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(12) # EUROPEAN PATENT APPLICATION

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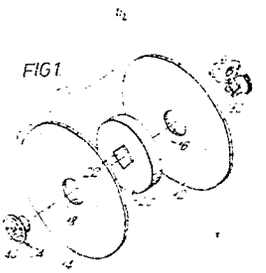
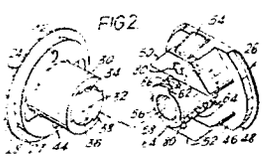
(54) **Storage reel assembly and a pair of matable hub members therefor.**

(57) A Storage Reel Assembly and a pair of matable hub members therefor.

The invention which relates to the art of packaging elongate flexible material is intended to provide a storage reel assembly comprising, as shown in Figure 1, a pair of hub members (24 and 26) which can be locked together to assemble simple annular reel end flange members (12 and 14) to a simple annular spacer member (20), the same hub members (24 and 26) being useable with a variety of different sized reel end flange members (12 and 14) and spacer members (20). As shown in Figure 2, the male hub member (26) has a series of ribs (62,964) which form a row of interrupted rings, the female hub member (24) having internal flanges (34, 36). When the hub members (24 and 26) have been mated, they are relatively rotated to engage the flanges between adjacent ribs (62 and 64).





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This invention relates in general to the art of packaging elongate flexible material and relates in particular to a storage reel assembly for such material and to a pair of matable hub members for such an assembly.

A problem with which the invention is concerned is the provision of a storage reel assembly which is simple to assemble into a finished storage reel and hub members of which can be used with a variety of different sized reel end flange members to produce, as required, storage reels of various diameters and widths. Although "knock down" or collapsable storage reels are known, for example from United States Patent Specifications Nos. 1,013,588; 1,265,110; 1,679,573; 2,312,899; 2,695,142; 2,881,985 and 3,301,500; and Australian Patent Specification No. 145,690, none of these known assemblies fulfill all the above criteria. The use of screw means to maintain the parts in assembled relationship, for example, renders the assembly time undesirably long and the provision of fastening means on the reel end flange members themselves, for example, renders them usable only with complementarily formed parts.

There is described in United States Patent Specification No. 3,822,841 a storage reel assembly comprising first and second reel end flange members each having a central opening; a hub for reception in the openings; and locking means for releasably securing the reel end flange members and the hub in assembled relationship, with the hub received in the openings and the flange members in substantially parallel spaced relationship at opposite ends of the hub. Such a known

storage reel assembly will hereinafter be referred to as a "storage reel assembly as herein defined".

In the case of this known assembly, the hub, with which latch arms of the locking means are formed, is useable only with specially adapted reel end flange members having blind recesses for receiving the ends of the hub, the walls of the recesses having openings for receiving the latch arms. If the width of the finished reel is to be altered, the hub must be replaced by a hub of different length.

The invention proceeds from the realization that locking means should be provided on the hub alone for securing the reel end flange members in assembled relationship with a spacer member for the flange members.

According to one aspect of the invention, a storage reel assembly as herein defined is characterised in that the assembly further comprises a spacer member having a central through aperture; and in that the hub comprises two matable hub members each of which can be passed through a respective one of the central openings, which are through openings, to an extent limited by stop means on the respective hub members, to mate in the central aperture of the spacer member when such is interposed between the reel end flange members, the locking means comprising at least one locking flange on one hub member and at least one row of locking ribs on the other hub member, the or each locking flange being interposeable between an adjacent pair of the locking ribs by relatively rotating the hub members when in their mating relationship, to an extent limited by an abutment carried by one of the hub members.

Not only can the parts of the assembly be easily and rapidly assembled, but the reel end flange members can be in the form of simple annular discs, different sized pairs of such flange members being capable of

female hub member having a circular cross-section female mating portion extending co-axially from its base portion, a central bore through the mating portion, at least one internal radially inwardly directed arcuate flange at the free end of the mating portion, and an abutment extending the length of the bore from an edge of the flange, the male hub member having an elongate, male mating portion extending centrally from its base portion with a plurality of interrupted rings on the outer surface thereof, each ring comprising at least one radially extending arcuate rib, at least one keying member extending from the base portion of the male mating portion and being shaped for keying engagement in the central aperture of the spacer member, the mating portions being such that the flange or flanges can be passed between the ribs of the female mating portion and the hub members relatively rotated to bring the ribs and the flange or flanges into locking engagement.

For a better understanding of the invention reference will now be made by way of example to the accompanying drawings, in which:-

Figure 1 is an exploded perspective view of a storage reel assembly;

Figure 2 is an enlarged perspective view of two mating hub members of the assembly;

Figure 3 is an enlarged, fragmentary, axial sectional view of the storage reel assembly in its assembled condition to provide a storage reel; and

Figure 4 is an enlarged perspective view of a metal insert for the assembly.

As shown in Figures 1 to 3, a storage reel assembly 10, comprises a pair of substantially identical reel end flange members 12 and 14 formed from thin, rigid stock material, for example metal or pressboard, the members 12 and 14 having central circular through openings 16 and

being connected by means of the same hub members, and the width of the finished reel being determinable by using a spacer member of appropriate length. The fact that for producing a range of different sized reels, only hub members of one size need be stocked reduces production costs and simplifies storage and stock keeping records. No locking means need be provided on the spacer member or the reel end flange members.

According to another aspect of the invention, a pair of matable hub members for an assembly according to the invention is characterised in that each hub member comprises a base portion having a flange for abutment against the respective reel end flange member, and a mating portion in the form of a circular, or substantially circular cross-section tube extending substantially centrally from the base portion, the mating portion of one hub member being adapted to receive the mating portion of the other hub member, the locking ribs being in the form of a series of spaced, interrupted rings extending circumferentially about the outer surface of the mating portion of the other hub member, a plurality of locking flanges extending axially inwardly from the inner surface of the mating portion of the one hub member at its end remote from its base portion, the abutment being in the form of a rib extending from one of the locking flanges towards the base portion of the one hub member.

According to a further aspect of the invention, an assembly as herein defined is characterised in that the assembly further comprises a spacer member having a central, non-circular through aperture; and in that the hub comprises substantially circular cross-section, matable female and male hub members, each hub member having a base portion receivable in a respective one of the central openings, and a radial flange adapted to engage the respective reel end flange member, the

18, respectively. The assembly also comprises a spacer member 20 having a central square through aperture 22 preferably being made from expanded polystyrene, and mating female and male hub members 24 and 26, respectively.

The female hub member 24 has a circular base portion 27 externally shaped for reception in one of the openings 16 or 18 of the reel end flange members and being provided with a radially extending flange 28 for engaging the axially outer face of the one reel end flange member. A circular cross-section tubular cylindrical mating portion 30 extending co-axially from the portion 27 has a through bore 32 at the extreme right hand (as seen in Figure 2) end of which are two internal, radially extending flanges 34 and 36 each having in its axially inward surface, a detent notch 38 (only one of which is shown), the notches being identical. An abutment in the form of a stop rib 40 (Figures 1 and 3) extends the full length of the wall of the bore 32 adjacent to one end of the flange 34. The base portion 27 has two finger grip apertures 42 and 44 formed therein.

The hub member 26 has a base portion 46 externally shaped for reception in the other of the openings 16 or 18 of the reel end flange members 12 and 14 and having a radially extending flange 48 for engaging the radially outer face of the other flange member 12 or 14. A pair of wedge shaped keying portions 50 and 52 extending from the base portion 46 each has a cantilever latch arm 54 diverging from the portion 50 or 52 in the axially outward direction of the assembly 10 when in its assembled condition (as best seen in Figure 3), each arm 54 terminating back from the plane of the flange 48. The outer peripheral surfaces of the portions 50 and 52 conform to the walls of the aperture 22 in the spacer member 20 so as to key the hub member 26 thereto. A circular cross-section tubular mating portion 56 extending

coaxially from the centre of the base portion 46 has a central bore 58, a plurality of segmental locking ribs 62 and 64 on the external surface of the mating portion 56 are arranged in two opposed rows to provide a series of interrupted locking rings coaxial with the portion 56 and being constantly spaced from one another in axial direction thereof. Each rib 62 and 64 has a detent projection 66 extending axially outwardly of the assembly 10 and being complementary with each notch 38 of the hub member 24, (only the projections 66 of the ribs 62 are shown).

The hub members 24 and 26 are preferably moulded from a hard wearing plastics material of high rigidity.

In practice a stock of reel flange members 12 and 14 of different diameters and spacer members 20 of different thicknesses, are held in store so that finished reels of different diameters and thickness, can be constructed to meet individual requirements.

In order to produce a finished reel, reel end flange members 12 and 14 of the required diameter and a spacer member 20 of the required thickness are first selected, together with a male and a female hub member these being essentially universal members of standard dimensions for use with any of the reel flange and spacer members held in store.

The male hub member 26 is first inserted through the opening 16 of the reel end flange member 12 (for example) so that the latch arms 54 engage the inner face of the flange member 12 (see Figure 3) whereby the reel end flange member 12 is held firmly in position between the latch arms 54 and the flange 48 of the hub member 26. The spacer member 20 is then mounted on the keying portions 50 and 52 of the member 26 so that these portions extend through the aperture 22 of the member 20 whereby the members 20 and 26 are keyed together and are

frictionally engaged with the annular [illegible] 30 of the hub member 24 so that it extends through the opening 18 in the reel end flange member 14 and is mated with, and locked to, the mating portion 56 of the hub member 26 as described below.

The hub members are shown in Figure 2 in aligned relationship as they would be in their fully mated and locked condition. In order to mate the two hub members 24 and 26 they are positioned so as to be relatively rotated by 90° with respect to the angular positions in which the hub members 24 and 26 are shown in Figure 2, so that ribs 62 and 64 of the hub member 26 are aligned with the spaces between the flanges 34 and 36 of the hub member 24. The portion 56 is inserted into the bore 32, to an extent determined by the widths of the spacer 20 and the reel end flange members 12 and 14, until the flanges 34 and 36 are aligned with the space between a pair of adjacent ribs 62 and that between the opposed pair of ribs 64, after which the hub members 24 and 26 are relatively rotated to their angular positions of Figure 2, in which each flange 34 and 36 is interposed between an adjacent pair of the ribs 62 and 64 and the detent projections 66 of those ribs engage in the detent notches 38 of the flanges, continued relative rotation of the hub members 24 and 26 in the same sense being prevented by the abutment of the ribs 62 against the stop rib 40. The hub members 24 and 26 are thus releasably locked together. The reel end flange member 14 is held in position between the flange 28 of the hub member 24 and the spacer member 20, as shown in Figure 3. The hub members can be released from one another by relatively rotating the hub in the opposite sense to that described above and then withdrawing the portion 56 from the bore 32.

The reel assembly described above may be modified

in various ways, for example, there may be only one, or more than two flanges 34 and 36 and more than two rows of ribs 62 and 64 on the portion 56. The ribs may be on the female hub member and the flange or flanges on the male hub member, the aperture 22 may be other than square, the portions 50 and 52 being appropriately modified in shape. The spacer member may be of any suitable form, being spoked for example. The finger grip apertures 42 and 44 may be of a number other than two and may be in the form of recesses rather than apertures. There may for example be only one latch member 54. Under some circumstances it may not be necessary to key the spacer member to the hub members.

As shown in Figure 3, a metal insert 70 has a square base wall 72 from which extend four rectangular side walls 74 so that the insert 70 has the form of an open rectangular box or tray. The wall 72 has a central circular opening 76 and four smaller circular openings 78 constantly spaced about the opening 76. The insert 70 is for inclusion in the assembly 10 where the finished reel is to be subjected to considerable torque when in use. In assembling the finished reel, the insert 70 is inserted into the aperture 22 of the spacer member 20 so that the open side of the insert 70 will face the reel end flange member 12. In the assembled condition of the reel assembly, the keying portions 50 and 52 of the hub member 26 engage the inner surfaces of the side walls 74 of the insert 70, with the mating portion 56 of the hub member 26 extending through the central aperture 75 of the insert 70. Prior to mating the hub members 24 and 26, fasteners (not shown) may be inserted through two of the smaller openings 78 which are aligned with openings 80 in the portions 50 and 52, to secure the insert 70 more firmly against rotation relative to the hub members. The insert 70 thus serves to increase

the resistance of the finished reel to torque developed when the reel is in use. It has been found that such resistance to torque can be optimized by making the spacer 20 of expanded polystyrene.

The finger grip apertures 42 and 44 (or finger grip recesses) may be employed to receive driving members (not shown) e.g. spindles, for rotating the finished reel about an axle (not shown) passed through the bores 32 and 58 of the hub members. The driving members may also extend from the apertures 42 and 44 through those openings 78 of the insert 70 (when such is provided), which are not occupied by the fasteners mentioned above, these openings 78 being aligned with the apertures 42 and 44.

1. A storage reel assembly comprising first and second reel end flange members each having a central opening; a hub for reception in the opening; and locking means for releasably securing the reel end flange members and the hub in assembled relationship, with the hub received in the openings and the reel end flange members in substantially parallel spaced relationship at opposite ends of the hub; characterised in that the assembly further comprises a spacer member (20) having a central through aperture (22); and in that the hub comprises two matable hub members (24 and 26) each of which can be passed through a respective one of the central openings, which are through openings (16 and 18), to an extent limited by stop means (28 or 48) on the respective hub members (24 or 26), to mate in the central aperture (22) of the spacer member (20) when such is interposed between the reel end flange members (12 and 14), the locking means comprising at least one locking flange (36) on one hub member (24) and at least one row of locking ribs (62) on the outer hub member (26), the or each locking flange (36) being interposeable between an adjacent pair of the locking ribs (62) by relatively rotating the hub members (24 and 26) when in their mating relationship, to an extent limited by an abutment (40) carried by one (24) of the hub members (24 and 26).

2. An assembly according to Claim 1, characterised in that detent means (38) are provided on the or each locking flange (34, 36) for co-operation with complementary detent means (66) on the locking ribs (62, 64), releasably to latch the hub members (24 and 26) in their relative angular positions as determined by the abutment (40).

3. An assembly according to Claim 1 or 2, characterised in that one hub member (26) has a keying portion (50 or 52) which is insertable into the central

aperture (22), which is of non-circular cross-section, of the spacer member (20) to key each hub member (24 or 26) to the spacer member (20).

4. An assembly according to Claim 3, characterised in that it further comprises a metal insert (70) for co-operation with the keying portion (30 or 52), the insert (70) having a base wall (72) conforming to the shape of the central aperture (22) of the spacer member (20) and a central opening (76) for the hub members (24 and 26), sidewalls (74) extending from the base wall (72) for engaging the wall of the central aperture (22) of the spacer member (20).

5. An assembly according to Claim 4, characterised in that the spacer member (20) is made of expanded polystyrene.

6. An assembly according to any one of the preceding claims, characterised in that at least one (26) of the hub members comprises means (54, 58) for latching it to the respective reel end flange member (12), and a finger grip aperture (42, 44) or recess for use in relatively rotating the hub members (24 and 26) and for receiving a reel driving member.

7. A pair of matable hub members for an assembly according to Claim 1, characterised in that each hub member (24 and 26) comprises a base portion (27 or 48) having a flange (28 or 48) for abutment against the respective reel end flange member (12 or 14) and a mating portion (30 or 56) in the form of a circular, or substantially circular cross-section tube extending substantially centrally from the base portion (27 or 46), the mating portion (30) of one hub member (24) being adapted to receive the mating portion (56) of the other hub member (26), the locking ribs (62 and 64) being in the form of a series of spaced, interrupted rings extending circumferentially about the outer surface of

the mating portion (56), of the other hub member (26), a plurality of locking flanges (34 and 36) extending axially inwardly from the inner surface of the mating portion (30) of the one hub member (24) at its end remote from its base portion (27), the abutment being in the form of a rib (40) extending from one of the locking flanges (34) towards the base portion (27) of the one hub member (24).

8. A pair of hub members according to Claim 7, characterised in that one of the hub members (26) has a wedge shaped keying portion (50) extending from its base portion (46) alongside the mating portion (58), for co-operation with the walls of the central aperture (22) of the spacer member (20) to key the hub member (26) to the spacer member (20).

9. A pair of hub members according to Claim 7 or 3, characterised by a cantilever latch arm (54) diverging from a position on one of the hub members (26) remote from its base portion (46) towards such base portion (46) and being arranged to co-operate with the flange (48) of such hub member (26) to latch the hub member (26) to the respective reel flange member (12).

10. A storage reel assembly comprising first and second reel end flange members each having a central opening; a hub for reception in the openings; and locking means for releasably securing the flange members and the hub in assembled relationship, with the hub received in the openings and the flange members in substantially parallel spaced relationship at opposite ends of the hub; characterised in that the assembly further comprises a spacer member (20) having a central, non-circular through aperture (22) and in that the hub comprises substantially circular cross-section, matable female and male hub members (24 and 26), each hub member (24 and 26) having a base portion (27 and 46) receivable in

a respective one of the central openings (16 and 18), and a radial flange (28 and 48) adapted to engage the respective reel end flange member (12 or 14), the female hub member (24) having a circular cross-section female mating portion (30) extending co-axially from its base portion (27), a central bore (32) through the mating portion (30), at least one internal radially inwardly directed arcuate flange (34) at the free end of the mating portion (30), and an abutment (40) extending the length of the bore (32) from an edge of the flange (34), the male hub member (26) having an elongate, male mating portion (56) extending centrally from its base portion (46) with a plurality of interrupted rings on the outer surface thereof, each ring comprising at least one radially extending arcuate rib (62, 64), at least one keying member (52, 54) extending from the base portion (46) of the male mating portion (58) and being shaped for keying engagement in the central aperture (22) of the spacer member (20), the mating portions (30 and 56) being such that the flange or flanges (34, 36) can be passed between the ribs (62, 64) of the female mating portion and the hub members (24 and 26) relatively rotated to bring the ribs (62, 64) and the flange or flanges (34, 36) into locking engagement.

FIG.1.

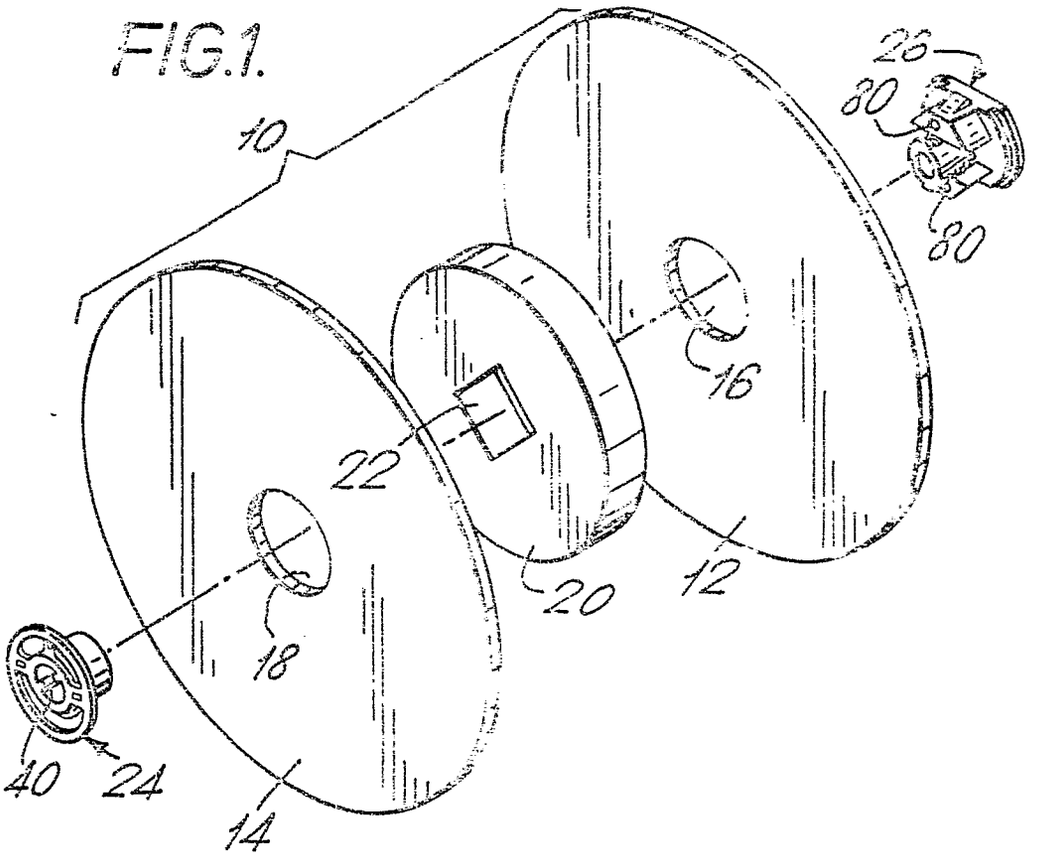
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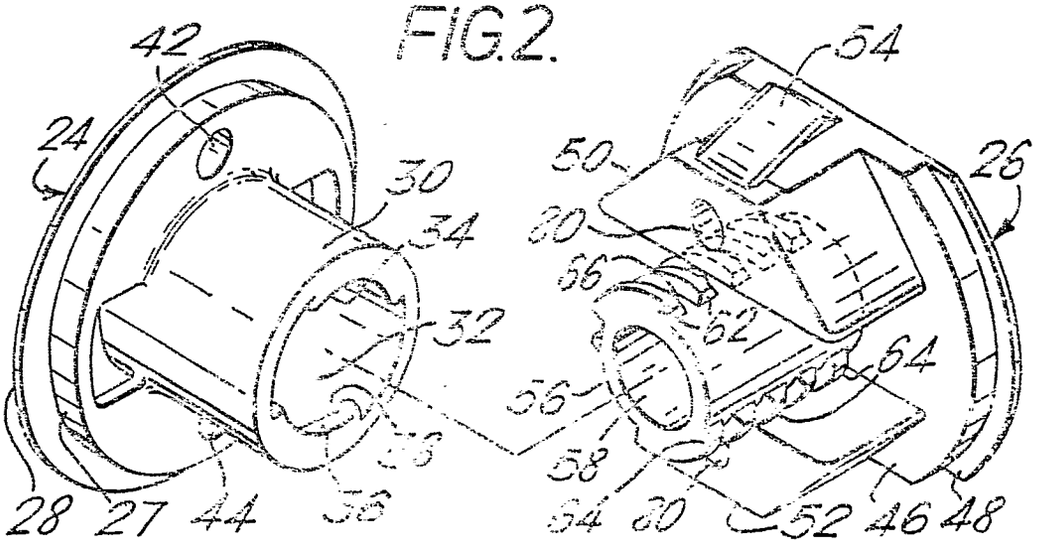
FIG.2.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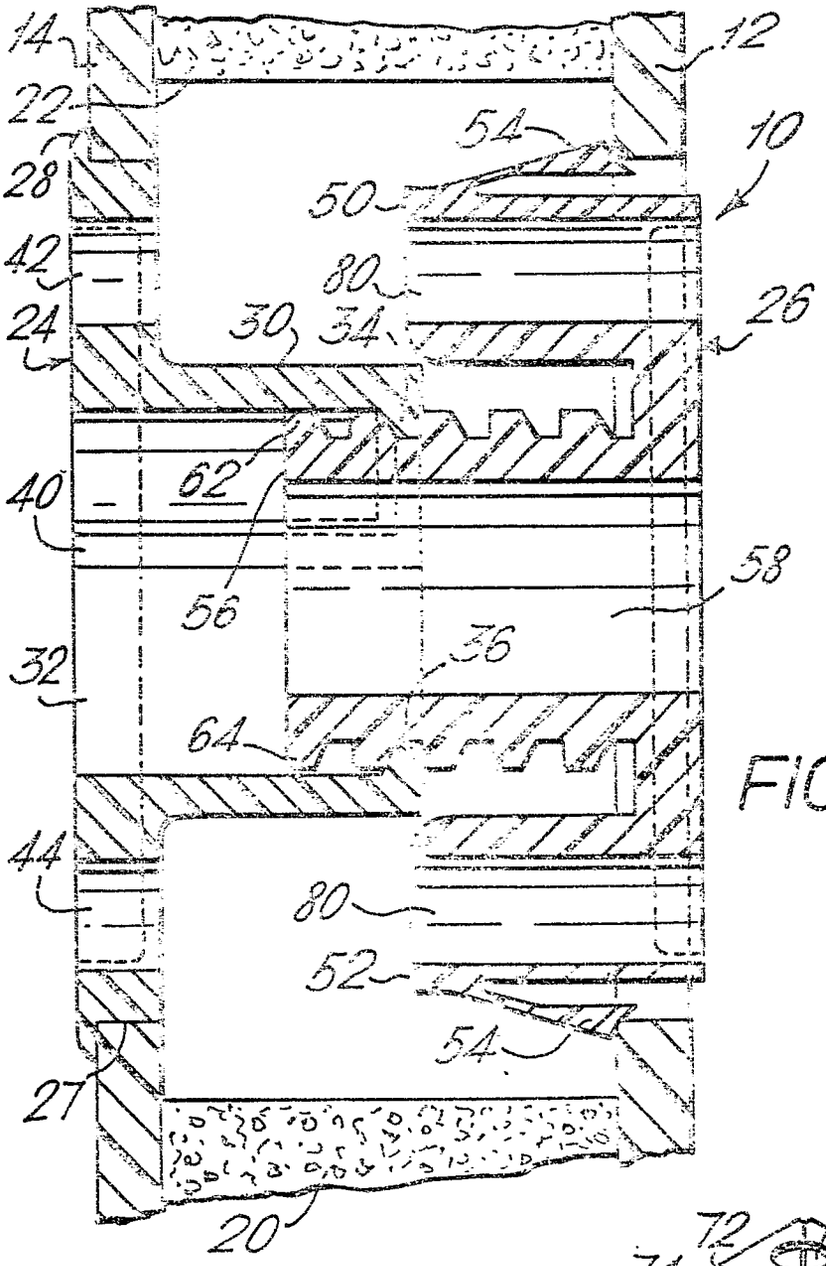
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FIG.3.

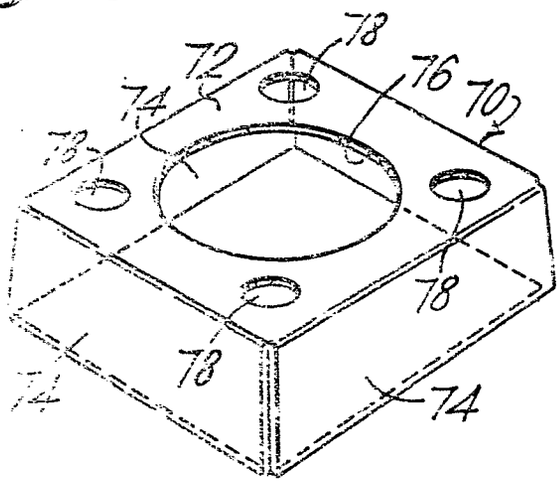
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FIG.4.

European Patent Office

EP 78 [illegible]

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A	US - A - 2 703 684 (WARFIELD) * Column 1, lines 68-81; column 2, lines 1-72 *	1
A	US - A - 1 949 378 (ROEHM) * Page 1, lines 27-105 *	1
A	US - A - 1 815 499 (DECOMBE) * Claims; figures *	1
A	GB - A - 1 029 820 (PRAKTIKUS) * Page 3, lines 36-96 *	1
A	DE - B - 1 211 461 (SIEMENS & HALSKE) * Column 2, lines 47-52; column 3, lines 1-34 *	1
A,D	AU - B - 145 690 (MARTIN & MANNING) * Claim 1; figures *	1
A	US - A - 3 253 802 (ANDERSON) * Figures *	1
A	DE - U - 7 008 696 (WAVIN) * Claim 1 *	1
A	US - A - 3 432 113 (FREEDMAN) * Figures *	1

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TECHNICAL FIELDS SEARCHED (Int.Cl.²)

B 65 H 75/22
B 65 H 75/24
B 65 H 75/14
B 65 H 75/02
B 65 H 75/04
B 65 H 75/18
B 65 D 85/04
B 65 D 85/672
B 65 D 85/676
G 03 B 21/32
G 11 B 23/02

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	31-08-1978	[illegible]

European Patent Office

EUROPEAN SEARCH REPORT 0000239

Application number

EP 78 30 00[illegible]

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A	FR - A - 1 535 724 (POSSO) * Claim *	1

CLASSIFICATION OF THE APPLICATION (Int. Cl.²)

TECHNICAL FIELDS SEARCHED (Int. Cl.²)