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(54) **Dispensers for viscous materials.**

(57) A mastic gun comprising a barrel (1), a piston on a piston rod (4), an operating mechanism (3) for advancing the piston rod (4), and a nozzle assembly (2) for delivery of the mastic. The nozzle assembly (2) comprises a nozzle holder (27) which extends through an aperture (31) in the end wall (22) of the barrel and has at least one spring biased detent (41,42) to retain the holder in the aperture and a nozzle (51) retained in the nozzle holder, the nozzle preventing release of the detent (41,42).

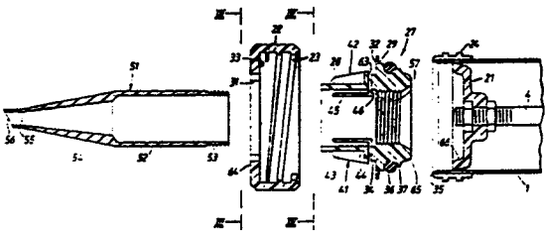

FIG. 2

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Description

DISPENSERS FOR VISCOUS MATERIALS

This invention relates to dispensers for viscous materials which may be of a thick liquid nature or of a pasty nature and is particularly suitable for dispensers of mastic caulking materials. Various constructions of dispensers for viscous materials are known and two particular examples are those shown in GBI2643IIA and GBI58938IA. In the first of these the viscous material is contained in a cartridge having a cylindrical body portion or barrel and an integral nozzle at one end and containing a piston which is advanced by a gun mechanism to which the cartridge may be attached. The gun mechanism comprises a body in which moves a rod attached to the piston and carrying a mechanism by which the rod may be advanced stepwise by successive operation of a trigger-like member. The second specification describes a dispenser having a barrel in which is contained a cartridge having an integral nozzle at one end and an open end at the other end and the dispenser provides means for controlling the admission of compressed air to the open end to express the contents of the cartridge out of the nozzle at the other end. Guns similar to the first described are also available on the market in which the barrel is open-ended and is provided with a removable nozzle assembly comprising a cap which is screwed onto the end of the barrel, a metal nozzle holder which is secured by machine screws into an aperture in the cap and a metal nozzle which is screwed into an aperture in the nozzle holder. The latter is mechanically satisfactory but is expensive to produce and is heavy. A more serious disadvantage is that it is difficult and time consuming to disassemble for cleaning, thorough cleaning being essential for satisfactory operation of the dispenser. It is an object of the present invention to provide a nozzle assembly for a dispenser of viscous material which is economical to produce and which can be disassembled and reassembled for cleaning rapidly and easily.

According to one aspect of the present invention, a dispenser for viscous materials comprises a barrel for the material, a discharge nozzle assembly at one end of the barrel, and means for expressing the material from the barrel through the nozzle assembly, the nozzle assembly comprising: an apertured end wall to the barrel; a nozzle holder having a bore therethrough, a first portion which will pass through the aperture in the end wall, a second portion affording a shoulder which will abut the perimeter of the aperture, a spring biased detent which is radially retractable to permit the first portion of the nozzle holder to pass through the aperture and which is biased to extend radially outwards to retain the nozzle holder after such passage, and means for retaining a nozzle within the bore; and a nozzle which, when retained by the retaining means, prevents retraction of the detents.

In a preferred construction there is a second detent identical to and diametrically opposite to the first.

Preferably the or each detent is made integral with at least the first portion of the nozzle holder, the first portion being made of a resilient material to afford the spring bias. The nozzle may be retained in the nozzle holder in various ways but is preferably screwed into the bore thereof. Preferably the end wall of the barrel is afforded by a cap retainable on the barrel, for example by a multi-start screwthread.

The nozzle assembly of the invention may be applied to dispensers of various kinds, for example those in which a piston is advanced mechanically as in the aforesaid GBI2643II and those where the viscous material is pressurized by compressed air as in the aforesaid GBI58938I. Where a piston is advanced along the barrel the face of the piston directed towards the nozzle end and the end wall of the barrel are preferably of complementary shape so that when the piston abuts the end wall any viscous material remaining within the barrel is in direct communication with the nozzle, i.e. there are no dead spaces and the only material remaining within the barrel is adjacent the nozzle. This feature may be used independently of the nozzle assembly described above but where such a nozzle assembly is used the piston preferably comes into contact with the nozzle holder so that the only viscous material left in the dispenser when such contact occurs is within the nozzle holder and the nozzle so that when these parts are removed no viscous material remains within the barrel. If the barrel is then refilled without cleaning of the nozzle assembly the viscous material within the nozzle assemby will be expressed before the new material.

The invention may be carried into practice in various ways but one dispensing device for viscous materials and embodying the invention will now be described by way of example with reference to the accompanying drawings in which:

Figure I is a side elevation of the dispenser;

Figure 2 is an exploded longitudinal section of the nozzle end of the dispenser shown in Figure I;

Figure 3 is an end elevation of the end cap of the nozzle assembly vieweed in the direction of the plane 33 shown in Figure 2; and

Figure 4 is an end elevation of the nozzle holder of the nozzle assembly viewed in the direction of the plane 44 in Figure 2.

The dispenser shown in the drawings, and particularly in Figure I, comprises a barrel I to contain the material to be dispensed and having at one end a nozzle assembly 2 and at the other end an operating mechanism 3 by means of which a piston rod 4 can be advanced step by step along the axis of the barrel I. The operating mechanism comprises a body portion 5 having a depending stock 6 which can be grasped in the hand and to which is pivoted a trigger-like member 7. On the side of the pivot 8 of the trigger member 7 remote from the finger engaging portion 9 thereof is a stud II which engages an apertured plate I2 through the aperture in which the piston rod 4 passes with some clearance. The

upper edge of the plate 12 rests against a shoulder 13 on the body portion 5 and the plate 12 is biased to the right as seen in the drawing by means of a compression spring 14. The piston rod 4 also passes through a second apertured plate 15 which engages against a boss 16 on the body 5 and which is biased to the right as seen in the drawing by means of a compression spring 17. Although the mode of operation of such a mechanism is well known in this art it will be briefly described. When the trigger member 7 is squeezed in the hand towards the stock 6 the stud 11 tilts the plate 12 about its point of engagement with the abutment 13 until the upper and lower extremities of the aperture in the plate grip the upper and lower surfaces of the piston rod 4. On continued backward movement of the trigger member 7, the plate 12 moves forward with the piston rod to advance the piston in the barrel 1. During this forward movement of the piston rod 4, the rod slides through the plate 15 which is tilted slightly about the stud 16 to allow free movement of the rod 4 through the aperture of the plate. On release of the trigger member 7, the spring 14 returns the plate 12 to the position shown in Figure 1, the plate sliding along the rod 4 which is prevented from moving in the reverse direction by the plate 15 resuming the position shown in Figure 1 and gripping the rod 4. The return movement of the plate 12 under the action of the spring 14 also returns the trigger member 7 to the position shown.

The nozzle assembly 2 is shown in greater detail in Figures 2, 3 and 4. Figure 2 also shows the piston 21 on the end of the piston rod 4. The left hand end of the barrel is closed by an apertured cap member 22 which has a two-start female screw thread which may be screwed onto a two-start male screw thread 24 on the end of the barrel 1. As can be seen in Figure 3, the outer forward and peripheral surfaces of the end cap 22 are formed with recesses 25 which assist gripping of the cap during threading and unthreading and also have weight-reducing and decorative purposes.

The nozzle assembly also includes a nozzle holder 27 having a first cylindrical portion 28 the outside diameter of which is such that it can pass through an aperture 31 in the end cap 22 and a second main body portion 29. A flange 32 on the body portion 29 engages the inner axially facing wall 33 of the end cap 22 and radial location is afforded by a cylindrial surface 34 on the body portion of the nozzle holder engaging the perimeter of the aperture 31. When the nozzle assembly is assembled onto the barrel 1, the right-hand axially facing surface of the flange 32 engages the circumferential end wall 35 of the barrel and an O-ring 36 located in a groove 37 in the body portion 29 of the nozzle holder seals against the inner surface of the barrel 1.

The nozzle holder is held in position in the aperture 31 in the end cap 22 by a pair of spring biased detents 41, 42 which are formed integrally with the cylindrical portion 28 of the nozzle holder. Each of the detents 41 and 42 is formed by four parallel generally triangular walls 43 projecting approximately radially outwardly from the cylindrical wall 28 and connected together at the right hand end as seen in Figure 2 by a generally radially extending wall 44. Extending along each side of each of each of the detents 41, 42 is an axial slit 45 which passes through the cylindrical wall 28. The slits 45 on each side of each detent are connected by a circumferentially extending slit 46. The detents are thus connected to the remainder of the nozzle holder only at their left hand ends as seen in Figure 2 and they can be moved towards one another by flexing of the portions of the wall 29 adjacent the points of connection of the detents.

A nozzle 51 comprises a first cylindrical portion 52 formed with a male screwthread 53 at one end, a tapering portion 54 and a second cylindrical portion 55 having a diagonal cut off 56 providing the discharge orifice of the nozzle. The bore of the nozzle holder 27 is formed with a female thread 57 into which the male thread 53 of the nozzle 51 can be screwed.

The nozzle assembly is assembled as follows. The cylindrical wall 28 of the nozzle assembly 27 is entered into the aperture 31 in the end cap 22, the detents 41 and 42 passing through notches 61 and 62 in the periphery of the aperture 31. As the nozzle holder is moved further through the aperture 31 the outer edges of the walls 43 of the detents 41 and 42 slide along the inner edges of the notches 61 and 62 and the detents are squeezed inwardly, resiliently deforming the portions of the cylindrical wall 28 providing the connections between the detents 41, 42 and the remainder of the nozzle holder 27. After the detents have passed completely through the aperture 31 they spring outwards and their end faces 63 engage the outer surface 64 of the end cap 22 to retain the nozzle holder 27 firmly in position in the end cap 22. The nozzle 51 is then screwed into the nozzle holder 27. The outer diameter of the cylindrical portion 52 of the nozzle 51 is only very slightly smaller than the inner diameter of the cylindrical portion 28 of the nozzle holder 27 so that once the nozzle 51 is in position it is not possible move the detents 41 and 42 radially inwards to release the nozzle holder 27.

After one or more fillings of the barrel 1 have been expressed, the nozzle assembly may be disassmbled for cleaning. This is effected by removing the assembly from the barrel 1 by unscrewing the cap 22, unscrewing the nozzle 51 from the nozzle holder 27 and then separating the nozzle holder 27 from the cap 22 by manually squeezing the two detents 41, 42 towards each other between the finger and thumb until the detents can be passed through the notches 61, 62 and the nozzle holder removed from the aperture 31. The various components of the nozzle assembly 27 can them be placed in a bath of solvent together with the piston 21 which can be unscrewed from the piston rod 4.

It will be noted from Figure 2 that the right hand end of the nozzle holder 27 is formed with a bead 65 the outer circumferential surface of which is complementary to a surface 66 on the dished interior of the piston 21. Accordingly when the nozzle assembly is assembled on the barrel and the piston is advanced to its maximum extent to the left until it abuts the nozzle holder 27 the only space remaining for the

contents of the dispenser is within the nozzle holder 27 and the nozzle 5l and there are no dead spaces in which the material can remain. If the piston is then retracted and then the barrel is refilled, the new material cannot be driven out of the nozzle until the remaining old material contained in the nozzle and the nozzle holder has passed out of the nozzle holder and the nozzle.

The piston 2l, the end cap 22 and the nozzle holder 27 (with the exception of the O ring 36) are made of the acetal plastic sold under the trade mark DELRIN. This material is extremely stable in the presence of the majority of solvents such as are used for cleaning mastics and other materials of the kind which are used in such guns. The O ring 36 is made of the polyester elastomer plastic sold by DuPont under the trade mark HYTREL which is also resistant to the majority of solvents. The nozzle 5l is made of high density polyethylene.

Claims

l. A dispenser for viscous materials comprising a barrel (l) for the material, a discharge nozzle assembly (2) at one end of the barrel, and means (3) for expressing the material from the barrel through the nozzle assembly, characterised in that the nozzle assembly (2) comprises: an end wall to the barrel having an aperture (3l) therein; a nozzle holder in the end wall (27) having a bore therethrough, a first portion (28) which will pass through the aperture (3l) in the end wall, a second portion (32) affording a shoulder which will abut the perimeter of the aperture, a spring biased detent (4l) which is radially retractable to permit the first portion of the nozzle holder to pass through the aperture and which is biased to extend radially outwards to retain the nozzle holder after such passage, and means (57) for retaining a nozzle (5l) within the bore; and a nozzle (5l) which, when retained by the retaining means, prevents retraction of the detent.

2. A dispenser according to Claim l which includes a second detent (42) identical to and diametrically opposite to the first (4l).

3. A dispenser as claimed in Claim l or Claim 2 in which the or each detent (4l,42) is made integral with at least the first portion (28) of the nozzle holder (27), the first portion (28) being made of a resilient material to afford the spring bias.

4. A dispenser as claimed in Claim 1 or Claim 2 or Claim 3 in which the nozzle is retained in the nozzle holder by being screwed (53,57) into the bore of the nozzle holder.

5. A dispenser as claimed in any of Claims 1 to 4 in which the end wall of the barrel is afforded by a cap (22) retainable on the barrel.

6. A dispenser as claimed in Claim 5 in which the cap is retained on the barrel by a multi-start screwthread (23).

7. A dispenser as claimed in any of Claims 1 to 6 which includes a piston (21) and means (4-17) for advancing the piston (21) along the barrel, the face (66) of the piston directed towards the nozzle end and the end wall (65) of the barrel being of complementary shape so that when the piston abuts the end wall there are no dead spaces in the barrel.

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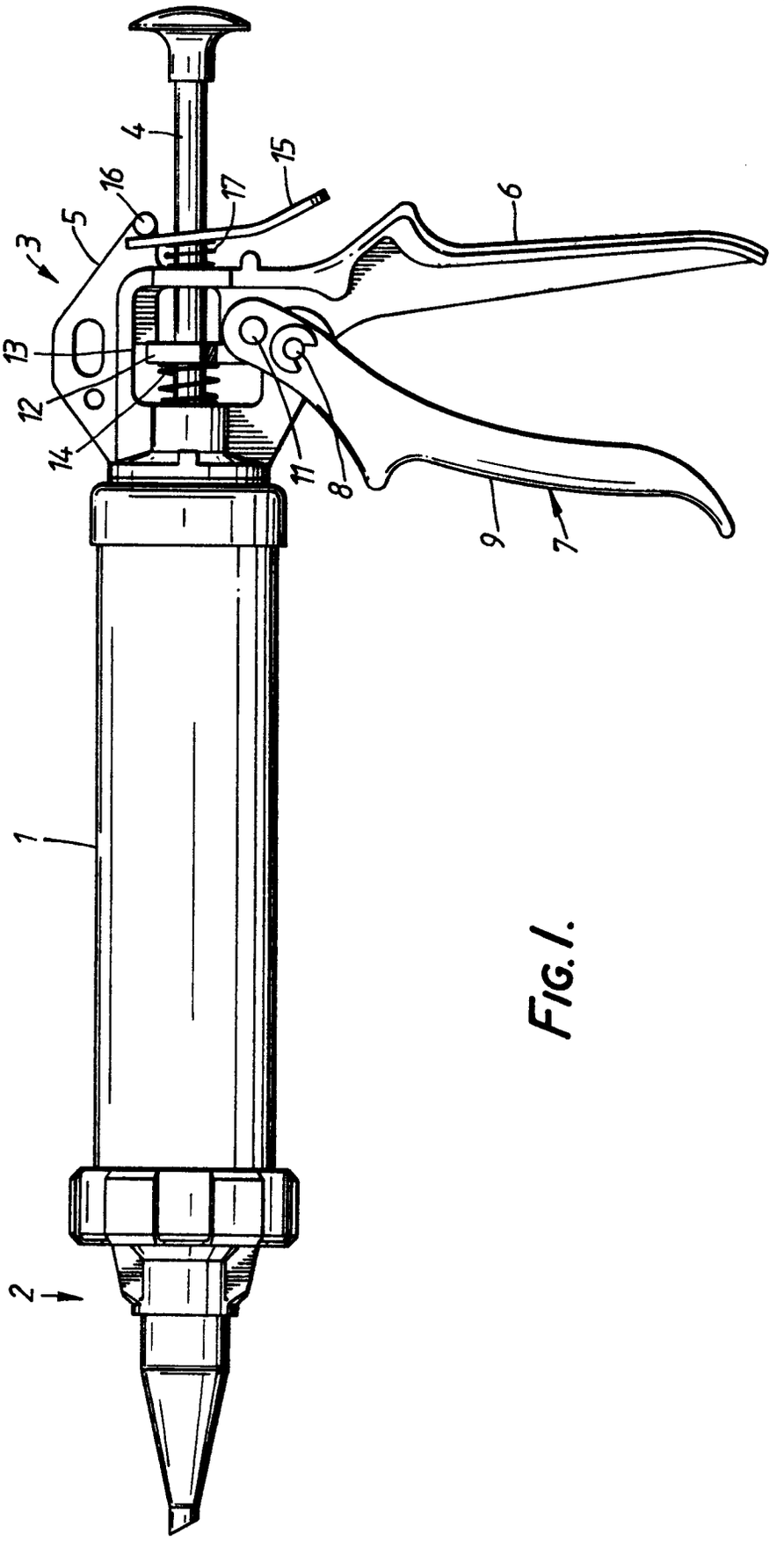

FIG. 1.

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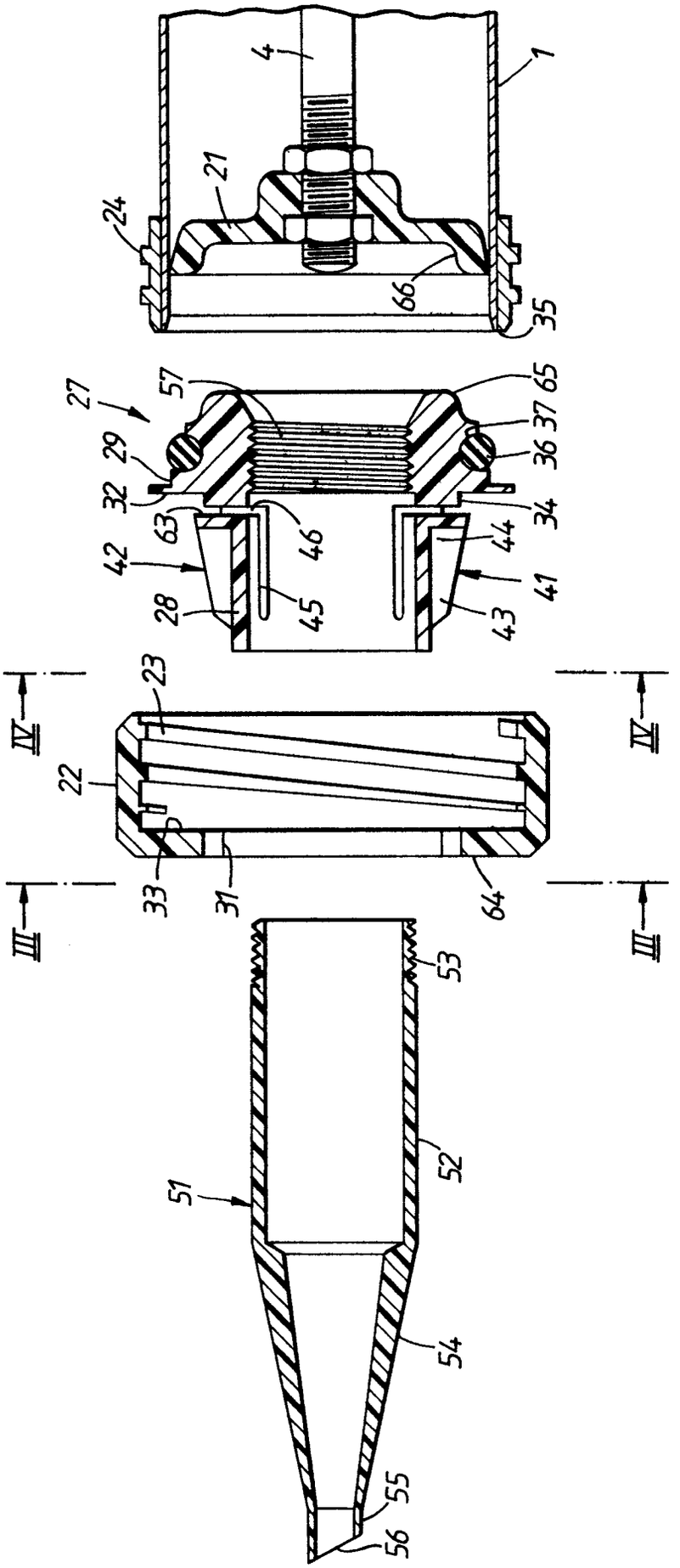

FIG. 2.

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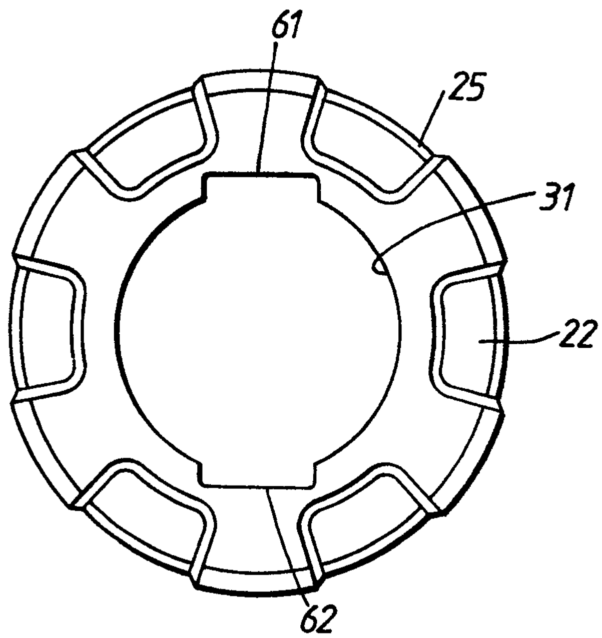

FIG. 3.

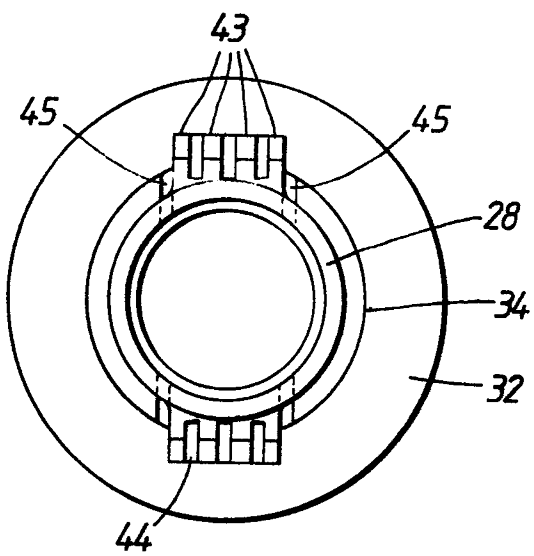

FIG. 4.