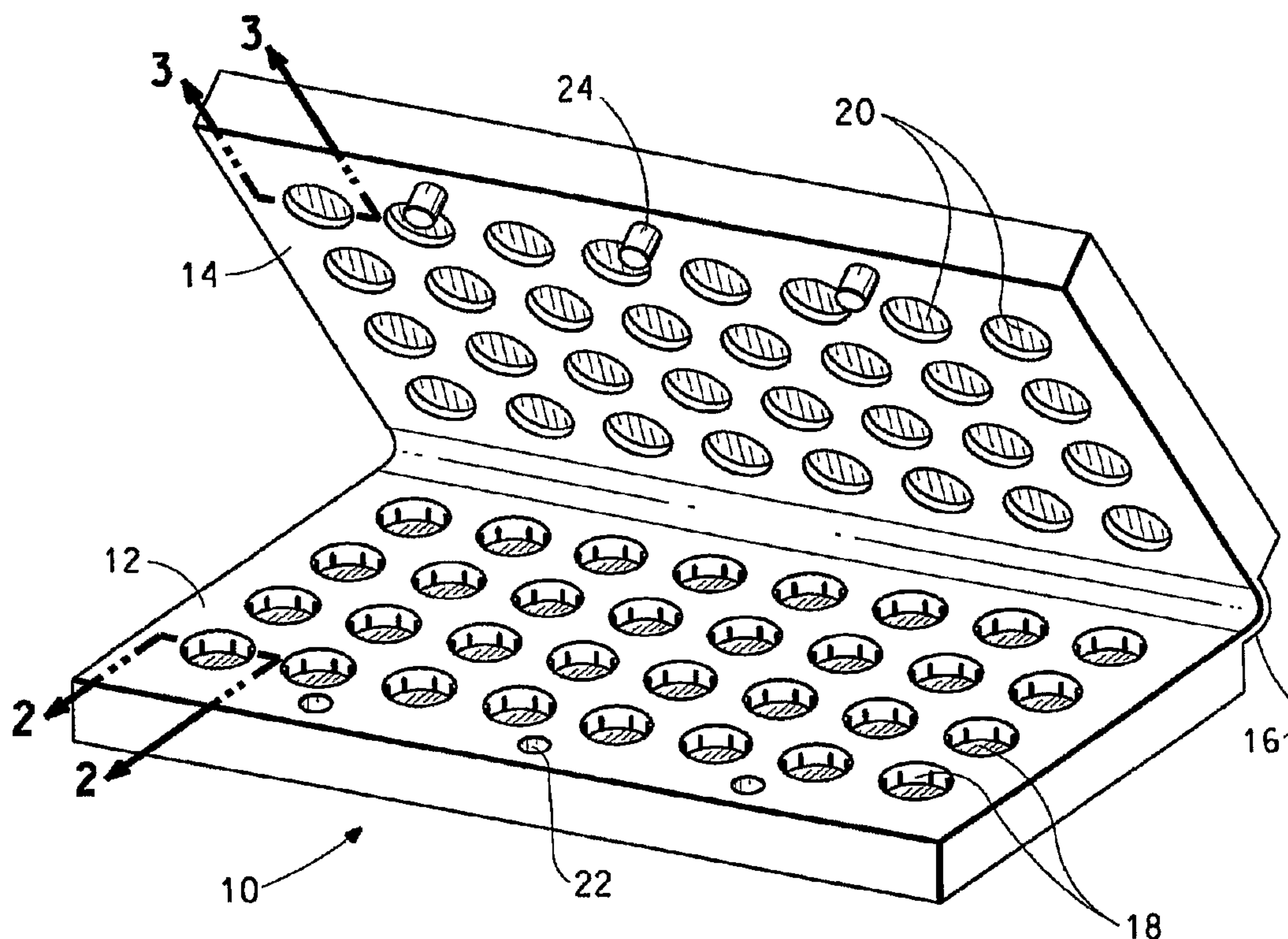




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(54) Title: TAPERED FILAMENT CONTAINER



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This invention provides a multi-compartmentalized container (10) made of a thermoplastic material for packaging bundles of tapered filaments. The container has a bottom receiving section (12) comprising a plurality of wells (18) and a cover (14) containing wells (20) that correspond to the wells (18) in the receiving section. The receiving section wells (18) contain ribs (26) that aid in guiding the filament bundles into the well. The container allows ease of handling filaments during packaging and securely holds the filaments during shipping to reduce filament damage.

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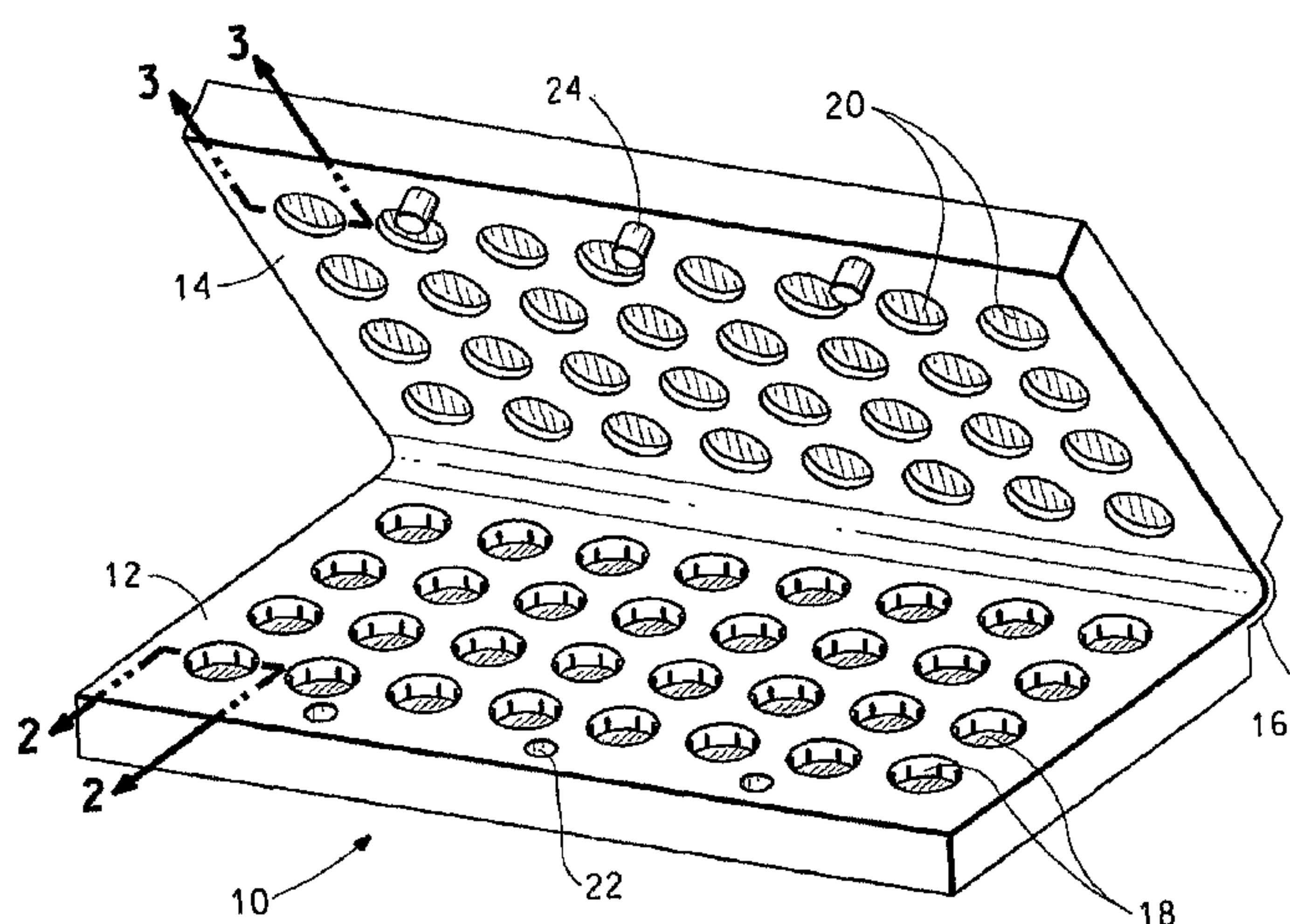
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(54) Title: TAPERED FILAMENT CONTAINER



(57) Abstract: This invention provides a multi-compartmentalized container (10) made of a thermoplastic material for packaging bundles of tapered filaments. The container has a bottom receiving section (12) comprising a plurality of wells (18) and a cover (14) containing wells (20) that correspond to the wells (18) in the receiving section. The receiving section wells (18) contain ribs (26) that aid in guiding the filament bundles into the well. The container allows ease of handling filaments during packaging and securely holds the filaments during shipping to reduce filament damage.

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## **TAPERED FILAMENT CONTAINER**

### **FIELD OF THE INVENTION**

5           The present invention relates to a container for packaging bundles of filaments, and more particularly, to a plastic container for packaging a plurality of bundled tapered filaments.

### **BACKGROUND OF THE INVENTION**

10           Tapered filament applications are primarily toothbrushes, paint brushes and cosmetic brushes. Tapered filaments are especially useful for toothbrushes. The tapered tips are able to reach difficult areas such as recesses between teeth and at the transitional area from gum to teeth. The tapered filaments more effectively remove dental plaque from these  
15           difficult to reach areas than filaments that are not tapered.

          The current practice for packaging tapered filaments is wrapping a bundle of filaments, optionally with a rubber band then, wrapping the bundle with a paper strip, and securing the wrapped bundle with a rubber band. Then the wrapped bundles are packed in a paper pouch. The  
20           paper pouch is packed in to a paper container and the paper containers are stacked in a carton. This means of packaging is poor for tapered filaments. The ends of the tapered filaments are sensitive to very small forces and easily broken or bent. The filament ends are not protected with the current packaging. In addition, the slippery surface of the filament  
25           makes the bundles difficult to handle during packing and unpacking causing increased susceptibility to breaking or damage.

          Thus, it is desirable to have an improved container for packaging tipped filament bundles such that the container securely holds the bundles while providing ease of handling bundles thus decreasing filament  
30           susceptibility to damage or breaking.

### **SUMMARY OF THE INVENTION**

Briefly stated, and in accordance with one aspect of the present invention, there is provided an improved multi-compartmentalized container for holding bundles of filaments comprising a receiving section having a plurality of wells and a cover for the receiving section. The cover may have a plurality of wells with the open end of the wells aligned with the opening of the plurality of the wells in the receiving section to form a receptacle for a filament bundle.

Pursuant to another aspect of the present invention, there is provided an improved container for filament bundles wherein the container is formed by vacuum forming, thermoforming or injection molding.

Pursuant to another aspect of the present invention, there is provided a process for removing tapered filaments bundles from a multi-compartmentalized container for holding bundles of filaments comprising a receiving section having a plurality of wells and a cover for the receiving section. The cover contains a plurality of wells in an array such that when the cover is in place, an open end of each of said plurality of wells in the cover is aligned with an open end of a corresponding well in the receiving section to form a receptacle for holding a filament (e.g. fiber) bundle. The filament bundles fit into the depth of cover wells and the depth of the corresponding receiving section wells when the cover is closed over the receiving section.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

The invention will be more fully understood from the following detailed description, taken in connection with the accompanying drawings, in which:

Figure 1 is a perspective view of a preferred embodiment of the filament container according to the present invention;

Figure 2 is a side view of a receiving well and

Figure 3 is a side view of a cover well.



While the present invention will be described in connection with a preferred embodiment thereof, it will be understood that it is not intended to limit the invention to that embodiment. On the contrary, it is intended to  
5 cover all alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

### **DETAILED DESCRIPTION OF THE INVENTION**

#### **Definitions:**

The following definitions are provided as reference in accordance with how they are used in the context of this specification and the accompanying claims.

15 The term "well" as used herein denotes a compartment or recessed area.

The term "cover well" as used herein denotes a well in the cover.

The term "receiving well" as used herein denotes a well in the receiving section.

20 The term "tipped" as used herein denotes a chemically or mechanically tapered or rounded filament where the diameter of the filament gradually becomes smaller closer to the end of the filament.

The term "array" as used herein denotes a rectangular arrangement in rows and columns.

25 The term "PET" as used herein denotes poly(ethylene terephthalate).

The term "PETG" as used herein denotes poly (1,4-cyclohexylene dimethylene terephthalate-co-isophthalate).

The term "HIPS" as used herein denotes high impact polystyrene.

The term "OPS" as used herein denotes oriented polystyrene.

30 The term "PVC" as used herein denotes polyvinylchloride.

The term "PC" as used herein denotes polycarbonate.

The term "PMMA" as used herein denotes poly (methyl methacrylate).

The term "PP" as used herein denotes polypropylene.

The term "rib" as used herein denotes a long, narrow member  
5 projecting from the surface of a well serving to guide the filament bundles when inserting the filament bundle in to the well.

The term "bundle" as used herein denotes a group of filaments fastened together for convenient handling.

The term "multi-compartmentalized" as used herein denotes  
10 containing at least two separate recessed areas for holding filament bundles.

The term "mm" as used herein denotes millimeters.

A container according to the preferred embodiment of the present invention comprises a multi-compartmentalized container for packaging  
15 bundles of tapered filaments having a bottom receiving section and a cover. The receiving section has a plurality of wells. Typically, the number of wells in the receiving section will depend on the size of the bundles and the number of bundles to be packaged. Typically, the wells in the receiving section are arranged in an array (i.e. a well-regulated and arranged  
20 order).. The cover may or may not contain wells depending on the length of the bundles and the depth of the wells in the receiving section.

In the event that the cover also contains wells, the cover wells are in an array such that, when the cover is in place, the open end of each well in the cover is aligned with the open end of a well in the receiving  
25 section to form a receptacle for a fiber bundle.

The multi-compartmentalized container can be made from a thermoplastic polymer. Preferably the thermoplastic is selected from PET, PETG, HIPS, OPS, PVC, PC, PMMA and PP. One particular type of HIPS that can be used is K-resin<sup>®</sup>, a clear HIPS produced by Phillips 66. The  
30 multi-compartmentalized container can be formed in a variety of ways including vacuum forming, thermoforming, or injection molding.



Reference is now made to the drawings for a detailed description of the present invention.

Reference is now made to Figure 1 which shows a perspective view of a preferred embodiment of the filament container **10** according to the present invention. The embodiment shown in Figure 1 generally defines a rectangular container having a bottom receiving section **12** containing a plurality of filament bundle receiving wells **18** and a top cover **14** containing a plurality of wells **20**. A more detailed drawing of the bundle receiving well **18** is in Figure 2. The cover and receiving section are optionally connected by a hinge **16**. The wells in the receiving section **12** have a depth of at least 66% of the total filament length. When the wells **18** in the receiving section **12** have a depth of 100% of the total filament length, the cover is a flat sheet. The wells in the receiving section **12** have gradually tapered ribs **26**, as shown in Figure 2, that guide the bundled filaments into the receiving well **18**. The ribs **26** begin and are widest at the base **28** of the well **18** in the receiving section **12**. The ribs **26** gradually taper as they extend axially up the sides of the receiving well **18** not to exceed 50% of the total receiving well **18** height. The ribs **26** aid in receiving the filament bundle to be stored therein. The well diameter is sufficient to allow the bundles to fit securely into the receiving well **18**. The close fit of the well diameters keeps the bundles securely in place thus, decreasing filament susceptibility to damage or breaking. The well diameter is generally at least 30 mm in order to accommodate common filament bundle sizes.

Figure 3 shows a side view of a well **20** embodiment in the cover **14**. The depth of the wells **20** in the cover **14** is from 0 to 33% of the total filament length. If the depth of the wells **20** on the cover **14** equals 0 then the cover is a flat sheet, which can be replaced with paperboard. One advantage to having cover wells **20** with a depth greater than 0 is easy removal of the tapered filament bundles. The bundles can be difficult to remove from the container from the tipped ends side of the filaments. The

tipped ends are susceptible to breaking and the slippery nature of the ends makes the bundles difficult to grasp. The new packaging overcomes this problem by placing the larger untipped ends of the filament bundle in the receiving wells **18**. When the bundles are to be unpacked, the  
5 container is turned upside down such that the receiving section **12** is on top and the cover **14** is on the bottom. The receiving wells end is lifted to open the container **10** exposing the untipped ends. Then, the bundles can be easily removed from the cover wells **20** of the container by grasping the untipped ends protruding therefrom.

10 Additionally, a cover **14** containing wells **20** is also an advantage for filaments that have both ends tipped since the depth of the cover wells **20** is up to 33% of the total filament length, at least 66% of the filament bundle length is protruding from the cover wells **20** when the container is inverted. As such, the bundles are easily grasped even when both filament  
15 ends are tipped.

The cover **14** may be fastened to the receiving section **12** using any suitable device known in the art such as hinges, studs, and fasteners. Preferably, a cooperating press-stud-fastening device is used. The cover **14** then comprises a convex stud **24** projecting outward from the  
20 underside of the cover **14**. The receiving section **12** comprises a concave stud **22** projecting inward to the interior of the receiving section **12** and is arranged to engage with the stud **24** on the cover **14**. The press-stud fastening device can be located along the free edges of the container. The container can have 1-4 press-stud-fastening devices on each free side  
25 depending on the length of the free side.

It is therefore, apparent that there has been provided in accordance with the present invention, a container for protecting filament bundles that fully satisfies the aims and advantages hereinbefore set forth. While this invention has been described in conjunction with a specific embodiment  
30 thereof, it is evident that many alternatives, modifications, and variations will be apparent to those skilled in the art. Accordingly, it is intended to



**embrace all such alternatives, modifications and variations that fall within the spirit and broad scope of the appended claims.**

**WHAT IS CLAIMED IS:**

1. A multi-compartmentalized container for holding bundles of filaments  
5 comprising:
  - a. a receiving section having a plurality of wells and
  - b. a cover for said receiving section.
2. The multi-compartmentalized container according to claim 1, further  
10 comprising a hinge connecting said receiving section and said cover.
3. The multi-compartmentalized container according to claim 1, wherein  
said cover contains a plurality of wells in an array such that, when the  
cover is in place, an open end of each of said plurality of wells in the cover  
15 is aligned with an open end of a corresponding well in the receiving  
section to form a receptacle for holding a filament bundle, said wells of the  
cover having a depth and said wells of the receiving section having a  
depth.
- 20 4. The multi-compartmentalized container according to claim 1, wherein  
the depth of said wells in said receiving section is at least 66% of a total  
filament length contained in the filament bundle.
5. The multi-compartmentalized container according to claim 3 wherein the  
25 depth of said wells in said cover is 0 to 33% of a total filament length  
contained in the filament bundle.
6. The multi-compartmentalized container according to claim 1 wherein  
said wells in said receiving section and in said cover have a diameter of at  
30 least 30mm.



7. The multi-compartmentalized container according to claim 1 wherein the filament bundle comprises a plurality of filaments, said filaments being tipped.
- 5 8. The multi-compartmentalized container according to claim 1, wherein said container is formed from a thermoplastic material.
9. The multi-compartmentalized container according to claim 8, wherein said thermoplastic material is selected from the group consisting of PET, PETG, HIPS, OPS, PVC, PC, PMMA and PP.
- 10 10. The multi-compartmentalized container according to claim 8, wherein said container is vacuum formed, thermoformed or injection molded.
- 15 11. The multi-compartmentalized container according to claim 1, wherein said wells of said receiving section contain ribs that begin at the base of said wells and extend axially up the sides of said wells.
12. The multi-compartmentalized container according to claim 11, wherein said axially extending ribs are tapered having the widest part of said rib being at the base of said well.
- 20 13. The multi-compartmentalized container according to claim 3, wherein said container comprises a cooperating press-stud-fastening device in order to secure said cover to said receiving section.
- 25 14. A process for removing tapered filament bundles from the container of claim 3, comprising the steps of:
- a. inverting said container such that said receiving section is on top and said cover is on the bottom;
- 30

- b. exposing the filament bundles by opening or removing said cover; and
- c. grasping the bundles by the ends protruding from the wells of said cover.

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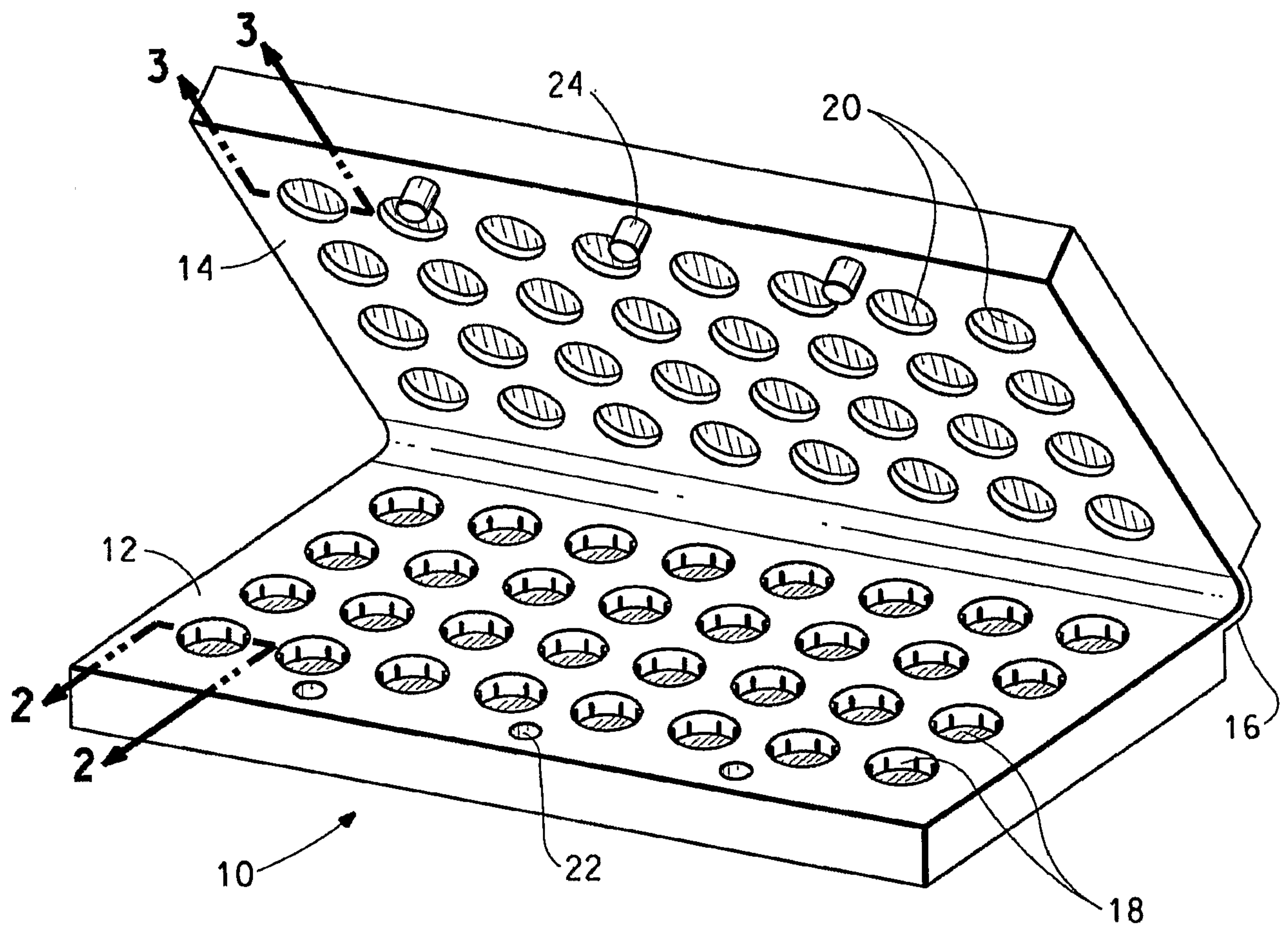


FIG. 1

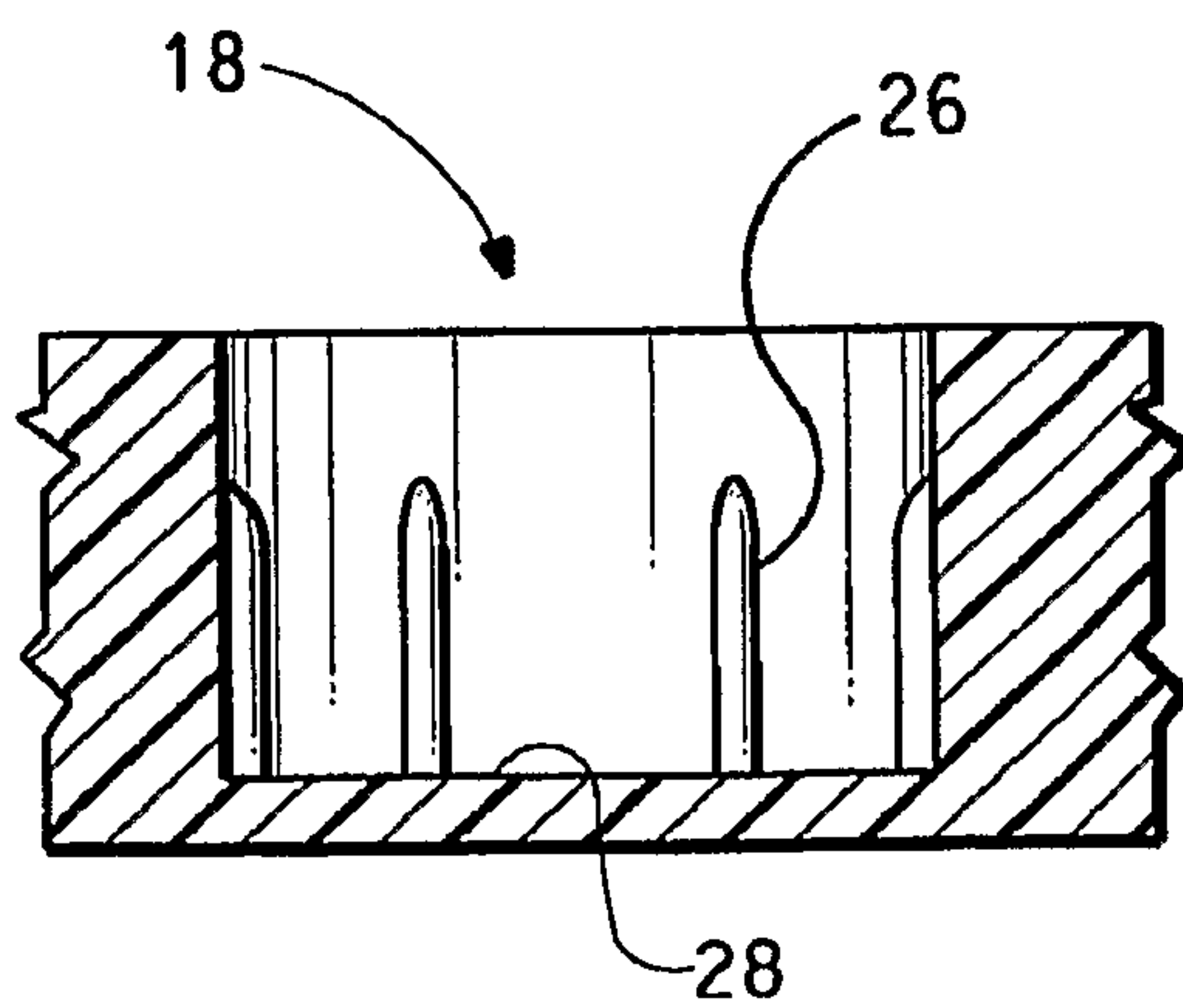


FIG. 2

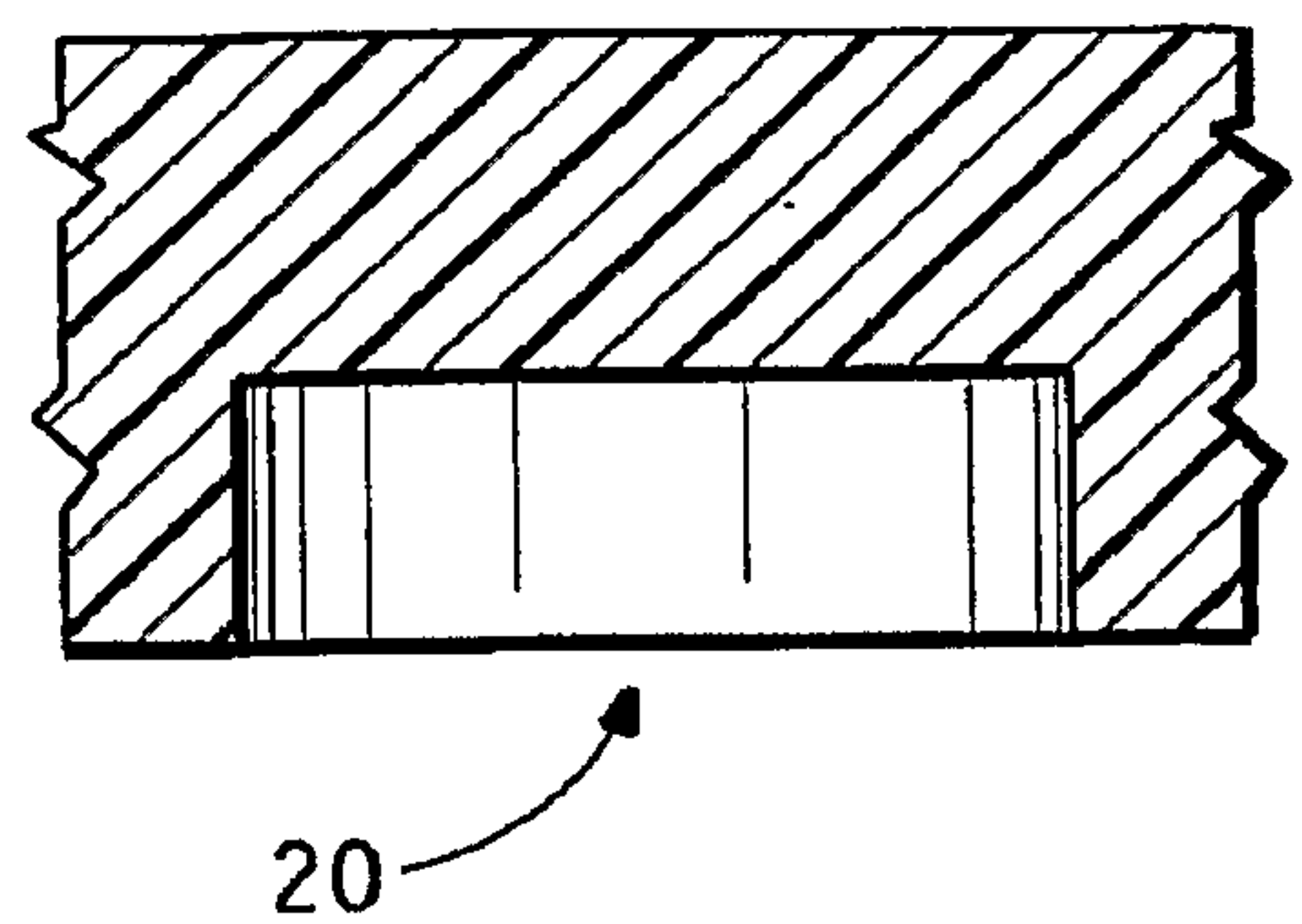


FIG. 3

