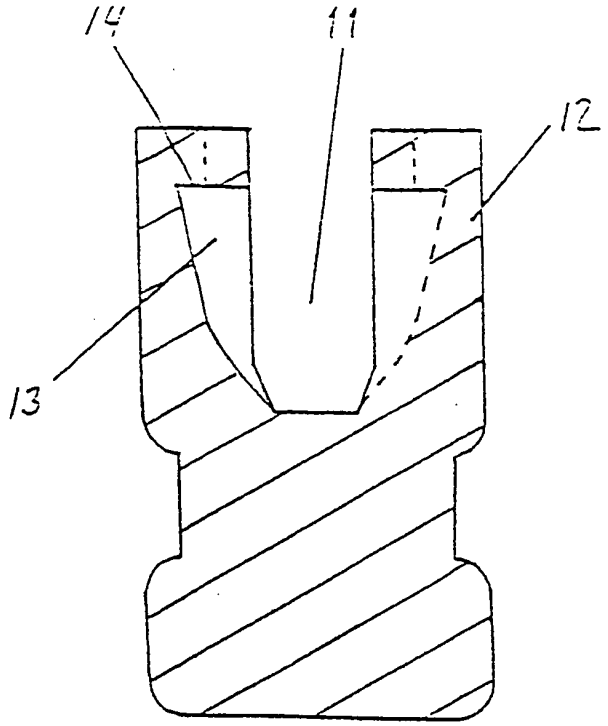


Fig. 2

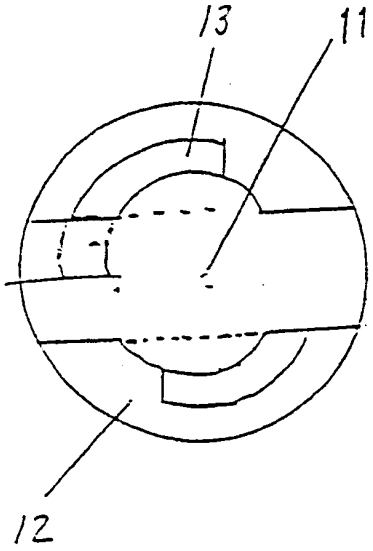
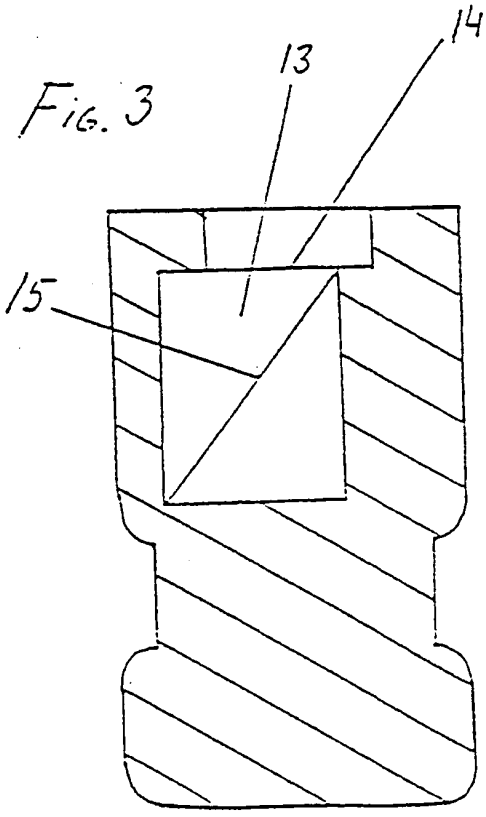


Fig. 3



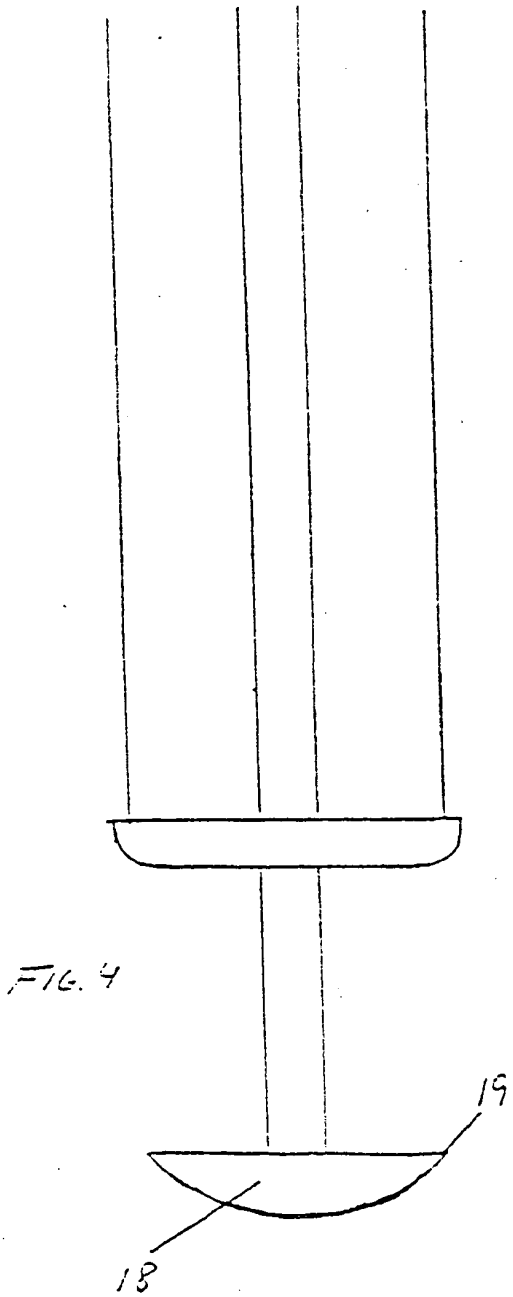


FIG. 4

FIG. 5

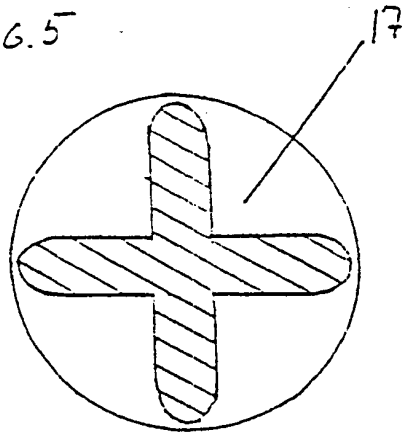


FIG. 6a

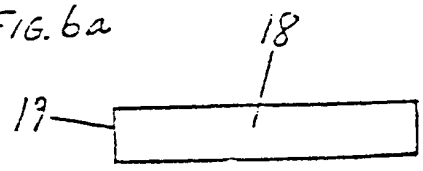


FIG. 6b

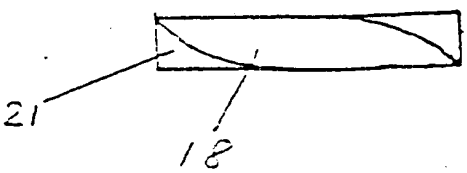


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FIG. 7

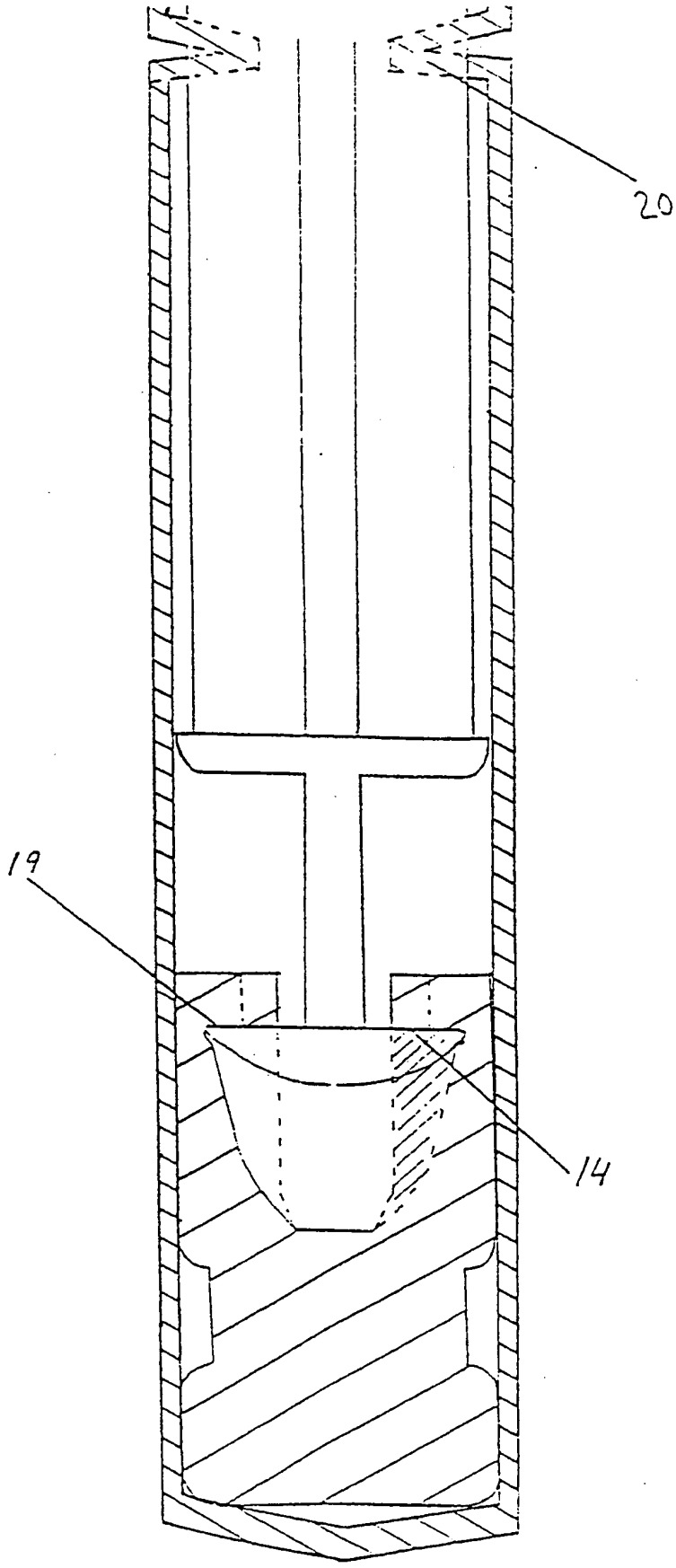

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FIG. 8

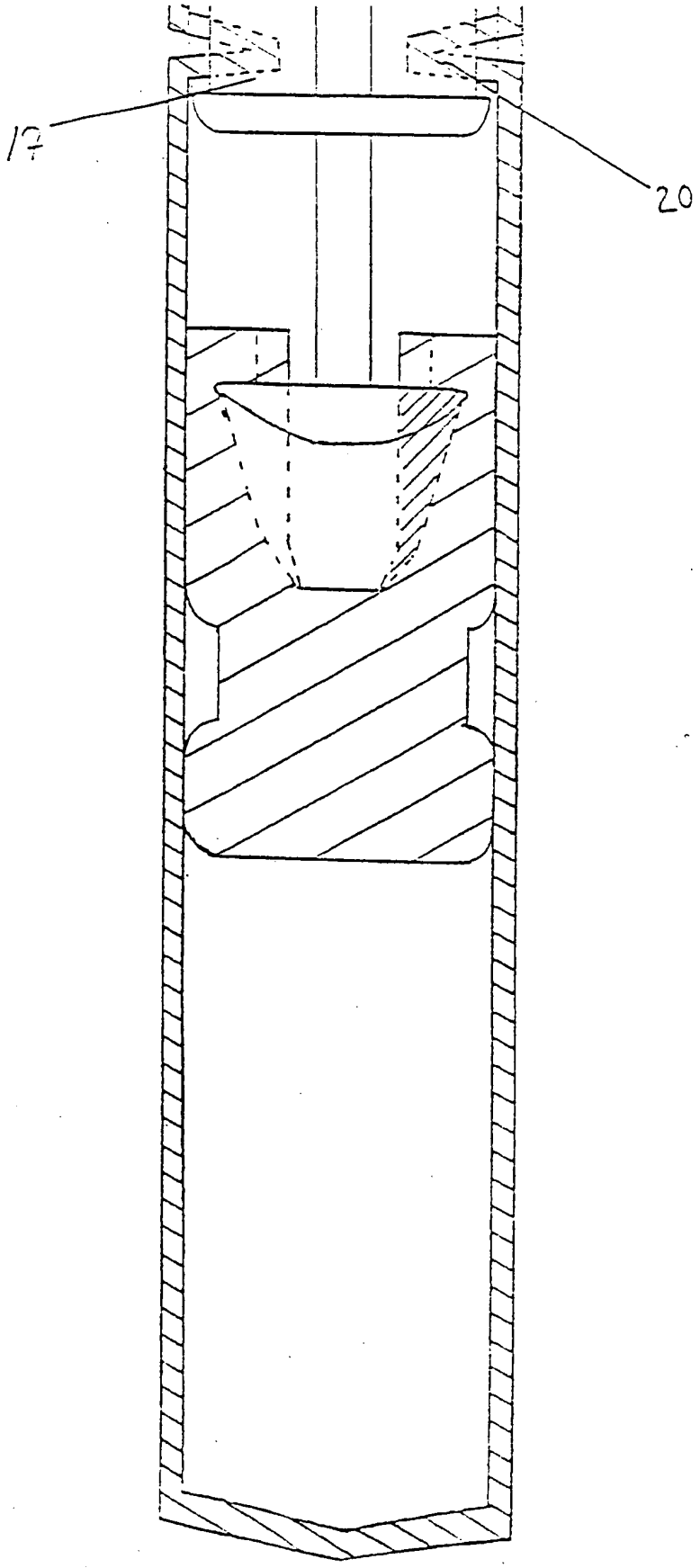


FIG 9

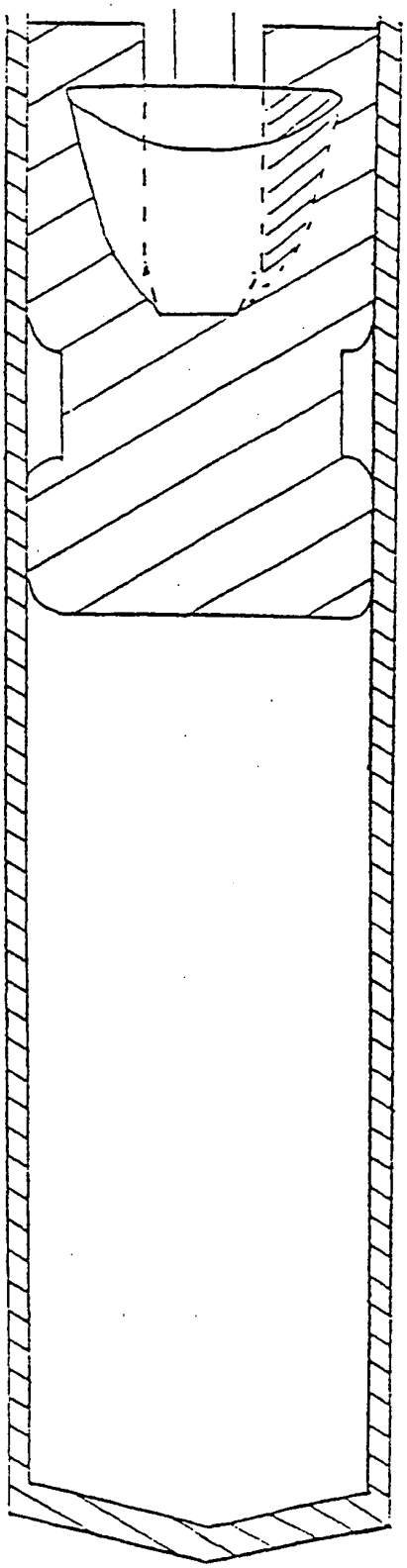


FIG. 9a

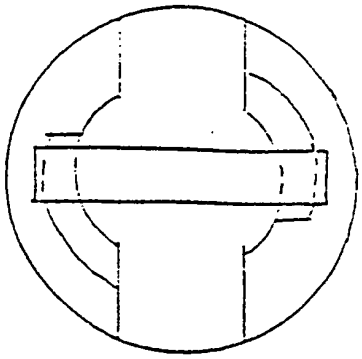


FIG. 10

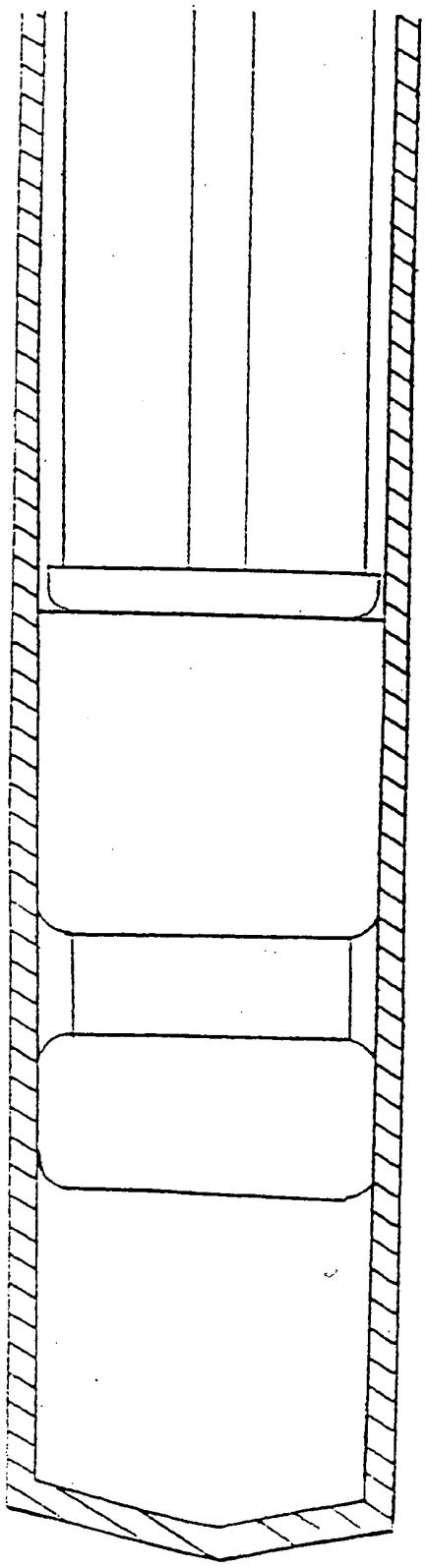
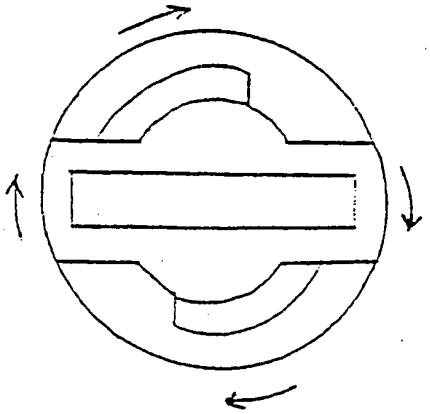


FIG. 10a



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