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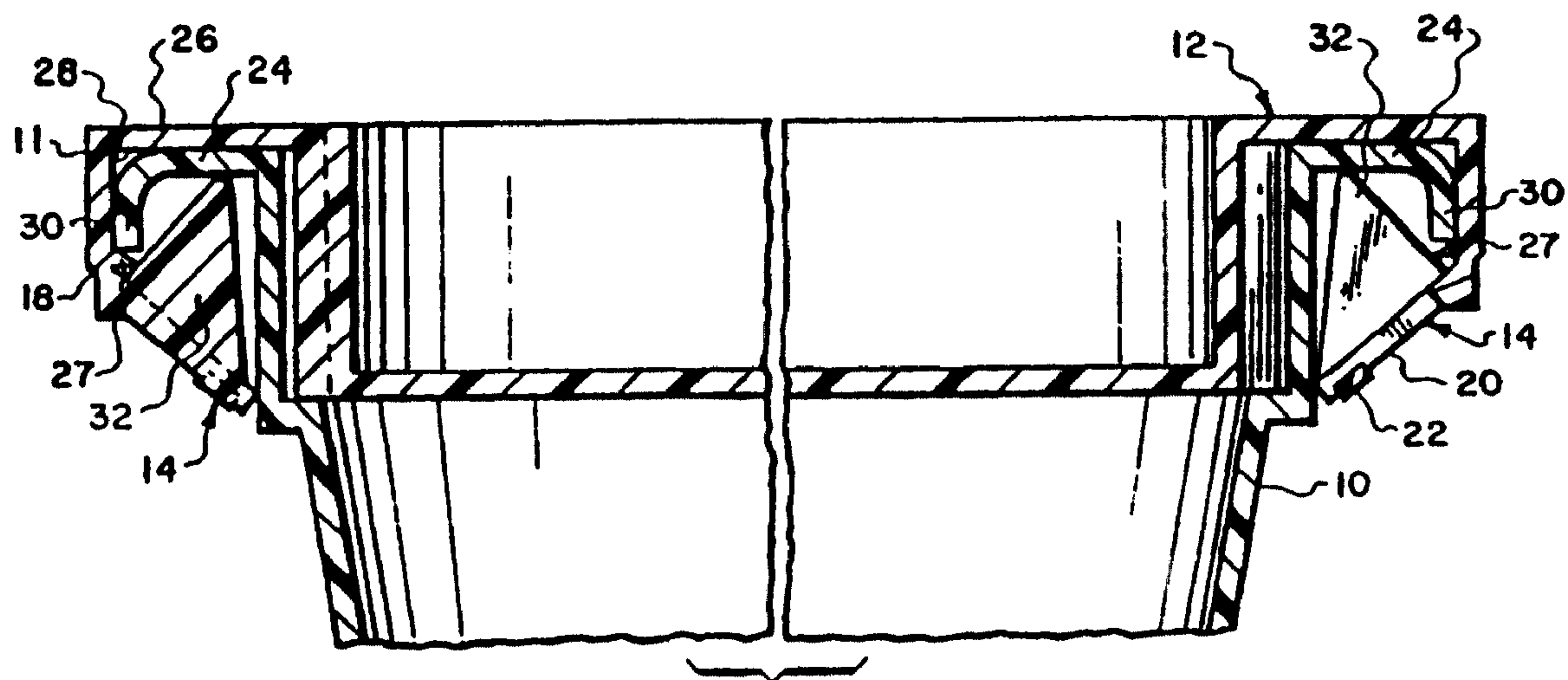
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(54) Titre : COUVERCLE DE CONTENANT INVOLABLE

(54) Title: TAMPER RESISTANT CONTAINER LID



(57) Abrégé/Abstract:

A tamper resistant container lid that provides a tear away strip that cannot be easily removed without evidence of tampering. The tear away strip is comprised of a plurality of tabs joined by integral thin film links that are heat contractible. With the lid mounted on a container and the tear strip folded or pressed down beneath the rim of the container heat applied to the strip will contract or collapse the thin film links securing the lid on the container. The thin film links are a secure method of providing evidence of tampering because the tear strip is nearly impossible to remove without rupturing one or more of these links. A second embodiment of the invention includes a latching mechanism to hold the tear strip in a closed or folded down position beneath the rim of a container while the thin film links are heated to secure the tear strip around the container. A molding apparatus end method is also described for manufacturing parts that require mold undercuts such as the latter tamper resistant lid. A spring biased stripper ring first pivots the portion of a part having indentations requiring undercuts away from the mold to release the undercut portion before ejecting the part from the mold.

TAMPER RESISTANT CONTAINER LID

## ABSTRACT OF THE DISCLOSURE

1  
2 A tamper resistant container lid that provides a tear away  
3 strip that cannot be easily removed without evidence of  
4 tampering. The tear away strip is comprised of a plurality of  
5 tabs joined by integral thin film links that are heat  
6 contractible. With the lid mounted on a container and the tear  
7 strip folded or pressed down beneath the rim of the container  
8 heat applied to the strip will contract or collapse the thin  
9 film links securing the lid on the container. The thin film  
10 links are a secure method of providing evidence of tampering  
11 because the tear strip is nearly impossible to remove without  
12 rupturing one or more of these links. A second embodiment of  
13 the invention includes a latching mechanism to hold the tear  
14 strip in a closed or folded down position beneath the rim of a  
15 container while the thin film links are heated to secure the  
16 tear strip around the container. A molding apparatus and method  
17 is also described for manufacturing parts that require mold  
18 undercuts such as the latter tamper resistant lid. A spring  
19 biased stripper ring first pivots the portion of a part having  
20 indentations requiring undercuts away from the mold to release  
21 the undercut portion before ejecting the part from the mold.  
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TITLE: TAMPER RESISTANT CONTAINER LID

SPECIFICATION

Field of the Invention

This invention relates to tamper resistant container lids and more particularly relates to a tamper resistant container lid having a tear strip secured by integral heat contractible thin film links.

Background of the Invention

In recent years because of package tampering many methods have been conceived to protect against tampering. The methods include products for sealing the container that will make the container tamper evident. That is, any tampering with the seals on the container will be apparent so that a potential user will be warned. While present methods have achieved some success, a disadvantage is that they are not as secure as they could be.

One such container has a plastic lid with sections that are easily ruptured to remove the lid. Any attempts to force the lid off the container will rupture these sections and provide evidence of tampering. However, this system can be defeated by a slow tedious prying of the lid a small section at a time, until the lid is removed without rupturing the tamper evident seal.

Another method of sealing containers is to provide a heat shrinkable plastic seal around the opening and over the cap. However, this system can be defeated by warming the heat shrinkable sleeve and slowly stretching it until it can be easily removed. It then can be replaced and heat shrunk back over the cover after the product in the package has been tampered with.

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Another disadvantage of these products is that the more secure they are the more difficult it is to gain access to the container. For example, the latter container with the heat shrinkable sleeve is so secure that it sometimes requires a  
5 knife to cut them away. Users have been injured by stabbing or cutting themselves trying to remove the seal.

Another method of sealing containers is to provide a thin foil covering over the mouth of the container beneath the cap. This too, while effective, has its disadvantages. The sealed  
10 foil or film is covered by the lid losing the visual effect of a secure package. Another difficulty with this type arrangement is that it also is difficult to remove and sometimes requires a cutting instrument to pierce the seal.

Thus it can be seen that while the present methods are  
15 effective they have disadvantages in that they can be defeated or if very secure they may be difficult to remove.

Accordingly the present invention seeks to provide a tamper resistant lid for containers that is almost impregnable. In this container lid a tear strip is provided that is extremely  
20 difficult to remove without rupturing integral thin film links securing the lid on a container.

Further the present invention seeks to provide a container lid that has a tear strip that is very secure but is also very easy to remove by a user. The tear strip is secured to the lid  
25 container by a thin section of material providing a flexible hinge that will easily tear.

Still further the present invention seeks to provide a tamper resistant container lid that is easy to open in that it has a tear strip and a pull tab that allows the strip to be  
30 easily stripped from the lid providing access to the container.

Yet further the present invention seeks to provide a unique molding apparatus and method that allows products having indentations at right angles to the plane of the mold to be ejected from the mold.

5           Moreover, the present invention seeks to provide an apparatus and method of molding that includes a spring loaded auxiliary stripper ring to first deflect a contoured part that goes beyond the plane of the mold before ejecting the part from the mold.

10   Summary of the Invention

The purpose of the present invention is to provide a tamper resistant lid that is extremely secure but yet may be easily removed providing access to a container.

15           The purposes of the invention are achieved by providing a lid with a tear strip secured around the periphery of the lid to a flange which forms the annulus for mounting the lid on the rim of a container. The tear strip is secured to the edge of the flange of the lid by a thin section of material forming a hinge. The tear strip also includes a number of thin film links that  
20   will buckle or wrinkle when the tear strip is folded and pressed down around the periphery of a container rim. Heat can then be applied to the tear strip to cause the thin film links to contract or collapse securing the lid to the container. This provides a nearly impregnable seal because the strip cannot be  
25   pried lose without breaking one or more of these thin film links.

          The tear strip also has a pull tab formed at the end so that it may easily be grasped by the fingers and smoothly torn from the lid. The annulus in the flange of the lid fits a  
30   mating rim of a container and has a ridge that will allow the



1 container lid to be used in a normal fashion.

2 The tear strip also includes a latching mechanism to hold  
3 the tear strip in a folded position around the rim of the  
4 container while the thin film links are heated. The latching  
5 mechanism in the form of bosses or ledges formed beneath the  
6 tear strip having a small notch that will catch on the lip of  
7 the container lid holding the tear strip in a folded position.  
8 Heat is then applied to the tear strip to contract the thin  
9 film links securing the lid to the container.

10 A unique molding apparatus and method have been designed  
11 to manufacture the flexible tear strip on the tamper resistant  
12 lid. Since the latching mechanism is in the form of a small  
13 notch formed on a boss beneath the tear strip an indentation  
14 beyond the plane of the mold must be machined. This makes it  
15 difficult to remove the part from the mold. Thus a mold has  
16 been designed which will first eject a section of the part that  
17 is not in the plane of the mold then allow the rest of the part  
18 to be ejected from the mold. To accomplish this purpose the  
19 mold design has a spring loaded stripper ring constructed and  
20 arranged to engage the flexible hinged tear strip of the lid  
21 deflecting it at a sufficient angle to eject the tear strip  
22 portion from the indentation in the mold allowing the rest of  
23 the part to be stripped from the mold.

24 The above and other novel features and advantages of the  
25 invention will be more fully understood from the following  
26 detailed description and the accompanying drawings in which:

27 Brief Description of the Drawings

28 Figure 1 is a side elevation of a container having a  
29 tamper resistant lid according to the invention.

30 Figure 2 is a section view taken at 2-2 of Figure 1.

31 Figure 3 is a deep partial section illustrating the  
32 securing of the tear strip.

1           Figure 4 is a partial sectional view taken at 4-4 of  
2 Figure 3 illustrating the container with the tamper resistant  
3 lid having the tear strip in an unfolded position prior to  
4 securing it.

5           Figure 5 is a partial sectional view illustrating another  
6 embodiment of the invention including a mechanism to hold the  
7 tear strip of the tamper resistant lid in a folded position.

8           Figure 6 is a partial sectional view taken at 6-6 of  
9 Figure 5 of a tamper resistant lid with the tear strip and heat  
10 shrinkable thin film links.

11          Figure 7a is a view taken at 7a-7a of Figure 5.

12          Figure 7b and 7c are views illustrating the steps  
13 for securing the tamper resistant lid to a container.

14          Figure 8 is a side elevation of a container having an  
15 alternate embodiment of the tamper resistant lid of Figure 1.

16          Figure 9 is a sectional view taken at 9-9 of Figure 8.

17          Figure 10 is a partial sectional view illustrating a  
18 tamper resistant lid before the tear strip has been secured to  
19 the container.

20          Figure 11 is an enlarged partial section taken at 11-11 of  
21 Figure 10 illustrating the latching of the tear strip prior to  
22 securing the lid to a container.

23          Figure 12 is a partial section of a mold for manufacturing  
24 the tamper resistant lid of the present invention.

25          Figure 13 is a partial section of a mold illustrating the  
26 pre-ejection of a portion of a part.

27          Figure 14 is a sectional view illustrating the full  
28 ejection of a part after the pre-ejection of Figure 13.

29          Detailed Description of the Invention

30          A container 10 using tamper resistant lid 12 of the  
31 invention is illustrated in Figure 1. Tamper resistant lid  
32 12 has tear strip 14 that is easily removed by a lateral



1 pulling force on pull tab 16. The tear strip 14 is formed on  
2 the lower edge of lip 11 of planar lid 12 with thin section 18  
3 providing a hinge that will easily fracture when a moderate  
4 lateral force is applied to tab 16. Tear strip 14 is  
5 constructed of alternating tabs 20 joined by thin film links 22  
6 as will be described in greater detail hereinafter. The  
7 arrangement shown provides an easily removed tear strip while  
8 at the same time providing a very secure tamper resistant lid.  
9 It solves the problem of providing a secure tamper resistant  
10 lid while allowing the container to be easily opened by a user.

11 The sectional view of Figure 2 illustrates the lid 12  
12 secured to the container 10 by tear strip 14. Container 10  
13 is a conventional container having a peripheral flange 24 for  
14 engaging flange 26 and annulus 28 on lid 12. Lid 12 is  
15 secured to container 10 by tear strip 14 folding beneath the  
16 flange 30 on rim 24 of the container. Tear strip 14 has  
17 bosses 32 which fit beneath the cavity formed by flange 30  
18 securely clamping lid 12 on container 10.

19 The construction and operation of the tear strip 14 is  
20 illustrated in Figures 3 through 7. Figure 3 is a partial  
21 section showing lid 12 placed on a container 10 with tear strip  
22 14 in an unfolded position. Flange 26 of lid 12 fits around  
23 rim 24 with annulus 28 fitting around rim 24 of container 10.  
24 Tear strip 14 is formed as shown in Figure 4 of a plurality of  
25 tabs 20 joined by thin film links 22 and thin section 18  
26 forming a flexible hinge allowing the tear strip to be folded  
27 down around rim 24 of container 10 as indicated by the arrow in  
28 Figure 3.

29 To secure lid 12 after it is seated on rim 24 of container  
30 10 tear strip 14 is folded down as illustrated in Figure 5  
31 until boss 32 rotates upward into channel 34 beneath rim 24 of  
32 container 10. Tear strip 14 is shown in its relaxed position



in Figure 6 with tabs 20 joined by thin film links 24 extending away from container 10. Thin section 18 acts as a hinge for the tear strip 14 allowing it to be folded down around the periphery of container 10.

5           The function of tear strip 14 and of thin film links 22 is illustrated in Figure 7a through 7c. In Figure 7a tear strip 14 is in an unstressed, relaxed position with thin film links 22 joining adjacent tabs 20 in a fully extended position. Thin film links 22 are of the same material but substantially thinner than tabs 20 and preferably are less than half the thickness of adjacent tabs 20 forming tear strip 14. When tear strip 14 is stressed by being pressed or folded downward against the side of the container 10 the maximum diameter of 36 of tear strip 14 is reduced, which means that the overall diameter of tear strip 14 must conform to a smaller diameter. This contraction causes thin film links 22 to buckle or wrinkle as illustrated in Figure 7b. Without something to hold tear strip 14 in its folded position it will tend to spring back out to the relaxed position of Figure 6. To hold the tear strip in this position tear strip 14 is heated causing thin film links 22 to contract or collapse as illustrated in Figure 7c until tear strip 14 is bound in a folded position beneath the rim of the cup as illustrated in Figure 1. This arrangement securely clamps the lid 12 on container 10 and substantially prevents removal of the lid without some evidence of tampering. Attempts to remove or pry tear strip 14 away from the side of the container and beneath the rim of the cup is difficult and nearly impossible without rupturing one or more of thin film links 22.

Because the design of tear strip 14 involves alternating thick (tabs 20) and thin (links 22) sections only the thin sections will contract or collapse when heat is applied to this area leaving the thicker tabs 20 intact. This creates a new

1 outer dimension of tear strip 20 after it has cooled.

2       However, while tear strip 14 makes lid 12 very secure  
3 against tampering it is not difficult for a user to remove. A  
4 lateral pulling force on tab 16 easily removes tear strip along  
5 section 18 forming the tear strip hinge. Pulling on tab 16  
6 strips the tear strip away at the thin section 18 forming the  
7 hinge leaving the lid securely on the container. The lid may  
8 now be removed and replaced on the container and is held in  
9 place by ridge 27 in annulus 28 beneath lip 11 on flange 28 of  
10 lid 10.

11       An alternate embodiment is illustrated in Figures 8  
12 through 11 which includes a latch mechanism to hold the tear  
13 strip in a folded down position around the periphery of the lid  
14 and container while the thin film links are being heated. This  
15 eliminates an extra labor step of holding the tear strip 14 of  
16 the embodiment of Figure 1 down around the periphery of the  
17 container while the strip is being heated.

18       In the later embodiment tear strip 34 is secured to the  
19 upper edge 36 of lid 38 by thin section 40 forming a flexible  
20 hinge as can be seen in greater detail in the sectional view of  
21 Figure 9. Lid 42 is substantially the same as the lid in the  
22 previous embodiment except that the tear strip is secured by  
23 hinge 40 to the upper edge 36 on flange 44 of lid 42. Flange  
24 44 forms an annulus 45 which mates with rim 24 of container 10  
25 and is held in place after tear strip 34 is removed by ridge 46  
26 on lip 48 of flange 44.

27       Tear strip 34 of this embodiment is unique because it  
28 includes structure to hold the tear strip folded down around  
29 the periphery of container 10 and lid 42. Tear strip 34 of  
30 this embodiment has bent tabs 50 joined by thin film links 52.  
31 The bent tabs 50 have a vertical section 54 and an angled  
32 section 56 that fits beneath the flange 44 and lip 48 of lid 42



1 when tear strip 34 is folded down around the periphery of the  
2 lid. Bosses or lugs 58 are provided beneath each tab 50 as  
3 before except that lugs 58 are provided with a notch 60 that  
4 is constructed to catch the lower edge of lip 48 on flange 44.  
5 In this manner tear strip 34 is held in a folded down position  
6 as shown in Figure 8 prior to heating the tear strip to  
7 contract thin film links 52 between adjacent tabs 50.

8 Lid 42 is shown prior to installing it on a container 10  
9 in a partial top view of Figure 10. Bent tabs 50 are each  
10 joined by thin film links 52 that lie flat when tear strip 34  
11 is in its relaxed, stretched out position. As before thin film  
12 links 52 are of the same material but substantially thinner  
13 than tabs 50. The tear strip 34 as described previously, is  
14 joined to the upper edge 36 of flange 44 by a thin strip of  
15 material 40 forming a flexible hinge for tear strip 34.

16 The installation of the lid 42 on container 10 is shown in  
17 the enlarged partial section of Figure 11. Lid 42 is pressed  
18 down around rim 24 of container 10 until ridge 46 passes over  
19 and catches beneath the edge 47 of flange 24. Tear strip 34 is  
20 then pressed downward as indicated by arrow 62 until notch or  
21 catch 60 in lug 58 catches the edge 64 of lip 48 on lid 42  
22 with the bent portion of tabs 50 beneath the rim of container  
23 10. When tear strip 34 is folded down (i.e. closed) as shown  
24 in Figure 11 thin film links 52 will buckle or wrinkle as  
25 illustrated in Figure 7b. Heating the thin film links will  
26 cause them to contract or collapse until they are flush with  
27 the surface of tabs 50 securely locking lid 42 on container 10.

28 A lid secured to container 10 as described is nearly  
29 impregnable and will show clear evidence of tampering if any  
30 attempt is made to pry the tear strip 30 from beneath the  
31 flange on the container. The thin film links will easily  
32 rupture if any attempt is made to pry tabs 50 away from the

1 container. However, the tear strip is easily removed by  
2 grasping tab 16 on the end of the tear strip and tearing the  
3 strip at the hinge 40 removing it from the lid. The lid now  
4 may be easily removed and replaced and is held in place by  
5 ridge 46 beneath the flange 44 of the lid.

6 A unique molding apparatus and method has been developed  
7 to manufacture the tamper resistant lid according to the  
8 invention and is illustrated in Figures 12 through 14. Mold 70  
9 is comprised of a core 72 and cavity section 74 having a gate  
10 76 for introducing material into the void 78 in the mold  
11 for forming the part. The mold also includes a machined insert  
12 80 mating with main stripper ring 82 and auxiliary spring  
13 loaded stripper ring 84. Spring 86 providing a thrust behind  
14 spring loaded stripper ring 84 for purposes which will be  
15 described in greater detail hereinafter.

16 This mold has been designed because of the difficulty of  
17 manufacturing parts that have any depressions or pockets that  
18 are beyond the plane of the void 78 in the mold. In the case  
19 of the lid disclosed and described with the respective Figures  
20 8 through 11 tear strip 34 is formed with a lug or boss 58 and  
21 a notch 60 requiring an indentation or pocket in the mold.  
22 Parts with these kinds of configurations are difficult to  
23 remove from the mold. However with the spring loaded stripper  
24 ring of 84 this part once molded can be removed from the mold  
25 as illustrated in Figures 13 and 14.

26 To mold a part such as lid 42 material is forced in void  
27 78 through gate 76 until material fills the void up to  
28 restriction 88 that forms the thin hinge section 40 of lid 42.  
29 When the pressure reaches a predetermined point cavity 74 will  
30 begin to separate from core 72 which will allow material to  
31 surge through restriction 88 into the remaining void of the  
32 mold forming tear strip 34. At this point in time the cavity



1 74 momentarily moves away from core 72 and material surges  
2 through restriction 88 into the void forming tear strip 34  
3 and then again closes. After the material has cured mold  
4 cavity 74 begins to move away from core 72 and spring loaded  
5 stripper ring 84 having a corner 90 constructed to catch the  
6 edge of tear strip 34 causes the tear strip to flex or pivot  
7 backward releasing lug 58 from the pocket in the mold. This  
8 clears the lug from the indentation in the mold allowing  
9 main stripper ring 82 to strip the part from the mold  
10 completely. The part or lid 42 drops from the mold and the  
11 mold closes ready to manufacture another part. Thus the mold  
12 illustrated in Figures 12 through 14 provides a unique method  
13 and structure for manufacturing parts having pockets or fingers  
14 that are undercut or indented in the mold beyond the usual  
15 plane or surface of the mold.

16 Thus there has been disclosed a novel tamper resistant lid  
17 for containers that has a heat contractible links that once  
18 installed are difficult to remove without evidence of  
19 tampering. In one embodiment the tear strip is on the bottom  
20 edge of the flange of the lid and is held in place while the  
21 thin film links are heated to contract and secure the lid on  
22 the container. In a second embodiment the tear strip includes  
23 a latching mechanism in the form of a notch in lugs between  
24 tabs on the tear strip that catch the underside of the flange  
25 of the lid and hold the tear strip in place while the thin film  
26 links are contracted by heating. This secures the lid on the  
27 container and prevents removal without some evidence of  
28 tampering. Also described is a novel mold apparatus and method  
29 utilizing a spring loaded stripper ring to first strip a part  
30 having sections which fit pockets, indentation, or undercuts in  
31 the mold which are beyond the normal plane of the mold prior to  
32 stripping a completed part from the mold.

1           This invention is not to be limited by the embodiment  
2 shown in the drawings and described in the description which is  
3 given by way of example and not of limitation but only in  
4 accordance with the scope of the appended claims.  
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The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1.           A tamper resistant lid for a container,  
            said lid having a peripheral flange forming an annulus  
for fitting a rim of the container;  
            a tear strip secured to a periphery of said peripheral  
flange by a thin section of material forming a hinge, said tear  
strip comprising:  
            a plurality of spaced apart tabs; and  
            a plurality of thin link sections joining said tabs,  
said thin link sections constructed to lie within a plane of  
said tabs when said tear strip is unstressed and to bend outward  
when said tear strip is in a stressed condition folded down  
around the rim of the container, said thin link sections being  
of a material that conforms to the plane of said tabs when  
heated, whereby said thin link sections secure said tear strip  
by conforming to securely hold said lid on said container.
2.           The lid according to claim 1 in which said tear strip  
is formed in a circular configuration substantially parallel to  
a plane of said lid, whereby said thin section of material  
forming said hinge is stressed when said tear strip is folded  
down around said container rim.
3.           The lid according to claim 1 in which said tear strip  
extends around the periphery of said lid and terminates in a  
pull tab, whereby said pull tab may be grasped by fingers to  
easily strip said tear strip from said lid along the thin  
sections of material forming said hinge.
4.           The lid according to claim 3 including a ridge around  
the interior of said annulus for holding said lid on the  
container when said tear strip has been stripped from said lid.
5.           The lid according to claim 1 including means for  
locking said tear strip in a folded position before heating said

thin link sections.

6. The lid according to claim 5 in which said locking means comprises at least one boss formed on an inside surface of said tear strip, said at least one boss including a notch constructed for engaging the rim of the container when said tear strip is pressed down around the rim, whereby said tear strip is locked and held in a folded position.

7. The lid according to claim 6 wherein there is one of said bosses formed on an inside surface of each tab formed on said tear strip.

8. A tamper resistant lid for containers,  
said lid having a peripheral flange forming an annulus for fitting a rim of the container;

a tear strip secured to a periphery of said peripheral flange by a thin section of material forming a hinge;

said tear strip being formed of a plurality of tabs, each joined by conformable thin film links constructed and arranged to wrinkle when said tear strip is pressed down around the rim of the container and conform when heated;

locking means for locking said tear strip in a folded position before heating said thin film links, said locking means comprising:

at least one boss formed on the inside surface of said tear strip, said boss including a notch constructed for engaging the rim of said container when said tear strip is pressed down around that rim;

whereby said conformable thin film links protect a lid against tampering by easily rupturing if said lid is tampered with.

9. The lid according to claim 8 in which said tear strip extends around the periphery of said peripheral flange and terminates in a pull tab, whereby said pull tab may be grasped by fingers to easily remove said tear strip from said lid along



the thin section of material forming said hinge.

10. The lid according to claim 9 including a ridge around an interior of said annulus for holding said lid on a container when said tear strip has been removed from said lid.

11. The lid according to claim 8 wherein there is one of said bosses formed on an inside surface of each tab formed on said tear strip.

12. A method of making a tamper resistant container having a peripheral rim comprising:

molding a planar lid with a peripheral flange forming an annulus adapted to fit over the rim of the container;

said molding including forming a tear away strip integrally joined around a periphery of said peripheral flange of said lid by a thin section of material forming a hinge, said tear strip comprising a plurality of tabs joined by thin film links;

pressing the annulus of said planar lid down over the rim of the container;

folding said tear strip down around the rim of said container so that said thin film links buckle;

heating said tear strip to contract said thin film links;

whereby said lid is nearly impregnably secured to said container so that it cannot be removed without rupturing one or more of said thin film links.

13. The method according to claim 12 wherein latch means are formed on said tear strip for holding said tear strip in a folded position down around the periphery rim of said container before heating said thin film links.

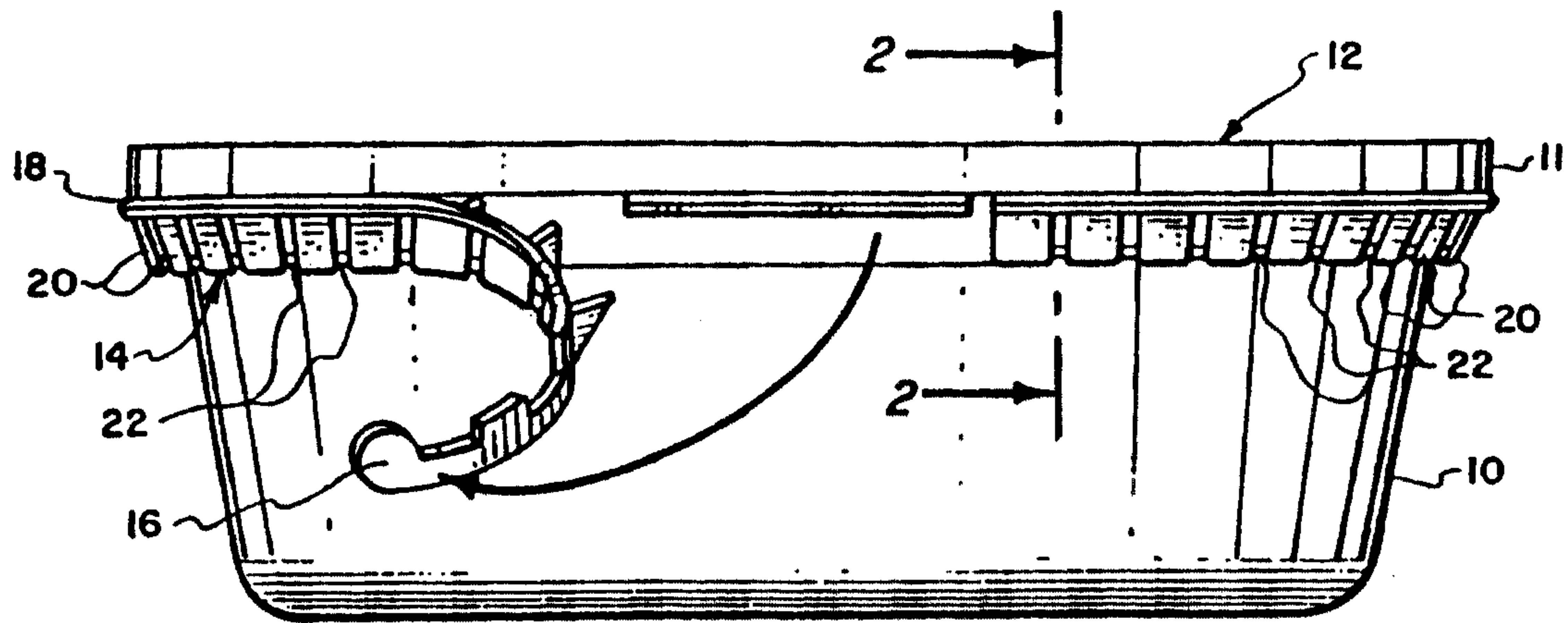
14. The method according to claim 13 wherein said latch means comprises at least one boss beneath said tear strip, having a notch constructed and arranged to catch a lower portion

of the rim of said flange on said planar lid when said tear strip is folded down around the rim of a container.

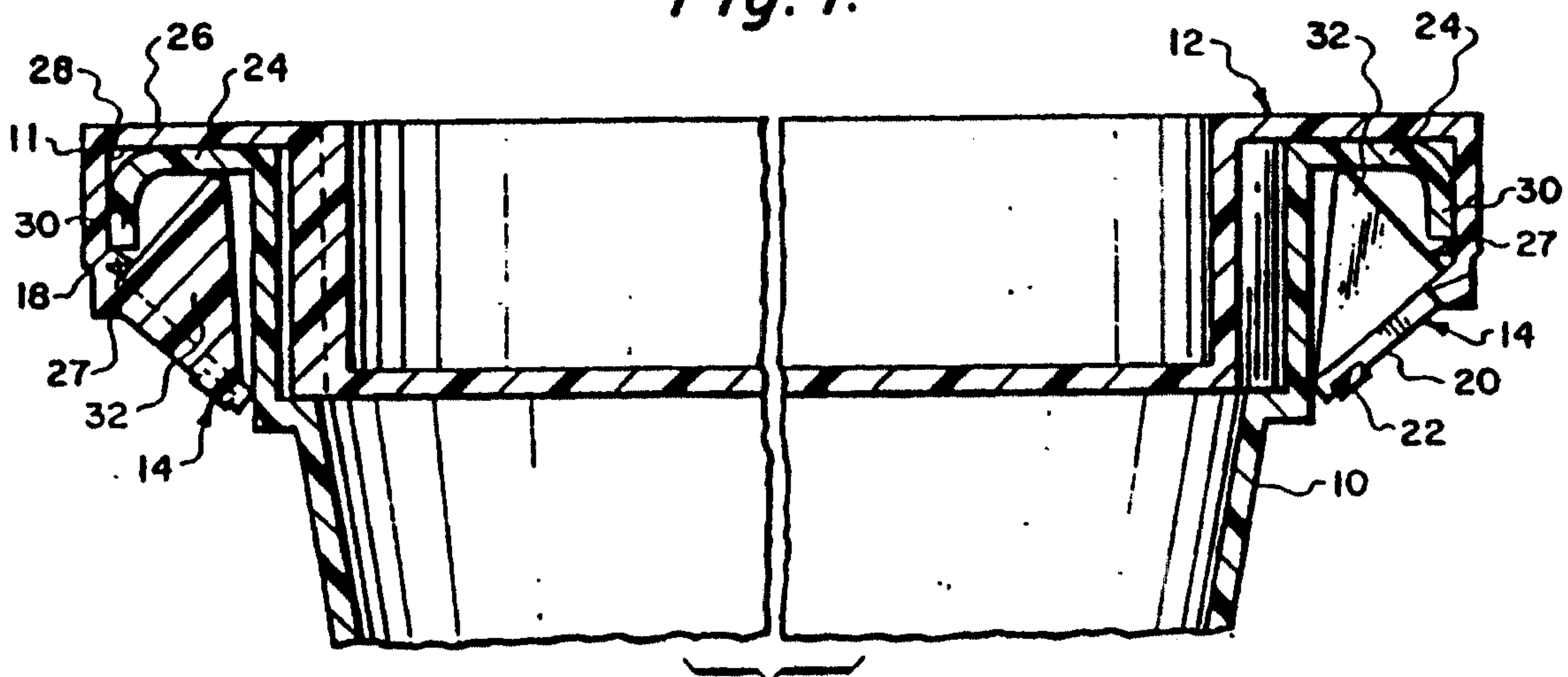
15. The method according to claim 14 wherein there is a boss beneath each tab formed on said tear strip.

16. The method according to claim 12 wherein a pull tab is formed at the end of said tear strip, whereby said pull tab may be easily grasped by fingers and said tear strip easily removed from said lid and said container along said thin section of material forming said hinge by a lateral pulling force on said pull tab.

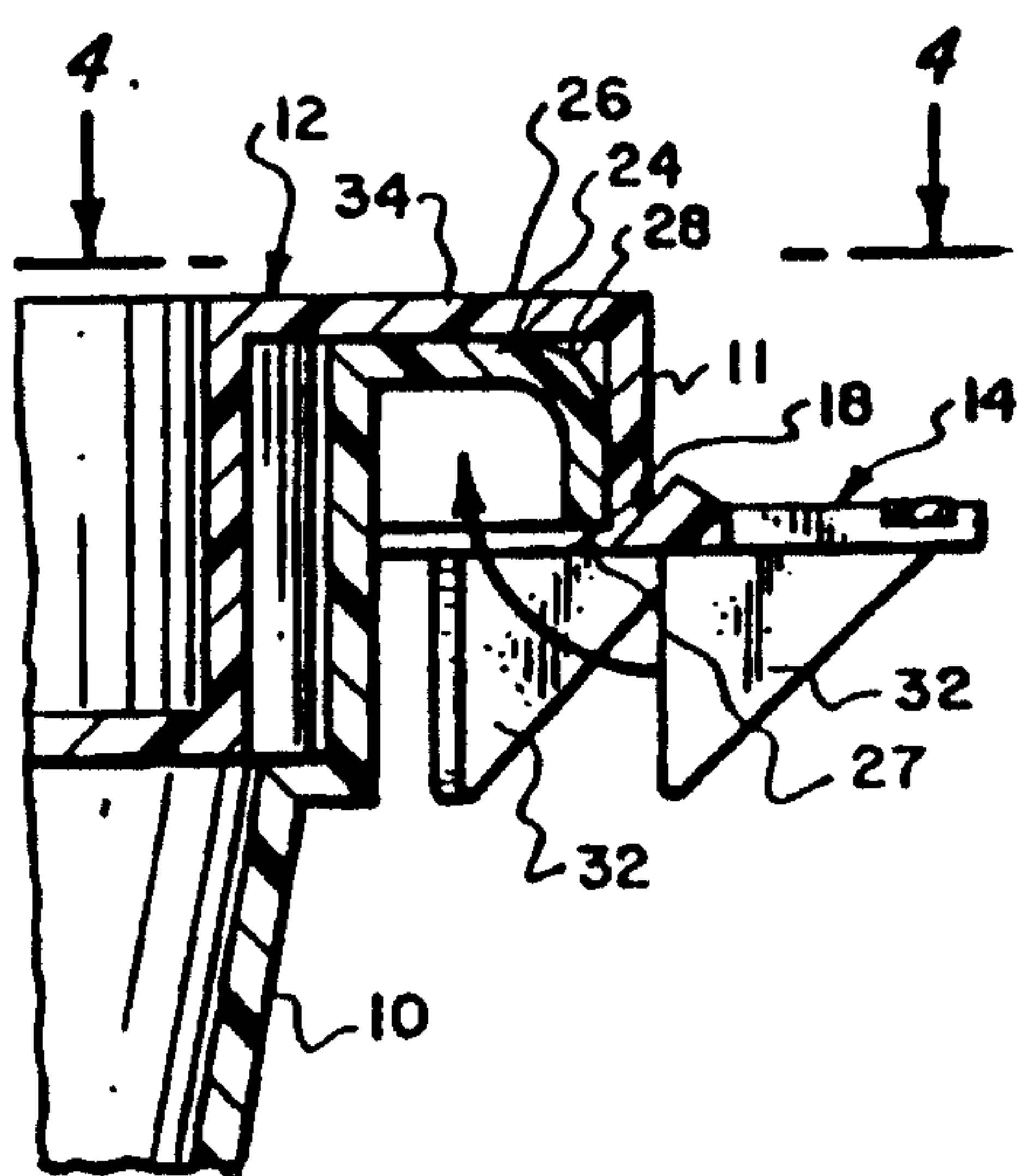




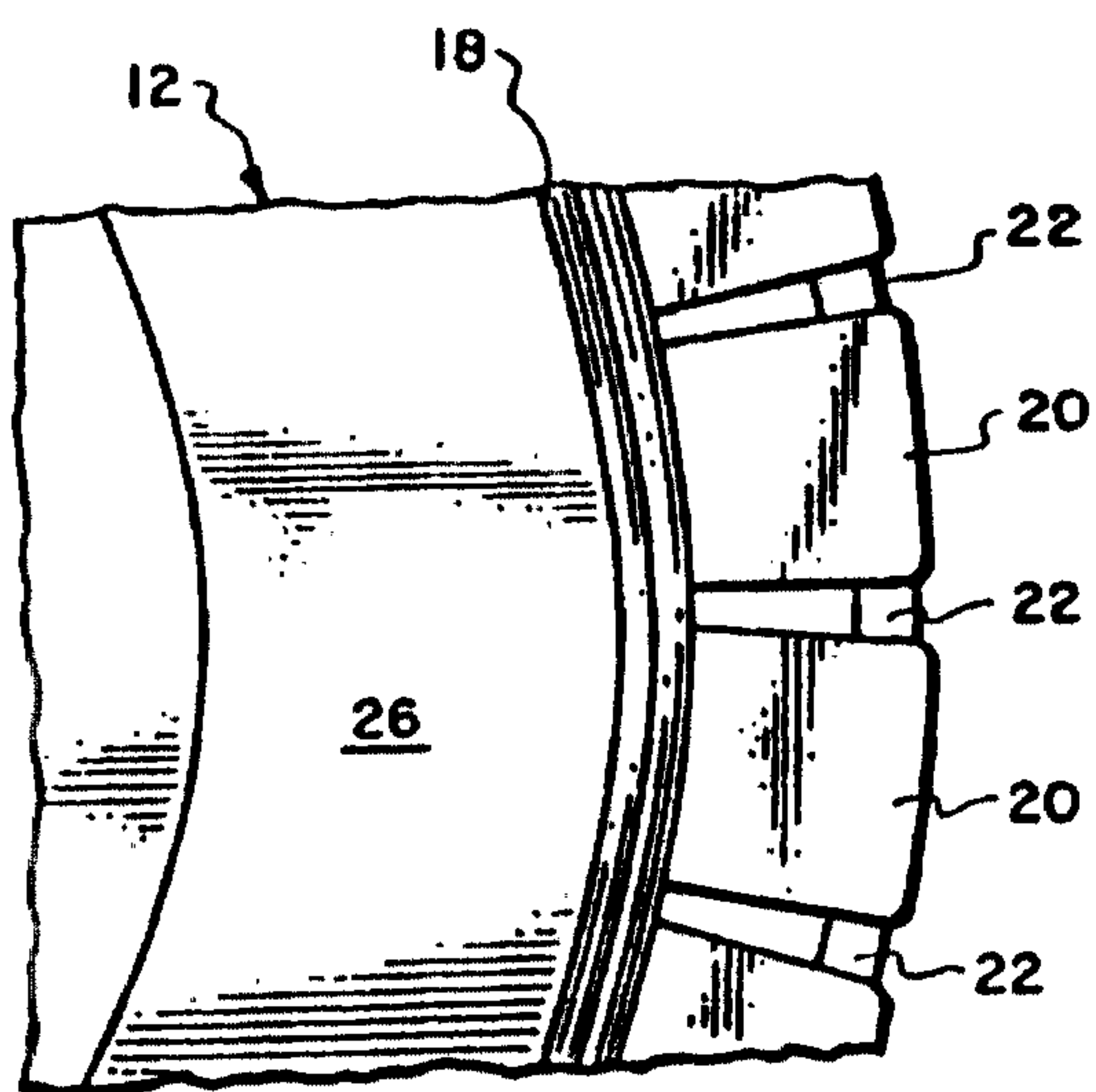
*Fig. 1.*



*Fig. 2.*

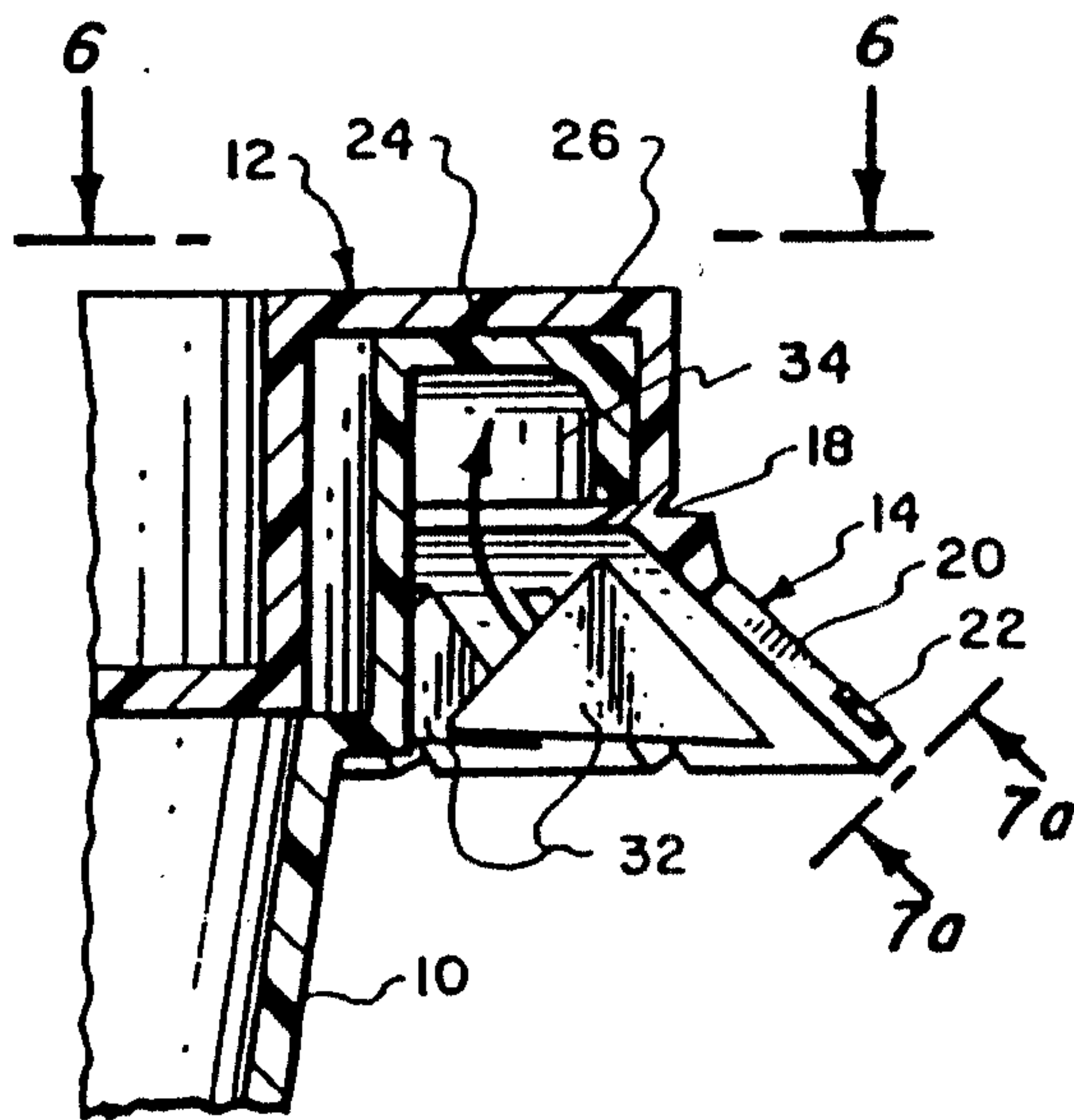


*Fig. 3.*

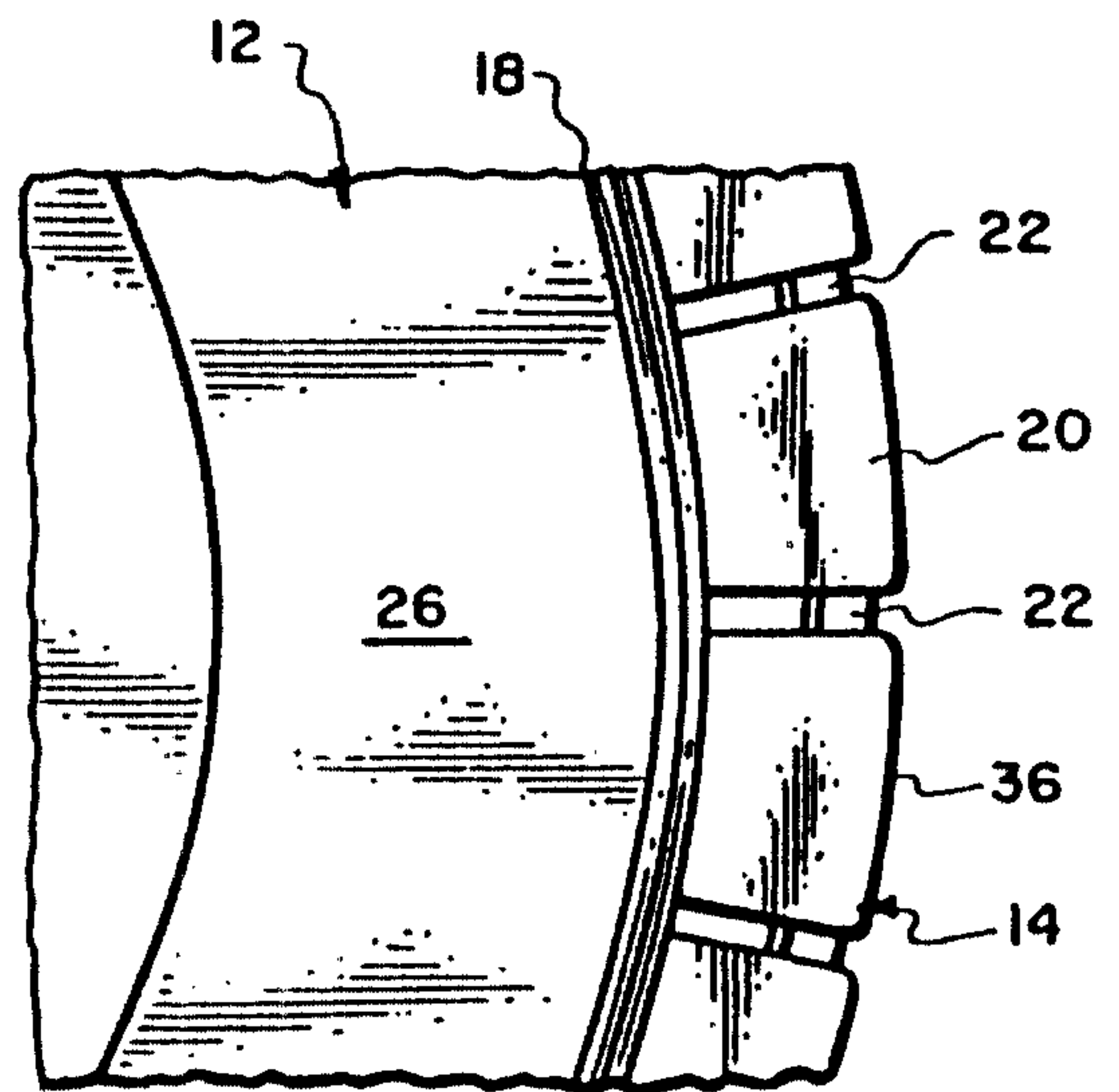


*Fig. 4.*

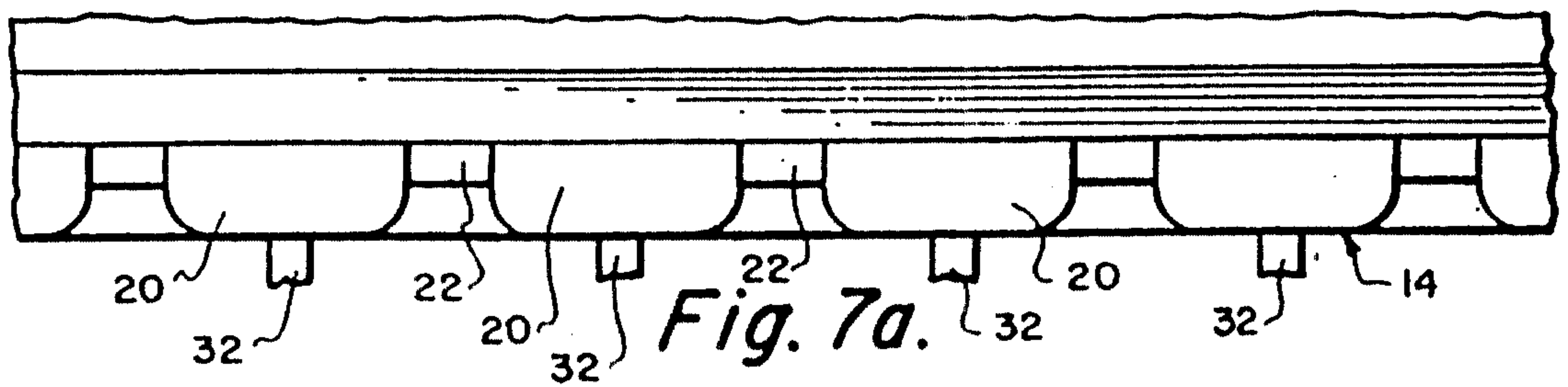
*Diablos & Co. Inc.*  
PATENT AGENTS



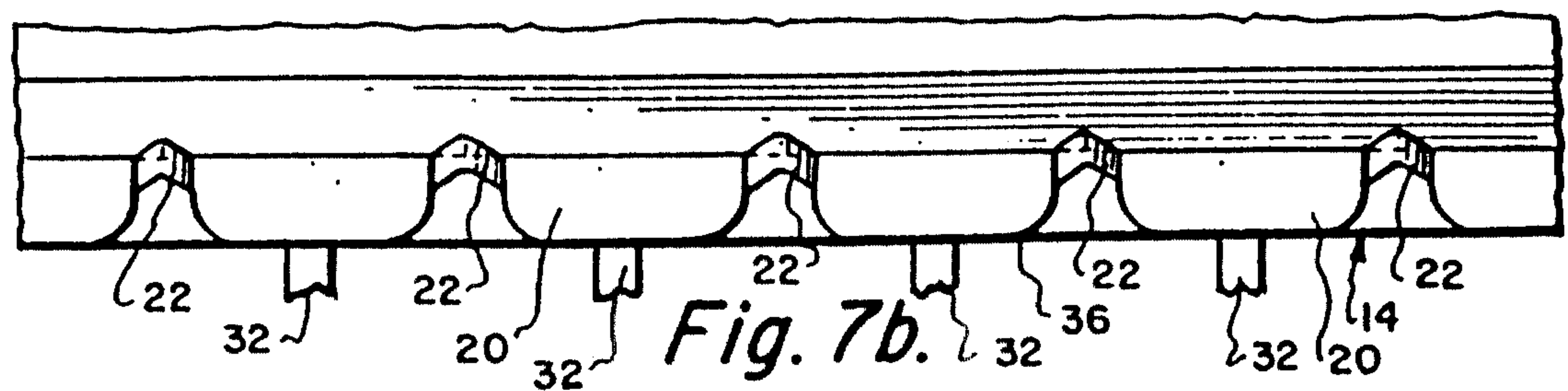
*Fig. 5.*



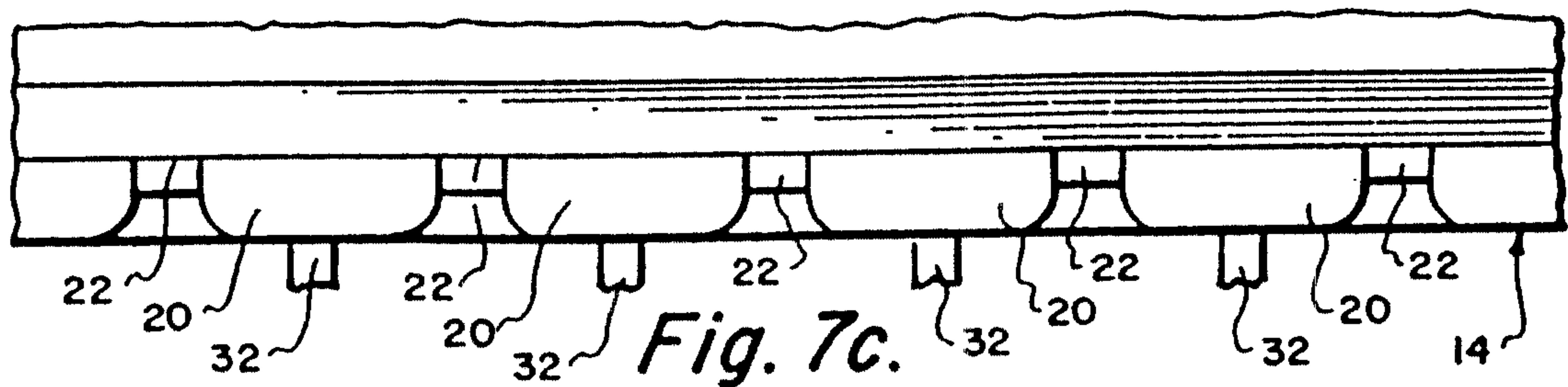
*Fig. 6.*



*Fig. 7a.*



*Fig. 7b.*



*Fig. 7c.*

*Lawrence S. Must*  
PATENT AGENTS



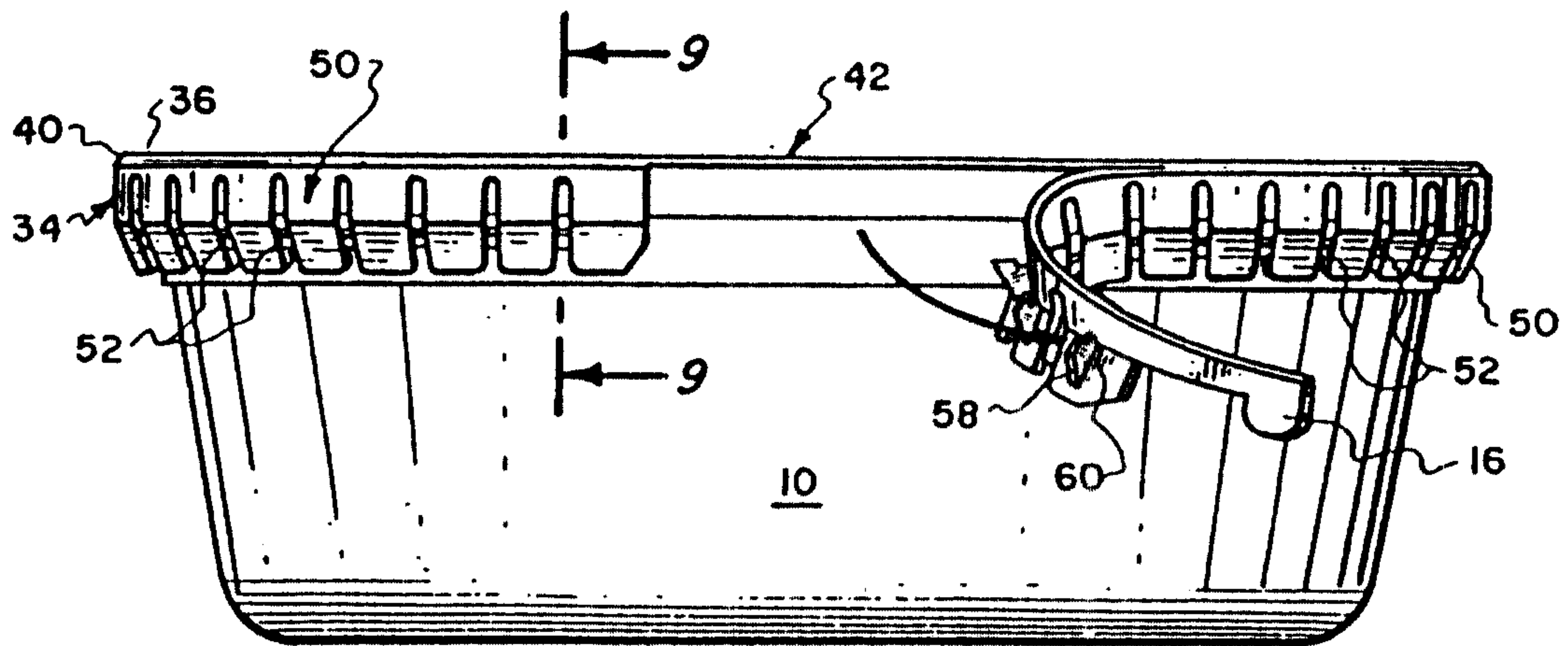


Fig. 8.

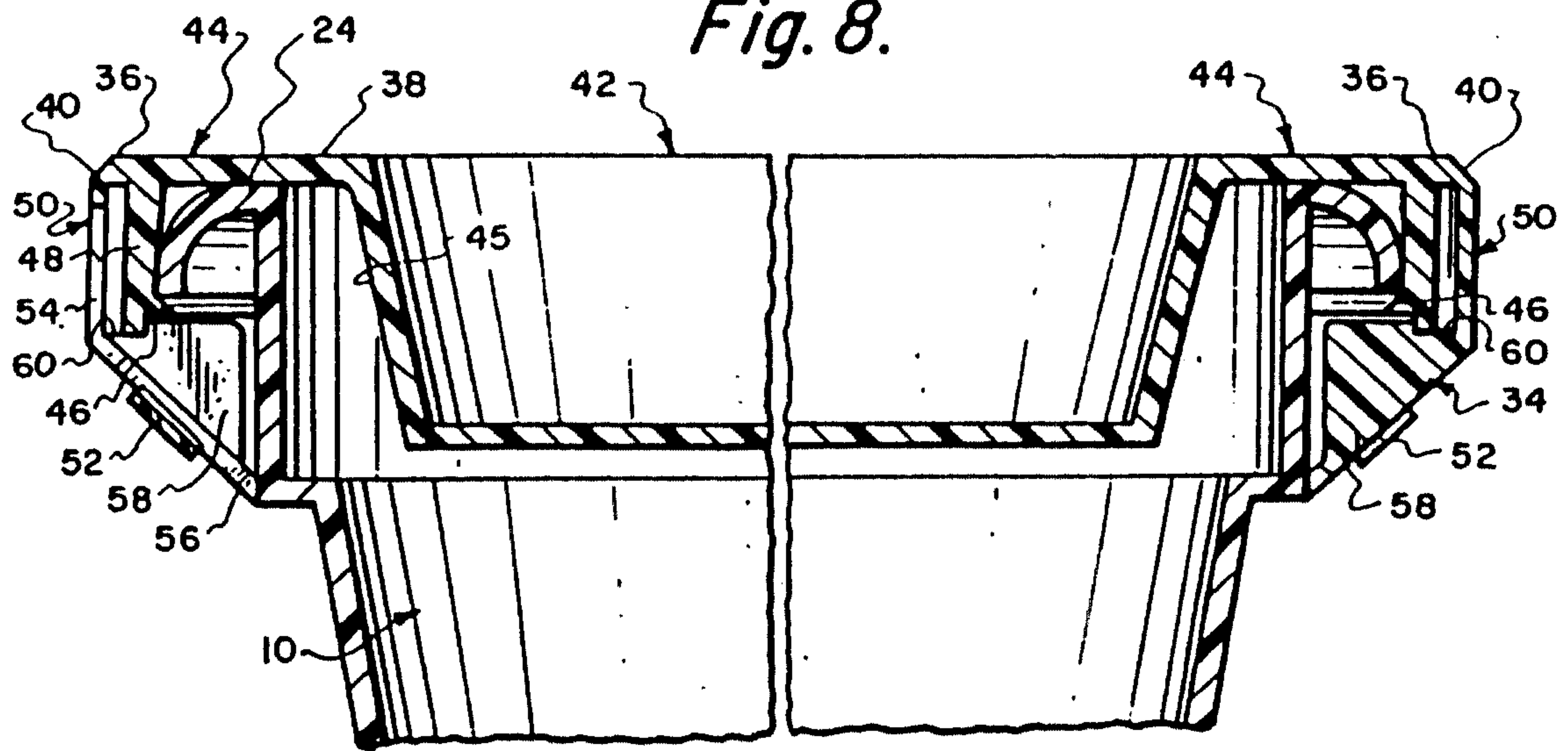


Fig. 9.

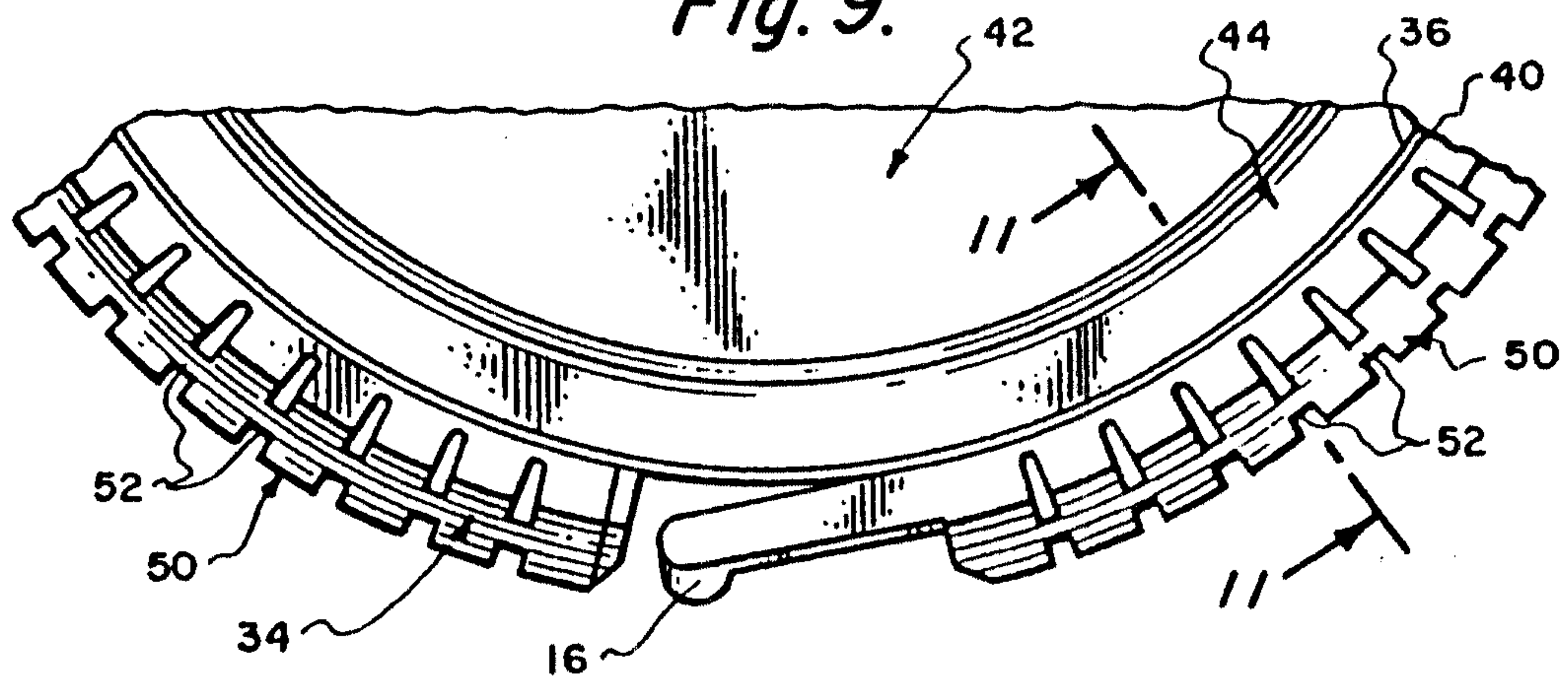
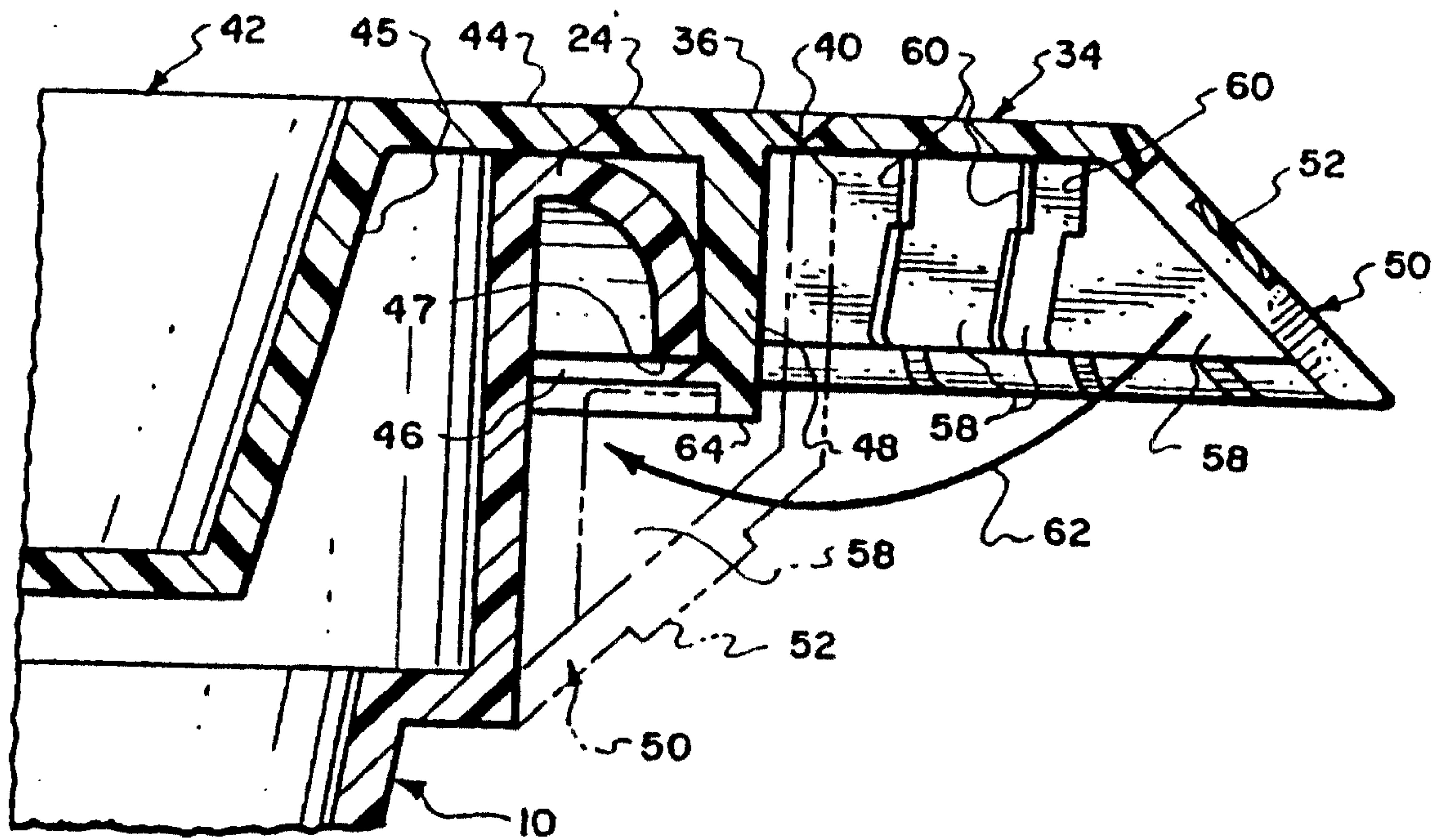
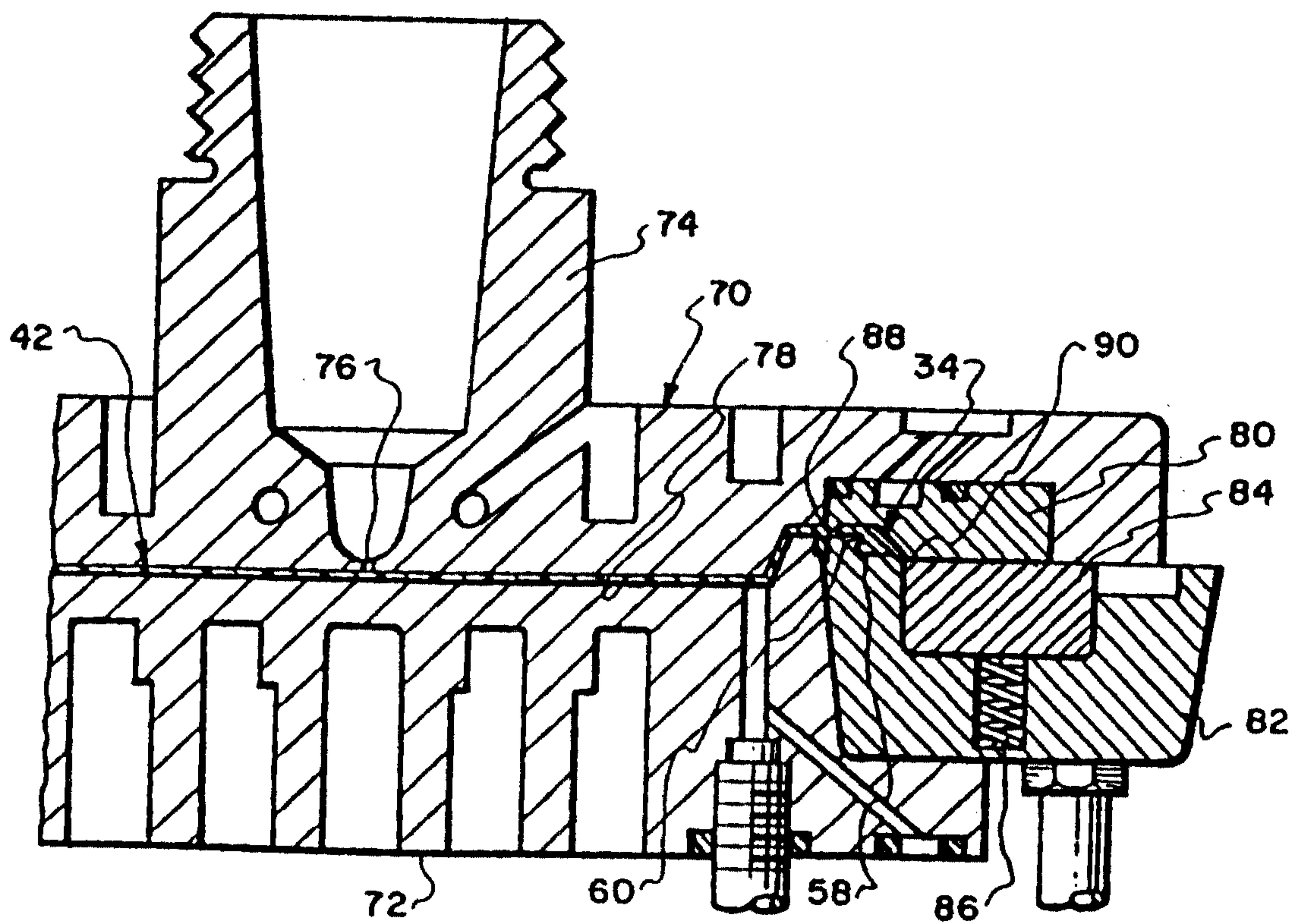


Fig. 10.

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*Fig. 11.*

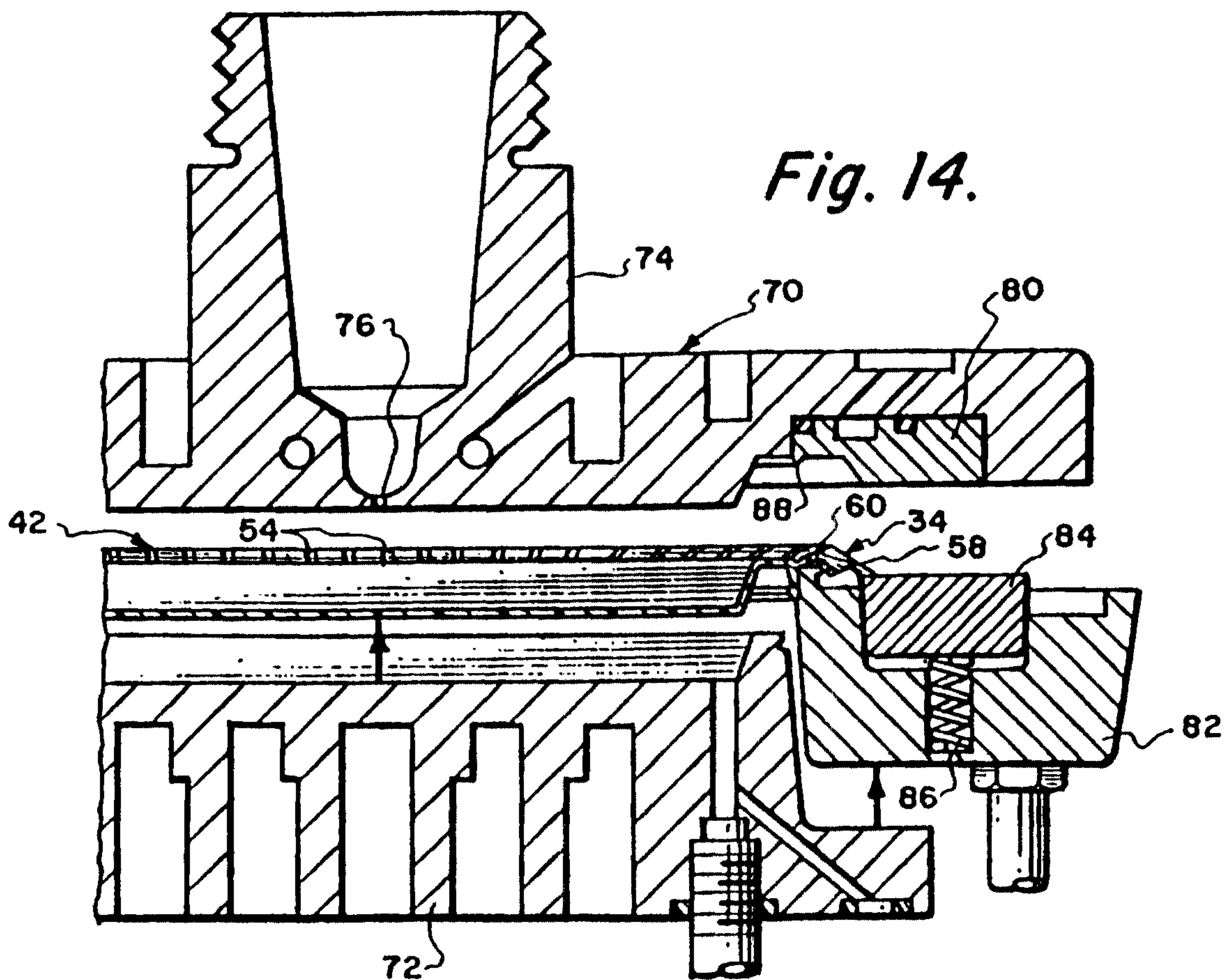
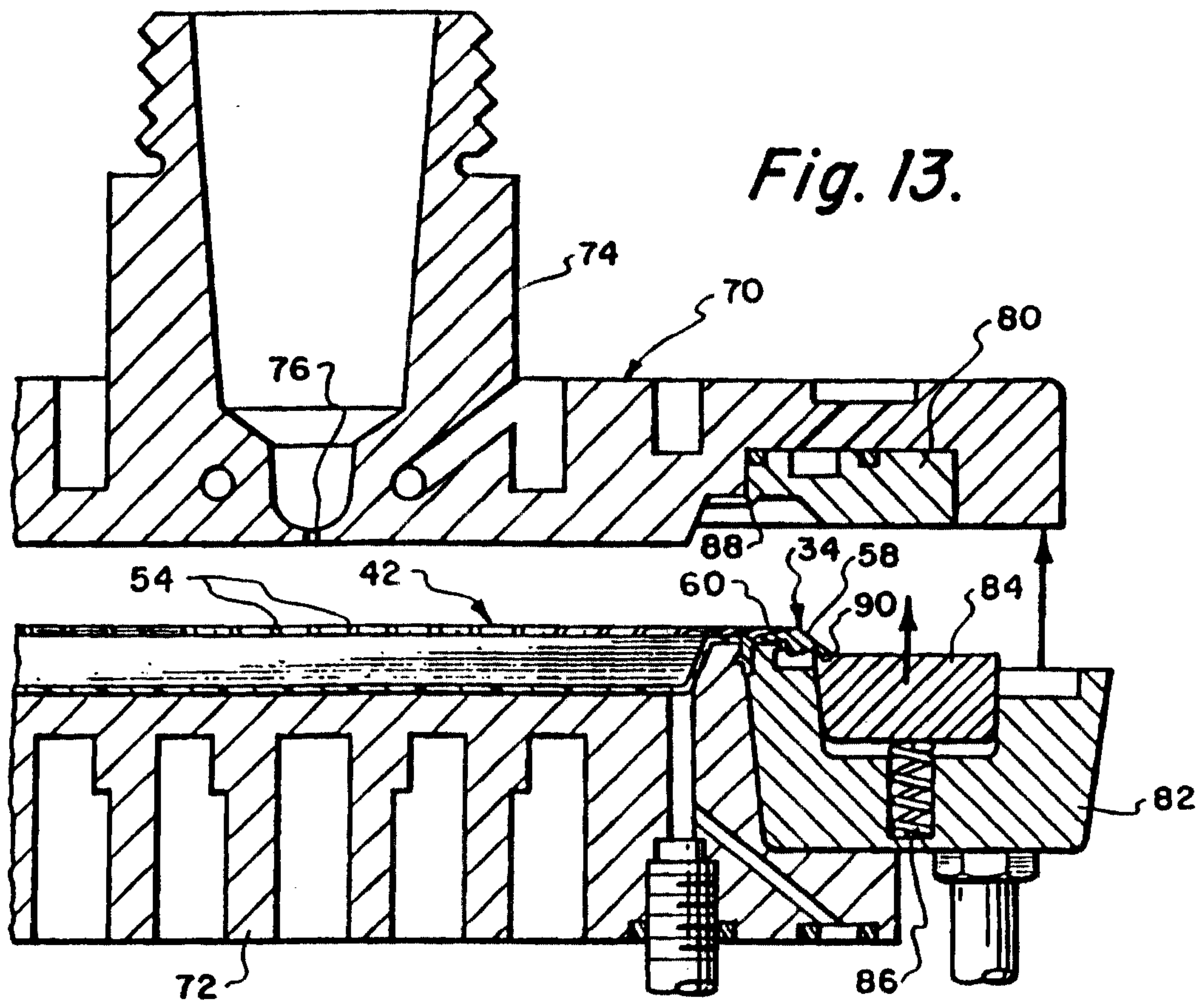


**Fig. 12.**

Discharge Certificate

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