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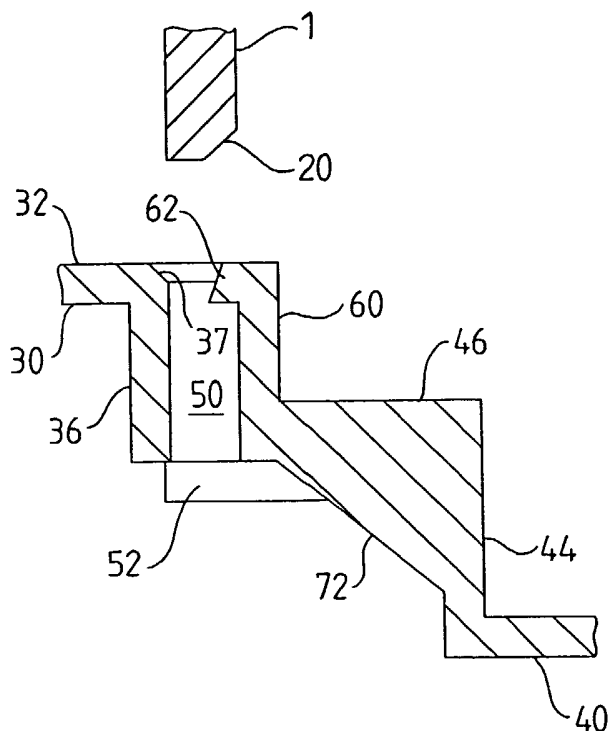
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(54) Title: STORAGE SPOOL



(57) Abstract: The spool consists of two half-cores and two end flanges (2). The half-cores are hollow and stackable before assembly. The longitudinal edges of the half-cores have tongues and grooves (14, 16) which interengage upon assembly of the spool. Each flanges has a groove (50) which receives an end portion of the half-cores in the assembled spool, in which hook portions (62) of latching portions (60) of the inner wall (50) of the groove (50) engage in a groove (18) in the outer periphery of the assembled half-cores. The flexibility of the latching portion (60), and hence the ease of assembly of the spool, is determined by triangular support pieces (72) beneath the floor of the groove (50).

STORAGE SPOOL

This invention relates to storage spools for the storage of elongate flexible materials, for example tapes, films and zippers of plastics material.

5 Unfilled storage spools are space-consuming unless they can be kept in separate, less space-consuming parts until immediately before use. Spools which can be assembled in this way have therefore been devised. The present invention aims to overcome or at least alleviate at least some of the
10 disadvantages of such known spools. These disadvantages include weakness and poor dimensional stability of the core and difficulty in assembling the spool.

 The present invention provides a storage spool comprising a core and first and second end flanges, at least
15 one end flange having a recess which is shaped to receive an end portion of the core upon assembly of the spool, the recess being defined at least in part by a plurality of latching tabs which are resiliently deformable upon entry of the core end portion into the recess to engage in a groove in
20 the periphery of the core adjacent one end thereof and thereby to secure the core and flange together.

 Advantageously, both end flanges have a said recess and the core has a said groove adjacent each of its ends.

 Conveniently, the core comprises two or more
25 longitudinal part-cores, for example two half-cores, which come together in the assembled spool to form the complete core.

 This further reduces the storage space occupied by the unassembled reel as, for example, a number of semi-
30 cylindrical part-cores can be stacked on one another and thereby occupy far less space than a one-piece cylindrical core of the same dimensions as the two part-cores when assembled.

 The part-cores may be held together by the latching

engagement with the end flanges. Preferably the part-cores have interfitting means which allow the part-cores to fit together before engagement with the end flanges. The interfitting means conveniently comprises tongues and grooves
5 formed in longitudinal edges of the part-cores.

The core is preferably hollow and is conveniently a relatively thin moulding of plastics material. When such a core comprises two or more longitudinal part-cores, the part-cores have the form of relatively thin shells which are
10 conveniently stackable one on another.

Advantageously, the hollow core has longitudinal and/or transverse stiffening ribs on its inner surface.

Advantageously, the latching tabs are located around the inner periphery of the recess in the end flange.

15 In such an arrangement, a hollow core is preferred and the groove in which the latching tabs engage is located adjacent one end of the inner surface of the hollow core.

Preferably, the latching tabs form alternate peripheral portions of the wall of the recess, the intervening portions
20 of the wall being shaped not to engage in the groove in the core. The peripheral extent of each tab may be about 2 to 5% of the peripheral length of the recess.

A particularly advantageous arrangement is one in which the latching tabs are upstanding from a portion of the end
25 flange which is generally perpendicular to the tabs, the gaps between the tabs extending into the said portion, the flexibility of the tabs, and hence the ease of engagement of the core with the end flanges, being determined at least in part by the flexibility of portions of the said surface
30 between the gaps. To this end, the said surface portions may be formed with support portions opposite to the latching tabs in order to stiffen the surface portions against deformation in the direction which results in deformation of the latching tabs.

Preferably, the end portion of the core has one or more anti-rotation tabs which, in the assembled reel, engage in sockets in the end flange and prevent relative rotation therebetween.

5 When the core is formed as a hollow part, whether in two or more part-cores or not, each tab is conveniently an end portion of a longitudinal stiffening rib of the core.

When latching tabs having gaps therebetween are provided, the or each anti-rotation tab conveniently engages
10 in a respective gap.

Embodiments of the invention will now be described by way of example with reference to the drawings, in which:

Figure 1 is a perspective view of the inner surface of one end flange of a spool;

15 Figure 2 is a perspective view of the outer surface of the end flange of figure 1;

Figure 3 is a diametrical sectional view of the flange shown in figures 1 and 2;

Figure 4 is a perspective view of one-half of the core
20 of the spool of figures 1 to 3;

Figure 5 is an end view of the half-core of figure 4;

Figure 6 is a partial section view on the radial line VI-VI on figure 1 showing the end flange and the half-core just prior to assembly;

25 Figure 7 is a view corresponding to figure 3 but of a modified spool; and

Figure 8 is a view corresponding to figure 6 but of the modified spool of figure 7.

The spool shown in the drawings consists of four parts
30 which are moulded from a suitable plastics material, for example polystyrene, polypropylene, polyethylene or acrylonitrile-butadiene-styrene copolymer. The four parts are a pair of identical half-cores 1 and a pair of identical end flanges 2. The dimensions of the half-cores 1 and the

end flanges 2 can vary according to the desired spool dimensions. By way of example, the flanges may be 450 mm in diameter and the core may be 350 mm in length and 200 mm in diameter. The spool may be used for storing tapes, films or
5 zippers of plastics material.

Each half-core 1 is semi-cylindrical in shape and has an internal longitudinal strengthening rib 10 and two transverse strengthening ribs 12. The ribs 10, 12 increase the rigidity of the half-core 1 and its resistance to compression. One
10 longitudinal edge of the half-core 1 has a longitudinal groove 14. The other longitudinal edge has a complementary tongue 16. When the two half-cores 1 are assembled together to form a complete cylindrical core, the groove 14 in one half-core receives the tongue 16 of the other half-core
15 whilst the groove 14 of the other half-core receives the tongue 16 of the first half-core. The two half-cores 1 thus form a complete cylindrical core having an outer cylindrical winding surface.

At a short distance from each end of each half-core 1,
20 the inner surface of the half-core is formed with two grooves 18 which each extend from one side of the longitudinal rib 10 through an arc of almost 90° to a respective longitudinal edge of the half-core 1. The grooves 18 thus form in the assembled core two continuous internal cylindrical grooves
25 adjacent respective ends of the core and interrupted only by the longitudinal ribs 10. The ends surfaces of each half-core 1 are inclined towards the interior to provide an internal chamfer 20.

It will be noted that each end of each longitudinal rib
30 10 extends a short distance beyond the end of the cylindrical winding surface to form a respective locating tab 22. The complete cylindrical core thus has four locating tabs 22, two at each end and located diametrically opposite each other.

Each end flange 2 is circular and has an outer part 30

having a smooth inner surface 32 which contacts material wound on the winding surface of the core as the wound material accumulates on the spool. Each end flange 2 has a circular central opening 34 which is bounded by a cylindrical wall 36 extending perpendicularly to the smooth inner surface 32. The junction between the wall 36 and the outer part 30 is formed with a chamfer 37. The central opening 34 contains a hub 38 which is moulded as an integral part of the end flange 2. Each hub 38 has a recessed circular floor 40 formed with a number of openings 42 which, when the spool is mounted in a winding or unwinding machine, receive the chuck and drive pins of the machine. A cylindrical wall 44 extends around the recessed floor 40. The height of the wall 44 is approximately one-half of the depth of the recess formed by the floor 40. A circular shoulder 46 extends outwardly around the end of the wall 44 distant from the floor 30 in a plane parallel to that of the floor 40. A further cylindrical wall 48 extends around the outer circumference of the shoulder 46 in a direction parallel to the cylindrical wall 36 and spaced radially inwardly therefrom so as to form a circular groove 50 therebetween. Each hub 38 is connected to the outer part 30 of the respective end flange 2 by sixteen radial tabs 52 which are spaced at equal angles around the opening 34 and form an interrupted floor of the groove 50. The circumferential extent of each tab 52 is approximately one-quarter of the extent of the circumferential gaps formed between the tabs.

The shoulder 46 and wall 48 are interrupted at regular circumferential intervals by thirty-two gaps 56, each of which extends the full height of the wall 48 and approximately three-quarters of the radial width of the shoulder 46. Alternate wall portions formed by the gaps are of slightly longer and slightly shorter circumferential extent. The shorter wall portions 58 are aligned with the

tabs 52 and have simple rectangular radial cross-sections. The longer wall portions 60 have radial cross-sections which form an outwardly extending hook portion 62 which partially closes the open top of the groove 50. The hook portions 62
5 thus form sixteen locking tabs which extend into the groove 50. The gaps 56 likewise divide the shoulder 46 into thirty-two portions which are alternately longer and shorter in the circumferential direction. The longer portions are shown by the reference numeral 70 in the drawings; the shorter
10 portions by 71.

The outer surface of each end flange 2 has sixteen radial strengthening ribs 64 and two circumferential strengthening ribs 66, in addition to a cylindrical flange 68 around its outer periphery. The radial ribs 64 are aligned
15 at their inner ends with the circumferential mid-points of the tabs 52 extending across the floor of the groove 50 and thus also with the circumferential mid-points of the shorter portions 58 of the interrupted inner wall 48 of the groove and the shorter portions 71 of the shoulder 46. The ribs 64
20 join at their inner end surfaces with the outer cylindrical surface of the wall 44 extending around the central opening 34.

The longer portions 70 of the shoulder 46 are connected to the outer surface of the wall 44 by triangular supports
25 72. As the longer portions 70 of the shoulder 46 are aligned with the longer portions 60 of the wall 48 which have the hook portions referred to above, the thickness of the supports 72 determines the flexibility in the radial direction of the locking tabs formed by the hook portions.

30 Figure 7 of the drawings corresponds to figure 3 but shows a modified spool in which features corresponding to features of the spool of figures 1 to 6 are shown with the same reference numerals increased by "100".

The spool shown in figure 7 is modified in that the hub

138 of its flange 102 does not have a recessed floor but instead has a central portion 140 which is flush with the inner surface 132 of the outer part 130 of the flange 102 of the spool. The cylindrical wall 144 of the flange thus
5 extends outwardly from the circular shoulder 146 to form a cylindrical wall which is open to the outer face of the flange 102. The structure of the flange 102 in the region of the groove 150 corresponds exactly to that in the region of the groove 50 of the spool of figures 1 to 6, as can be seen
10 from a comparison of figure 8 with figure 6.

The core of the modified reel is identical to that of the reel of figures 1 to 6.

Assembly of the half-cores 1 and the end flanges 2 to form the finished spool of figures 1 to 6 will now be
15 described. Particular reference should be made to figure 6 of the drawings.

The two half-cores 1 are first brought together with their tongues 16 and grooves 14 interfitting. One end of the core thus formed is then inserted into the groove 50 of one
20 of the end flanges 2. The core is positioned circumferentially so that the tabs 22 on the ends of the longitudinal ribs 10 are located in a diametrically-opposed pair of gaps 56 in the shoulder 46 and the wall 48. Axial pressure is applied to the assembled half-cores 1 and, as a
25 result of the action of the chamfer 20 on the inner surfaces of the half-cores on the radially outer upper edges of the hook portions 62, the hook portions are deflected in a radially inward direction to allow the end portion of the assembled core to become located in the groove 50. The hook
30 portions then snap back in the outward direction to become located in the grooves 18 in the half-cores 1 which are thus held in engagement with the end flange 2. The procedure is then repeated with the other end flange to produce the completed spool.

It will be noted that the force required to assemble the spool is determined in part by the thickness of the triangular supports 72 which, as explained, determines the flexibility of the locking tabs. The ease of disassembly of the spool is thus determined by the thickness of the supports 72, amongst other factors. It will also be noted that, in the assembled spool, the tabs 22 by their engagement in the gaps 56 prevent relative rotation of the core and the end flanges.

Assembly of the half-cores 101 and flanges 102 of the modified spool takes place in an exactly similar fashion, as can be seen by reference to figure 8 of the drawings. In the assembled spool therefore the hook portions 162 become engaged in the internal grooves in the half-cores 101, the end portions of which are received in the grooves 150 in the flanges 102 of the spool.

CLAIMS:

1. A storage spool comprising a core and first and second end flanges, at least one end flange having a recess
5 which is shaped to receive an end portion of the core upon assembly of the spool, the recess being defined at least in part by a plurality of latching tabs which are resiliently deformable upon entry of the core end portion into the recess to engage in a groove in the periphery of the core adjacent
10 one end thereof and thereby to secure the core and flange together.

2. A spool according to claim 1, in which the core comprises two or more longitudinal part-cores which come
15 together in the assembled spool to form the complete core.

3. A spool according to claim 2, in which the core comprises two longitudinal half-cores.

20 4. A spool according to claim 2 or 3, in which the part-cores are held together by the latching engagement with the end flanges.

5. A spool according to any of claims 2 to 4, in which
25 the part-cores have interfitting means which allow the part-cores to fit together before engagement with the end flanges.

6. A spool according to claim 5, in which the interfitting means comprise tongues and grooves formed in
30 longitudinal edges of the part-cores.

7. A spool according to any of claims 2 to 6, in which each part-core is in the form of a hollow shell, a plurality of which are stackable one on another.

8. A spool according to claim 7, in which the hollow shells have internal longitudinal and/or transverse stiffening ribs.

5 9. A spool according to any preceding claim, in which the latching tabs are located around the inner periphery of the recess in the end flange.

10 10. A spool according to claim 9, in which the latching tabs form alternate peripheral portions of the wall of the recess, the intervening portions of the wall being shaped not to engage in the groove in the core.

15 11. A spool according to claim 10, in which the latching tabs are upstanding from a portion of the end flange which is generally perpendicular to the tabs, the gaps between the tabs extending into the said portion, the flexibility of the tabs being determined at least in part by the flexibility of portions of the said surface between the
20 gaps.

12. A spool according to claim 11, in which the said surface portions are formed with support portions opposite to the latching tabs in order to stiffen the surface portions
25 against deformation in the direction which results in deformation of the latching tabs upon insertion of the core into the groove.

13. A spool according to any preceding claim, in which
30 the end portion of the core has one or more anti-rotation tabs which, in the assembled reel, engage in sockets in the end flange and prevent relative rotation therebetween.

14. A storage spool substantially as hereinbefore

described with reference to the drawings.

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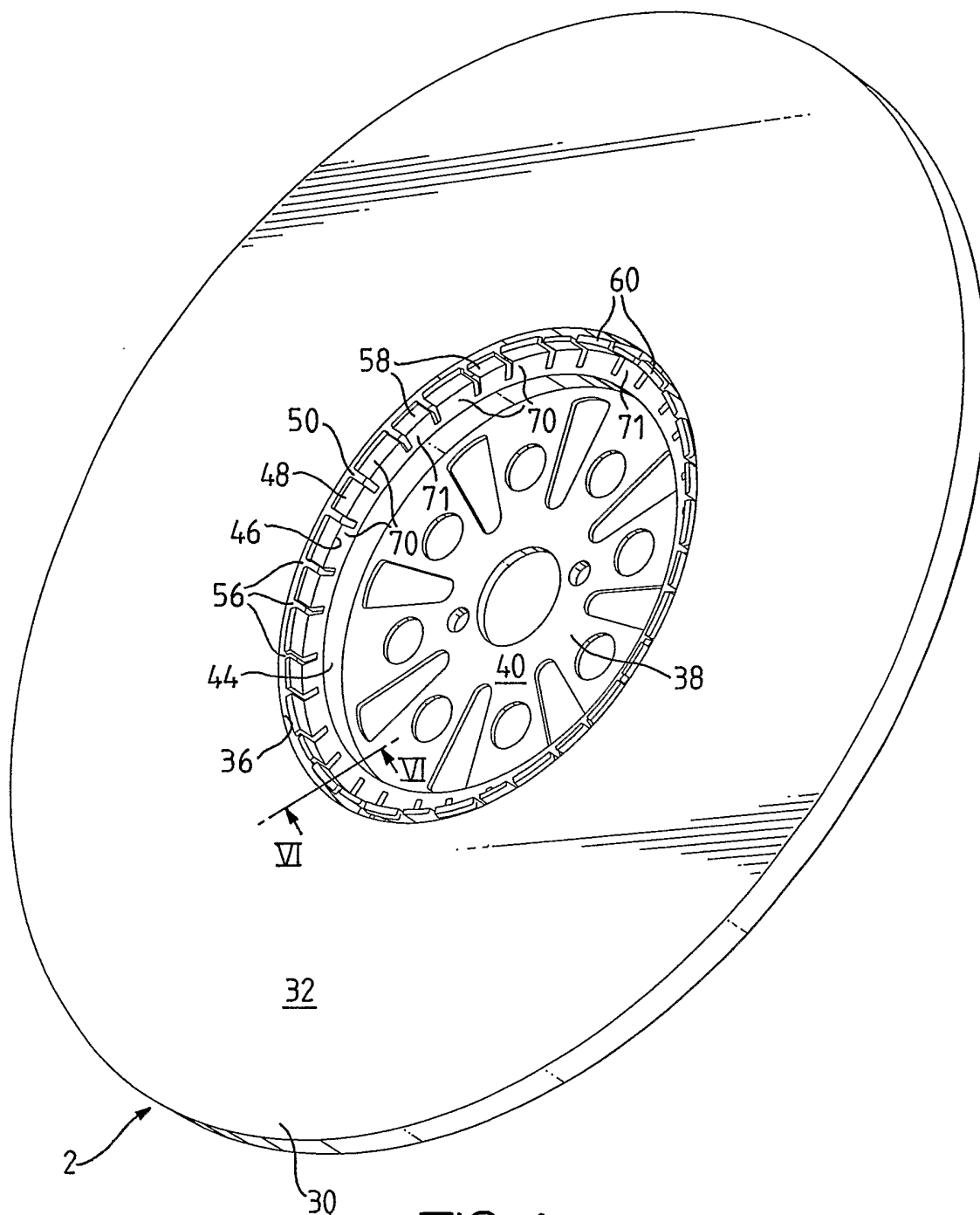


FIG. 1

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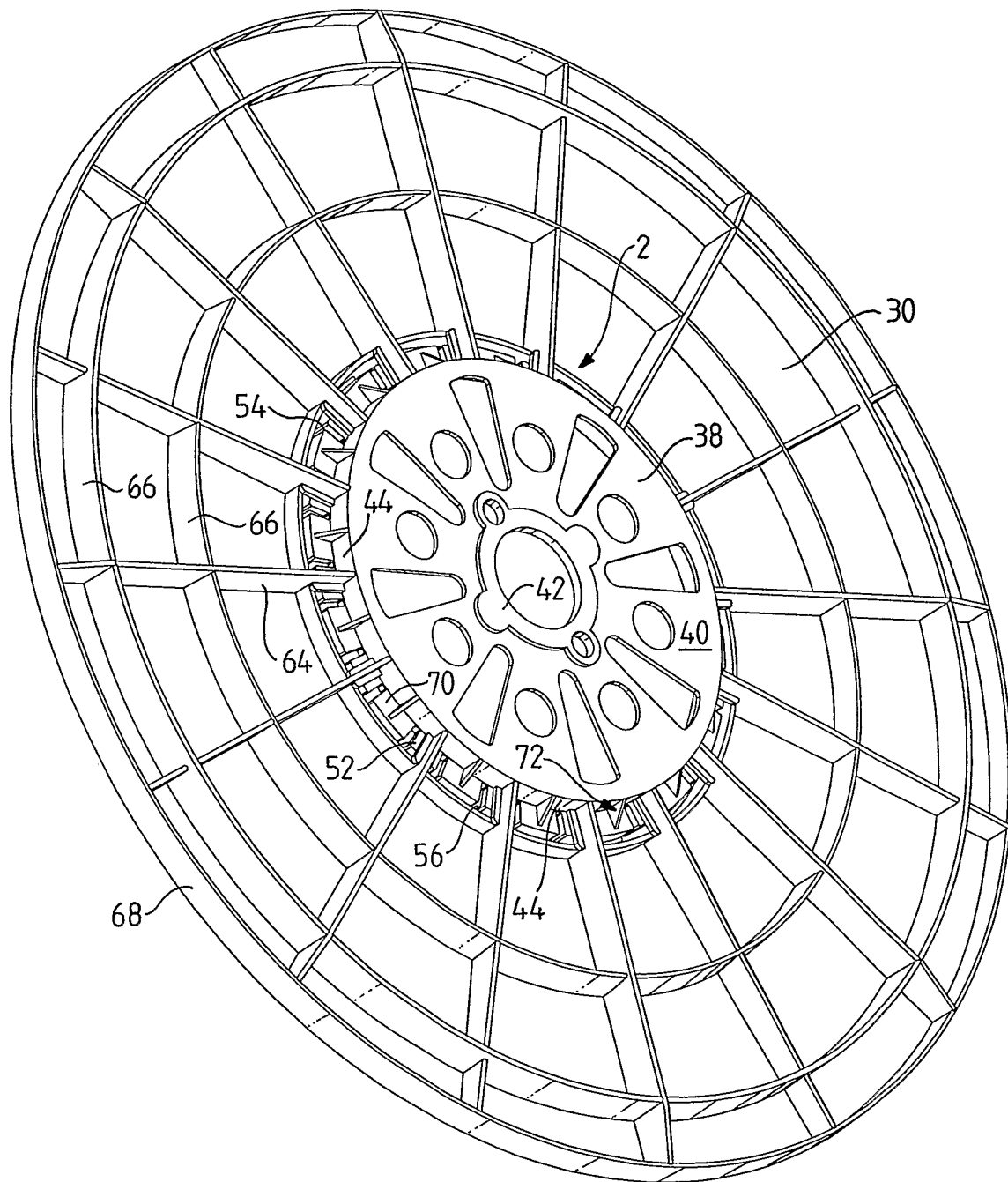


FIG. 2

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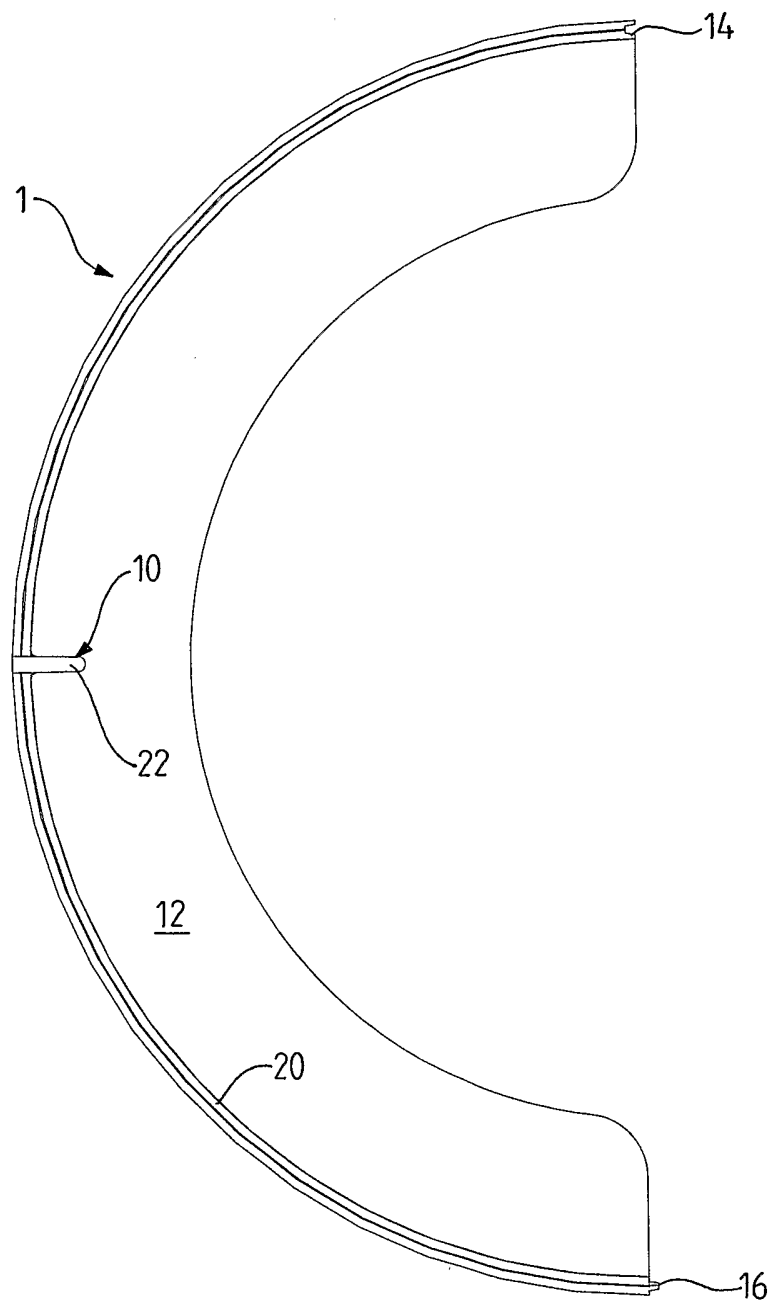


FIG. 5

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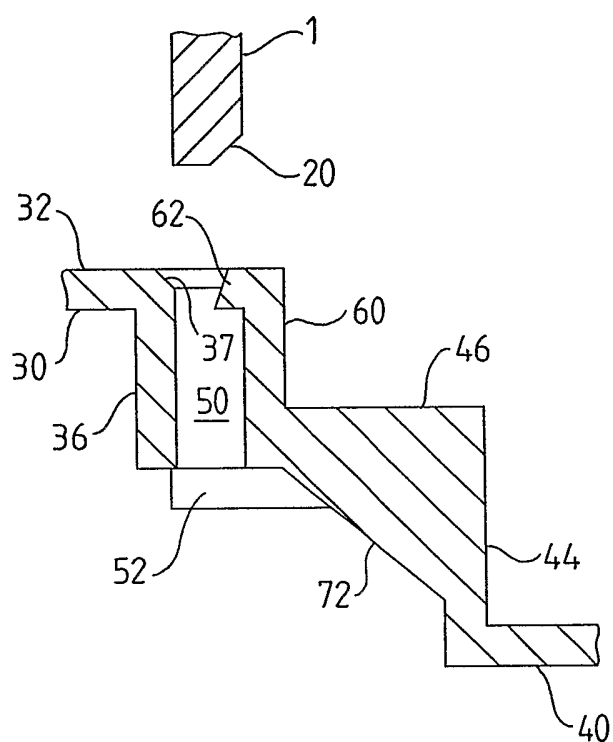


FIG. 6

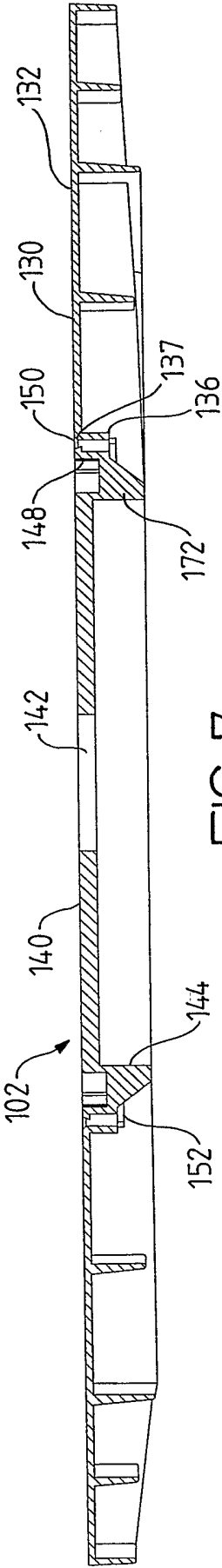


FIG. 7

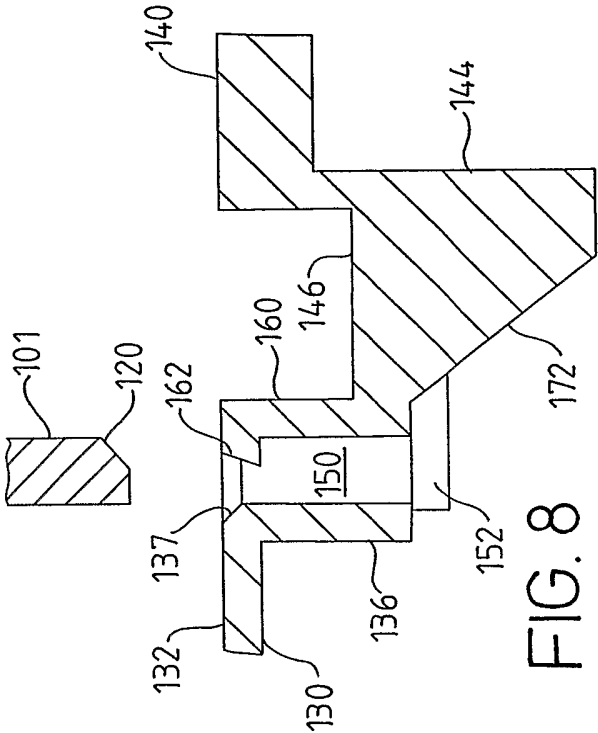


FIG. 8

INTERNATIONAL SEARCH REPORT

Internationa Application No
PCT/GB 03/03216

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B65H75/22

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)
IPC 7 B65H

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)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 07, 29 September 2000 (2000-09-29) -& JP 2000 118877 A (GIFU PLAST IND CO LTD), 25 April 2000 (2000-04-25)	1, 9, 10, 13
Y	abstract; figures	2-8, 14
Y	US 3 552 677 A (H. H. HACKER) 5 January 1971 (1971-01-05)	2-8, 14
A	the whole document	1, 9, 13
X	US 3 785 584 A (J. R. CRELLIN) 15 January 1974 (1974-01-15) figures	1, 9, 13
X	US 2002/017588 A1 (E. KITAYAMA) 14 February 2002 (2002-02-14) paragraph '0073!; claims 1-4, 9; figures	1, 9, 13, 14
	----- -/-	

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

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

30 October 2003

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06/11/2003

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INTERNATIONAL SEARCH REPORT

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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	US 5 575 437 A (K. E. CAMPBELL) 19 November 1996 (1996-11-19) claims; figures ---	1-7, 9, 13
A	WO 00 64797 A (C. CHARLTON) 2 November 2000 (2000-11-02) claims; figures -----	1-9, 13

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Information on patent family members

Internat application No

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