



(12)

**EUROPEAN PATENT APPLICATION**

(21) Application number : **91300251.5**

(51) Int. Cl.<sup>5</sup> : **B65D 47/24**

(22) Date of filing : **14.01.91**

(30) Priority : **23.01.90 GB 9001489**

(43) Date of publication of application :  
**31.07.91 Bulletin 91/31**

(84) Designated Contracting States :  
**AT BE CH DE DK ES FR GB IT LI LU NL SE**

(71) Applicant : **FERRY PICKERING (SALES)  
LIMITED  
PO Box 6, Coventry Road  
Hinckley, Leicestershire LE10 0JJ (GB)**

(72) Inventor : **Nixon, Philip Graham  
The Old Rectory, Rectory Lane, Nailstone  
Nuneaton, Warwickshire CV13 0QQ (GB)**

(74) Representative : **SERJEANTS  
25, The Crescent King Street  
Leicester, LE1 6RX (GB)**

(54) **Tamper-evident drum containers.**

(57) **The invention relates to tamper-evident drum containers.**

A first aspect of the invention provides a drum container (1) in which a plug top (7) is provided with a continuous unbroken web (12) overlying the whole of the top of the container without any apertures. A fracture zone (14) is formed therein to define a frangible portion (15) which when broken away defines a dispensing hole through the web. A closure disc (8) is rotatably mounted on the plug top by having a cylindrical depending flange portion (23) received in an annular depression in the web defined by a pair of spaced cylindrical wall portions (16,17) of the web, with an undercut portion (24) around the inner cylindrical face of the flange portion receiving and retaining an annular retention bead (19) on the innermost one of the cylindrical portions of the web.

A second aspect of the invention provides a drum container (1) having a plug top (7) comprising a depending outer annular wall for insertion into the top of the drum container, and moulded thereon a continuous outwardly directed barb or snatch (10) which in use engages beneath an intumed roll or bead (4) around the inside of the top of the drum container.

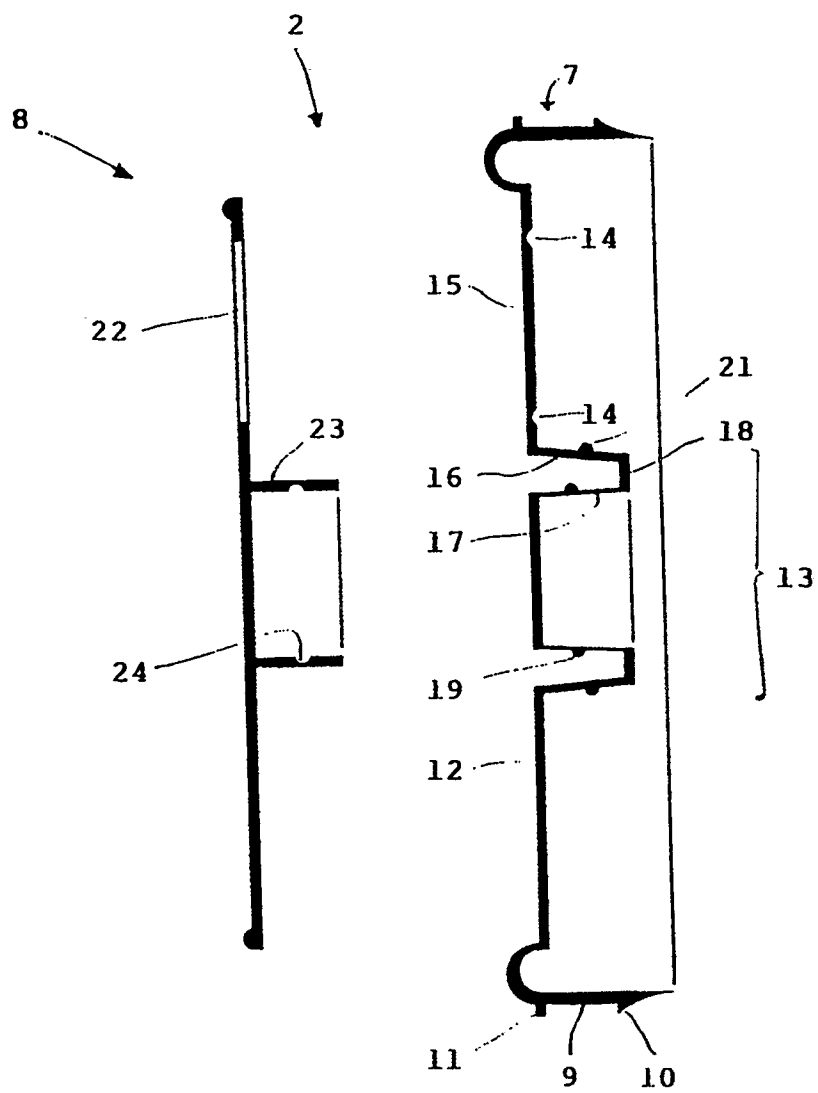


Figure 2

## TAMPER-EVIDENT DRUM CONTAINERS

### Field of the invention :

The invention relates to drum containers, having dispensing closures for dispensing powdered or granulated solid materials. The invention provides such containers that are tamper-evident, so that once filled in the factory they cannot be opened or their contents exposed without such tampering being immediately evident. The invention also provides dispensing closures for such tamper-evident containers.

### Background Art

Drum containers are commonly used for holding and dispensing powders such as talcum powder or pepper, or granulated solids such as breadcrumbs or granulated sugar. The dispensing closure may be in two parts : a plug top for the otherwise open end of the drum container, and a rotary cover disc rotatably mounted on a central spindle extending through the plug top. The rotary cover disc is apertured, and by rotation can selectively cover or expose a dispensing hole in the plug top. Thus rotation of the cover disc to bring its aperture or apertures into alignment with the dispensing hole in the plug top is necessary before the contents of the drum can be dispensed by pouring or sprinkling. If the rotary cover disc has a single large aperture in alignment with the dispensing hole in the plug top then the contents can be poured. If it has a group of small apertures in alignment with the dispensing hole in the plug top then the contents can be sprinkled. The cover disc may have both large and small apertures, and it is known to have drum containers which permit their contents to be either poured or sprinkled depending on the angular positioning of the rotary apertured cover disc.

Of particular importance when the drum container is to contain foodstuffs, and of lesser but general importance for all other uses, is the need to ensure that the drum container cannot be opened or the contents reached or exposed to tampering after the container has been filled and after it has left the factory. To that end it is known to provide an integral frangible seal over the dispensing hole in the plug top, by moulding a continuous web over that hole in the manufacturing stage, with a weak fracture line around the edge of the web so that it can be broken inwardly by the user prior to first use of the drum container. Such a container is tamper-evident to the extent that if anyone succeeds in opening the dispensing hole before the product is purchased, that fact is immediately apparent to the purchaser. However there are other ways of tampering with the contents, other than by opening the dispensing hole in the plug top, and further security measures are therefore necessary.

The rotary apertured cover disc of such a dispensing closure is rotatably mounted on the plug top by a moulded spindle portion of the cover disc which passes through a through-hole in the plug top. If the cover disc is prised off the plug top, that through-hole is exposed and could be used as a means for reaching the contents of the drum container before replacing the cover disc. Furthermore the entire closure is generally secured to the drum container by a simple push-fit of the plug top into the open end of the drum container, where it is retained by friction. Therefore removal of the entire closure is another means of gaining access to the contents. Both of such access routes can be made tamper-evident by applying a ring or collar of heat-shrunk plastics film around the upper edge of the drum container after it is filled, so that the film shrinks tightly against the outer cylindrical wall of the drum container and over at least a part of the upper surface of the dispensing closure and the rotary apertured cover disc. Anyone determined to tamper with the contents, and to conceal the fact that they had done so, could however cut away the shrink film, remove the dispensing closure from the drum or the cover disc from the plug top, tamper with the contents, reassemble, and apply a new heat-shrink collar. Such drum containers are therefore still not fully tamper-evident, and there is a substantial consumer-resistance to such containers because of the difficulty of legitimate opening after purchase, and because of the increased cost associated with the application of the heat-shrink collar after filling.

The invention has as its object the provision of a tamper-evident drum container that is more reliably tamper-evident than those discussed above, that is less costly, that requires no over-wrapping after filling, and that is therefore easier to open after legitimate purchase. The invention also has as its object the provision of dispensing closures for such containers.

### SUMMARY OF THE INVENTION

The invention provides a drum container having a dispensing closure for powders and/or granulated solids, which dispensing closure comprises a plug top and a rotary apertured closure disc closely overlying the plug top, wherein the plug top comprises an unbroken closure web extending across the whole of the top of the drum container with a fracture zone formed therein to define the periphery of a frangible portion which when broken away defines a dispensing hole through the web ; and wherein the closure disc is rotatably mounted on the plug top by having a cylindrical depending flange portion of the closure disc received in an annular depression in the web defined by a pair of spaced cylindrical wall portions of the web, with an

undercut portion around the inner cylindrical face of the flange portion receiving and retaining an annular retention bead formed on the innermost one of the cylindrical portions of the web.

A drum container according to the invention is tamper-evident in that even if the closure disc is removed by prising it away from the plug top, no mounting aperture through the plug top is exposed. The web extends continuously across the plug top, and the mounting for the closure disc is not a through-hole but an annular depression formed in the web without creating any opening through the web into the interior of the drum container.

At first sight the annular depression described above, with its annular bead for retaining the closure disc, would seem to make the plug top extremely difficult or impossible to form by an injection moulding process. However the Applicants have devised a plug top which successfully avoids all of the expected difficulties. The anticipated problem was that when the mould halves separate it might be impossible to control retention of the moulded plug top by the mould half provided with ejector pins: the annular bead would tend to be retained in an undercut portion of the other mould half which would tend to cause the moulded part to be drawn off onto that other mould half on mould separation. The Applicants have solved this problem by providing on the radially outermost of the spaced cylindrical wall portions of the plug top an annular bead which during moulding extends into, and on mould separation is retained in, an undercut portion of the mould half which carries the ejector pins. This latter annular bead may be the same size as or larger than the first-mentioned annular bead, and counteracts the tendency for the moulded plug top to be drawn away from the mould half carrying the ejector pins on mould separation. Moreover, if the radially innermost of the spaced cylindrical wall portions of the plug top is made to a wall thickness less than that of the remainder of the continuous closure web over the top of the drum container, then on mould separation flexure is most likely to occur at that thin wall so that in practice the moulded plug top can reliably and consistently be released from the mould part carrying no ejector pins and retained by the mould half carrying the ejectors pins.

Another problem to be countered in providing a truly tamper-evident container is the possibility in known drum containers, of simply withdrawing the entire dispensing closure from the top of the drum where it has conventionally been a simple friction fit. The use of adhesives and heat-weld techniques has been proposed, as has the use of a collar of shrink-wrap material as discussed above. The invention also has as its object the provision of a drum container having a dispensing closure which effectively locks onto the rim of the paper or paper-lined drum container, and which in true tamper-evident manner would

involve visible damage to the container or to the plug top if an attempt were made to remove it.

In accordance with this second objective, the invention provides a plug top for a drum container, comprising a depending outer annular wall for insertion into the top of the drum container, and moulded thereon a continuous outwardly directed annular barb or snatch which in use engages beneath an inturned roll or bead around the inside of the top of the drum container. A conventional rolled rim around the top of the drum container does not, however, create the most secure of engagements with the moulded barb or snatch, and advantageously the drum rim is one which has started out as a conventional inwardly rolled rim but which has been post-formed by having its topmost portion creased into a sharp crease around the top of the drum. The creasing of the topmost portion of the rolled rim has the effect of modifying the shape of the remainder of the rim and creating a shape which cooperates positively with the inwardly directed annular barb or snatch to lock the closure top securely onto the drum container. Indeed it is possible according to such a construction to create a sealed drum container from which the dispensing closure can be removed only by destruction of the drum container or the dispersing closure or both.

A combination of both aspects of the invention, namely the continuous web over the whole of the plug top and the secure anchorage of the plug top on the drum container, provides a particularly secure and tamper-evident drum container which can be very speedily and economically sealed after filling simply by pushing the plug top, with its cover disc in place, into the open mouth of the filler drum.

## DRAWINGS

Figure 1 is an axial section through a dispensing drum container according to the invention;

Figure 2 is an axial section through the dispensing closure of Figure 1, but on a larger scale and with the two components thereof in exploded view;

Figures 3a and 3b are axial sections through the rim of the drum container of Figure 1 and through a conventional rolled rim respectively;

Figure 4 is an axial section through the partially separated mould halves of an injection moulding machine for moulding the plug top of Figures 1 and 2; and

Figure 5 is a front plan view of the right-hand mould half of Figure 4, with its split dies separated.

Referring first to Figure 1, there is illustrated a drum container assembly according to the invention comprising a drum container 1 and a dispensing closure 2. The drum container 1 is formed from paper or card with a base portion 3 adhered in place between

the two plies of an inturned bottom flange of the container wall. The open mouth of the container 1 is formed as an inturned rolled bead which in the interest of clarity is not shown in Figure 1 but is shown with the reference numeral 4 in Figure 3a. That bead 4 is formed by initially forming a conventional inturned rolled bead 4' as shown in Figure 3b, and then continuing the rolling to provide a sharp crease 5 at the extreme rim of the drum container 1, without flattening the remainder of the rolled bead 4. This has the effect of creating an acute angle between the free end 6 of the rolled bead 4 and the wall of the drum container, and this acute angle is very important for obtaining an optimum locking of the dispensing closure 2 in the mouth of the drum container 1 as will be described below.

The dispensing closure 2 comprises a plug top 7 and a cover disc 8, as clearly seen in Figure 2. The plug top 7 comprises a cylindrical plug portion 9 which in use is received as a close fit in the open mouth of the drum container 1. An annular barb or snatch 10 in use engages beneath the portion 6 of the rolled bead 4 of the drum container, and very effectively prevents the plug top 7 from being withdrawn from the drum container. Withdrawal is made even more difficult by a small outwardly directed flange 11 around the upper end of the plug top 7, which on assembly nestles closely against the wall of the drum container without any substantial overhang, as shown in Figure 1, and so does not offer any significant grip or leverage for anyone trying to withdraw the plug top from the drum container.

Across the entire upper face of the plug top 7 there extends a continuous web 12 which is moulded integrally with the remainder of the plug top. The web 12 includes a conformation 13, to be described in greater detail below, for rotatably mounting and retaining the cover disc 8; and it also includes a fracture zone 14 which defines the periphery of a frangible area 15 which, when broken away in use, provides a dispensing hole for the contents of the drum 1. Such frangible portions 15 are known in themselves, although the rotary mounting of the cover disc 8 on the plug top 7 has previously been provided by a central spigot on the cover disc which extends completely through an aperture formed in the web portion 12 of the plug top 7.

The conformation 13 comprises two generally cylindrical wall portions 16 and 17 which in practice for ease of moulding would be created as marginally conical, to assist removal from the mould. The conical extent of the walls 16 and 17 has been exaggerated in Figure 2 for illustrative purposes. The walls 16 and 17 are joined at their base by an annular portion 18 of the continuous web 12, and the wall thickness of the inner wall 17 is appreciably less than that of the remainder of the web 12, including the cylindrical wall 16. Extending outwardly around a mid point of the wall 17 is an annular bead 19 of generally semicircular

section, and extending outwardly from the cylindrical wall portion 16 is a similar bead 21.

5 The cover disc 8, which is apertured at 22, includes an integrally moulded cylindrical mounting spigot 23 which in use is received in the annular depression formed in the web 12 of the plug top 7 between the generally cylindrical walls 16 and 17. The mounting spigot 23 is made to be a close fit around the 10 the generally cylindrical wall portion 17, and an annular undercut portion 24 in the spigot 23 receives the annular bead 19 which serves to retain the cover disc 8 on the plug top 7.

15 The moulding of the plug top 7 is made possible by an injection moulding machine having multiple dies as illustrated in Figures 4 and 5. A fixed die 40 defines the shape of the top surface of the plug top 7, and an assembly of split dies 41 and a main core 42 together 20 define the shape of the underside of the plug top. Figure 5 shows the assembly of the main core 42 and split dies 41 of Figure 4, viewed from the left, with the split dies 41 having moved apart to permit ejection of the moulded plug top from the injection moulding machine. The sequence of mould separation is as follows:

After moulding, a retracting core 43 in the main core 42 is first withdrawn by moving it to the right as shown in Figure 4.

30 The fixed die 40 is then withdrawn by moving it to the left as shown in Figure 4, and simultaneously the split dies 41 are moved apart to their relative positions as shown in Figure 5.

35 Finally an ejector sleeve, and optionally also ejector pins in the main 44 core 42, are moved to the left as viewed in Figure 4 to eject the moulded plug top 7.

40 The problem addressed by the designers of this mould was that it was necessary to retain the moulded part on the main core during withdrawal of the fixed die 40, and to overcome the tendency for the annular bead 19 of the moulded part to become trapped in the associated undercut portion of the fixed die 40, which could result in either distortion of the moulded part while it was still soft and flexible or adherence of the moulded part to the fixed die. There are no ejector pins in the fixed die, so that the injection moulding machine would in those circumstances have to be stopped to permit manual removal of the moulded part from the fixed die. The solution to this potential problem has been to make the cylindrical wall portion 17 of the moulded plug top 7 of a thinner wall thickness 45 than the remainder of the plug top. When the retracting core 43 is retracted, this relatively thin and therefore relatively flexible wall portion of the moulded part does not have sufficient strength to resist the retraction of the fixed die 40, since it is in competition with the stronger anchorage of the moulded part to the main core 42 created by the moulded bead 21 which is formed on a wall portion 16 of greater thickness and

therefore greater strength. Surprisingly, the reduced thickness of the wall portion 17 does not result in any significant reduction in the retaining ability of the bead 19 which retains the cover disc 8 in place in the assembled product.

The drum container and dispensing disclosure described and illustrated offers a great security against unwarranted tampering with the contents of the drum after packing but prior to opening by the user, and has the advantage that there are no additional packaging steps needed after filling of the drum, such as over-wrapping or otherwise sealing the plug top onto the drum.

has been post-formed by having its topmost portion creased into a sharp crease around the top of the drum.

### Claims

1. A drum container having a dispensing closure for powders and/or granulated solids, which dispensing closure comprises a plug top and a rotary apertured closure disc closely overlying the plug top, wherein the plug top comprises an unbroken closure web extending across the whole of the top of the drum container with a fracture zone formed therein to define the periphery of a frangible portion which when broken away defines a dispensing hole through the web; and wherein the closure disc is rotatably mounted on the plug top by having a cylindrical depending flange portion of the closure disc received in an annular depression in the web defined by a pair of spaced cylindrical wall portions of the web, with an undercut portion around the inner cylindrical face of the flange portion receiving and retaining an annular retention bead formed on the innermost one of the cylindrical portions of the web.
2. A drum container according to claim 1, wherein the radially innermost of the spaced cylindrical wall portions of the plug top is made to a wall thickness less than that of the remainder of the continuous closure web over the top of the drum container.
3. A plug top for a drum container according to claim 1 or claim 2.
4. A plug top for a drum container, comprising a depending outer annular wall for insertion into the top of the drum container, and moulded thereon a continuous outwardly directed annular barb or snatch which in use engages beneath an inturned roll or bead around the inside of the top of the drum container.
5. A drum container comprising a plug top according to claim 4 inserted as a push fit in the top of a drum container which has an inwardly rolled rim which

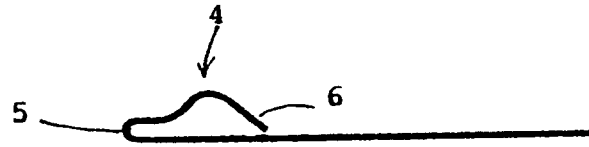


Figure 3a

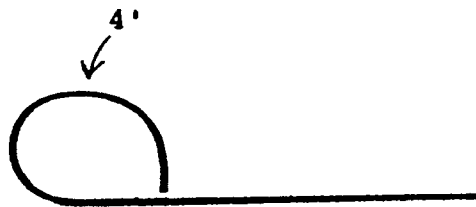


Figure 3b

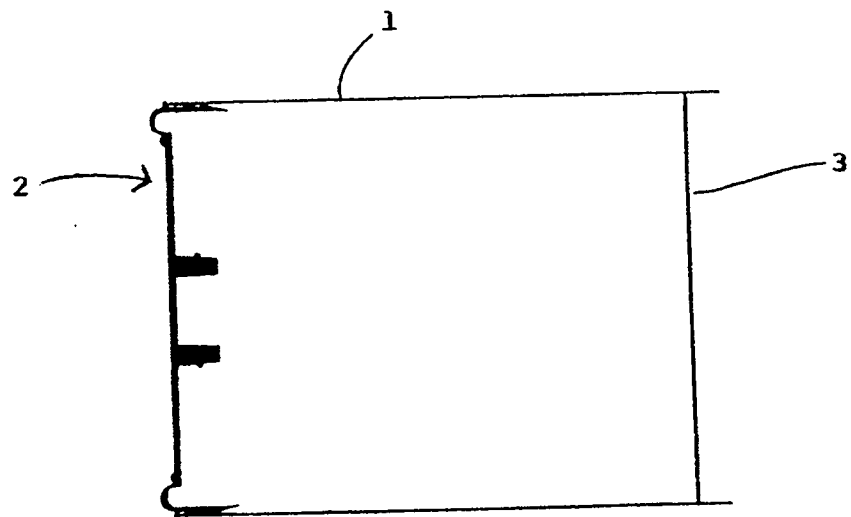


Figure 1

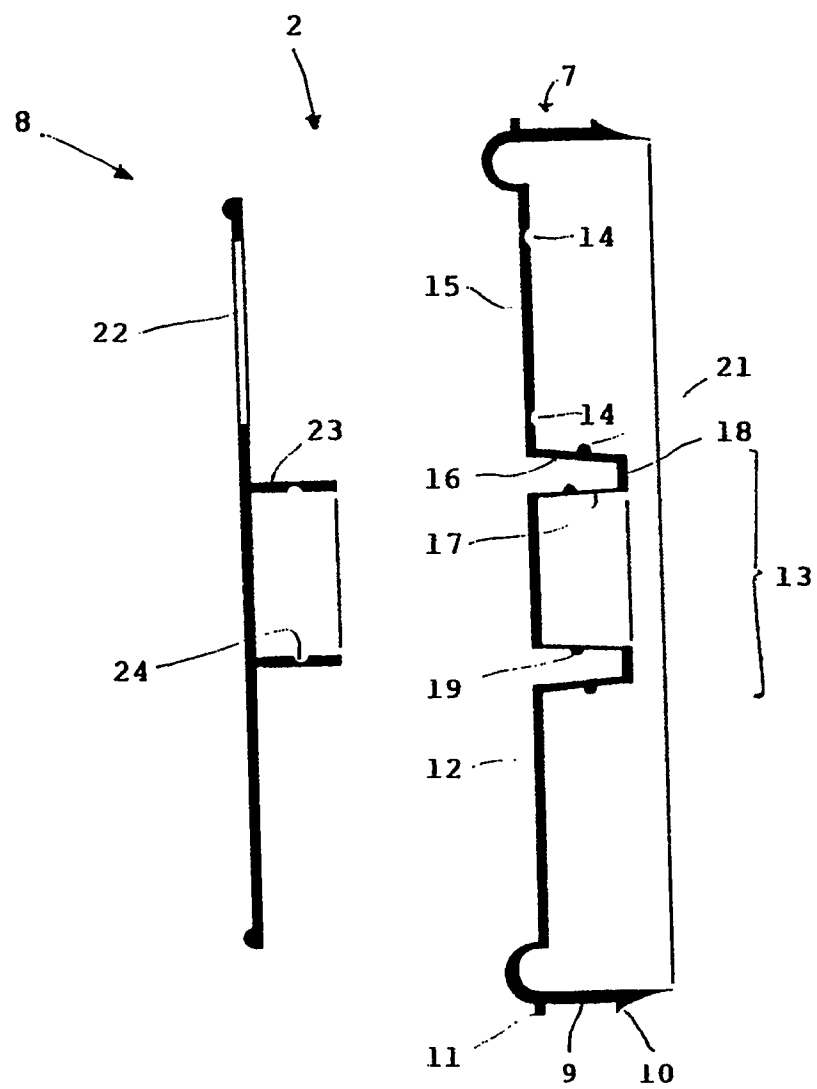


Figure 2

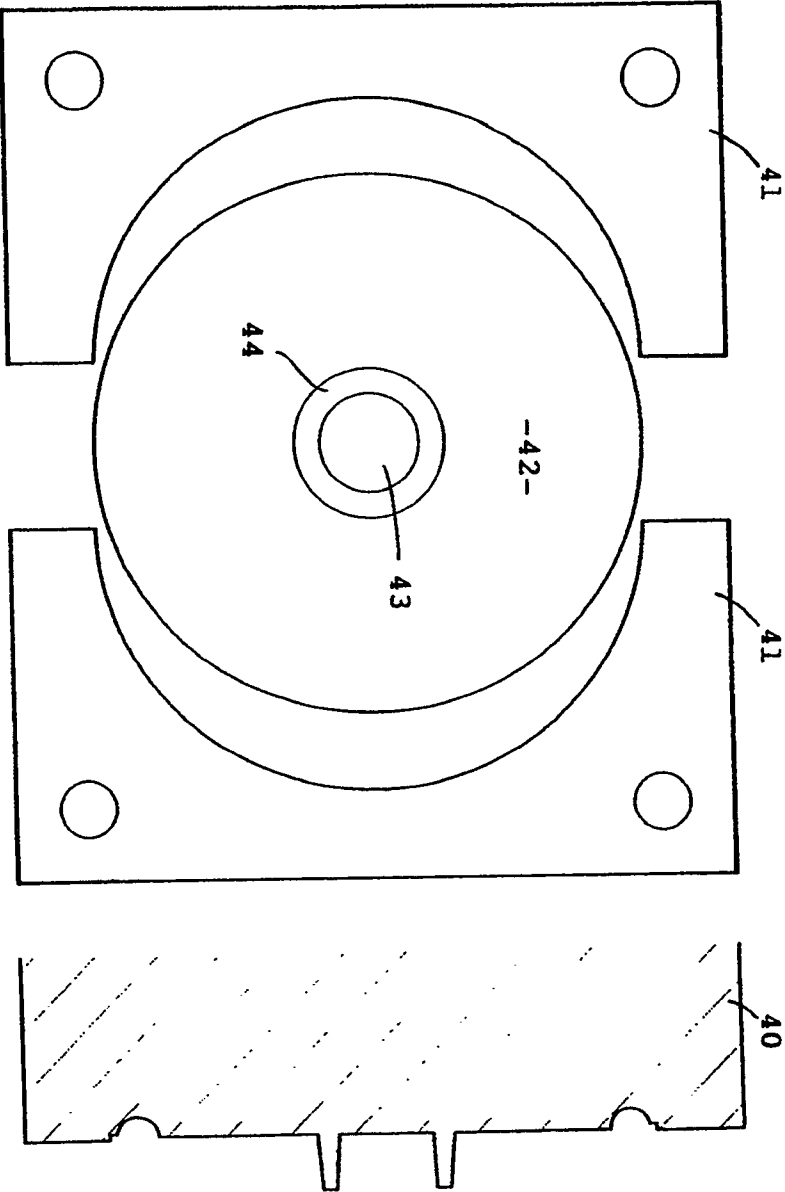


Figure 4

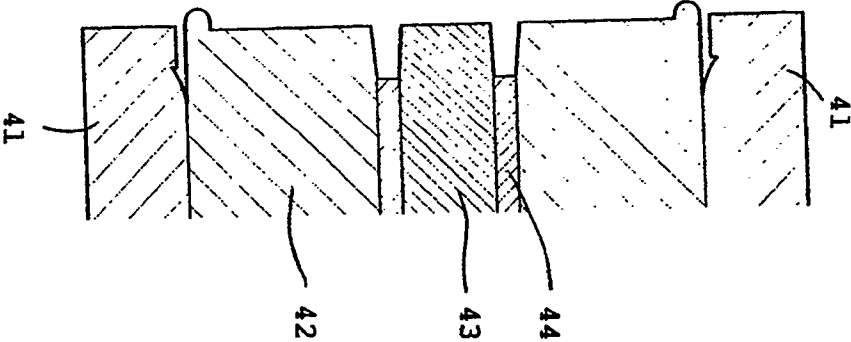


Figure 5