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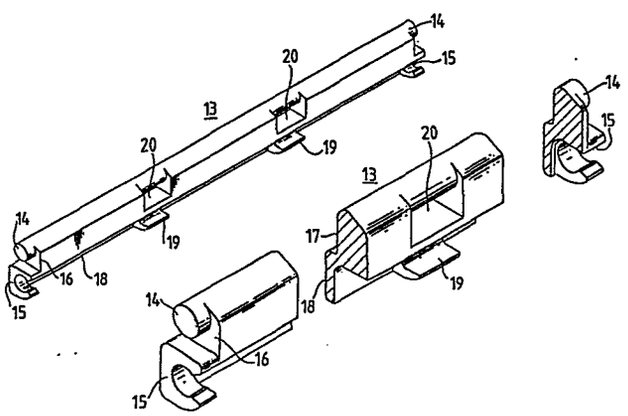
(54) Injection moulded shutter.

(57) A shutter (7) of the kind which comprises a series of inter-connected strips (8, 13) which extend laterally of the shutter so as to provide a flexible form of shutter (7) or door capable of negotiating bends during its opening and closing operation.

The strips (13) are injection moulded from plastics material and have integral male and female connecting members (14, 15) at their ends. These connecting members are formed adjacent a shoulder (16) so that when the connecting members (14, 15) are joined together the shoulder (16) prevents relative lateral movement of the strip (13) because the inner surfaces of the female members (15) engage the shoulders (16) on adjacent strips (13). Throughout the length of the strip (13) is formed a recess (17) and a corresponding extension portion (18) so that when the strips (13) are engaged to form a shutter (7) the portions (18) lie in adjacent recesses (17) on adjacent strips (13) thus forming a uniform shutter surface and preventing or substantially preventing tampering with the shutter (7).

To further strengthen the shutter (7) and to assist in preventing tampering a tongue (19) is formed on each strip (13) and a corresponding recess (20) so that when the strips (13) are joined together the tongues (19) of all the strips (13) engage in recesses (20) of adjacent strips (13).

A preferred use of the shuter (7) is a door to a banknote cassette.



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Injection Moulded Shutter

This invention relates to a shutter of the kind which comprises a series of inter-connected strips which extend laterally of the shutter so as to provide a flexible form of shutter or door capable of negotiating bends during its opening and closing operation. Shutters of this kind are used as closures for boxes and containers such as cassettes containing bank-notes, vertical filing cabinets, and for doors for garages, lock-up shops etc.

An object of this invention is to provide a shutter which is inexpensive to manufacture, has a minimum of parts, and is substantially tamper-proof when used in appropriate circumstances such as when used as a cassette door.

In accordance with the present invention there is a flexible shutter comprising a series of inter-connected strips which extend laterally of the shutter, each strip having at each end integral male and female connecting members whereby the strips may be joined in series to form the shutter, each strip also comprising a recess running the length of the strip adapted to receive a corresponding overlapping portion of an adjacent strip. The strips are preferably individually formed by injection moulding.

Preferably the individual strips are formed from plastics material.

The strips may be reinforced by embedding reinforcement wires or reinforcement strips in the individual injection moulded plastic strips.

Each of the strips may be formed with a protruding tongue and a recess so positioned that when the strips are joined at their ends the tongue of one strip enters the recess of an adjacent strip so as to interlock the strips to prevent tampering and to allow flexibility of the strips.

Preferably also the male and female connecting members are formed adjacent shoulders at the ends of the

strips so that when the male and female connecting members are engaged relative lateral movement of the strips is prevented.

The shutter may be used as the door of a cassette, particularly a cassette intended to contain bank-notes, and in this case the ends of the strips forming the shutter are preferably engaged in guides at each side of the cassette so that the male and female connecting members are totally enclosed within the guides.

In the accompanying drawings:-

Figure 1 is an isometric view of a bank-note cassette having a shutter door made in accordance with the invention;

Figure 2 shows one of the injection moulded strips which will form the shutter door;

Figure 2A shows an enlarged view partly in section of the same strip;

Figure 3 shows the way in which the individual strips of Figure 2 are assembled to form a shutter; and

Figure 4 is a section through one end of an assembled shutter illustrating the inter-engaging male and female portions which are enclosed within a guide on the cassette.

The bank-note cassette shown in Figure 1 is shown in more detail in our published UK Patent Specification No. 2039264A.

The cassette is in the form of a strong box 6 which has at one end a shutter 7 formed of a number of strips 8 made in accordance with the invention. The lateral ends of the strips forming the shutter are when the shutter is closed engaged in guides 9 and 10 at the sides of the cassette. The guides are of U-shaped sections so as to receive the ends of the shutter.

The cassette is arranged so that when it is put into an appropriate machine a pair of rods 11 and 12 enter

the cassette and operate mechanism to open the shutter.

The full details of this cassette will not be described but they may be obtained by reference to our published UK Patent Specification 2039264A.

In Figures 2 and 2A is shown a single moulded plastic strip adapted to form a shutter in accordance with the invention. In Figure 2A the strip 13 is shown broken into three parts for convenience of illustration but it will be appreciated that the three parts are injection moulded to form a single unitary strip with integral male and female connecting members 14 and 15 at each end of the strip as shown in Figure 2. These connecting members are formed adjacent a shoulder 16 so that when the connecting members are joined together the shoulder 16 prevents relative lateral movement of the strip because the inner surfaces of the female members 15 engage the shoulders 16 on adjacent strips. Throughout the length of the strip is formed a recess 17 (Fig.2a) and a corresponding extension portion 18 so that when the strips are engaged to form a shutter the portions 18 lie in adjacent recesses 17 on adjacent strips thus forming a uniform shutter surface and preventing or substantially preventing tampering with the shutter.

To further strengthen the shutter and to assist in preventing tampering tongues 19 is formed on each strip and corresponding recesses 20 so that when the strips are joined together the tongues 19 of all the strips engage in recesses 20 of adjacent strip. This is best seen in Figure 3 where it is seen that several of the strips have been joined together by engaging the male and female inter-connecting members at their ends. The formation of the connecting members is such as to allow flexibility of the shutter, security in joining the strips to form the shutter and restriction of relative lateral movement of the strips.

When the shutter is used as the door of a cassette of the type shown in Figure 1 of the drawings the male and female inter-connecting members 14 and 15 will be totally contained within the U-shaped guides 9 and 10 which extend around the bend at the front top edge of the cassette and into the area below the lid of the cassette.

A portion of the guide 9 is shown in Fig. 3 and also somewhat diagrammatically in Figure 4 with one end of the shutter shown contained within the guide. Portions of the ends of the strips forming the shutter are shown broken away and in sections to illustrate the way in which the male and female members are contained totally within the guides 9 and 10 and to illustrate the way in which the strips bend to follow the contour of the guides.

Because the male and female members at the ends of the shutter are contained within these guides and can be dimensioned so as to be a very close fit in the guides with virtually no play, the wear on the shutters is restricted.

Also by enclosing the inter-connecting male and female members totally in the guides it is very difficult for them to become disconnected or for anybody to attempt to disconnect them by tampering with the shutter.

The injection moulded plastic strips are very inexpensive and thus the total cost of producing a shutter may be reduced by making use of this invention.

The material used for the injection moulding of the strips is preferably glass filled acetal or nylon.

The strips 13 may be reinforced by embedding elongated reinforcement members such as Nylon cord, metal strips, rods or wires or glass or other fibres in the strips 13.

Claims:

1. A flexible shutter comprising a series of interconnected strips (13) which extend laterally of the shutter, each strip (13) having at each end integral male and female connecting members (14,15) whereby the strips (13) may be joined in series to form the shutter characterised by each strip also comprising a recess (17) running the length of the strip adapted to receive a corresponding overlapping portion (18) of an adjacent strip (13).

2. A flexible shutter according to claim 1 characterised in that the strips (13) are individually formed by injection moulding.

3. A flexible shutter according to claim 1 or claim 2 characterised in that the individual strips (13) are formed from plastics material.

4. A flexible shutter according to any preceding claim characterised in that the strips (13) are reinforced by embedding reinforcement wires or reinforcement strips in the individual plastic strips.

5. A flexible shutter according to any preceding claim characterised in that the strips (13) are formed with a protruding tongue (19) and a recess (20) so positioned that when the strips are joined at their ends the tongue (19) of one strip (13) enters the recess (20) of an adjacent strip (13) so as to interlock the strips to prevent tampering and to allow flexibility of the strips.

6. A flexible shutter according to any preceding claim characterised in that the male and female connecting members (14,15) are formed adjacent shoulders (16) at the ends of the strips (13) so that when the male and female connecting members (14,15) are engaged relative lateral movement of the strips (13) is prevented.

7. A flexible shutter according to any preceding

claim characterised in that it is used as the door (7) of a cassette (6).

8. A flexible shutter according to claim 7 characterised in that the ends of the strips (13) forming the shutter are engaged in guides (9,10) at each side of the cassette so that the male and female connecting members are totally enclosed within the guides.

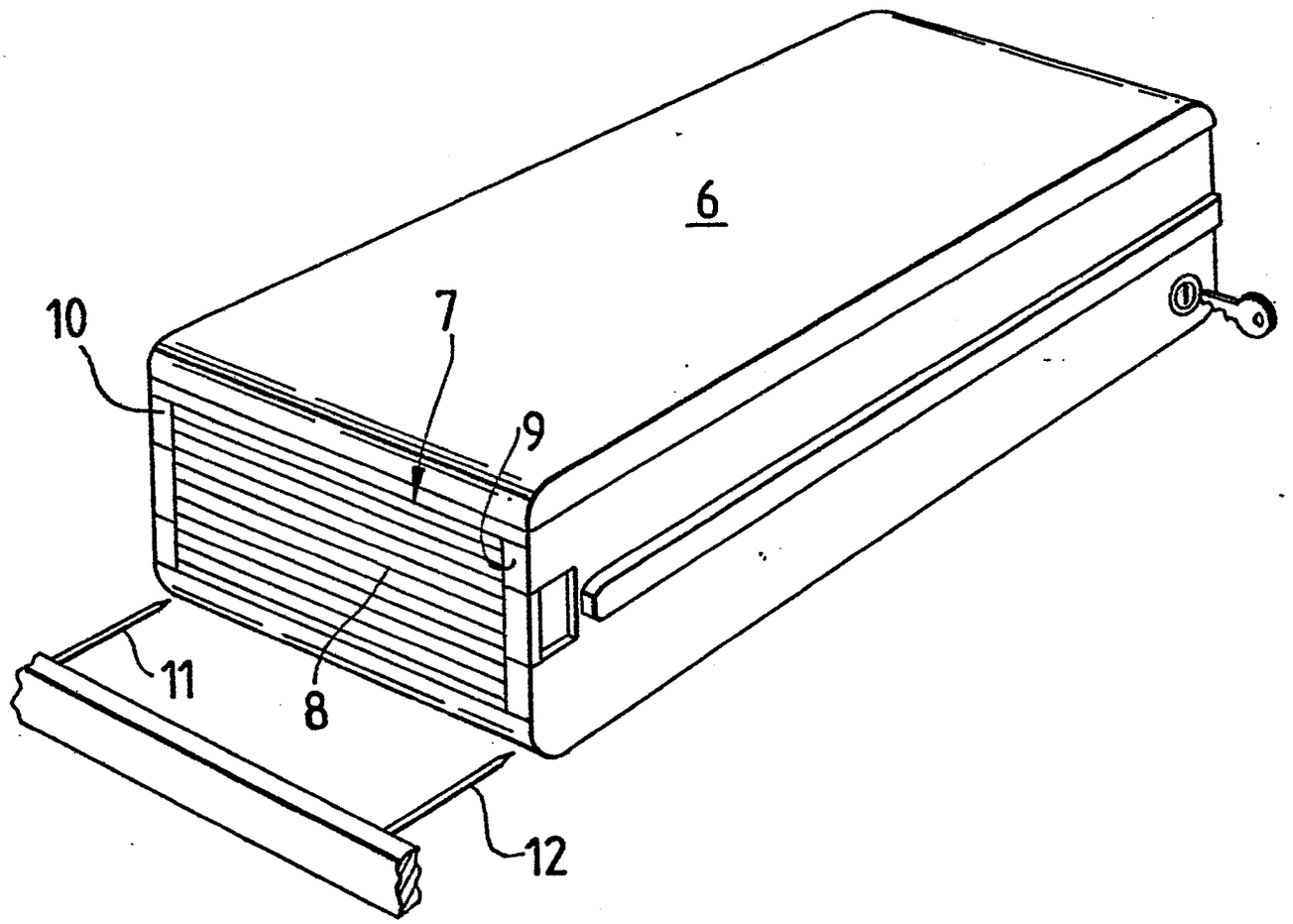
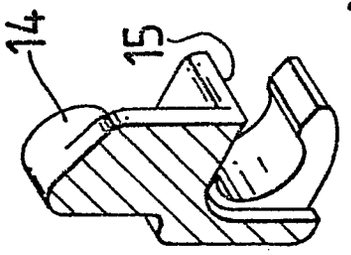


FIG.1.



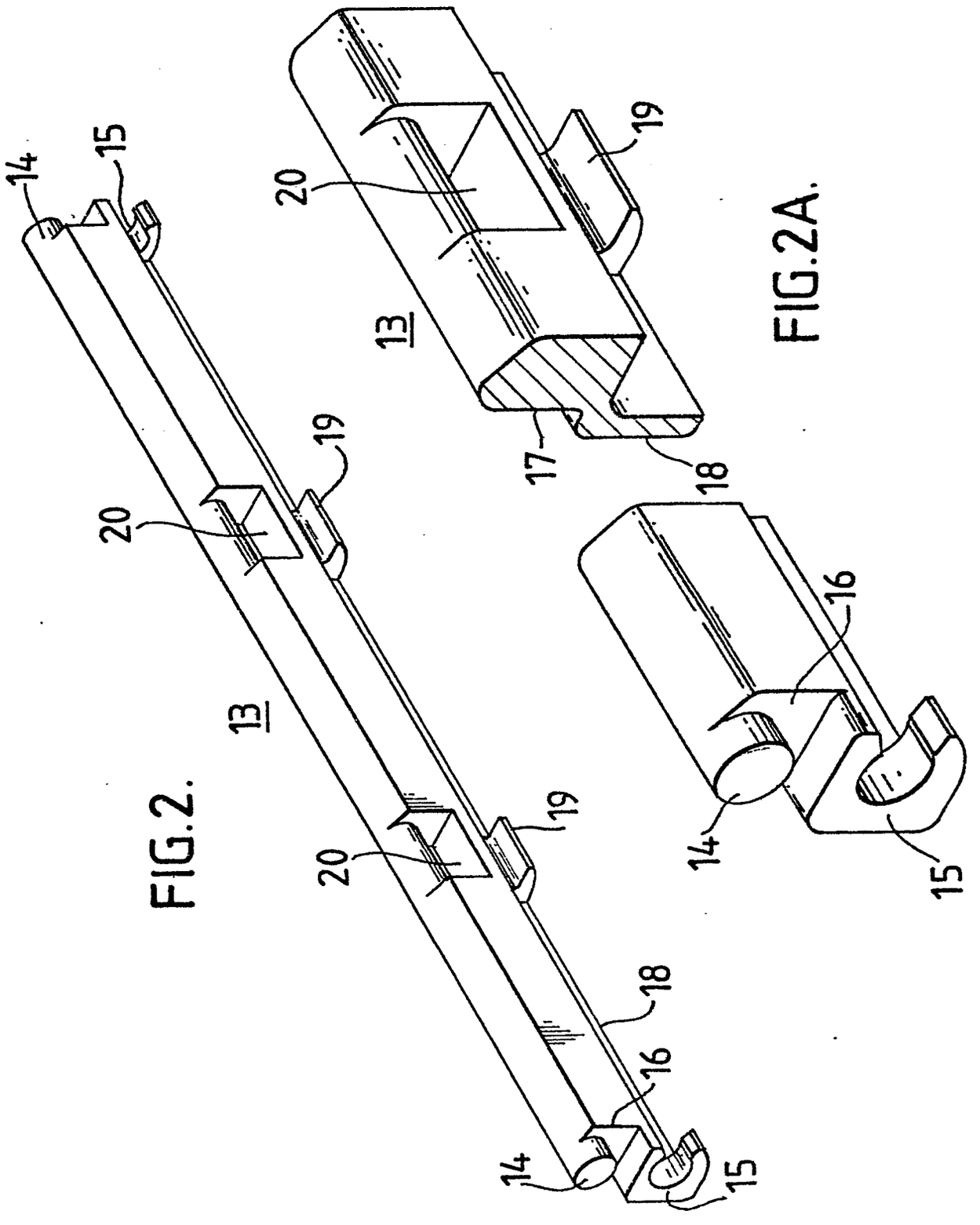


FIG.2.

FIG.2A.

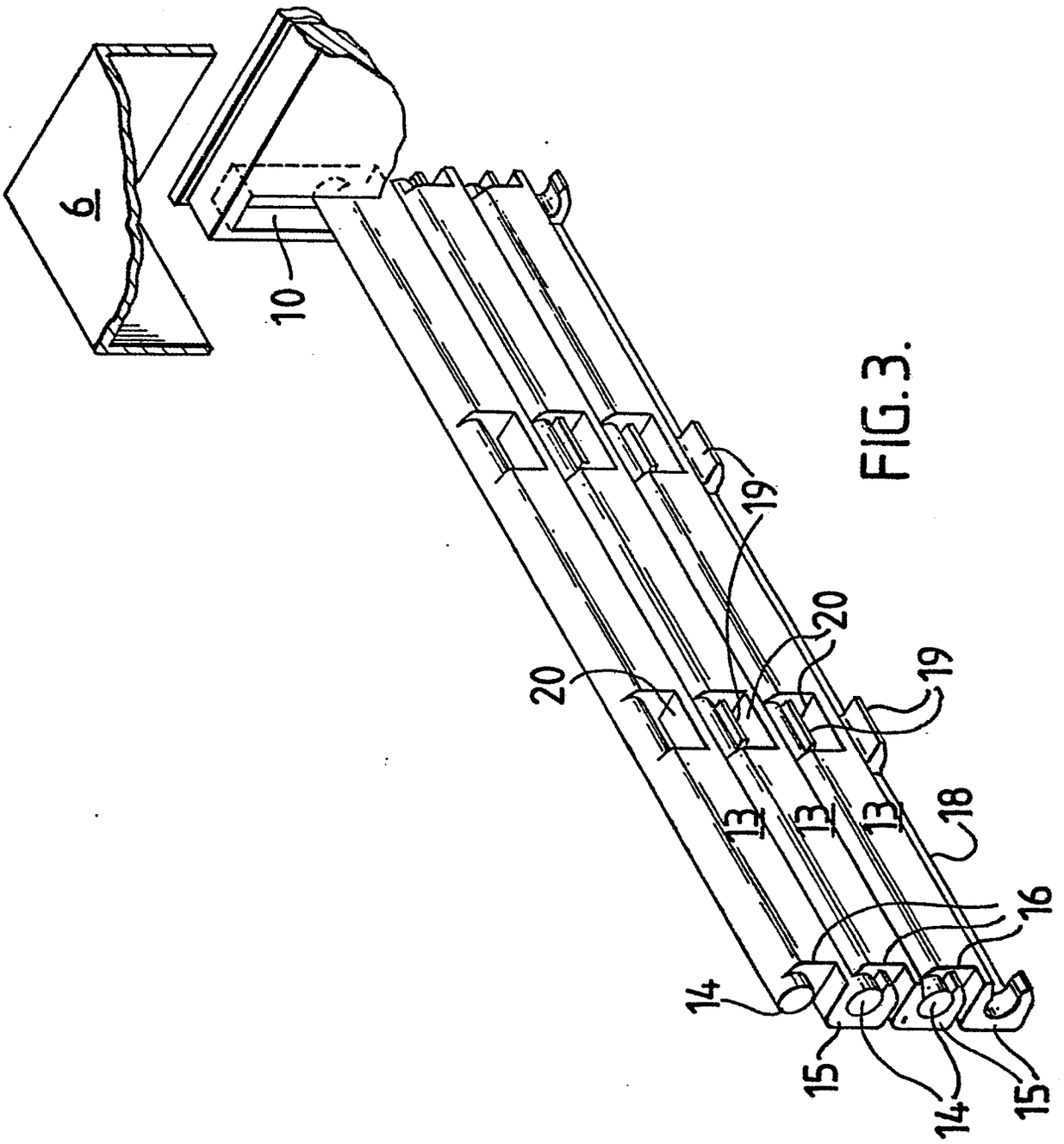


FIG.3.

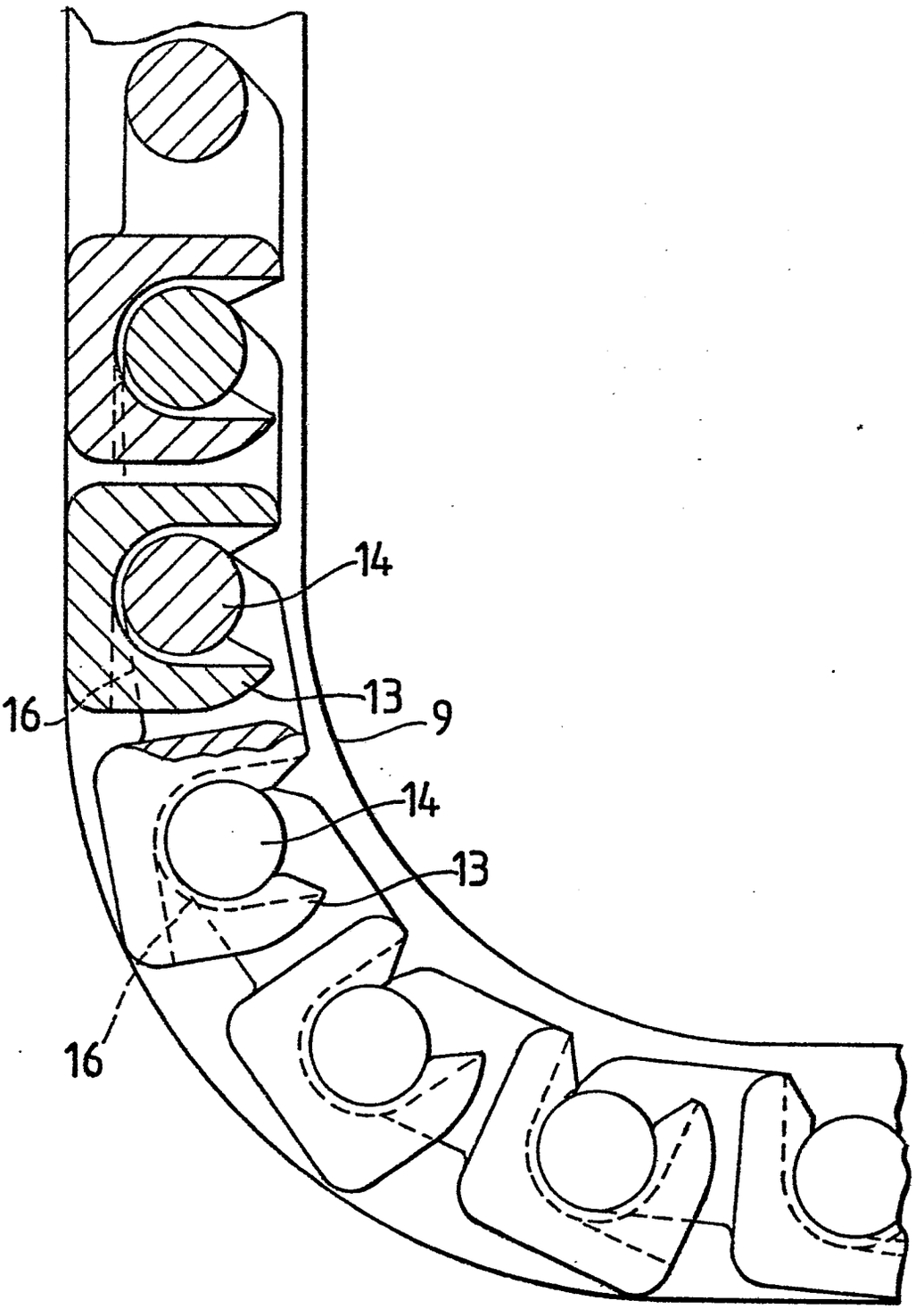


FIG.4.

European Patent Office

EUROPEAN SEARCH REPORT

0172953
Application number

EP 84 30 5828

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	AT-B- 236 093 (KLAUS BRASELMANN K.G.) * Complete document *	1,3,5	E 06 B 9/16
A	CH-A- 332 404 (ROLLADENFABRIK A. GRIESSER AG) * Complete document *	2-4	
A	GB-A-1 046 391 (J.P. BOOTH) * Figures 1-5; page 1, lines 62-64 *	5	
A	DE-U-7 118 130 (WAREMA RENKHOFF KG) * Figures 1-4a; claim 1; page 5, column 2 *	6	TECHNICAL FIELDS SEARCHED (Int. Cl.4)
D,A	GB-A-2 039 264 (DE LA RUE CROSFIELD LTD.) * Figure 1; page 2, lines 78-84 *	7,8	E 05 G 1/00 E 06 B 9/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	03-04-1985	KRABEL A.W.G.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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