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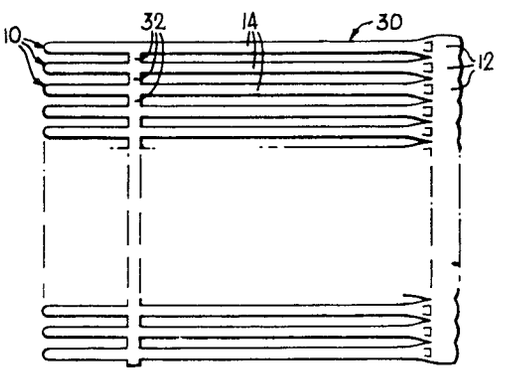
(54) **Flexible ties.**

(57) A bandolier (30) of flexible plastics ties (10) for supply to an automatic tie gun to effect tying of a roll or bundle, the ties being held in parallel arrangement in the bandolier by integral bridging pieces (32) with buckles or apertured heads (12) along one edge of the bandolier and the ends of the tails (14) of the ties along the other edge. The buckles (12) may be apertured parallel or transversely to the length of the tie, to suit the type of gun being fed. A preferred embodiment of bandolier is incorporated in a magazine having a mouth shaped to bend the tie as it enters the gun so that the apertured buckle is correctly orientated.



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Specification

Flexible Ties

This invention relates to flexible ties for application to an elongate roll or bundle, e.g. a bundle of cables or wires which if left unbound might present a hazard as well as being unsightly.

Guns have been designed for the automatic application of such flexible ties. One known gun receives the ties from a magazine which is mounted to the gun exterior. The ties are accommodated separately within the magazine, and are fed singly to the gun. In practice, this can result in an unreliable and sometimes erratic supply of ties to the gun, resulting in unreliable and spasmodic operation of the gun itself.

It is an object of this invention to provide an improved arrangement for the storage and supply of flexible ties, more especially but not exclusively an arrangement which will facilitate the supply of ties into an automatic tie gun.

According to the invention there is provided a belt or bandolier of flexible ties for supply to a tie gun, comprising a large plurality of ties having apertured heads and tails trailing therefrom, said

large plurality of ties being connected in parallel arrangement by integral bridging pieces.

Preferably, the ties are connected in parallel arrangement with the apertured heads aligned at one longitudinal edge of the bandolier and the ends of the tails aligned at the other longitudinal edge of the bandolier. Conveniently, each bridging piece lies in the same plane as the two adjacent ties connected by the bridging piece.

The ties individually may be of a known type, wherein the end portion of the tail of each tie is formed with integral ratchet like projections for locking engagement with an integral pawl formed within the aperture of the head. The aperture in the head may be longitudinal or transverse, according to requirements.

Preferably, each two adjacent ties in the bandolier are connected by flat bridging pieces extending between the tails of the ties, breakage being facilitated if the bridging pieces are of lesser thickness and connect to each tie on breakage lines disposed slightly inwardly of the width of the tie from the opposed longitudinal edges of the latter.

A preferred bandolier is injection moulded, conveniently of mouldable nylon, in sub-units of 20 or so ties which are then integrally connected by plastics

welding to form the bandolier.

The invention also relates to the combination of the bandolier of ties with a magazine housing the bandolier in the form of a coil.

A preferred magazine is generally of cylindrical form but of maximum circumference at an intermediate point in its length, the bandolier being spirally coiled within the magazine so that the heads of the ties do not overlap in the direction of the axis of the coil, the maximum diameter of the coil being defined by the final outermost turn of heads. Such a magazine may be adapted for attachment to the exterior of an automatic tie gun. In such a gun, it is often desirable to turn the head relative to the length of the tie in readiness to receive the tail after the latter has been passed around the roll or bundle to be tied. Accordingly, the magazine may have an elongate mouth shaped, as by means of ribs, to bend an emerging tie adjacent the apertured head thereof so that the aperture in the head has a predetermined orientation relative to the length of the tail of the tie.

The preferred magazine has a two part hinged construction to permit insertion of the coiled bandolier.

The invention will now be exemplified with reference to the accompanying drawings, wherein:

Figure 1 shows part of the length of a bandolier

of ties according to one embodiment;

Figure 2 shows a modified embodiment;

Figure 3 shows in enlarged detail a portion of a tie and its connecting bridging pieces in a preferred embodiment of bandolier;

Figure 4 shows a longer length of bandolier;

Figure 5 is a sectional view through an individual tie of the bandolier according to one embodiment;

Figures 6a to 6e show constructional details of an individual tie of the bandolier according to a preferred embodiment;

Figure 7a shows a small part of the length of a bandolier according to an alternative preferred embodiment and Figure 7b is a sectional view thereof;

Figures 8a to 8d show details of the tie in the preferred embodiment of Figure 7;

Figure 9 shows the interior of an opened magazine for the bandolier of Figure 7;

Figure 10 shows the closed magazine; and

Figures 11a and 11b are sectional views on the lines A-A and B-B of Figure 10.

In order to facilitate understanding, reference is first made to Figure 5, which shows one embodiment of individual flexible tie 10, conveniently made of plastics material. The tie 10 comprises an apertured head or

buckle 12 and a tail 14. The buckle 12 has a longitudinal aperture 16 through which, after being passed in a loop 18 around a roll or bundle to be fastened by the tie, the tail 14 is threaded so that ratchet serrations 20 on one surface of the tail engage with a pawl 22 on the inside of aperture 16. This ratchet/pawl arrangement permits the tail 14 to be advanced through the buckle 12 to tighten the loop 18, but prevents the tail of the tightened tie from being pulled back out of the aperture. Conveniently, a slot 24 is provided beneath the pawl 22 which enables the latter to be resiliently depressed by the serrations 20 for ease of advancement of the tail 14 through the buckle 12.

In practice, the tie will preferably be applied to the roll or bundle to be tied by an automatic tie gun. This gun will bend the tie 10 adjacent the buckle 12 through 180 degrees, so that when a pusher on the gun advances the tie around a nose loop closed around the roll or bundle to be tied, the tail 14 will re-enter the gun barrel and be guided into and through the buckle.

In accordance with the present invention, a stock of ties 10 is provided in the form of a belt or bandolier, as exemplified at 30 in Figure 1. The buckles 12 of the ties 10 are integrally connected in juxtaposed relationship,

and the tails 14 are integrally connected by flat bridging pieces 32 disposed in line in the plane of the bandolier 30. The bandolier 30, which may be coiled in a suitable magazine, is intended to supply ties 10 to a tie gun which incorporates knife means for severing the end tie from the bandolier on entry of such tie into position in the gun barrel in front of the pusher.

Preferably, however, operation of the knife means in the gun is facilitated by the bandolier 40 shown in Figure 2, wherein the buckles 12 of the ties 10 are separate and the tails 14 are integrally connected by two spaced lines of bridging pieces 42. This construction of bandolier 40 can also ease the function, carried out within the gun, of bending the buckle 12 into the required orientation. Thus, the bandolier may be formed with the ties pre-bent adjacent the buckles 12, at least by 90 degrees, the bent over buckles being pressed flat for packing, e.g. in a magazine, but springing into the preformed bent condition on entry into the gun barrel to facilitate further turning of the buckle 12 through a completed bend of 180 degrees, i.e. into the condition shown in Figure 5.

A small portion (one tie) of a preferred construction of bandolier is shown at 50 in Figure 3. Here, the ties 10 are separated by somewhat longer

bridging pieces 52 integrally connecting the tails 14. The bridging pieces 52 can be stepped to be of shallower depth (perpendicularly to the plane of the drawing) than the tail 14, at least over a part of the length of said bridging pieces, and in the preferred embodiment connect to the tail through grooves 53 defining lines 54 of weakness or breakage lying just inside the longitudinal edges 56 of the tail in the direction of the width of the tie. In use, the knife means in the gun acts to apply a break-off pressure to the bridging pieces substantially in line with the longitudinal edges 56 of the tail 14, and causes the bridging pieces 52 to break off substantially along the lines 54. Thus, any defects or roughnesses along the breakage lines will not project laterally beyond the full width of the tail 14 between its longitudinal edges 56, and will not interfere with operation of the gun, will not be liable to damage the roll or bundle during tightening of the tie therearound, and will not impair the general appearance and feel of the applied tie. In respects not shown, the bandolier 50 of Figure 3 is similar to the bandolier 40 of Figure 2. However, the construction of the tie 10 is similar to that later described with reference to Figure 6.

In practice, the bandolier will be injection

moulded of plastics material such as mouldable nylon, i.e. Nylon 66. First, sub-units of about 20 ties will be injection moulded with their bridging pieces, and the sub-units joined together at their bridging pieces by ultrasonic or thermal welding to form a complete bandolier of say 500 ties. Figure 4 shows a longer length of bandolier 60 formed of sub-units 62 joined by welds 64. The welded joints 64 will be made as smooth as practicable in order to avoid risk of jamming as the bandolier emerges from a magazine or enters the automatic tie gun.

Figures 6a to 6e show a modified form of tie, a plurality of which can be integrally moulded with bridging pieces to form a bandolier in accordance with the invention. This tie 10 has serrations 72 on the tail 14 which will be disposed on the outside of the loop formed around the roll or bundle when the tie is applied. The serrations 72 engage similarly profiled teeth 74 on the interior of the buckle 12. Channels 76 are provided on the buckle 12 which accommodate ridges 78 along the edges of the tail 14.

Figure 7a shows a part of a bandolier 80 of ties 100 of a different type.

The bandolier 80 is itself generally the same as that previously described with reference to Figure 3, the

bridging pieces 90 connecting to the tails 102 of the ties through grooves 92 defining lines of weakness or breakage 94 just inside the projected lines of the longitudinal edges 96 of the tails 102. Knife means in a tie gun may then act in a similar manner to that already indicated in connection with Figure 3, with similar advantageous results. Figure 7b is a sectional view on the line B-B of Figure 7a, from which is apparent the lesser thickness of the bridging pieces 90 as compared to that of the tails 102 of the ties 100.

The ties 100 differ from the ties 10 previously described in that the buckle consists of a head 104 apertured at 106 transversely to the length of the tie 100, i.e. normally to the plane of the drawing in Figure 7a.

The tie 100 is intended for use in a tie gun which acts to push the tie forwardly around a nose loop closed around the roll or bundle to be tied so that the tail 102 re-enters the barrel of the gun to be threaded through the aperture 106 in the buckle 104, the latter being orientated at right angles to the re-entrant tail. Thus, for enabling the tail 102 to be threaded through the buckle 104, the tie 100 when located in the gun is bent through 90 degrees adjacent the buckle, thus appropriately orientating the buckle aperture 106. The bending of the

tie 100 can be achieved by preforming the tie so that, on entering the gun from a magazine or the like, the buckle springs into required orientation, in similar manner to that previously mentioned in connection with Figure 2, or by a bending means incorporated in the gun, or as later described by a bending means provided in a magazine from which the tie is supplied to the gun.

The construction of an individual tie 100 is shown in Figures 8a to 8d. Figure 8b is a central longitudinal section through the tie and Figure 8d is a section on line D-D of Figure 8a. The tail 102 has serrations 108 which engage with a pawl 110 formed on the inside of the aperture 106 in the buckle or head 104, so that the serrated tail can be threaded and advanced through the buckle to tension the tie around the roll or bundle to be tied, whilst said tail once threaded cannot be pulled back through the buckle. It should be noted that as shown the serrations 108 are formed on the side of the tail 102 which will face inwardly of the loop around the roll or bundle being tied, but the converse arrangement can be used if desired. It will also be clear from the drawings that the tail 102 of the tie 100 has untoothed ribs 112 along its edges, which ribs are accommodated in clear portions 114 of the aperture 106 in the buckle 104 to the sides of the pawl 110.

Figures 9 to 11 show a magazine for housing the bandolier 80 of Figure 7. The magazine 120 is formed of two parts 122, 124 hinged at 126, as indicated in Figure 9, which shows the interior of the opened magazine when empty. The shaped elongate mouth of the magazine 120, formed when the two parts 122, 124 are closed together, is referenced 128 in Figure 10.

The closed magazine 120 is generally of cylindrical form but with a maximum diameter at an intermediate position 130 in its length generally corresponding to the level of one end of the mouth 128. The magazine is shaped in this manner to receive a bandolier 80 of ties 100 which is coiled spirally, with the adjacent turns of buckles in juxtaposed but not overlapping relationship. Thus, when the magazine is full, the one end of the spiral coil formed by a turn of buckles is accommodated at the bottom end 132 of the magazine as shown in Figure 10. As successive turns of buckles progressing up the coil are wound around an increasing number of tails, the diameter of the coil increases to a maximum at a level corresponding to the immediate position 130 along the magazine. This level is the level of the final turn of buckles, i.e. the outermost turn of the coil. The end of the bandolier 80 emerges through the mouth 128 from this final turn. The upper part of the coil progressing

towards the top end 134 of the magazine is constituted by a reducing number of tails, so that the coil gradually reduces in diameter.

The mouth 128 of the magazine is adapted to preform a 90 degrees bend in the tie 100, adjacent the head, as the tie emerges from the magazine into a tie gun to which the magazine is adapted to attach. The purpose of such bend in the tie is to pre-orientate the buckle in the gun ready to receive the tail, as previously described. In order to bend the tie, the mouth is formed with a series of five ribs, 136, 138, 140, 142 and 144, as shown in Figures 10 and 11a. While the tie 100 is emerging from the magazine, the ribs 136, 138, 140 act on the head and adjacent portion of the tie to bend the head through 90 degrees relative to the length of the tail, the latter being held straight and flat by the ribs 142 and 144. The manner in which the 90 degree bend is formed in the tie 100 by the ribs appears clearly from Figure 11a which is a section through the mouth 128 near its exit. In Figure 11a, reference 146 denotes the passage traversed by a buckle, and reference 148 denotes the passage traversed by the bent portion of the tie adjacent the buckle. The rib 136 (not visible in Figure 11a) graduates away from the mouth exit to a shallower bend of greater radius, so

that the bend in the tie is gradually developed as the tie progresses towards the mouth exit.

In practice, several ties 100 at the end of the bandolier 80 will be following one another to emerge from the mouth 128, being suitably advanced by an indexing means in the gun to which the magazine is attached. The previously referred to knife means which acts to break off the bridging pieces will not be operative until the leading tie has emerged from the magazine, and in any event such knife means will be disposed on the remote side of the above-mentioned indexing means from the mouth of the magazine.

Figure 11b serves to show a pawl 150 provided within the mouth 128 of the magazine to prevent the bandolier 80 from sliding back inwardly of the magazine. The ties 100 are drawn out over this pawl 150 to drop in front of it as the bandolier is indexed outwardly of the magazine.

In addition to the possible variations mentioned in the above description, other modifications (both of the bandolier and the bandolier/magazine combination) are possible within the scope of the invention, which is characterised by the appended claims.

Claims

1. An arrangement of flexible ties for supply to a tie gun, characterised by a large plurality of ties (10 or 100) having apertured heads (12 or 104) and tails (14 or 102) trailing therefrom, said large plurality of ties being connected in parallel arrangement by integral bridging pieces (32 or 90) to form a bandolier (30 or 40 or 50 or 60 or 80).

2. An arrangement according to claim 1, characterised in that the ties are connected in parallel arrangement with the apertured heads aligned at one longitudinal edge of the bandolier and the ends of the tails aligned at the other longitudinal edge of the bandolier, and each bridging piece lies in the same plane as the two adjacent ties connected by the bridging piece.

3. An arrangement according to claim 1 or claim 2 characterised in that the end portion of the tail of each tie is formed with integral ratchet like projections (22) for locking engagement with an integral pawl (20) formed within the aperture of the head.

4. An arrangement according to any of claims 1 to 3, characterised in that the head (12) of each tie (10) is apertured in the longitudinal direction of the tie.

5. An arrangement according to any of claims 1 to 3,

characterised in that the head (104) of each tie (100) is apertured in a direction normal both to the length of the tie and to the direction of the length of the bandolier.

6. An arrangement according to any of claims 1 to 5, characterised in that each two adjacent ties in the bandolier are connected by a pair of bridging pieces extending between the tails of said ties, said bridging pieces being aligned on two lines spaced across the width of the bandolier.

7. An arrangement according to any of claims 1 to 6, characterised in that the bridging pieces connect to each tie on breakage lines (54) disposed slightly inwardly of the width of the tie from the opposed longitudinal edges (56) of the latter.

8. An arrangement according to any of claims 1 to 7, characterised in that sub-units (62) of ties connected by bridging pieces are individually formed by injection moulding of plastics material such as nylon and the sub-units of ties are integrally connected by plastics welding (64) to form the bandolier.

9. An arrangement comprising a bandolier according to any of claims 1 to 8 in combination with a magazine housing the bandolier, characterised in that the magazine (120) is generally of cylindrical form but of

maximum circumference at an intermediate point (130) in its length, the bandolier being spirally coiled within the magazine so that the heads of the ties do not overlap in the direction of the axis of the coil, the maximum diameter of the coil being defined by the final outermost turn of heads.

10. A bandolier/magazine combination according to claim 9, characterised in that the magazine has an elongate mouth (128) incorporating ribs (136 to 144) adapted to bend an emerging tie adjacent the apertured head thereof so that the aperture in the head has a predetermined orientation relative to the length of the tail of the tie.

Fig. 1.

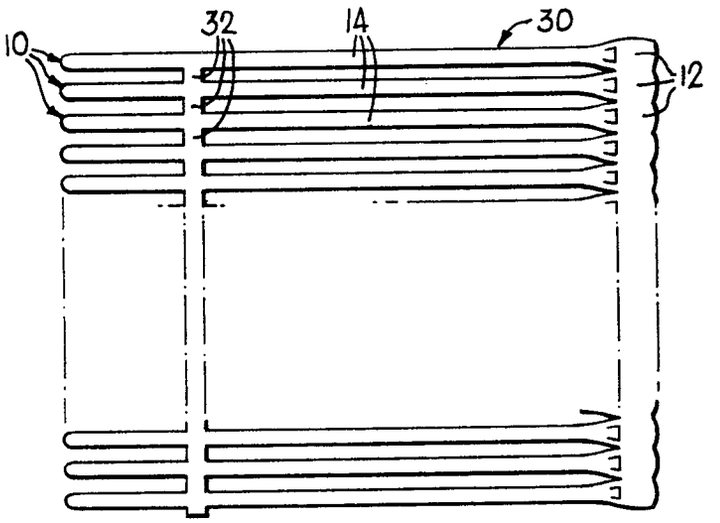


Fig. 2.

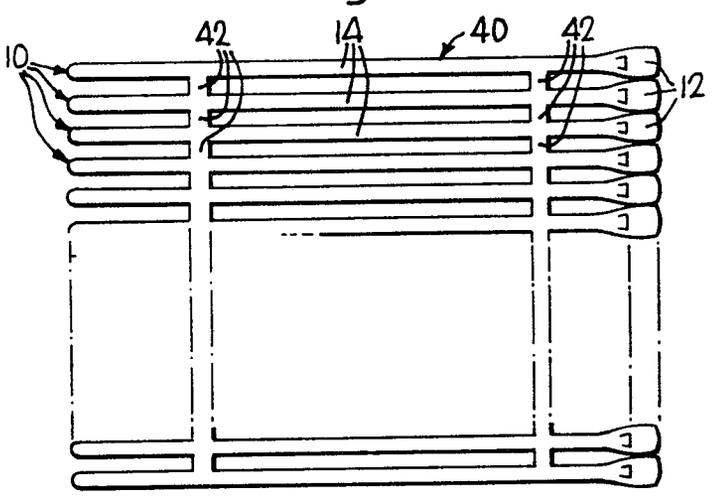


Fig.5.

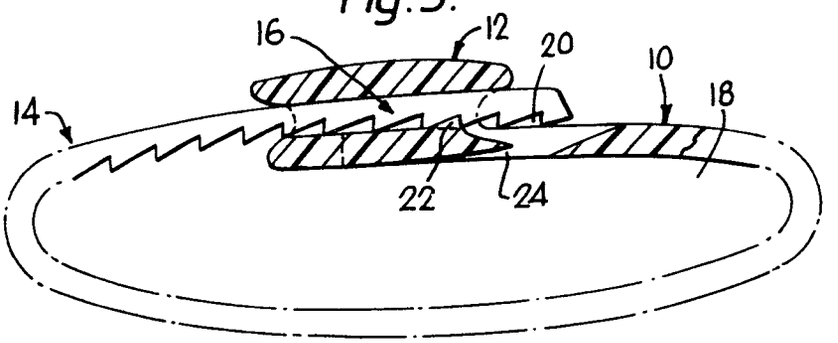
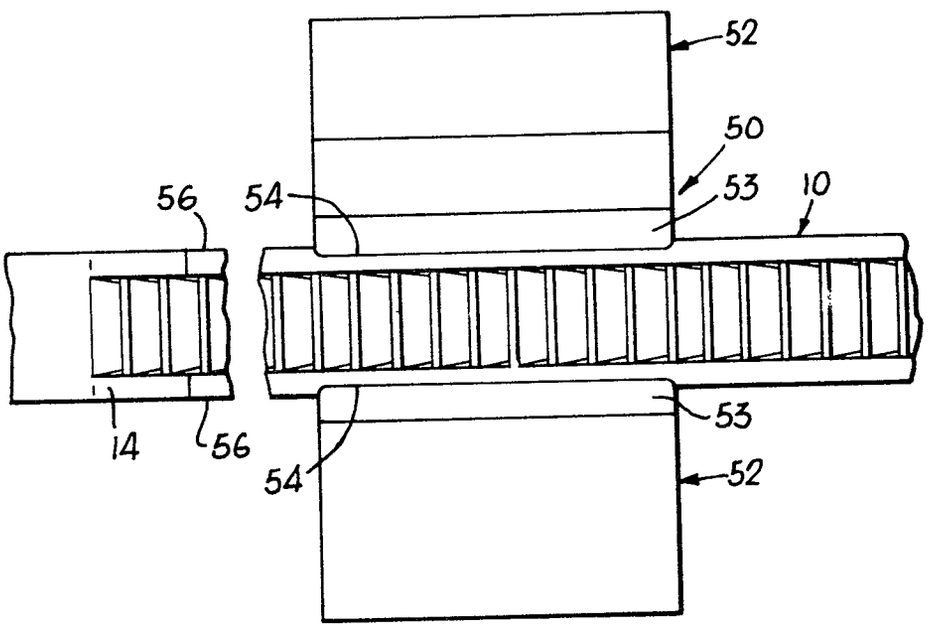


Fig.3.



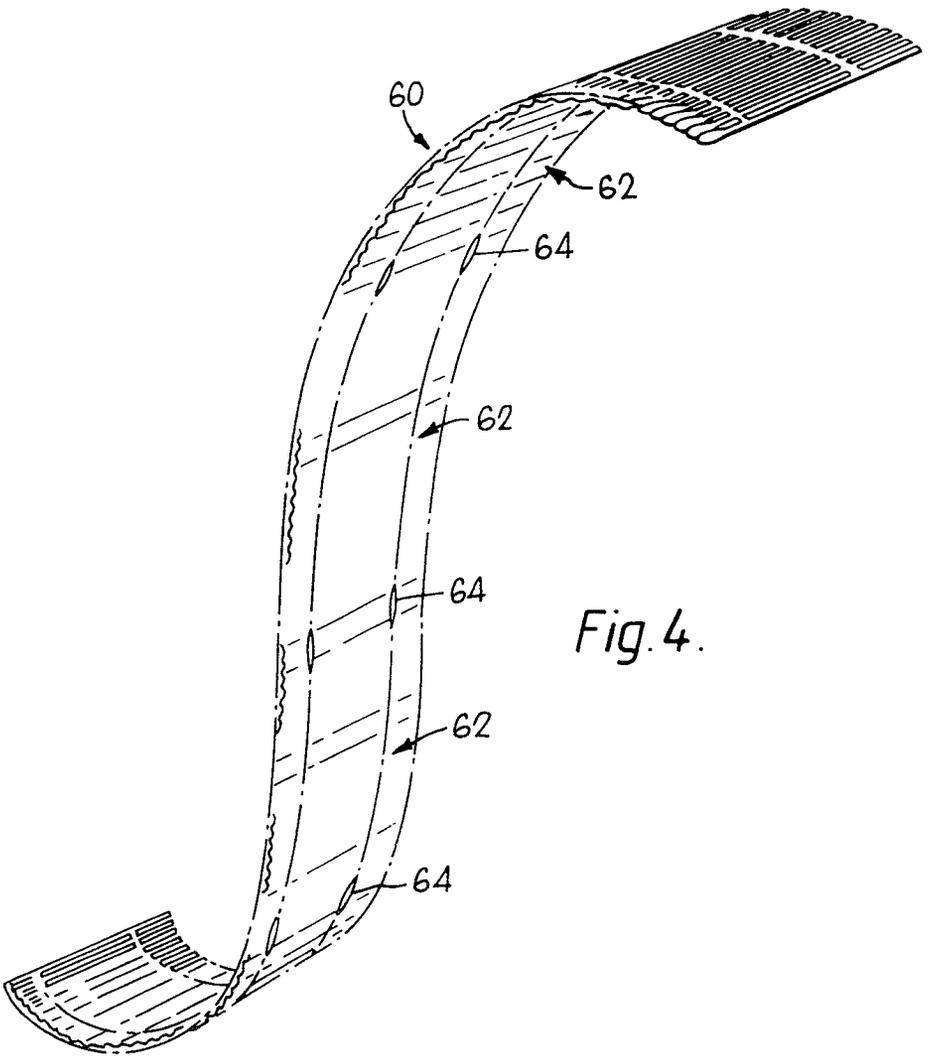


Fig. 4.

Fig.6a.

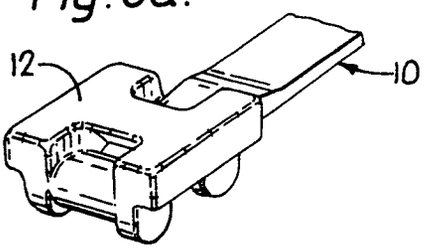


Fig.6b.

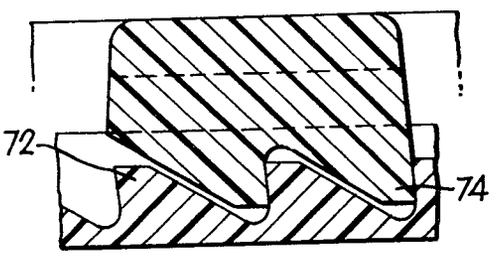


Fig.6c.

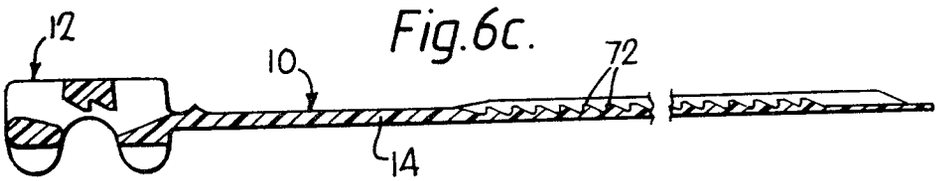


Fig.6d.

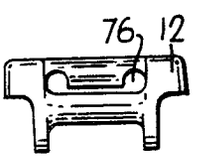
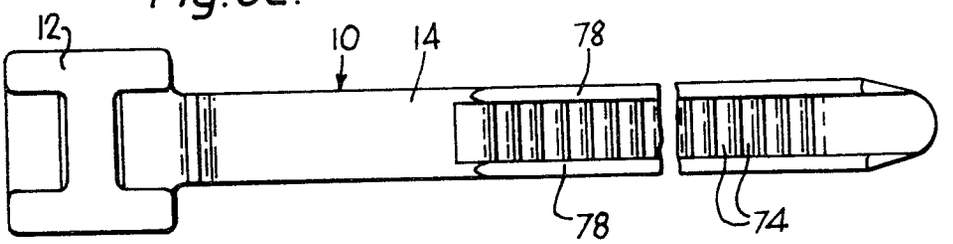


Fig.6e.



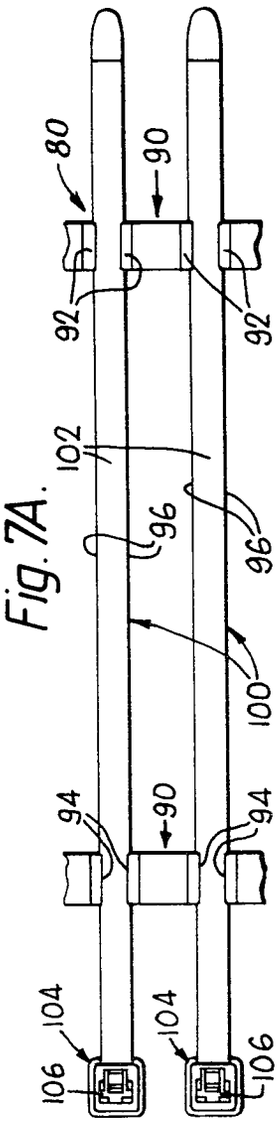


Fig. 7A.

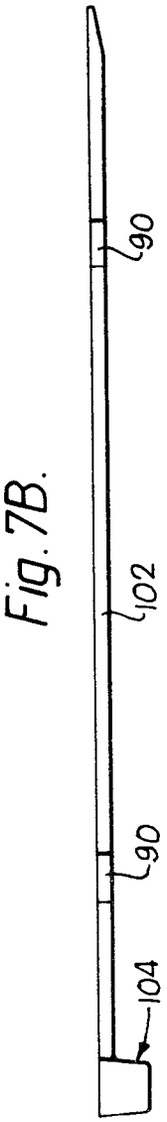


Fig. 7B.

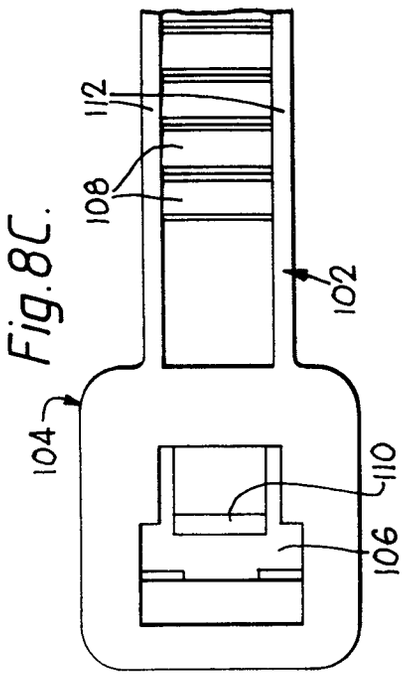


Fig. 8C.

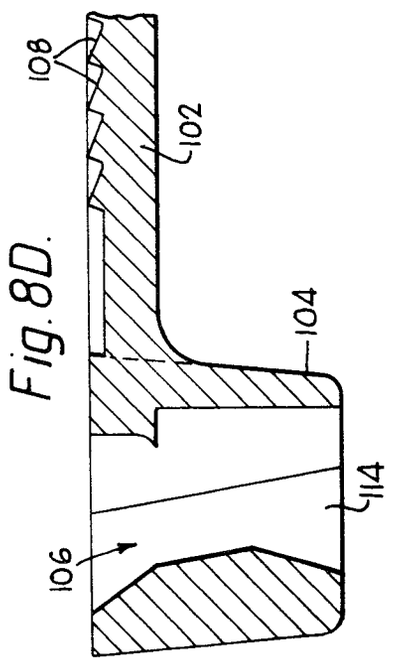


Fig. 8D.

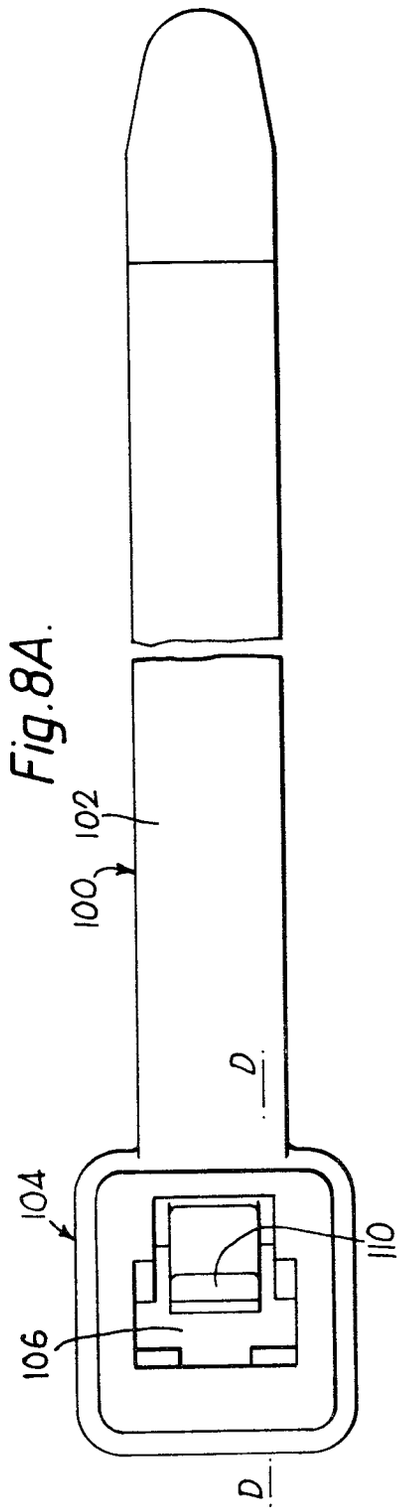


Fig.8A.

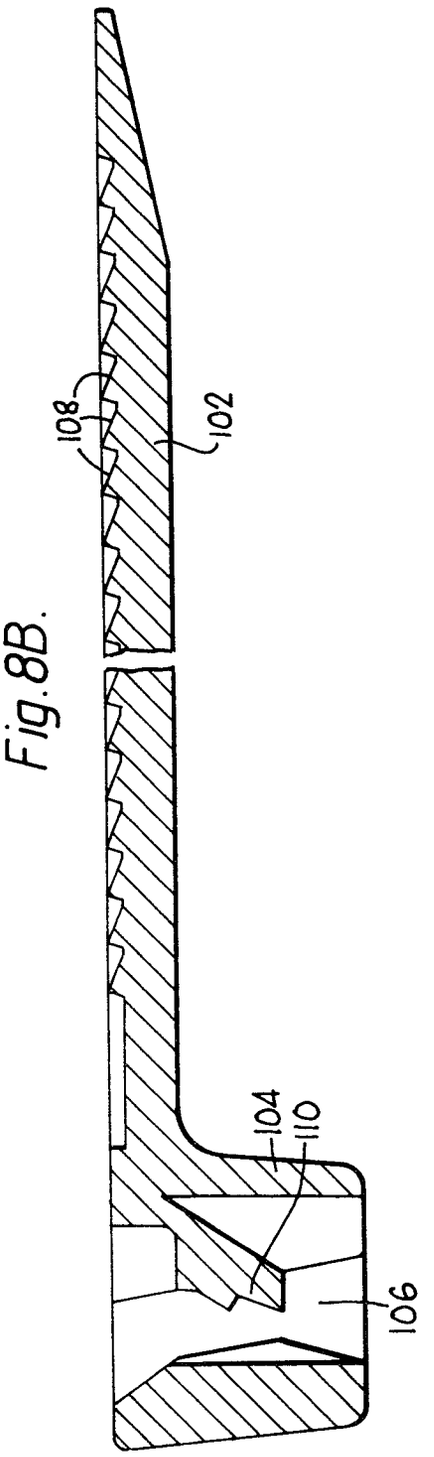
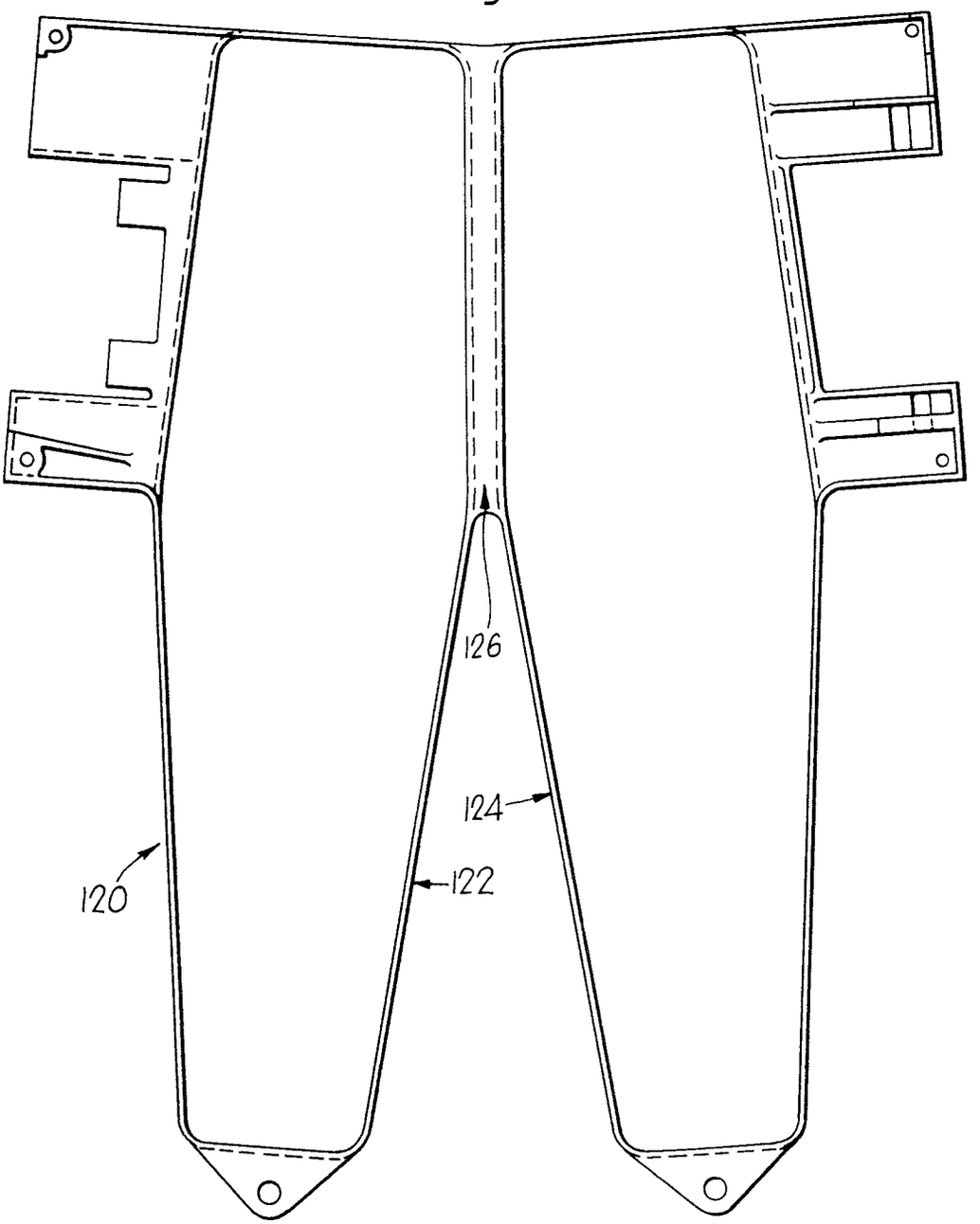


Fig.8B.

Fig.9.



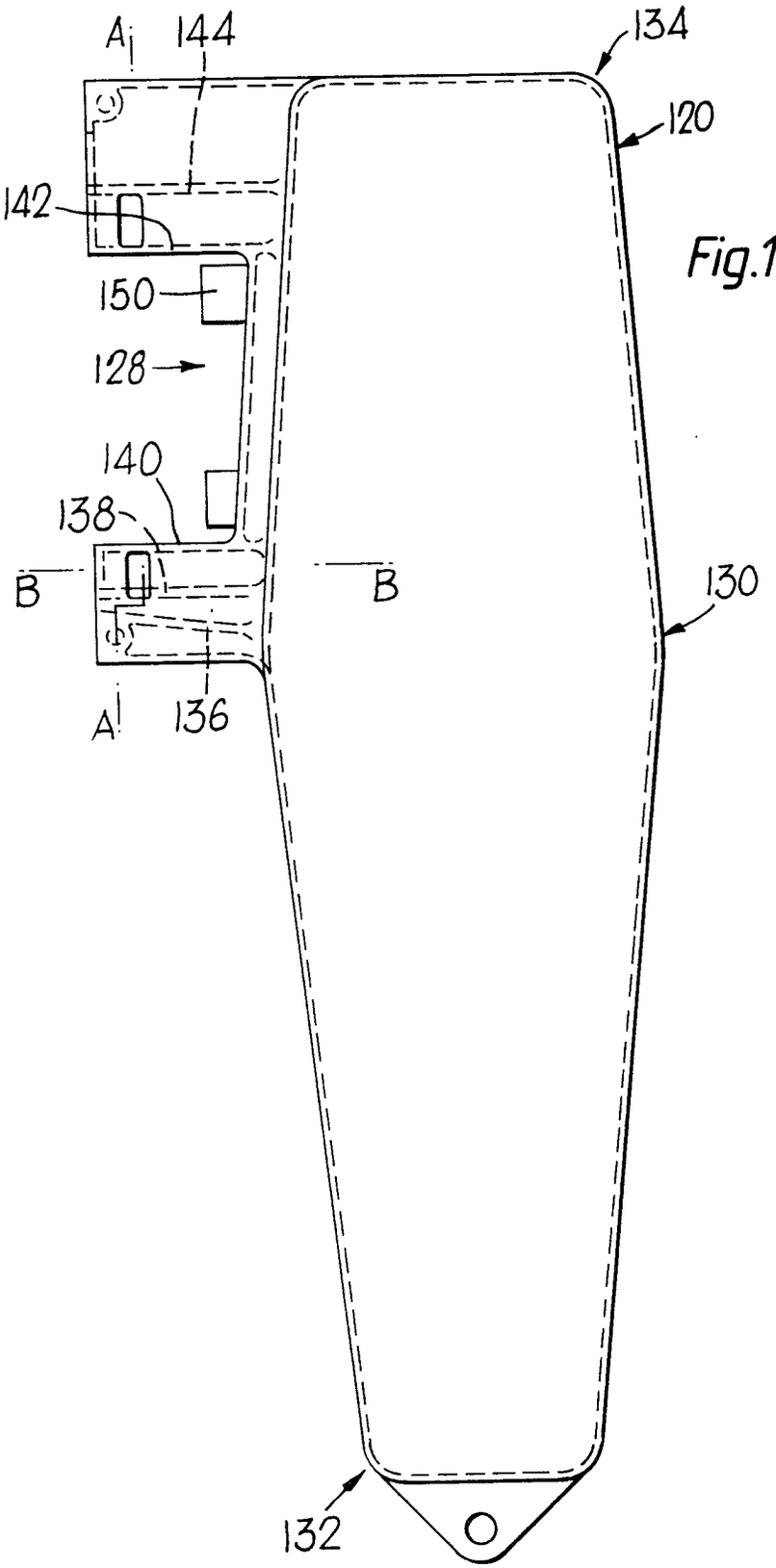


Fig.10.

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Fig.11A.

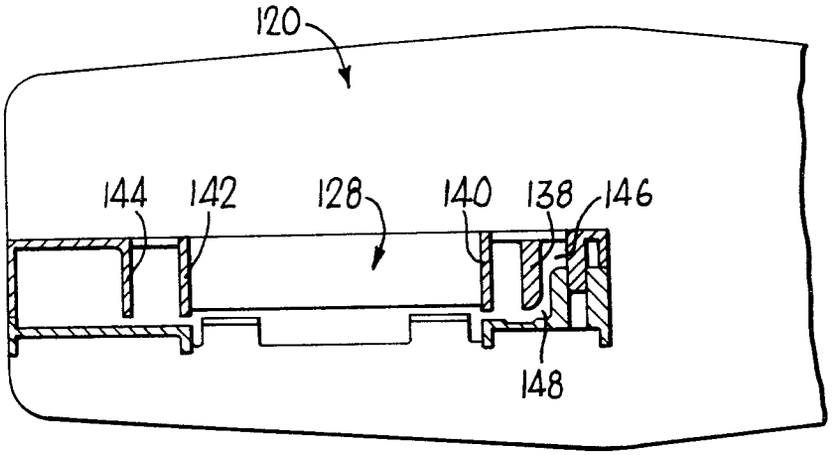
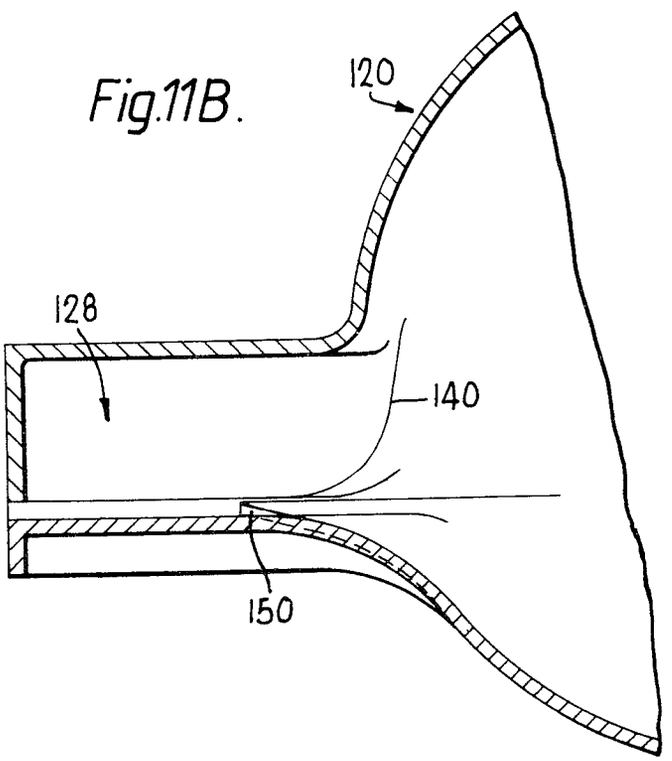


Fig.11B.



European Patent Office

EUROPEAN SEARCH REPORT

0035368
Application number

EP 81 30 0792

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	US - A - 3 147 522 (SCHUMM) * Patent specification * ----	1,2,3,4

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

B 65 D 63/10

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

B 65 D
B 65 B

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

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25-05-1981	VANTOMME

EPO Form 1503.1 06.78