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INSERT WITH SEAL AND METHOD OF USING SAME**Technical Field**

[0001] The present invention generally relates to melt compression molded parts and in particular, to a sealed threaded insert for melt compression molded parts.

Background of the Invention

[0002] The melt compression molding (MCM) process is a preferred manufacturing method for plastic parts that include reinforcing fibers, such as, long strands of glass fiber. However, it can be difficult to mold in holes, or apertures, into the plastic parts produced by the MCM process. For instance, the holes cause a break in the flow of material. As a result, there may be difficulty in filling out the plastic part with material. On the other hand, there may be difficulty in preventing the material from flowing into the hole during the MCM process. In those instances, the material may partially or completely fill the hole, rendering it non-functional.

[0003] Also, when using materials that contain strands of glass fibers, the strands of glass fibers tend to clump around the circumference of the holes. The creation of clumping, or knit-lines, of the strands of glass fiber can result in an initiation point for failure in the plastic part.

Summary of the Invention

[0004] An insert for reserving space in a part, said insert comprising a sleeve defining a passage; and a seal covering an end of the passage.

Brief Description of the Drawings

[0005] Figure 1 is a cutaway view of a melt compression mold in an open position in accordance with an exemplary embodiment of the invention.

[0006] Figure 2 is a cutaway view of the melt compression mold in a closed position in accordance with an exemplary embodiment of the invention.

[0007] Figure 3 is a cross-sectional view of a threaded insert with a seal in accordance with an exemplary embodiment of the invention.

[0008] Figure 4 is a cross-sectional view of an alternate embodiment of a threaded insert with an integrated seal in accordance with an exemplary embodiment of the invention.

[0009] Figure 5 is a cross-sectional view of the threaded insert with the seal in a bottom die of the melt compression mold tool in accordance with an exemplary embodiment of the invention.

[00010] Figure 6 is a cross-sectional view of a bolt engaging the threaded insert with the seal molded into the plastic part in accordance with an exemplary embodiment of the invention.

Detailed Description

[00011] Referring to Figures 1 and 2, a mold tool 10, such as, for example a melt compression mold tool, is illustrated in accordance with an exemplary embodiment of the invention. The melt compression mold tool 10 is used to manufacture plastic parts. Figure 1 illustrates the melt compression mold tool 10 in an open position and Figure 2 illustrates the melt compression mold tool 10 in a closed position. The melt compression mold tool 10 includes a top die 12 and a bottom die 14. The bottom die 14 includes heated platens 16 that provide heat to the bottom die 14.

[00012] Material 18 in the form of a billet, pellet, powder, pre-formed blank, or the like, is placed in the bottom die 14. It can be appreciated that the material 18 may be formed from polymers, such as, for example, polyethylene, polypropylene, polystyrene, polyvinyl chloride, or the like. The polymers may be any type of polymer, including, for instance, thermoplastic or thermoset polymers. Furthermore, material 18 may be a composite and therefore, include reinforcements, such as, for example, strands of glass fiber. The heat provided by the heated platens 16 should be sufficient to substantially melt the material 16.

[00013] During manufacturing, the material 18 is placed in the bottom die 16 of the melt compression mold tool 10. The top die 12 is then closed over the bottom die 14. The heat from the bottom die 14 and the pressure from the top die 12 melts the material 18. As the material 18 melts, the pressure from the top die 12 causes the material 18 to spread and fill the bottom die 14. The end result of a cycle within the melt compression molding process is that the material 18 forms a plastic part, *P*. (Figure 5). It can be appreciated that the material 18 may be preheated and placed into the melt compression mold tool 10 in a

softened, or melted, state. As a result, the melt compression mold tool 10 does not require the use of the heated platens 16, however, the process of making a plastic part remains substantially the same.

[00014] Referring to Figures 3 and 4, one or more inserts 20 may be used in conjunction with the melt compression mold tool 10 to provide holes, openings, apertures, or the like, within the plastic part, *P*. In the exemplary embodiment, inserts 20 are threaded inserts. The threaded insert 20 includes a cavity 22 of a generally cylindrical shape and is defined by a top cavity 22a and a threaded, bottom cavity 22b. The top cavity 22a has a greater surface area than the bottom cavity 22b. At the point where the cavity 22 transitions from the top cavity 22a to the bottom cavity 22b, a ledge 22c is formed around the circumference of the cavity 22. It should be noted that the insert 20 may be of any shape, for instance, insert 20 may be hexagonal, octagonal, or the like.

[00015] In an exemplary embodiment of the invention, as illustrated in Figure 3, the threaded insert 20 is covered by a seal 26, such as a cap, a membrane, or the like. The seal 26 fits snugly over a top portion 28a of the threaded insert 20. Seal 26 includes a circumferential lip 30 that surrounds the top portion 28a of the threaded insert 20.

[00016] In an alternative embodiment of the invention, as illustrated in Figure 4, a seal 26' may be integrally formed with the threaded insert 20. Thus, the threaded insert 20 and the seal 26' form one continuous part. Seal 26' is similar to seal 26, however, seal 26' does not have a circumferential lip 30 due to the integration of seal 26' to the threaded insert 20. It should be noted that while seal 26 is referenced below, seal 26' may be interchanged with seal 26.

[00017] Figure 5 illustrates the threaded insert 20 and the seal 26 molded into the plastic part, *P*. The threaded insert 20 is placed over a locating device 32, such as, for example, a pin, stub, or the like, located along either the top die 12 or the bottom die 14. In the exemplary embodiment, the threaded insert 20 is placed over the locating device 32 that is welded, or otherwise secured, to the bottom die 14. The locating device 32 is in a location that coincides with the location of the hole in the plastic part, *P*. It should be noted that the locating device 32 easily engages the threaded insert 20, while maintaining an appropriate tolerance for the location of the hole within the plastic part, *P*. Thus, the locating device 32 cooperates in shape to the shape of the cavity 22 of the threaded insert 20.

[00018] When the threaded insert 20 is properly placed within the melt compression mold tool 10, a bottom portion 28b of the threaded insert 20 is flush with the top surface of the bottom die 14. As a result, when material 18 fills the bottom die 14, the material 18 cannot flow past the bottom portion 28b of the threaded insert 20. Likewise, if the locating device is welded to the top die 12, the bottom portion 28b of the threaded insert 20 would be flush with the top surface of the top die 12, such that material 18 cannot flow past the bottom portion 28b of the threaded insert 20.

[00019] When the material 18 softens and spreads to fill the bottom die 14, the seal 26 and the circumferential lip 30 prevent material 18 from flowing into the threaded insert 20. Instead, the material 18 surrounds the threaded insert 20 and covers the seal 26. As a result, there is no significant weakness in the plastic part, *P*, surrounding the hole formed by the threaded insert 20. If the material includes reinforcements, such as strands of glass fiber, the strands of glass fiber do not clump, or create “knit-lines”, as in conventional methods using MCM processes.

[00020] The plastic part, *P*, includes a molded-in locating feature 34, to mark the location of the threaded insert 20. In the illustrated embodiment, the molded-in locating feature 34 is a small triangular-shaped indent and marks the central axis, *A*, of the threaded insert 20. However, it can be appreciated that the molded-in locating feature 34 may be any number of features, and may be in any number of locations, so long as the molded-in feature 34 marks the location of the threaded insert 20. For instance, the molded-in locating feature 34 may be a groove around the inner or outer circumference of the threaded insert 20. The molded-in locating feature 34 may be created by the top or bottom die 12, 14 depending upon whichever die contains the locating pins 32.

[00021] Figure 6 illustrates a bolt, *B*, being fastened into the threaded insert 20. In the exemplary embodiment, the molded-in locating feature 34 is shaped to correspond to the tip of the bolt, *B*, and thus, help center the bolt, *B*, within the threaded insert 20. The seal 26 of the threaded insert 20 is easily pierced by the bolt, *B*. Accordingly, it should be noted that seal 26 may be of any material and any width, so long as the seal 26 can withstand the weight of material 18 and be pierced by bolt, *B*. As the bolt, *B*, is fastened into the threaded insert 20, the material 18 displaced by the bolt, *B*, fills any gap formed between the bolt, *B*, and the threaded insert 20. The ledge 22c of the threaded insert 20

prevents the material 18 from filling the entire cavity 22 of the threaded insert 20 once the bolt, *B*, is fastened past the ledge 22c.

[00022] It can be appreciated that the threaded insert 20 may be of any particular height, so long as the threaded insert 20 is shorter than the thickness of the plastic part, *P*. This concept is illustrated in Figure 6, where the threaded insert 20 has a height, *H*, and the plastic part, *P*, has a thickness, *T*.

[00023] The threaded insert 20 and bolt, *B*, are used to secure an external apparatus (not shown) to the plastic part, *P*. For example, bolt, *B*, may be used to secure a speaker (not shown) to a plastic door trim panel (not shown). It should be noted that the present invention may also be practiced with an insert 20 that is not threaded. For instance, insert 20 may have one cavity 22 with a smooth surface area and a rivet (not shown) may be in exchange for the bolt, *B*.

[00024] The embodiments disclosed herein have been discussed for the purpose of familiarizing the reader with novel aspects of the invention. Although preferred embodiments of the invention have been shown and described, many changes, modifications and substitutions may be made by one having ordinary skill in the art without necessarily departing from the spirit and scope of the invention as described in the following claims.

Claims

1. An insert for reserving space in a part, said insert comprising:
a sleeve defining a passage; and
a seal covering an end of the passage.
2. An insert according to claim 1, wherein the passage has a length and a perimeter, and further wherein the perimeter of the passage varies along its length.
3. An insert according to claim 1, wherein the seal is frangible.
4. An insert according to claim 1, wherein the passage includes a first portion defining a first passage portion and a second portion defining a second passage portion.
5. An insert according to claim 4, further including a ledge between the first and second passage portions.
6. An insert according to claim 1, wherein the seal is integrally formed with the end of the passage of the sleeve.
7. An insert according to claim 1, wherein the seal includes a lip.
8. An insert according to claim 1, wherein the passage includes an inner surface for engaging a fastener.
9. An insert according to claim 7, wherein at least a portion of the inner surface is threaded.
10. An insert according to claim 4, wherein the first passage portion has a greater surface area than the second passage portion.

11. An insert according to claim 1, wherein the seal prevents external material from entering the passage through the end covered by the seal.
12. An insert according to claim 1, wherein the passage has a length and a circumference.
13. An insert according to claim 12, wherein the circumference of the passage varies along the length.
14. An insert according to claim 1, wherein the seal is a cap.
15. An insert according to claim 1, wherein the insert is cylindrical, hexagonal, or octagonal.
16. An insert according to claim 1, wherein the passage is polygonal.
17. An assembly comprising:
 - a part made of material;
 - an insert including a sleeve, the sleeve defining a passage therein; and
 - a seal covering an end of the insert for sealing the end and the passage, wherein the insert is molded into a portion of the part and material covers the seal.
18. An assembly according to claim 17, wherein the passage includes an inner surface configured to engage a fastener.
19. An assembly according to claim 18, wherein the inner surface includes a portion that is threaded.
20. An assembly according to claim 17, wherein the assembly includes a locating feature for determining the position of the insert.

21. An assembly according to claim 20, wherein the locating feature is positioned above a portion of the seal.
22. An assembly according to claim 20, wherein the locating feature is provided in the part.
23. An assembly according to claim 22, wherein the locating feature is a notch formed in the material.
24. An assembly according to claim 17, including a fastener adapted for receipt in at least a portion of the passage.
25. An assembly according to claim 17, wherein the seal is integrally formed with said insert.
26. An assembly according to claim 17, wherein the seal is adapted to be pierced.
27. An assembly according to claim 17, wherein the passage defines a first passage portion for receiving material when a fastener pierces the seal.
28. An assembly according to claim 27, wherein the passage further defines a second passage portion for receiving at least a portion of a fastener when introduced into a portion of the second passage portion.
29. A method for making an assembly, comprising:
 - providing an insert having a sleeve defining a passage, and a seal for covering an end of the passage;
 - placing the insert over at least a portion of a locating device; and
 - introducing material about the insert such that the seal is covered by the material and the material is substantially prevented from entering the passage.

30. A method for making an assembly according to claim 29, wherein the material is introduced into a mold.
31. A method for making an assembly according to claim 29, wherein the locating device and the insert are positioned such that a portion of the insert is substantially flush with a surface of a die.
32. A method according to claim 29, wherein the passage includes an inner surface for engaging a fastener.
33. A method according to claim 29, further comprising:
providing a locating feature in the material, wherein the locating feature is configured provide a indicate a position of the insert within the material.
34. A method according to claim 33, wherein said step for providing a locating feature further comprises forming the locating feature by molding the locating feature into the part.
35. A method according to claim 33, wherein said locating feature is provided over a portion of the seal.
36. A method according to claim 29, further comprising:
providing a fastener;
providing a portion of the passage to include an inner surface for engaging the fastener; and
piercing the seal and inserting the fastener such that a portion of the fastener engages at least a portion of the inner surface.

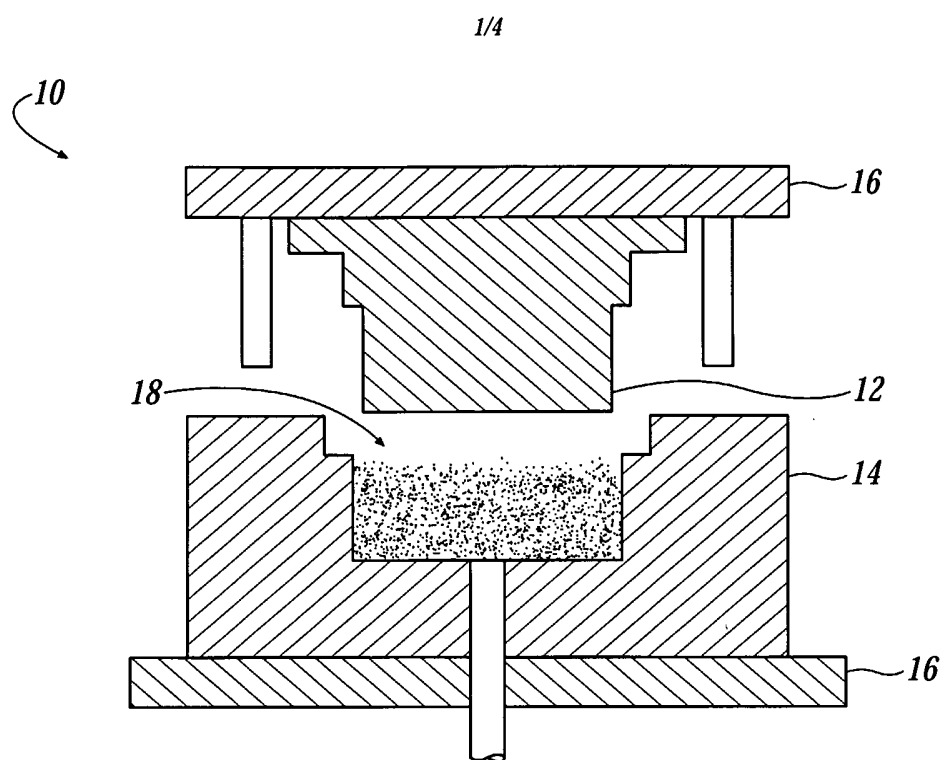


FIG. 1

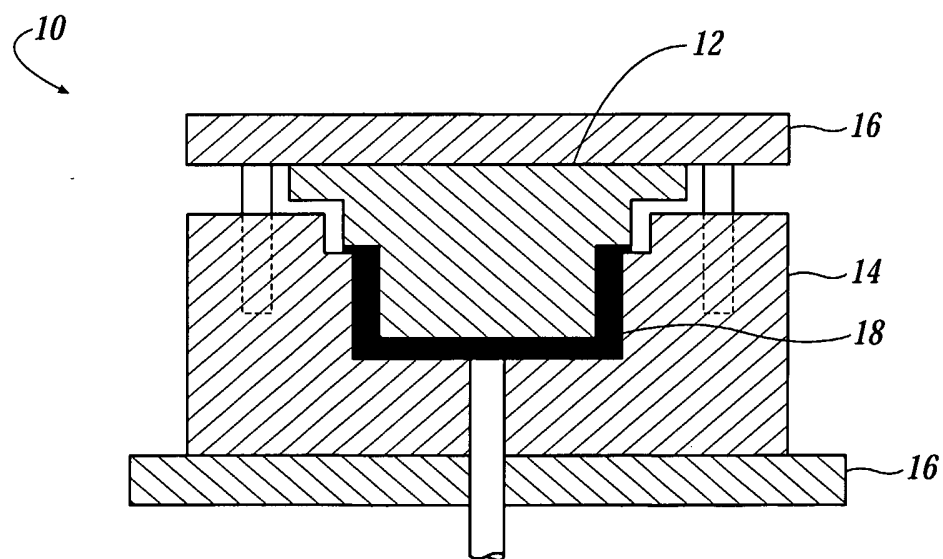


FIG. 2

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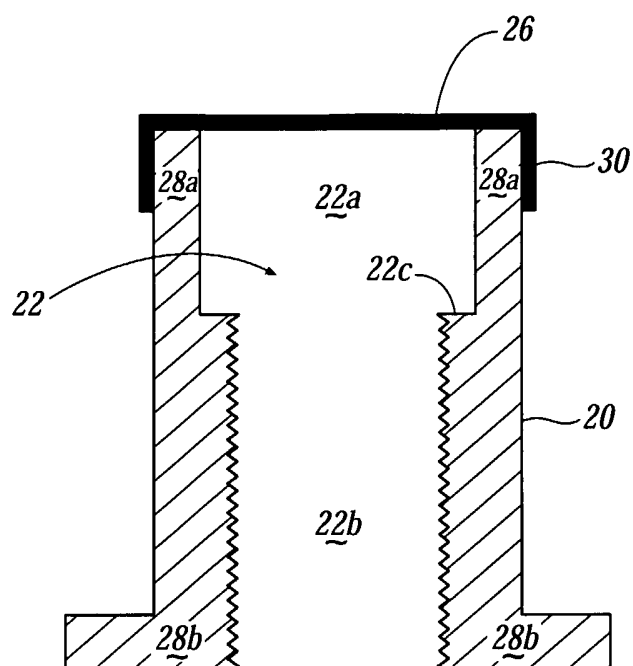


FIG. 3

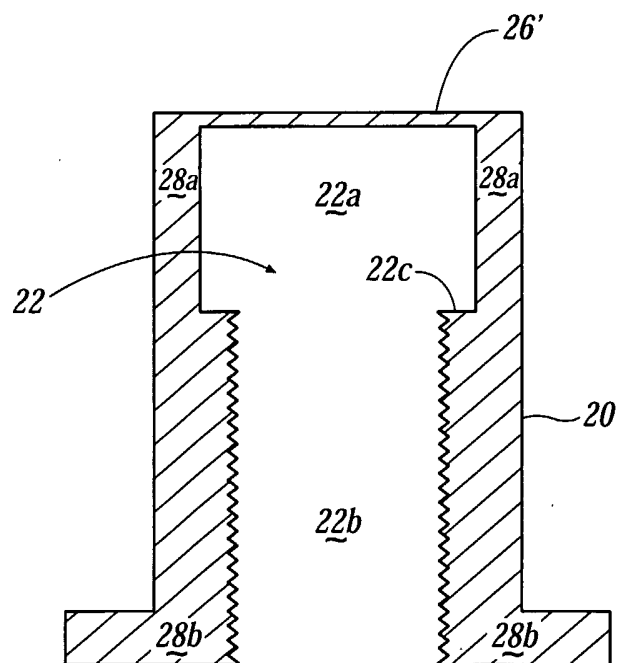


FIG. 4

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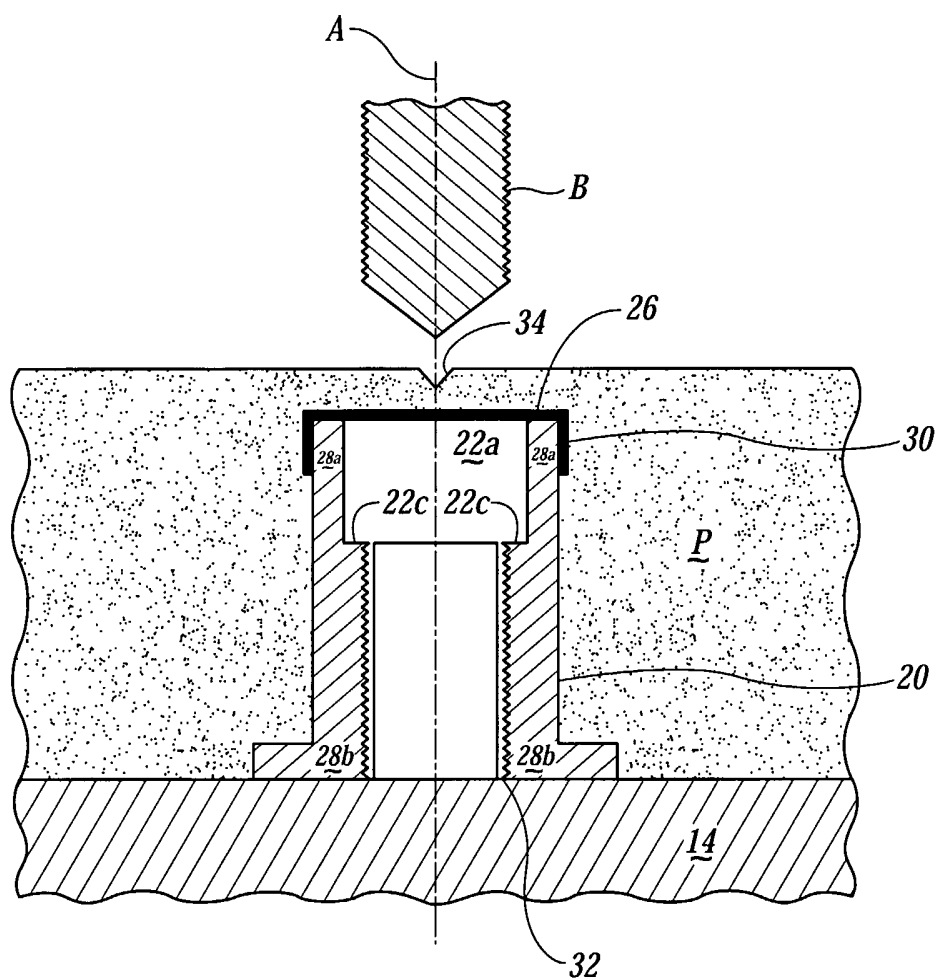


FIG. 5

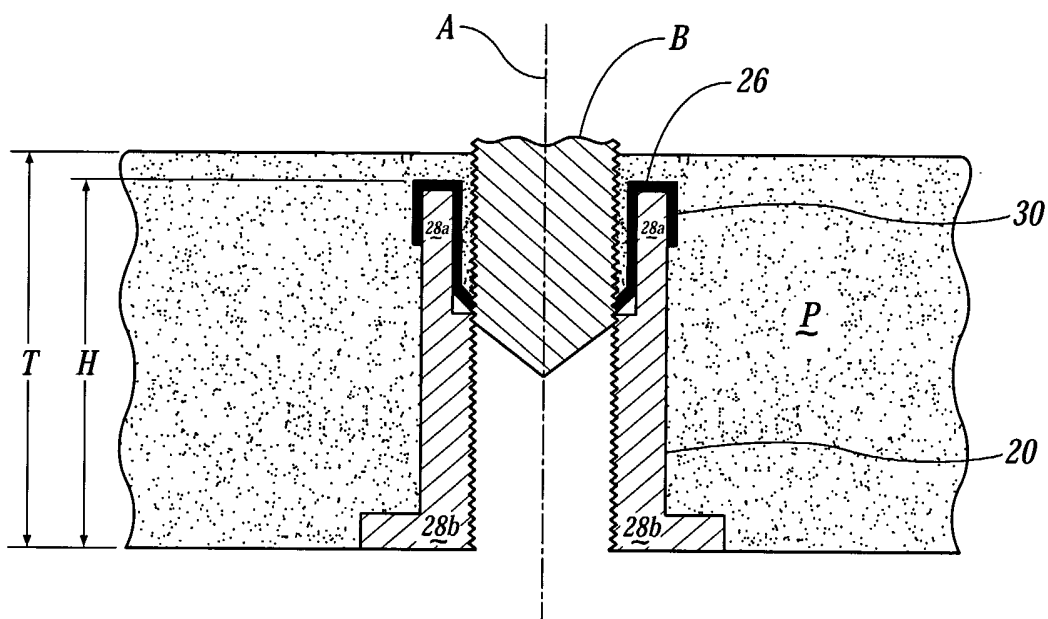


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2005/044515

A. CLASSIFICATION OF SUBJECT MATTER
INV. B29C43/18 B29C70/68

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 1 986 374 A (SHIPPY LEO C) 1 January 1935 (1935-01-01) column 1, line 38 - column 2, line 37; figures -----	1-36
X	US 1 355 254 A (PARSONS NEWELL B) 12 October 1920 (1920-10-12) column 3, line 6 - line 64; figures -----	1,17,29
A	US 6 309 586 B1 (COLLEY DAVID ET AL) 30 October 2001 (2001-10-30) column 8, line 6 - line 26; figures 4,5 -----	1-36
A	DE 198 18 881 A1 (JUN, SUNG-DO, KYONGGI, KR) 5 November 1998 (1998-11-05) column 1, line 48 - column 2, line 21; figures 2a,2b ----- -/--	1,17,26

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 017, no. 385 (M-1448), 20 July 1993 (1993-07-20) & JP 05 069444 A (MATSUSHITA ELECTRIC WORKS LTD), 23 March 1993 (1993-03-23) abstract	1, 17, 26
A	----- EP 0 511 061 A (SAGEM ALLUMAGE SOCIETE ANONYME) 28 October 1992 (1992-10-28) -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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