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(71) Applicant *(for all designated States except US):* NORFROST LIMITED [GB/GB]; Murrayfield, Castletown, Caithness KW14 8TY (GB).

(72) Inventor; and
(75) Inventor/Applicant *(for US only) :* GRANT, Alexander [GB/GB]; The Chimney's, Castletown, Caithness (GB).

(74) Agent: FITZPATRICKS; 4 West Regent Street, Glasgow G2 1RS (GB).

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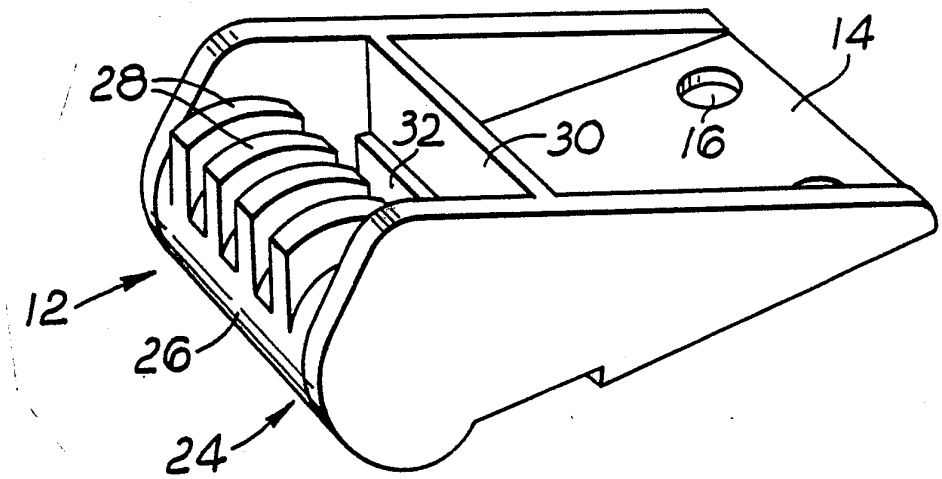
(54) Title: HINGE



(57) Abstract

The hinge comprises first and second components (10, 12) for attachment to respective structural members. A substantially cylindrical surface (26) on the second component (12) snap-fits into a part-cylindrical bearing surface (20) on the first component (10). The components (10, 12) have interengaging formations which act to resist closing over a predetermined arc; in the embodiment shown one set of interengaging formations comprises blades (28) sliding in slots (22), and another set comprises protrusions (32, 34).

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HINGE

This invention relates to hinges.

The invention is particularly but not exclusively concerned with hinges for use in applications such as the lid of a chest-type freezer. In such applications it is desired to provide a hinge which will allow the lid to be lifted to an open position and will retain the lid in that position until it is positively closed by the user. It is also desirable that the user may open the lid to any selected angle within a range of opening angles. These objects have conventionally been met by the use of a metal hinge comprising two body components, a hinge pin, and a counterpoise torsion spring. Such an arrangement is expensive and complex to assemble.

It is therefore an object of the present invention to provide a hinge which will allow a lid to be held open without the use of a counterpoise spring.

Accordingly the present invention provides a hinge as defined in the claims appearing hereinafter.

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

Figure 1 is a perspective view of a body component;

Figure 2 is a perspective view of a lid component;

Figure 3 is a side view illustrating the assembly of the hinge;

Figure 4 is a side view of the hinge in the closed position;

Figure 5 is a side view of the hinge in a partially open position;

Figure 6 is a side view of the hinge in a fully open position; and

Figure 7 is a perspective view showing part of a hinge arrangement in accordance with another embodiment.

Referring to Figures 1 and 2, the hinge comprises a body component 10 which is integrally moulded from polypropylene and a lid component 12 which is integrally moulded from ABS. Each of the components 10 and 12 is provided with a plate-like portion 14 having holes 16 for fastening means, such as self-tapping screws.

The body component 10 has an end portion 18 of generally part-cylindrical form whose interior is moulded to provide a number of ribs having inside faces 20 providing a part-cylindrical bearing surface and defining four circumferential grooves 22.

The lid component 12 has an end portion 24 comprising a solid cylindrical part 26 from which extend four blades 28.

Turning to Figure 3, the hinge can be assembled by orienting the parts 10 and 12 as shown and forcing them together. Since the bearing surface 20 extends over more than 180° the cylindrical part 26 becomes trapped therein as shown in Figure 4. This arrangement makes the hinge particularly suited to automatic assembly methods.

In this assembled condition, the blades 28 are positioned within the grooves 22 to provide mutual engagement as discussed in more detail below. The lid component 12 has a transverse wall portion 30

which includes a protrusion 32. The outer surface of the body component end portion 18 is of part-cylindrical shape but is provided with a convex protrusion 34. The protrusions 32 and 34 are positioned and dimensioned such that they engage with each other over an opening arc from the 40° position shown in Figure 5 to a 60° position to retain the lid open.

Preferably the blades 28 and grooves 22 are also arranged to provide engagement over an opening arc between 40° and 90°. This angle of engagement may be provided by suitable shaping of the thickness of the blades 28 and/or the grooves 22, or by the provision of protrusions on one or other of these at appropriate angular spacings.

The engagement between the protrusions 32 and 34, and that between the blades 28 and grooves 22, is partly of a frictional nature since the relevant surfaces are in rubbing contact. Additionally, however, the parts are so dimensioned that the interengagement causes elastic deformation; this produces a high degree of force akin to a spring force opposing closing movement, eg closing movement of a lid under gravity.

The hinge of this embodiment therefore rotates freely from the closed position to the 40° position. Between 40° and 60° (where the closing effect of the weight of the lid is greatest) a relatively high frictional resistance is provided by the protrusions 32 and 34 acting as a primary friction pad plus the blades and grooves 28, 20 acting as a secondary friction pad, and between 60° and 90° a relatively lower degree of friction is provided by the secondary friction pad only.

Fig 7 illustrates a modified embodiment in which two lid components 12', each substantially similar to the lid components 12 of the first embodiment, are formed integrally as part of a moulding 36. The moulding 36 has a plane outer surface 38 and an internal flange 40 which can be received within a box-like lid such that the moulding 36 forms an end cap for the lid. This moulding 36 can be used with the body components 10 of Figs 1-6.

CLAIMS

1. A hinge comprising:

a first component (10) and a second component (12), each having a first portion (14) for attachment to a respective structure;

the first component (10) having a second portion (18) shaped to provide a concave bearing surface (20) of generally part-cylindrical form extending over an arc greater than 180°;

the second component (12) having a second portion (24) presenting a convex generally cylindrical surface (26) of a diameter matching that of said bearing surface (20);

said second portion (18) of the first component (10) being arranged to receive said second portion (24) of the second component (12) in a snap-fit manner with said surfaces in engagement;

characterised in that said components (10,12) are also provided with formations (28,32;22,34) which interengage over a predetermined part of the opening arc of the hinge in such manner as to produce elastic deformation thereby providing a force tending to maintain the position of the hinge.

2. The hinge of claim 1, in which each component (10,12) is a one-piece plastics moulding.

3. The hinge of claim 1, or claim 2, in which said interengaging formations comprise first formations (32,34) which interengage over a first arc, and second formations (22,28) which interengage over said first arc and additionally over a second arc.

4. The hinge of claim 3, in which said first formations comprise a convex protuberance (34) formed on a part-cylindrical outer surface of said second portion (18) of the first component (10) and

a protuberance (32) formed on the second component (12).

5. The hinge of claim 3 or claim 4, in which said second formations comprise at least one blade (28) extending radially from said convex surface (26) of said second component (12), and a groove (22) in said bearing surface (20) in which the blade engages over said first and second arcs.

6. A hinge according to any preceding claim, in which the second component (12') is moulded integrally with a structural member (36) an additional like second component (12') also being moulded integrally therewith form part of a second hinge.

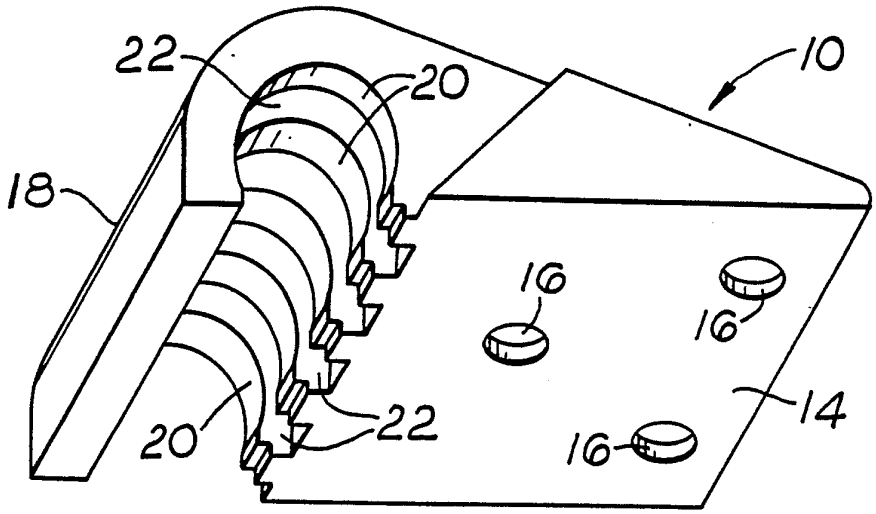

Fig.1

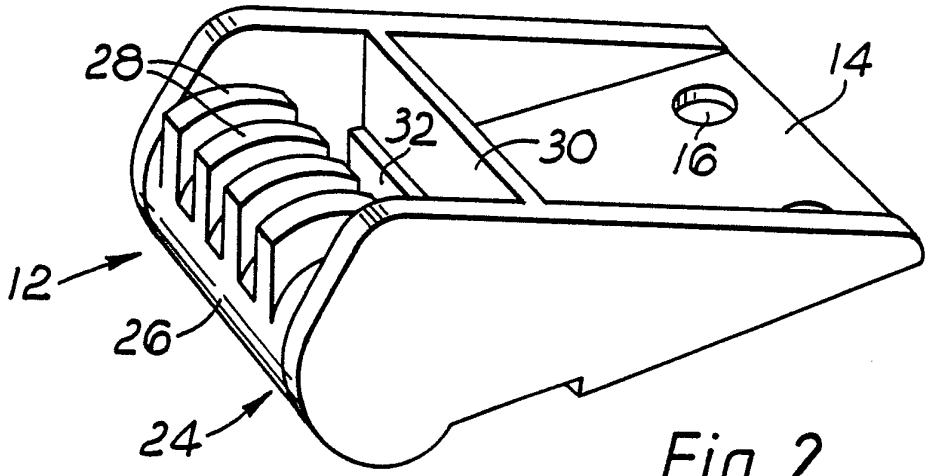

Fig. 2

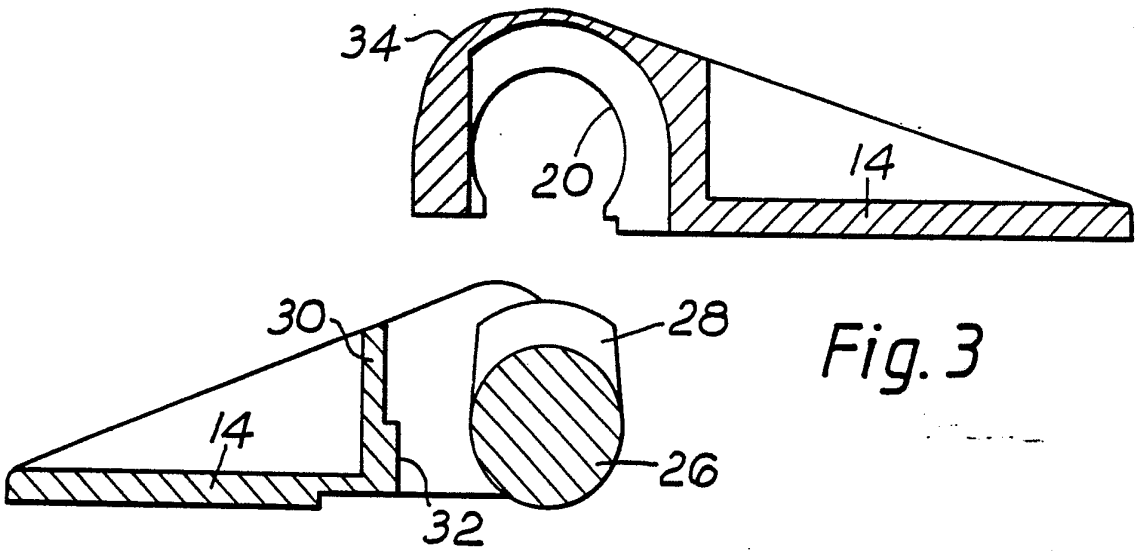

Fig. 3

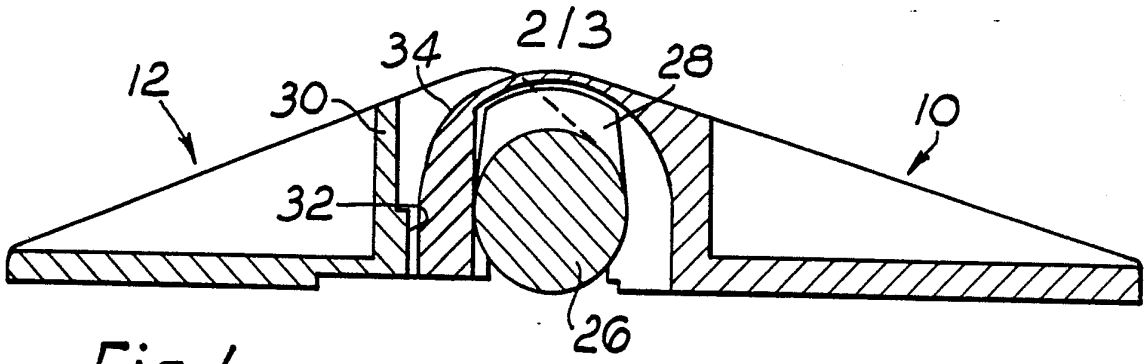

Fig. 4

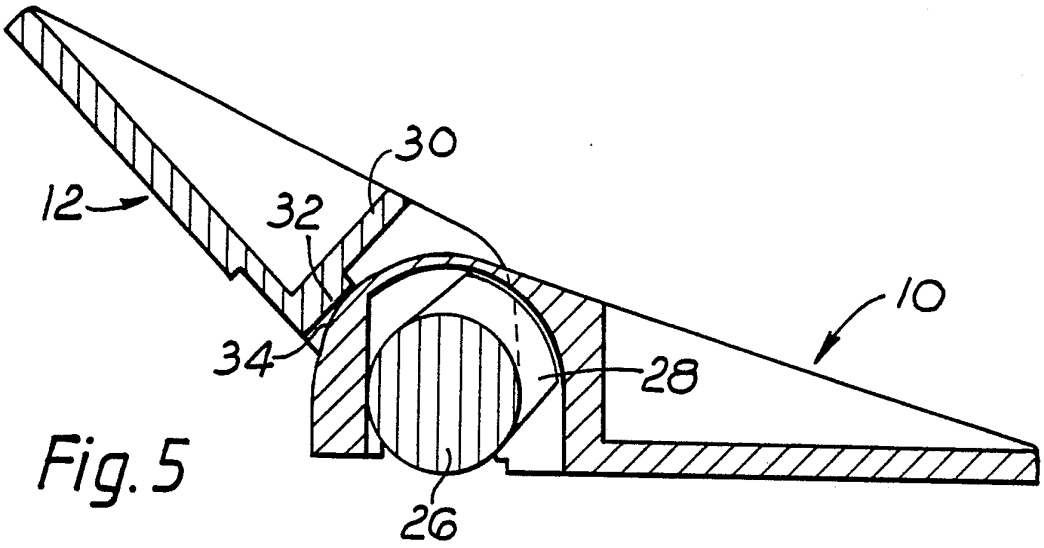

Fig. 5

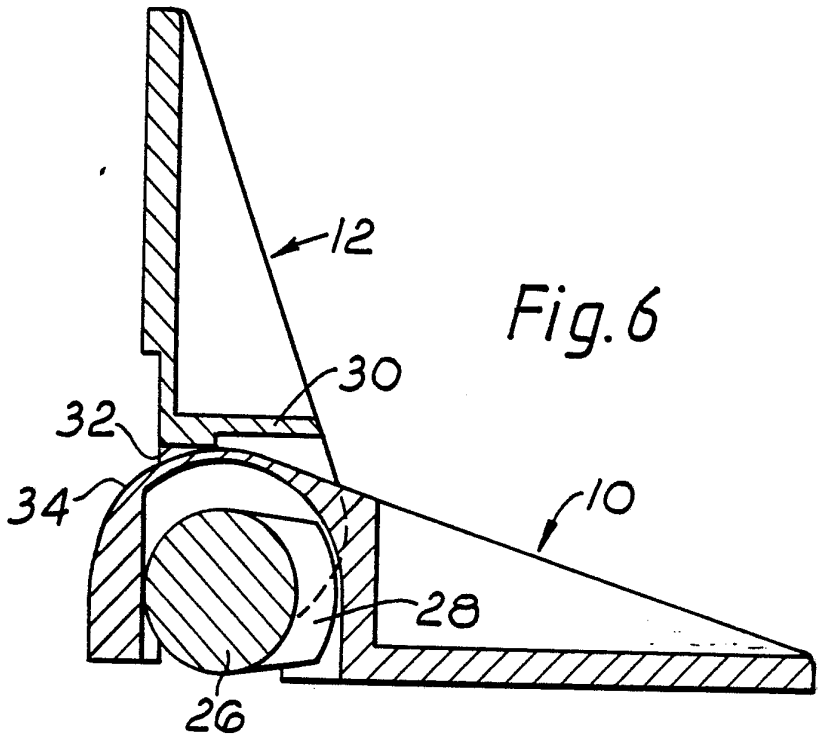

Fig. 6

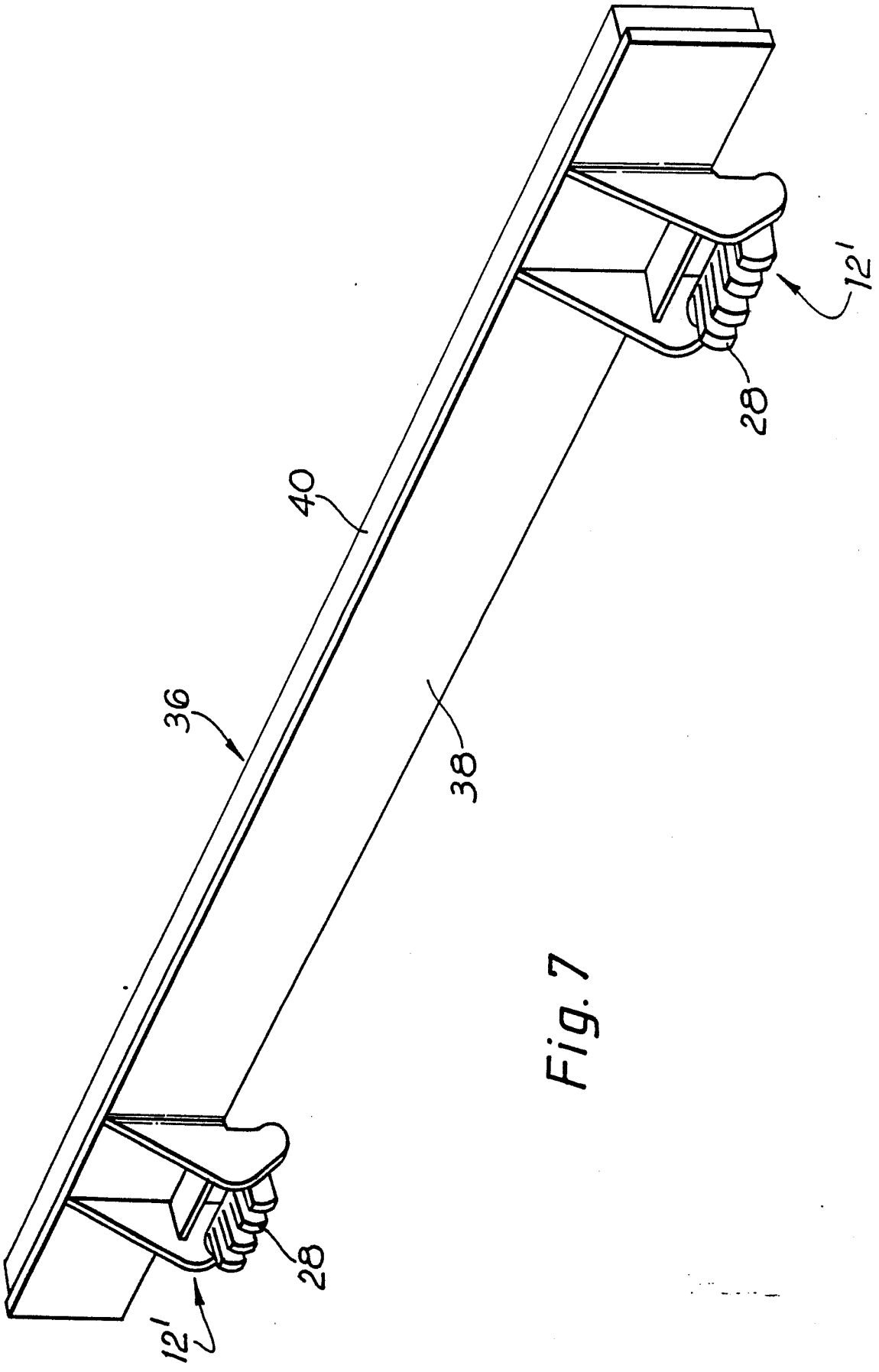

Fig. 7

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 87/00328

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC[4]: E-05 D 1/04; E 05 D 7/10; E 05 D 9/00

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
IPC[4]	E 05 D

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
A	EP, A, 0013338 (IBM) 23 July 1980 see page 4, lines 24-30; page 5, lines 1-32; page 6, lines 1-15; page 7, lines 23-33; page 8, lines 1-10; figures 2-6 --	1,2,6
A	US, A, 4333206 (LANG) 8 June 1982 see column 3, lines 11-22, 59-68; column 4; lines 1-5; figures 3,4 --	1-4
A	US, A, 3178761 (RESTAINO) 20 April 1965 see column 2, lines 15-25; figures 3,5 --	3,4
A	GB, A, 2140862 (AHI OPERATIONS LTD) 5 December 1984 see abstract; figures 3-8 --	5
A	US, A, 3488667 (GUTSHALL) 6 January 1970	

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* Special categories of cited documents: [10]

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
31st July 1987	20 AUG 1987
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	M. VAN MOL

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/GB 87/00328 (SA 17209)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 06/08/87

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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP-A- 0013338	23/07/80	US-A-	4227283	14/10/80
		JP-A-	55093482	15/07/80
		CA-A-	1118969	02/03/82
US-A- 4333206	08/06/82	CA-A-	1151230	02/08/83
US-A- 3178761		None		
GB-A- 2140862	05/12/84	AU-A-	2851484	06/12/84
		JP-A-	60001418	07/01/85
US-A- 3488667	06/01/70	None		