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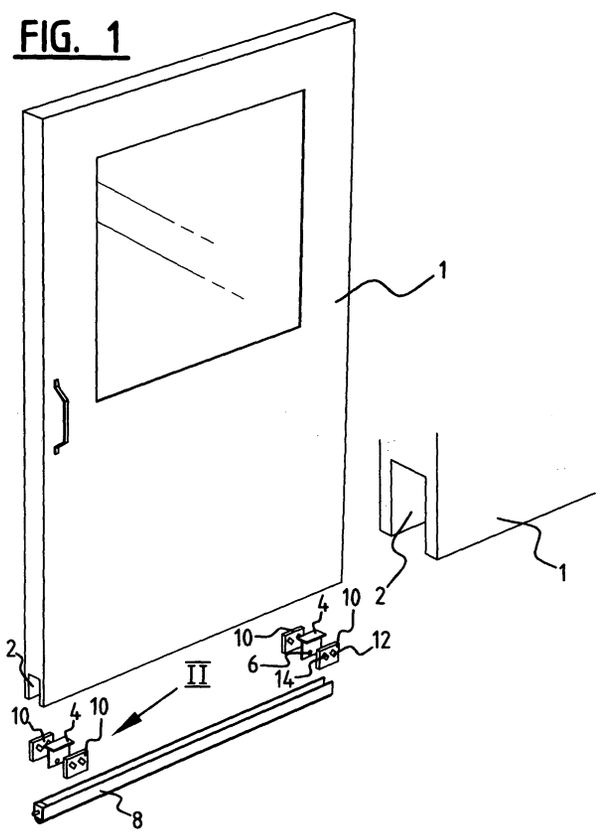
(54) Device for closing a chink at the bottom of a door

(57) The present invention provides a device for closing a chink at the bottom of a door (1) in a closed position thereof, comprising:

- an elongate member (8) with a length roughly equal to the width of the door (1);
- first magnetic means (12,14,16,18) arranged on the member for bringing the member into a first position of the door (1) closing the chink as well as a second position leaving the chink open.

FIG. 1



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Description

[0001] The present invention relates to a device for closing a chink at the bottom of a door in a closed position thereof, and for leaving this chink open when the door is situated in an opened position. Such devices serve to close the chink to draught and sound and can also have a fire-resistant function. Such threshold seals are applied particularly by companies and public institutions.

[0002] Known devices make use of spring mechanisms. When a door is closed a cam is automatically operated which sets one or more springs into operation to lower the threshold seal by means of the force of gravity, while during opening the springs are tensioned in order to raise the threshold seal again. The drawback of these known devices is the lifespan of the spring mechanism, which already displays deteriorating operation after a few months due to wear.

[0003] The present invention has for its object to obviate the above stated problem and provides for this purpose a device for closing a chink at the bottom of a door in a closed position thereof, comprising:

- an elongate member with a length roughly equal to the width of the door;
- first magnetic means arranged on the member for bringing the member into a first position of the door closing the chink as well as a second position leaving the chink open.

[0004] Since the device according to the invention functions on the basis of magnetic attraction and repulsion, the invention results in a greatly reduced wear or even no wear at all, thereby decreasing maintenance costs. The device, which can serve as automatic threshold seal, can be readily removed herein, for instance for servicing or replacement.

[0005] In a further preferred embodiment the first magnetic means comprise:

- first magnets with a first orientation which are arranged coupled to the member close to opposite ends of the member; and
- second magnets with a second, opposite orientation which are arranged coupled to the member close to the first magnets;

wherein the first magnetic means are magnetically coupled during use to second magnetic means.

[0006] In a further preferred embodiment the member is movable relative to the second magnetic means.

[0007] In a further preferred embodiment the member is movable in the width direction of the door. The member can slide relative to the door, whereby the construction is relatively simple. It is also easy to remove the member for cleaning or maintenance, since the member is only coupled to the door magnetically.

[0008] In a further preferred embodiment the first magnets are flat magnets which are magnetized in thickness direction and which are arranged at a predetermined angle to the longitudinal axis of the member. Flat magnets are found to have a sufficient attracting and repellent action, and are suitable for use in doors due to their small thickness.

[0009] In a further preferred embodiment the second magnets are flat magnets which are magnetized in thickness direction and which are arranged at a predetermined angle to the longitudinal axis of the member.

[0010] In a further preferred embodiment the third magnets are bar magnets. The magnetic field generated by the bar magnets is found to be suitable for the intended operation.

[0011] In a further preferred embodiment a rubber profile is arranged over roughly the whole length on an underside of the member. The profile provides sufficient sealing for draught and sound, and owing to the flexibility of the rubber the assembly is also suitable for an irregular ground surface.

[0012] Further advantages and features are elucidated with reference to the annexed figures, wherein:

- Fig. 1 shows a perspective exploded view of a door provided with a first preferred embodiment of an assembly according to the present invention;
- Fig. 2 shows an exploded detail view of the assembly of fig. 1;
- Fig. 3 is a schematic side view of a door provided with the assembly of fig. 1 in a first position of use;
- Fig. 4 shows the door of fig. 3 in a second position of use;
- Fig. 5 shows the door of fig. 3 in a third position of use;
- Fig. 6 is a perspective view of a door provided with a second preferred embodiment of an assembly according to the present invention;
- Fig. 7 is a schematic side view of the door with the second preferred embodiment of the assembly of fig. 6.

[0013] A door 1 (fig. 1) provided with a device according to the present invention comprises on the underside a slot-like opening 2 arranged along the whole width. Arranged in slot-like opening 2 close to the outer ends thereof are two T-shaped aluminium profiles 4 which are connected to door 1. In both profiles 4 is arranged a bar magnet 6 which extends over the whole thickness of profile 4 (fig. 2). An elongate member, in the shown embodiment an aluminium U-profile 8 extending in longitudinal direction, has a length which practically corresponds to the width of door 1. Plastic blocks 10 are arranged in U-shaped profile 8 on the inner side close to the two outer ends thereof, in which blocks are arranged flat rectangular magnets 12, 14, 16, 18 respectively, which are magnetized in thickness direction and extend over the whole thickness of a block 10. The magnets

are oriented such that magnets 12, 16 are attracted by bar magnet 6 and magnets 14, 18 are repulsed by bar magnet 6. A plastic block 20 with a protruding pin 22 is further arranged on an end of profile 8. A curved rubber profile 24 is further arranged on the underside of profile 8 to provide an adequate sealing against draught and sound.

[0014] When door 1 is closed, pin 22 rests against frame 30, wherein profile 8 with the rubber seal 24 thereon rests on a ground surface 32 due to the magnetically repellent action between magnet 14 and magnet 6 (fig. 3). When sliding door 1 is opened, the pressure of frame 30 on pin 22 is relieved so that the attractive magnetic force between magnet 12 and magnet 6 raises the U-profile 8 from the ground surface 32 (fig. 4). When the sliding door is open (fig. 5), magnet 12 is drawn by the attractive magnetic action to magnet 6 so that the rubber profile 24 is completely clear of the ground surface 32.

[0015] Magnets 12, 14 lie at a predetermined angle to the longitudinal axis of profile 8, in the shown embodiment about 45°, so that in addition to the vertical movement during opening and closing of the door the profile 8 also moves over a distance of about 1 cm in horizontal direction, respectively in the direction of pin 22 or in the opposite direction. During use the profile is slidable relative to the door. Profile 8 is magnetically coupled to magnets 6, so that the profile, which serves as automatic threshold seal, can be readily removed, for instance for cleaning.

[0016] The assembly according to the present invention can likewise be applied for a hinged door 34 (fig. 6, 7), wherein pin 22 is replaced by a wedge-shaped or prismatic block 36 of a suitable material which is arranged on U-profile 8 on the hinge side of door 34. When door 34 is closed, block 36 causes a movement of U-profile 8 in horizontal direction through contact with frame 30, wherein the U-profile will close the chink under the door in the above described manner due to the magnetic repulsion. When the door is opened, the contact between block 36 and frame 30 is released, wherein the magnetic attraction ensures that U-profile 8 is lifted.

[0017] The above described embodiments, in which many modifications can be envisaged, are intended only by way of example; the scope of protection is defined by the appended claims.

Claims

1. Device for closing a chink at the bottom of a door in a closed position thereof, comprising:

   - an elongate member with a length roughly equal to the width of the door;
   - first magnetic means arranged on the member for bringing the member into a first position of the door closing the chink as well as a second position leaving the chink open.

2. Device as claimed in claim 1, wherein the first magnetic means comprise:

   - first magnets with a first orientation which are arranged coupled to the member close to opposite ends of the member; and
   - second magnets with a second, opposite orientation which are arranged coupled to the member close to the first magnets;

   wherein the first magnetic means are magnetically coupled during use to second magnetic means arranged on the door.

3. Device as claimed in claim 2, wherein the member is movable relative to the second magnetic means.

4. Device as claimed in claim 1, 2 or 3, wherein the member is movable in the width direction of the door.

5. Device as claimed in claims 2-4, wherein the first magnets are flat magnets which are magnetized in thickness direction and which are arranged at a predetermined angle to the longitudinal axis of the member.

6. Device as claimed in claims 2-5, wherein the second magnets are flat magnets which are magnetized in thickness direction and which are arranged at a predetermined angle to the longitudinal axis of the member.

7. Device as claimed in claim 3, wherein the second magnetic means comprise bar magnets.

8. Device as claimed in any of the claims 1-7, wherein a rubber profile is arranged on the underside of the member along roughly the whole length.

9. Method for manufacturing a device as claimed in one or more of the claims 1-8.

10. Method for using a device as claimed in one or more of the claims 1-8.

FIG. 1

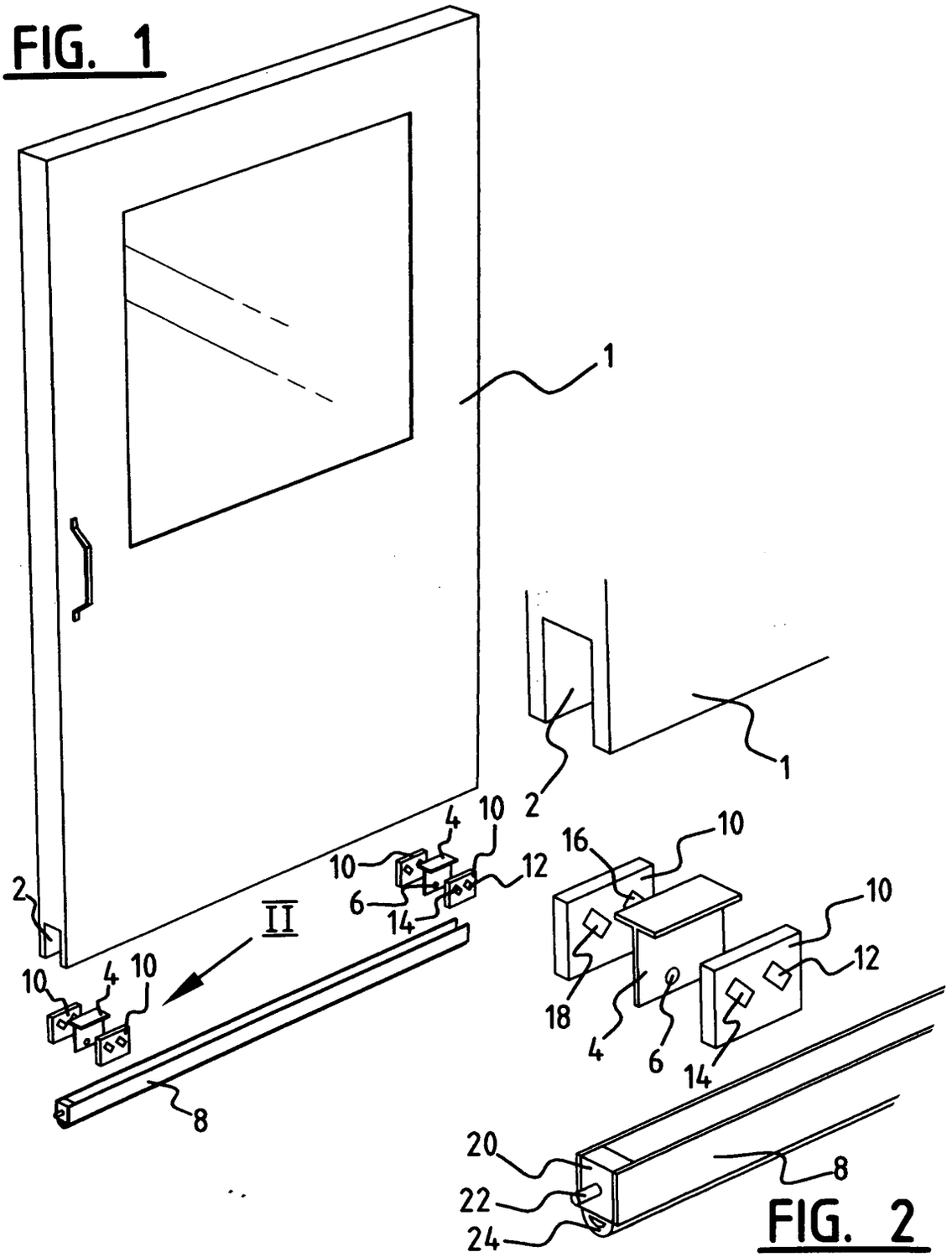

FIG. 2

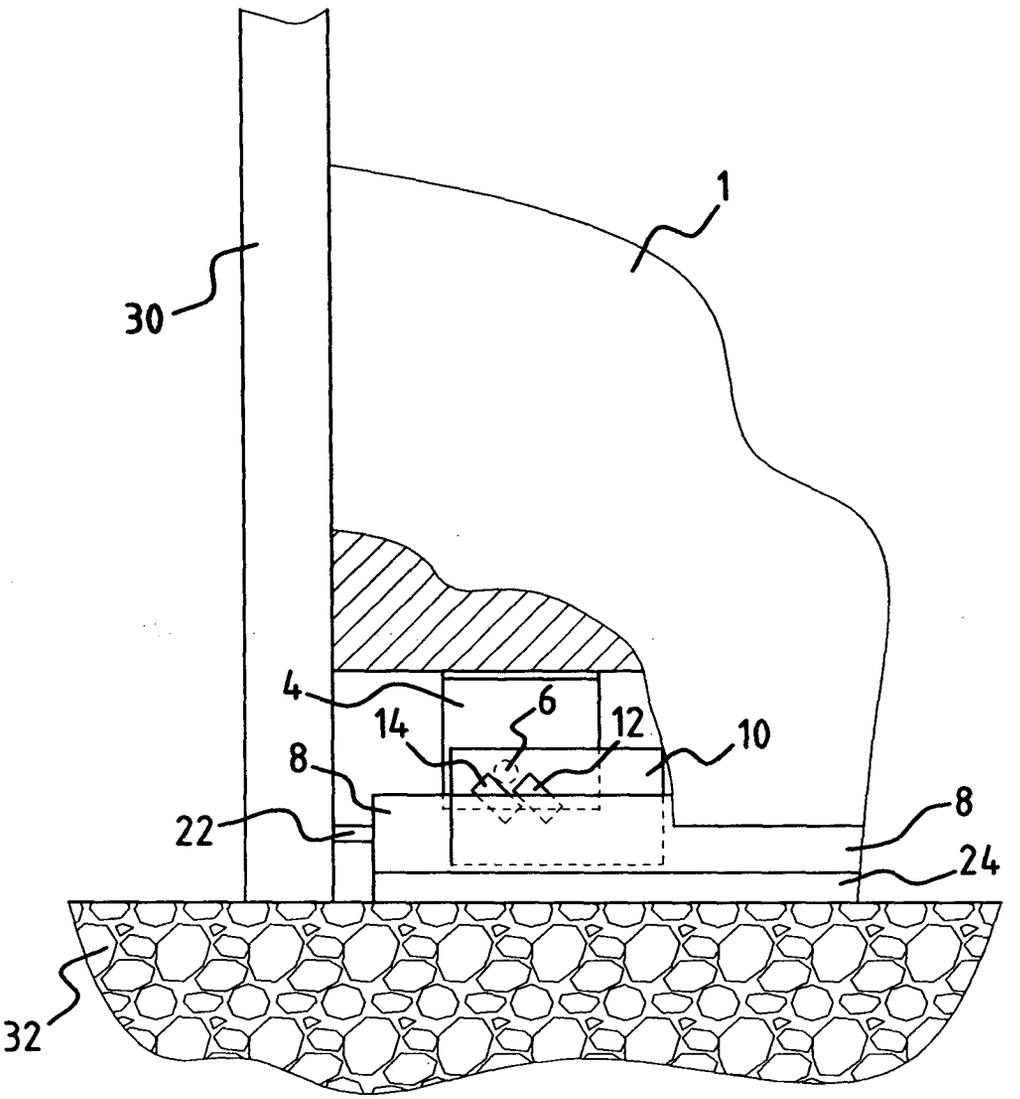

FIG. 3

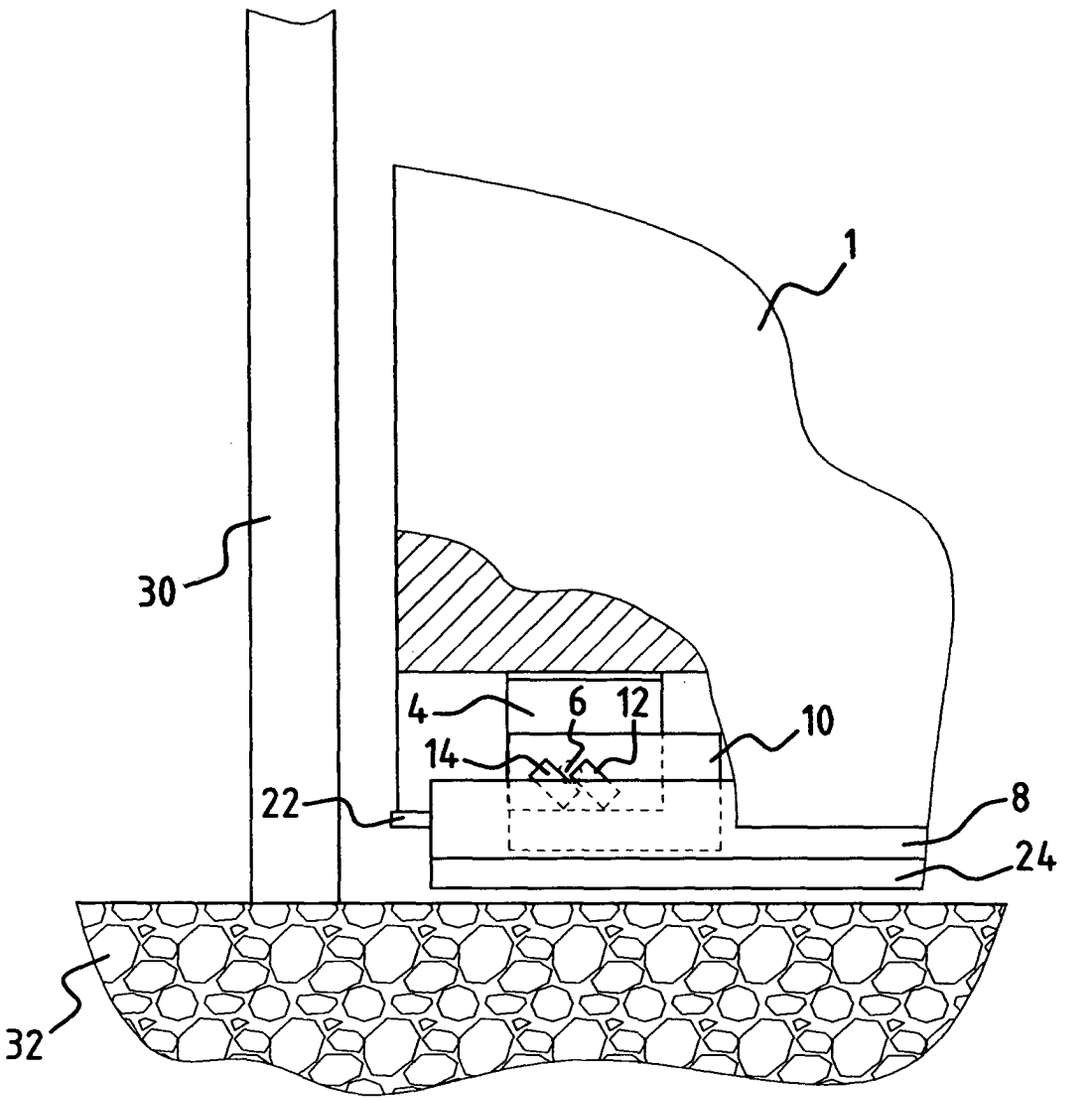

FIG. 4

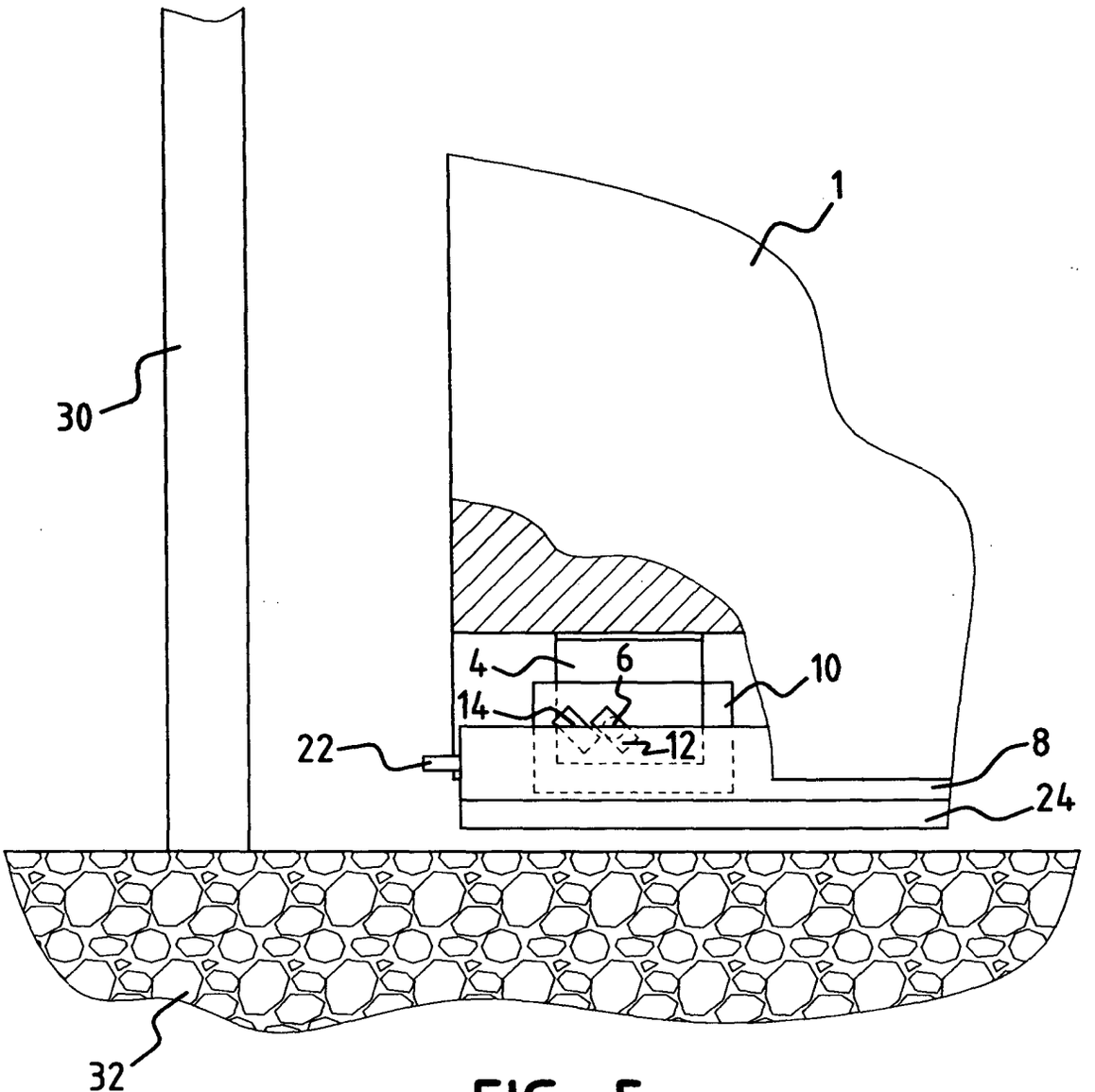

FIG. 5

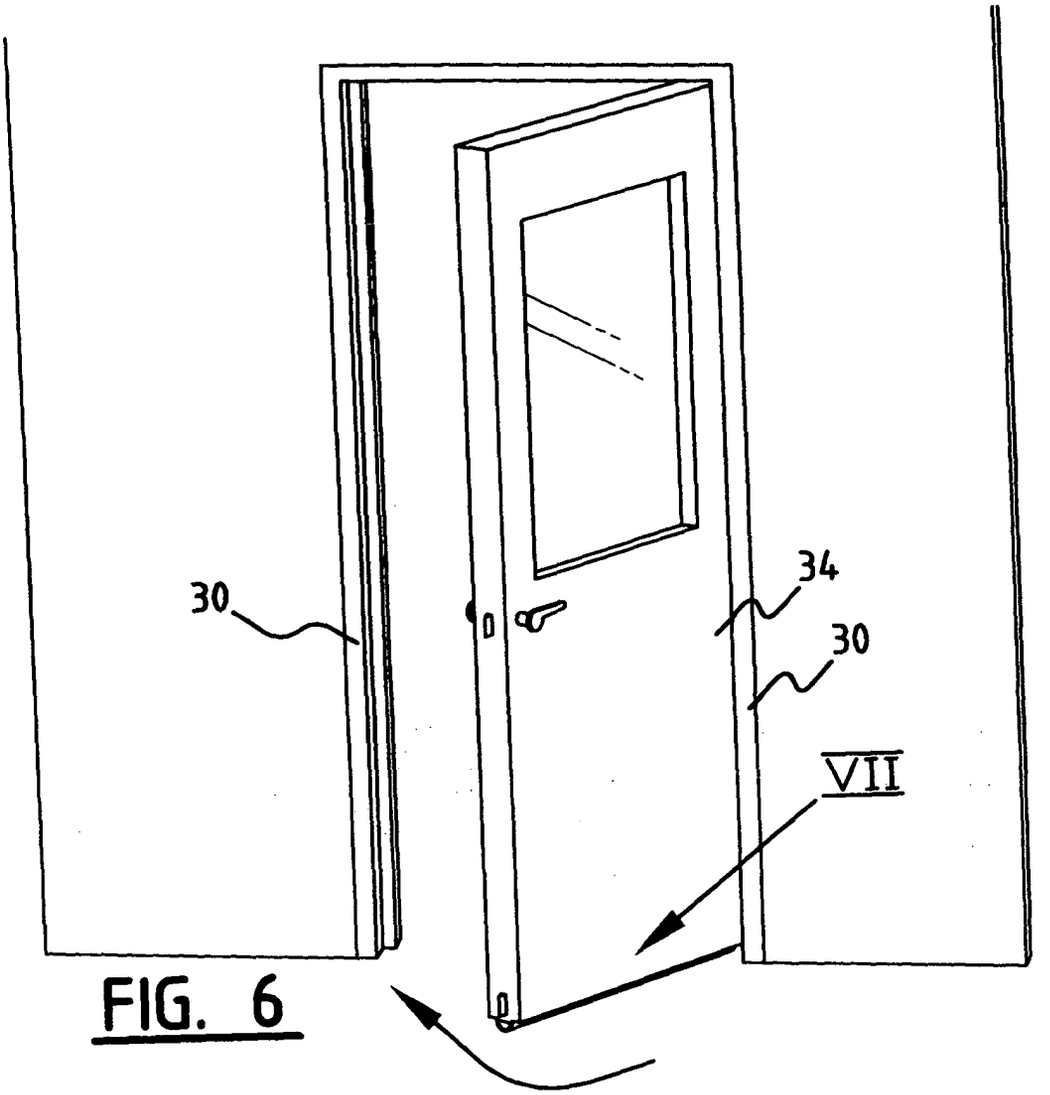

FIG. 6

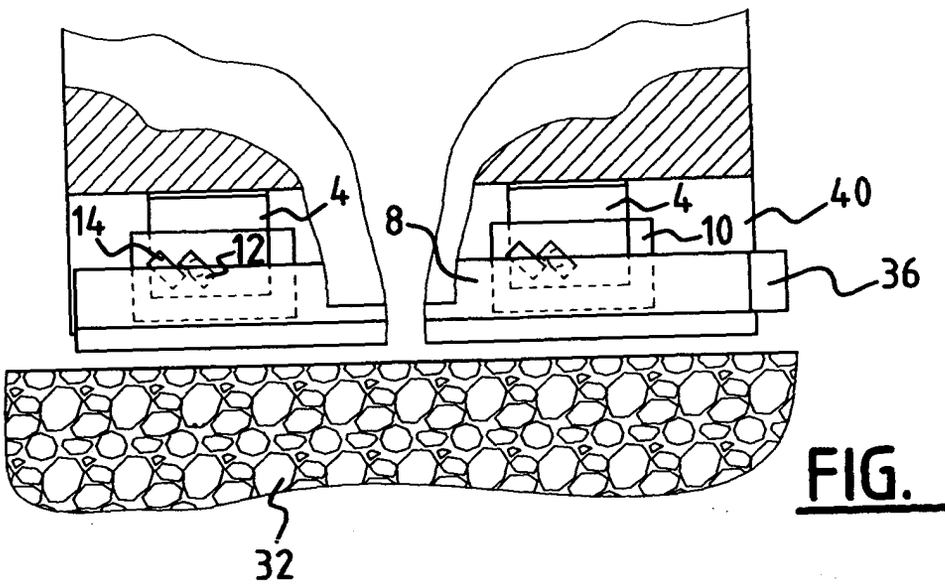

FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 03 07 8116

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.7)
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 09, 31 July 1998 (1998-07-31) -& JP 10 096378 A (KIYOOC KK), 14 April 1998 (1998-04-14) * abstract * ---	1-10	E06B7/21
X	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 09, 31 July 1998 (1998-07-31) -& JP 10 096379 A (KIYOOC KK), 14 April 1998 (1998-04-14) * abstract * ---	1,4,8-10	
X	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 05, 14 September 2000 (2000-09-14) -& JP 2000 054756 A (NIPPON JIDO DOOR KK), 22 February 2000 (2000-02-22) * abstract * -----	1,4,9,10	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7) E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	6 January 2004	Geivaerts, D

CATEGORY OF CITED DOCUMENTS

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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06-01-2004

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 10096378 A	14-04-1998	NONE	
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82