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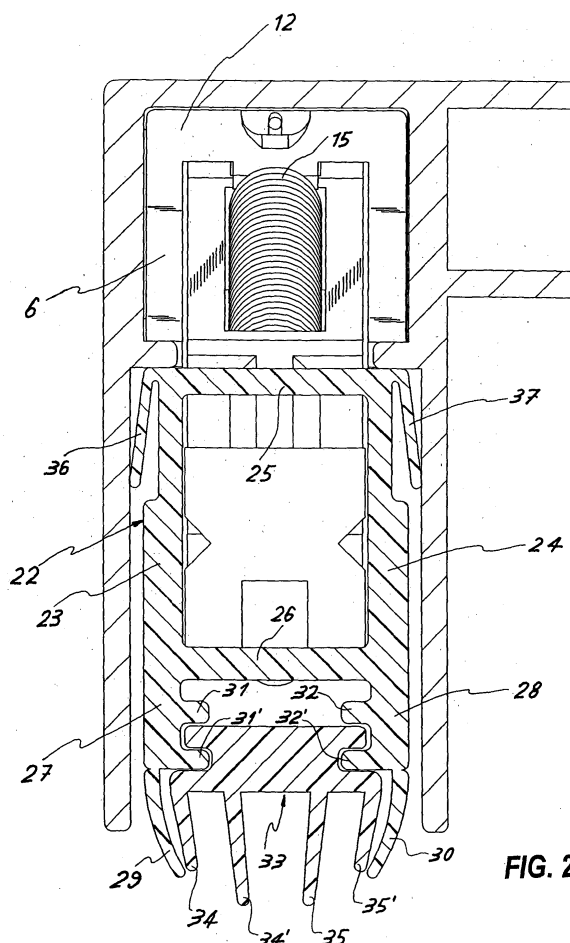
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(54) **Draft stopper device, particularly for hinged or sliding doors and similar door frames, as well as manufacturing method**

(57) A draft stopper device, particularly for hinged or sliding doors and similar fixtures, comprises a first, fixed, elongated profile (2) with a cross-section substantially in the form of an overturned U, which can be secured to the bottom edge (B) of a door (P), a second movable profile (3) which can be inserted inside the fixed profile (2) with the possibility of a limited degree of transverse movement with respect to the latter, fastening means (4, 5) able to connect together the fixed profile (2) and the movable profile (3) and limit the transverse movement, automatic actuating means (21) able to move the movable profile (3) away from the fixed profile (2) and bring it into contact with the floor (T) when the door (P) is in the closed position, and elastic opposing means for moving the movable profile (3) towards the fixed profile (2) when the door is in the open position. The movable profile (3) is made entirely of plastic material and has a box-shaped portion (22) with a closed cross-section for increasing its flexural and torsional rigidity.

**FIG. 2****EP 1 347 146 A2**

Description

Field of Application

[0001] The present invention concerns to the field of manufacturing of hinged or sliding fixtures and relates to a draft stopper device to be mounted on doors of various types, as well as to a method for manufacturing said device.

Background Art

[0002] It is known that generally a door must be mounted slightly raised from the floor underneath so that the opening and closing movement of the door itself is smooth. If the air gap between the bottom part of the door and the floor is eliminated, the door rubs along the floor, creating difficulties during opening and closing and possible damage to the floor.

[0003] The air gap underneath the door, although it is necessary for the abovementioned reasons, is bothersome when the door is closed. In fact, this gap allows undesirable air drafts to pass through and forms a preferred passage for sound waves, diminishing the sound insulating properties of the door.

[0004] A solution to these known drawbacks of the present state of the art consists in the use of a small step on the floor which acts as a bottom stop for the door. It is possible to mount on the step or on the corresponding bottom edge of the door a strip of elastic material which ensures the absence of gaps and prevents the penetration of air drafts and noise. The main drawback of this solution is that the step on the floor, although small, may constitute an obstacle when passing through the doorway and may be dangerous if not seen. A further drawback of this solution consists in the fact that this step may be unaesthetic and visually unattractive.

[0005] The patent document EP-A-0940551 describes a constructional example of an alternative solution. A flexible element is mounted on the bottom edge of the door so that it remains in contact with the floor and closes the gap between the door and the floor. This flexible element may consist of a brush. A drawback of this solution is that the flexible element, since it always rubs along the floor, is prone to get dirty and wear out quickly and therefore lose its effectiveness.

[0006] Moreover, the force of contact between the flexible element and the floor must be limited so as not to be troublesome during opening and closing of the door.

[0007] An alternative solution is described in EP-A-0916802 and EP-A-0915226. A fixed profile with a U-shaped cross-section is secured onto the bottom edge of the door and a movable profile with a U-shaped cross-section is placed inside it. When the door is open, the movable profile is retained by a recall spring inside the door and at a certain distance from the floor. When the door is closed, a mechanism causes the movable profile

to come out from the bottom edge of the door and come into contact with the floor, thereby preventing the passage of air and noise.

[0008] A first drawback of this device consists in the fact that the movable profile has an open cross-section which is less rigid than a closed cross-section. In order to remedy this lack of rigidity due to the shape of the profile, it is advisable to use a rigid material. A rigid material, such as metal, however, is more costly than a material, such as plastic, having inferior mechanical properties.

[0009] A second drawback of this solution arises from the fact that the recall spring acts between the fixed profile and the movable profile and exerts a flexing action on the movable profile when the door is closed, and the movable profile comes out from the edge of the door. Consequently the profile may touch the floor only in a few zones and in a non-uniform manner, limiting the effectiveness of the device.

[0010] A third drawback is associated with the fact that the force requires to actuate the mechanism and cause the movable profile to come out of its seat increases considerably with an increase in the movement imparted to the profile. As a result, particularly in the case of sliding doors, the sliding force required to close the door could cause it to spring back instead of remaining locked in position.

[0011] A fourth problem of this device may arise when the movable profile is in the lowered position in contact with the floor. In this configuration the draft stopper device may become less effective owing to the play present between the movable profile and the fixed profile. Undesirable air drafts and sound waves may pass through owing to this internal play in the device.

Disclosure of the invention

[0012] A main object of the present invention is that of eliminating the abovementioned drawbacks by providing a draft stopper device suitable for hinged or sliding doors and windows.

[0013] A general object is that of providing a draft stopper device which is effective and, at the same time, inexpensive to produce.

[0014] A particular object is that of providing a draft stopper device which prevents air from passing between the bottom edge of a door and the floor and is able to increase the overall acoustic insulating capacity of the door in the closed configuration.

[0015] A particular object is that of providing a draft stopper device which is easy to operate and does not create any obstacle to the movement of the door on which it is mounted nor any difficulty during closing.

[0016] A further particular object is that of providing a draft stopper device whose operating characteristics remain unchanged, without any appreciable reduction in performance.

[0017] These and other which will appear more clearly

hereinafter, are achieved, in accordance with Claim 1, by a draft stopper device, particularly for hinged or sliding doors and similar fixtures, comprising a first elongated fixed profile with a cross-section substantially in the form of an overturned U, which can be secured to the bottom edge of a door, a second movable profile inserted inside said fixed profile with a limited degree of transverse movement with respect thereto, fastening means able to connect together said fixed profile and said movable profile and limit said transverse movement, automatic actuating means able to move said movable profile away from said fixed profile and bring it into contact with the floor when the door is in the closed position, elastic opposing means for moving said movable profile towards said fixed profile when the door is in the open position, characterized in that at least said movable profile is made entirely of plastic material and has a box-shaped portion with a closed cross-section for increasing its flexural and torsional rigidity.

[0018] Owing to this particular configuration, the draft stopper device according to the invention is able to improve the overall acoustic insulation provided by the door in the closed configuration and facilitate the movement of the door on which it is mounted, while maintaining substantially unchanged operating characteristics, without any appreciable reduction in performance.

Brief description of the drawings

[0019] Further features and advantages of the invention will appear more clearly from the detailed description of a preferred but not exclusive embodiments of a draft stopper device according to the invention, illustrated by way of a non-limiting example with the aid of the accompanying figures in which:

FIG. 1 shows a perspective view of a draft stopper device according to the invention;
 FIG. 2 shows a sectioned side view of the draft stopper device according to Fig. 1;
 FIG. 3 shows an exploded perspective view of the draft stopper device according to Fig. 1;
 FIG. 4 shows a sectioned side view of a draft stopper device according to the invention;
 FIG. 5 shows a side view of a detail of the device according to Fig. 1;
 FIG. 6 shows a side view of another detail of the device according to Fig. 1;
 FIG. 7 shows a partial perspective view of another detail of the device according to Fig. 1;
 FIG. 8 shows a partial side view of another detail of the device according to Fig. 1;
 FIG. 9 shows a partial perspective view of another detail of the device according to Fig. 1;
 FIG. 10 shows a partially sectioned side view of a door provided with a device according to the invention;
 FIG. 11 shows a perspective view of a step of the

manufacturing method according to the invention;
 FIG. 12 shows a side view of the step of the method according to FIG. 11.

5 Detailed description of a preferred embodiment

[0020] With reference to the above figures, a draft stopper device is shown according to the invention, denoted in its entirety by the reference number 1, which may be mounted on the bottom edge of a fixture of the type consisting of a hinged or sliding door or window.

[0021] In the examples of embodiment shown in the figures, reference will be made for the sake of simplicity to a door P with a bottom edge B and a jamb S, with a certain clearance G from the floor T.

[0022] The device 1 essentially comprises a fixed, elongated, profile 2 with a cross-section substantially in the form of an overturned U and with a longitudinal axis L, which can be secured to the bottom edge B of the door P and inside which a movable profile 3 is slidably inserted, with the possibility of a limited transverse movement with respect to the fixed profile 2.

[0023] The movable profile 3 is operatively coupled to the fixed profile 2 by means of suitable fastening means - denoted overall by 4 and 5 - which are able to limit the abovementioned relative transverse movement.

[0024] In particular, the fastening means 4, 5 may consist of pair of arms 6, 7, each having one end 8, 9 hinged with the movable profile 3 and the other end 10, 11 joined to the fixed profile 2.

[0025] In the rest position, the arms 6, 7 are slightly inclined with respect to the longitudinal direction of said profiles at angles of inclination α , β which are substantially equal and opposite.

[0026] In particular, the ends 10, 11 of the arms 6, 7 are joined to the fixed profile 2 by means of respective rotatable supports 12, 13 which have an elongated shape and consist of profiled portions with a suitable cross-section, which can be inserted into a counter-shaped longitudinal seat 14 of the fixed profile 2.

[0027] Elastic opposing means are provided for moving the movable profile 3 towards the fixed profile 2 when the door P is in the open position.

[0028] In particular, these opposition means may consist of a pair of extension springs 15, 16 having a first end 17, 18 fixed to each of the arms 6, 7 and the other end 19, 20 fastened to a respective rotatable support 12, 13.

[0029] Automatic actuating means, denoted overall by the reference number 21, are also envisaged, said means being able to operate the movable profile 3 so as to move it transversely away from the fixed profile 2 and bring it into contact with the floor T when the door P is in the closed position.

[0030] According to the invention, the movable profile 3 is made entirely of plastic material and has a box-shaped portion 22 with a closed cross-section so as to increase its flexural and torsional rigidity.

[0031] Thus, even when using a plastic material such as PVC, with relatively limited mechanical properties, it will be possible to provide the profile 2 as a whole with the necessary robustness and flexural and torsional rigidity to ensure correct and effective use thereof.

[0032] Conveniently, the closed cross-section comprises a pair of side walls 23, 24 which are joined together by transverse walls 25, 26. The transverse wall 26 is situated at a predetermined distance from the free end of the side walls so as to define a pair of longitudinal extensions 27, 28.

[0033] The longitudinal extension 27, 28 have along their free longitudinal edges projecting flanges 29, 30 which may be coextruded with the longitudinal extensions 27, 28 and are designed to come into contact with the floor T when the door is in the closed position so as to define an effective fluid and sound barrier.

[0034] Conveniently, the projecting flanges 29, 30 are made of a material different from that used for the remaining portions of the movable profile 3. More particularly, the base material of the projecting flanges 29, 30 is resiliently yielding so as to adapt to the irregularities of the floor T, while the base material of the remaining portions of the movable profile 3 is relatively rigid.

[0035] Moreover, the internal surface of the longitudinal extensions 27, 28 has one or more longitudinal projections 31, 31', 32, 32' directed transversely inwards for transversely retaining a removable seal 33 made of flexible material and if necessary also provided with vertical flanges 34, 34', 35, 35' defining acoustic and fluid seals.

[0036] Furthermore, the movable profile 3 may have a pair of longitudinal lips 36, 37 which extend outwards from the side walls 23, 24 and are resiliently yielding so as to interact with the internal side wall of the fixed profile 2 and reduce the lateral play with the latter.

[0037] The actuating means 21 comprise a plunger 38 which may at least partially slide in a direction substantially parallel to the profiles 2, 3 so as to bring the movable profile 3 from a rest position completely retracted inside the fixed profile 2, into an operative position completely extended from the fixed profile 2.

[0038] Moreover, the plunger 38 is at least partly housed inside the fixed profile 2 so as to be adaptable to doors of the sliding type.

[0039] In a preferred embodiment, the actuating means may comprise a lever element 39 with an end 40 hinged at one end to the fixed profile 2 and having a free end 41 interacting on one side with the plunger 38 and on the other side with the jamb of the door S or with the opposite edge of another sliding door situated opposite.

[0040] The lever element 39 may have a through-hole, not shown in the drawings, for screw-type adjustment of the plunger 38.

[0041] In another preferred embodiment, an abutment element 42 is envisaged, said element being formed so as to interact with an adjustable end 43 of the plunger 38, when the sliding door is in the closed position. This abutment element may be secured onto the

jamb S of the door P using suitable fixing means, such as, for example, one or more screws.

[0042] The abutment element 42 comprises a pair of resiliently yielding lateral lugs 44, 45 able to engage with the fixed profile 2 so as to keep the door in the closed position. The width between the lateral lugs 44, 45 may be adjusted by means of a screw 46.

[0043] It is also possible to envisage a guide 47 which is able to guide the fixed profile in a longitudinal direction when the door is of the sliding type. The guide may consist of a fixed support 48 which can be secured to the floor T in the vicinity of the outgoing edge of the door P.

[0044] The draft stopper device 1 according to the invention may be manufactured using a method comprising the steps described below.

[0045] In a first step a), the first fixed, elongated, profile 2 with a predetermined longitudinal extension E' is prepared.

[0046] In a second step b) the second movable profile 3 with a length E" greater than or equal to the longitudinal extension E' of the fixed profile 2 is prepared.

[0047] In a third step c) the fastening means 4, 5 for performing connection to the fixed profile 2 are mounted on the movable profile 3 together with also the automatic actuating means 21 and the elastic opposing means able to move the movable profile 3 away from and towards the fixed profile 2.

[0048] In a fourth step d) the movable profile 3 is inserted inside the fixed profile 2. Advantageously, insertion may be performed by means of longitudinal sliding.

[0049] In a last step e) cutting of the movable profile 3 is performed, as shown in FIG. 11 and FIG. 12. In this way the length E" of the movable profile 3 is adapted so that it is substantially equal to the longitudinal extension E' of the fixed profile 2, by means of a simple and quick procedure.

[0050] From that described above, it is obvious that the device according to the invention achieves the pre-defined objects and particular attention is drawn to its effectiveness as a low-cost sound barrier which is extremely light and easy to install.

[0051] The device 1 according to the invention may be subject to numerous modifications and variants all falling within the inventive idea expressed in the accompanying claims. All the details may be replaced by other technically equivalent elements and the materials may differ according to requirements, without departing from the scope of the invention.

[0052] Although the draft stopper device has been described with particular reference to the accompanying figures, the reference numbers used in the description and in the claims are used to facilitate understanding of the invention and do not impose any limitation on the scope of protection claimed.

[0053] The present application is based on and claims the priority of the patent application No. VI2002A000051 filed in Italy on 20.3.2002, the text of which is expressly incorporated herein by way of reference.

Claims

1. A draft stopper device, particularly for hinged or sliding doors and similar door frames, comprising:

- a first elongated fixed profile (2) with a cross-section substantially in the form of an over-turned U, which can be secured to the bottom edge (B) of a door (P);
- a second movable profile (3) inserted inside said fixed profile (2) with a limited degree of transverse movement with respect thereto;
- fastening means (4, 5) suitable to connect together said fixed profile and said movable profile and limit said transverse movement;
- automatic actuating means (21) suitable to move said movable profile away from said fixed profile and bring it into contact with the floor when the door is in a closed position;
- elastic opposing means for moving said movable profile (3) towards said fixed profile (2) when the door is in the open position;

characterized in that at least said movable profile (3) is made entirely of plastic material and has a box-shaped portion (22) with a closed cross-section for increasing its flexural and torsional rigidity.

2. Draft stopper device according to Claim 1, **characterized in that** said closed cross-section comprises a pair of side walls (23, 24) joined together by a pair of transverse walls (25, 26), at least one of said transverse walls (25, 26) being located at a predetermined distance from the free end of said side walls (23, 24) so as to define a pair of longitudinal extensions (27, 28).

3. Draft stopper device according to Claim 2, **characterized in that** it has one or more longitudinal projections (31, 31', 32, 32') directed transversely inwards on the internal surface of said longitudinal extensions (27, 28), for transversely retaining a removable seal (33) made of flexible material.

4. Draft stopper device according to Claim 2, **characterized in that** said longitudinal extensions (27, 28) have along their free longitudinal edges projecting flanges (29, 30) intended to come into contact with the floor (T) when the door (P) is in the closed position so as to define an effective sound barrier.

5. Draft stopper device according to Claim 4, **characterized in that** said projecting flanges (29, 30) are made from a material different from that used for the remaining portions of said movable profile (3).

6. Draft stopper device according to Claim 5, **characterized in that** the base material of said projecting

flanges (29, 30) is resiliently yielding so as to adapt to the irregularities of the floor (T), while the base material of the remaining portions of said movable profile (3) is relatively rigid.

7. Draft stopper device according to Claim 1, **characterized in that** said movable profile (3) comprises at least one longitudinal lip (36, 37) extending outwards from one of said side walls (23, 24) and being resiliently yielding so as to interact with the internal side wall of said fixed profile (2) and reduce the lateral play with the latter.

8. Draft stopper device according to Claim 1, **characterized in that** said fastening means (4, 5) comprise at least one pair of arms (6, 7) each having one end (8, 9) hinged with said movable profile (3) and the other end (10, 11) which can be joined to said fixed profile (2), said arms (6, 7) being slightly inclined with respect to the longitudinal direction of said movable and fixed profiles (2, 3) at mutually opposite angles of inclination.

9. Draft stopper device according to Claim 8, **characterized in that** one of the ends (10, 11) of said arms (6, 7) is joined to said fixed profile (2) by means of a rotatable support (12, 13) which can be inserted into a counter-shaped longitudinal seat (14) of said fixed profile (2).

10. Draft stopper device according to Claim 9, **characterized in that** said elastic opposing means comprise at least one extension spring (15, 16) having one end (17, 18) fixed to each of said arms (6, 7) and the other end fastened to said rotatable support (12, 13).

11. Draft stopper device according to Claim 10, **characterized in that** said extension springs (15, 16) have an arrangement such that at least one of them is partially untensioned when said movable profile (3) is moved away from said fixed profile (2).

12. Draft stopper device according to Claim 9, **characterized in that** said actuating means (21) comprise a plunger (38) fixed to one of said rotatable supports (12, 13).

13. Draft stopper device according to Claim 12, **characterized in that** said plunger (38) is at least partially slidable in a direction substantially parallel to said fixed and movable profiles (2, 3) and is arranged so as to bring said movable profile (3) from a rest position completely retracted inside said fixed profile (2) into an operative position completely outside said fixed profile (2).

14. Draft stopper device according to Claim 13, **char-**

acterized in that said plunger (38) is at least partially housed inside said fixed profile (2) so as to be adaptable to doors of the sliding type.

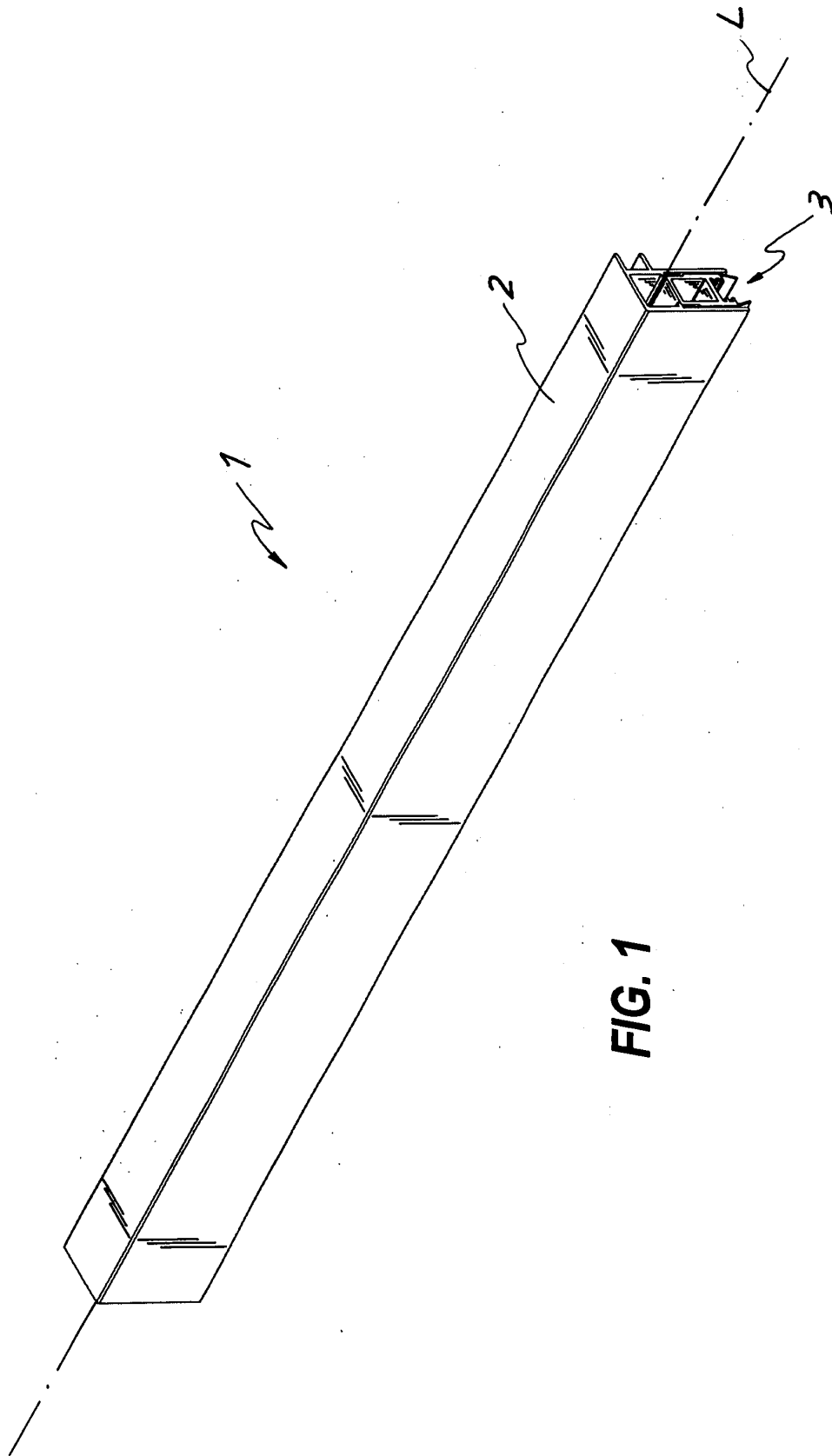
15. Draft stopper device according to Claim 14, **characterized in that** said actuating means (21) comprise a lever element (39) hinged at one end (40) with said fixed profile (2) and having a free end (41) interacting on one side with said plunger (38) and on the other side with the jamb (S) of the door (P) or with the opposite edge of another sliding door situated opposite. 5 10
16. Draft stopper device according to Claim 15, **characterized in that** said lever element (39) has a through-hole for screw-type adjustment of said plunger (38). 15
17. Draft stopper device according to Claim 14, **characterized in that** said plunger (38) comprises an adjustable end (43) able to interact with an abutment element (42) when the sliding type door is in the closed position. 20
18. Draft stopper device according to Claim 17, **characterized in that** said abutment element (42) comprises a pair of resiliently yielding lateral lugs (44, 45) adapted to engage with said fixed profile (2) so as to retain the door (P) in a closed position. 25 30
19. Draft stopper device according to Claim 1, **characterized in that** it comprises guide means (46) able to guide said fixed profile (2) in a longitudinal direction when said door (P) is of the sliding type, said guide means (46) consisting of a fixed support (47) which can be secured to the floor (T) in the vicinity of the outgoing edge of said door. 35
20. Method for manufacturing a draft stopper device according to one or more of the preceding claims, particularly for hinged or sliding doors and similar fixtures, in which the device comprises: 40
 - a first, fixed, elongated profile (2) with a predetermined longitudinal extension (E') and a cross-section substantially in the form of an overturned U, which can be secured to the bottom edge (B) of a door (P); 45
 - a second movable profile (3) made entirely of plastic material, having a box-shaped portion (22) with a closed cross-section, and inserted inside said fixed profile (2) with the possibility of a limited transverse movement with respect to the latter; 50
 - fastening means (4, 5) suitable to connect together said fixed profile and said movable profile and limit said transverse movement; 55
 - automatic actuating means (21) suitable to

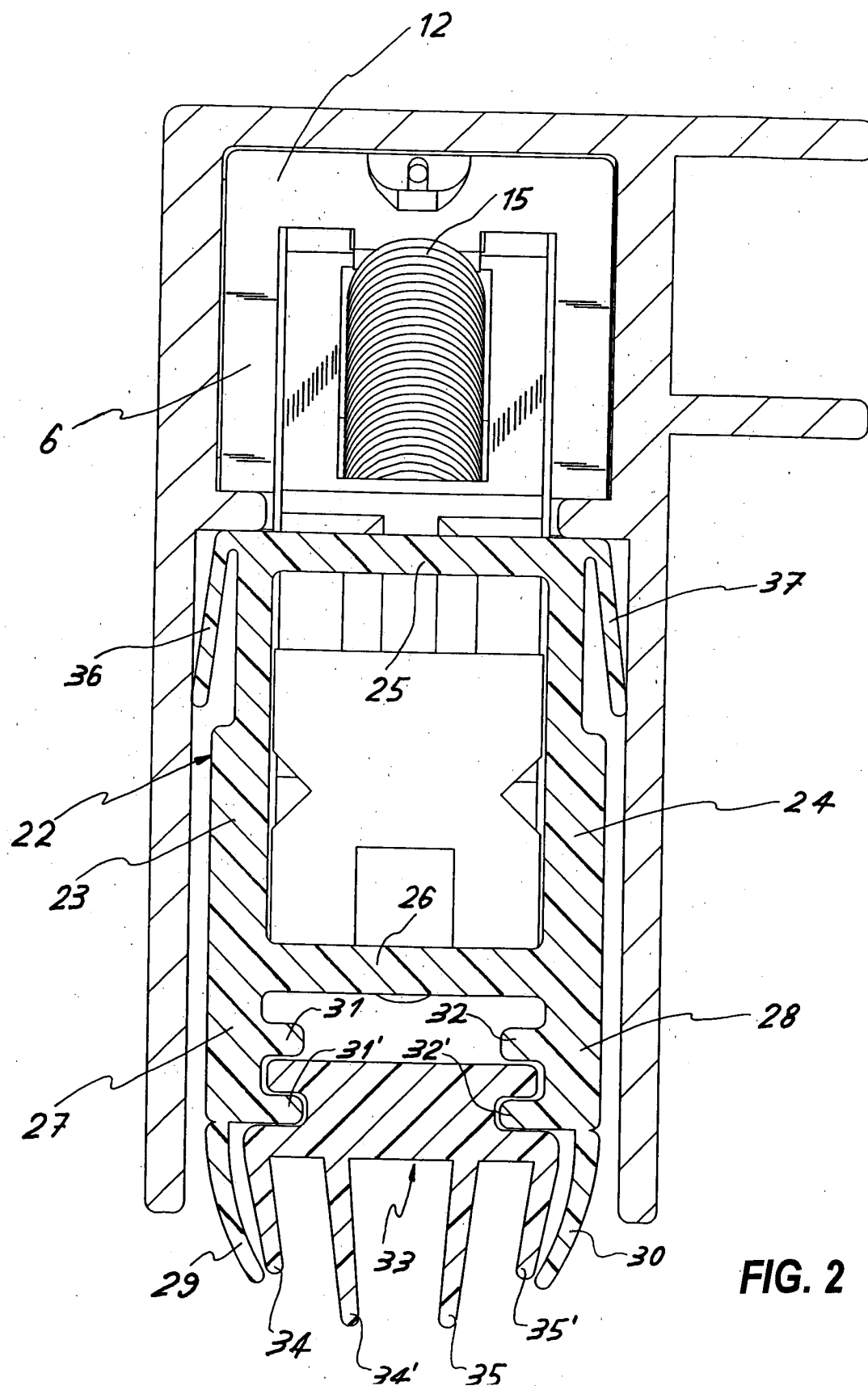
move away said movable profile from said fixed profile and bring it into contact with the floor when the door is in the closed position;

- and elastic opposing means for moving said movable profile (3) towards said fixed profile (2) when the door (P) is in the open position;

wherein the method comprises the following steps:

- a) preparing said fixed profile (2);
- b) preparing said movable profile (3) with a length (E'') greater than or equal to the longitudinal extension (E') of said fixed profile (2);
- c) mounting on said movable profile (3) said fastening means (4, 5), said automatic actuating means (21) and said elastic opposing means;
- d) inserting said movable profile (3) inside said fixed profile 2;
- e) cutting said movable profile (3) so that the length (E'') of the latter is substantially equal to the longitudinal extension (E') of said fixed profile (2).





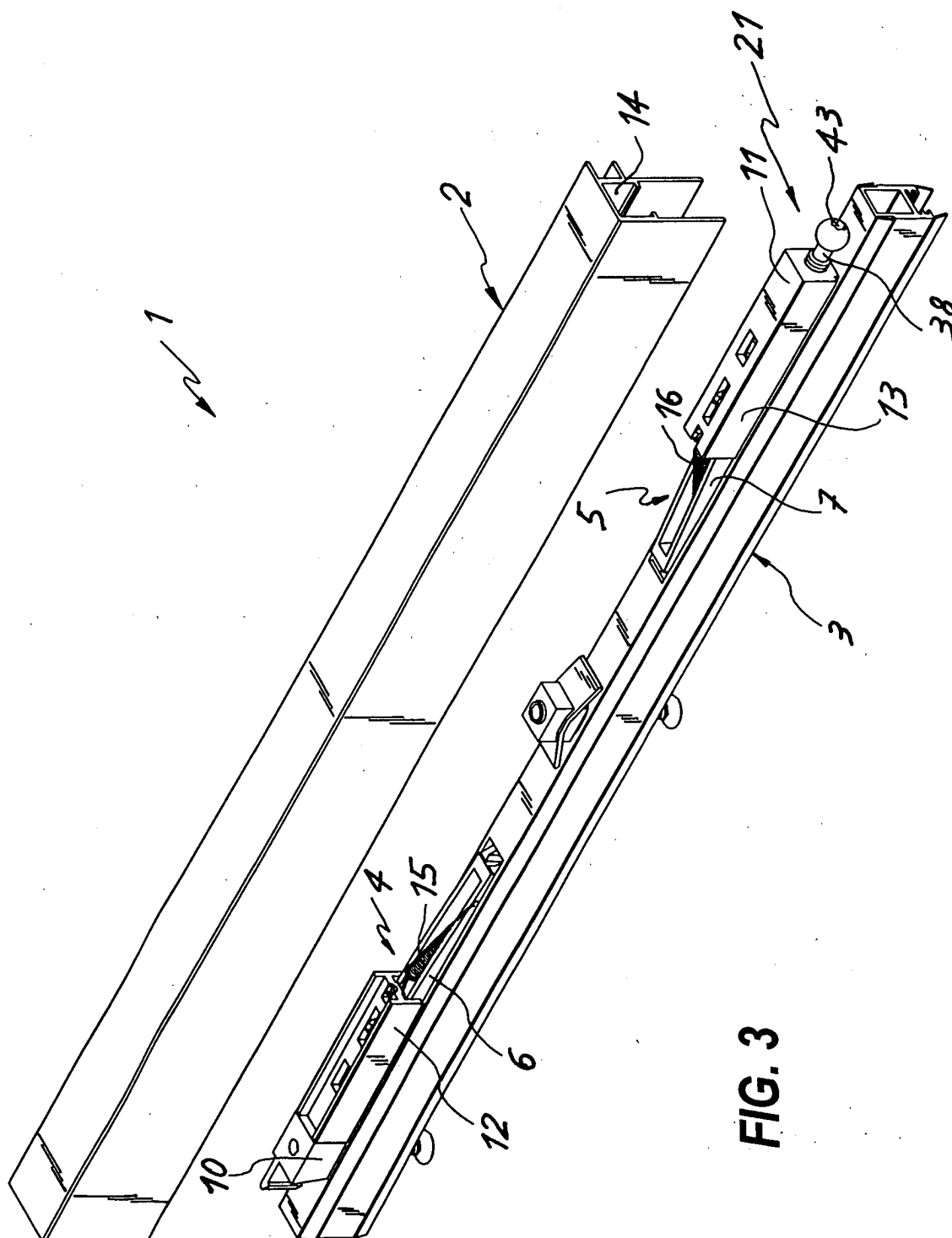
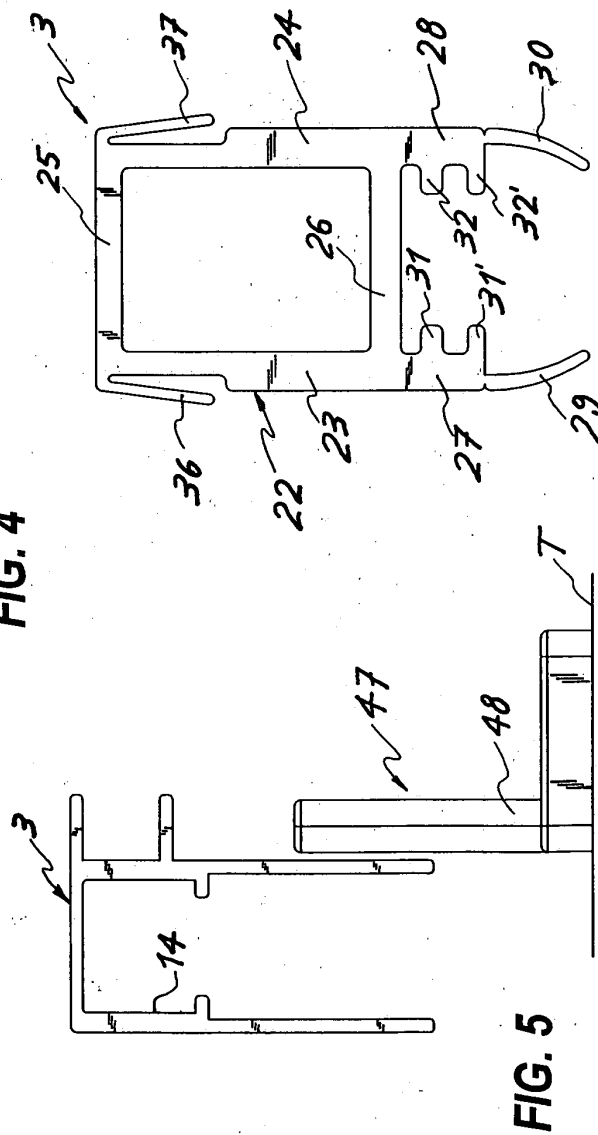
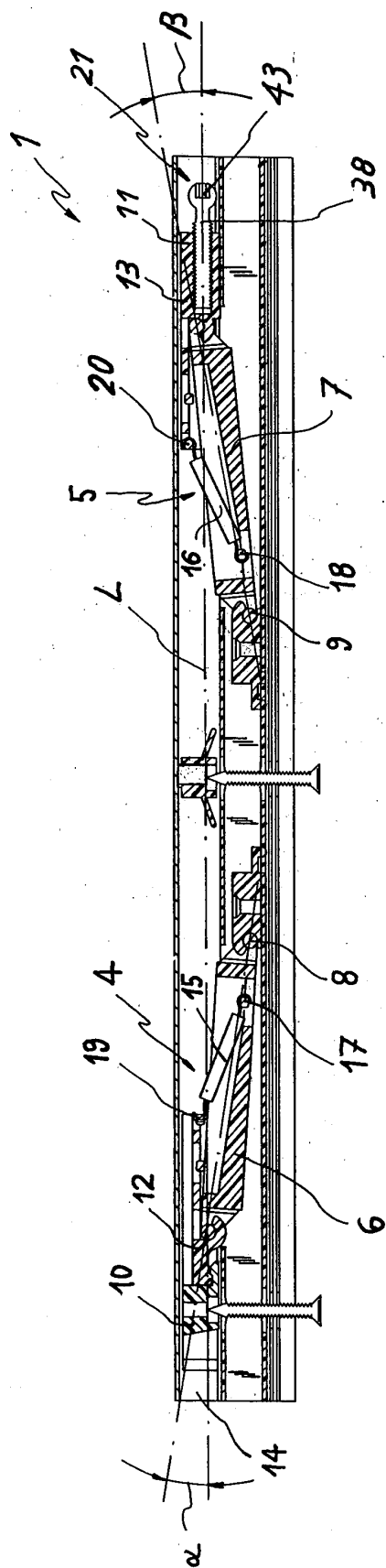


FIG. 3



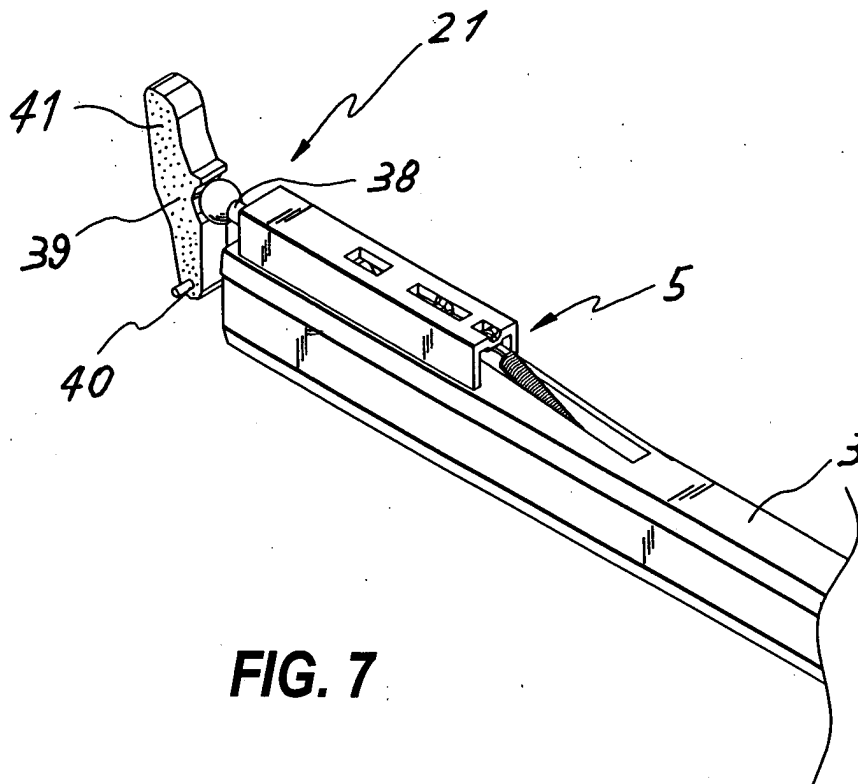


FIG. 7

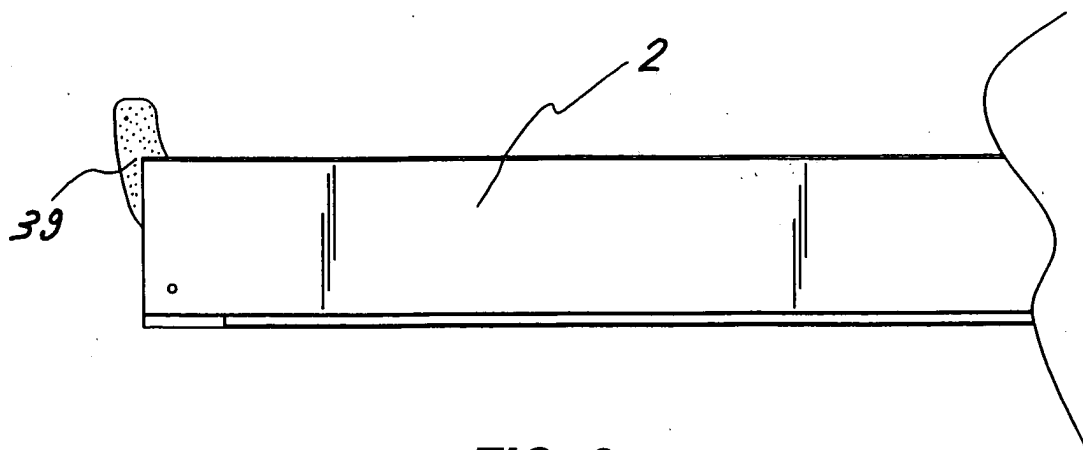
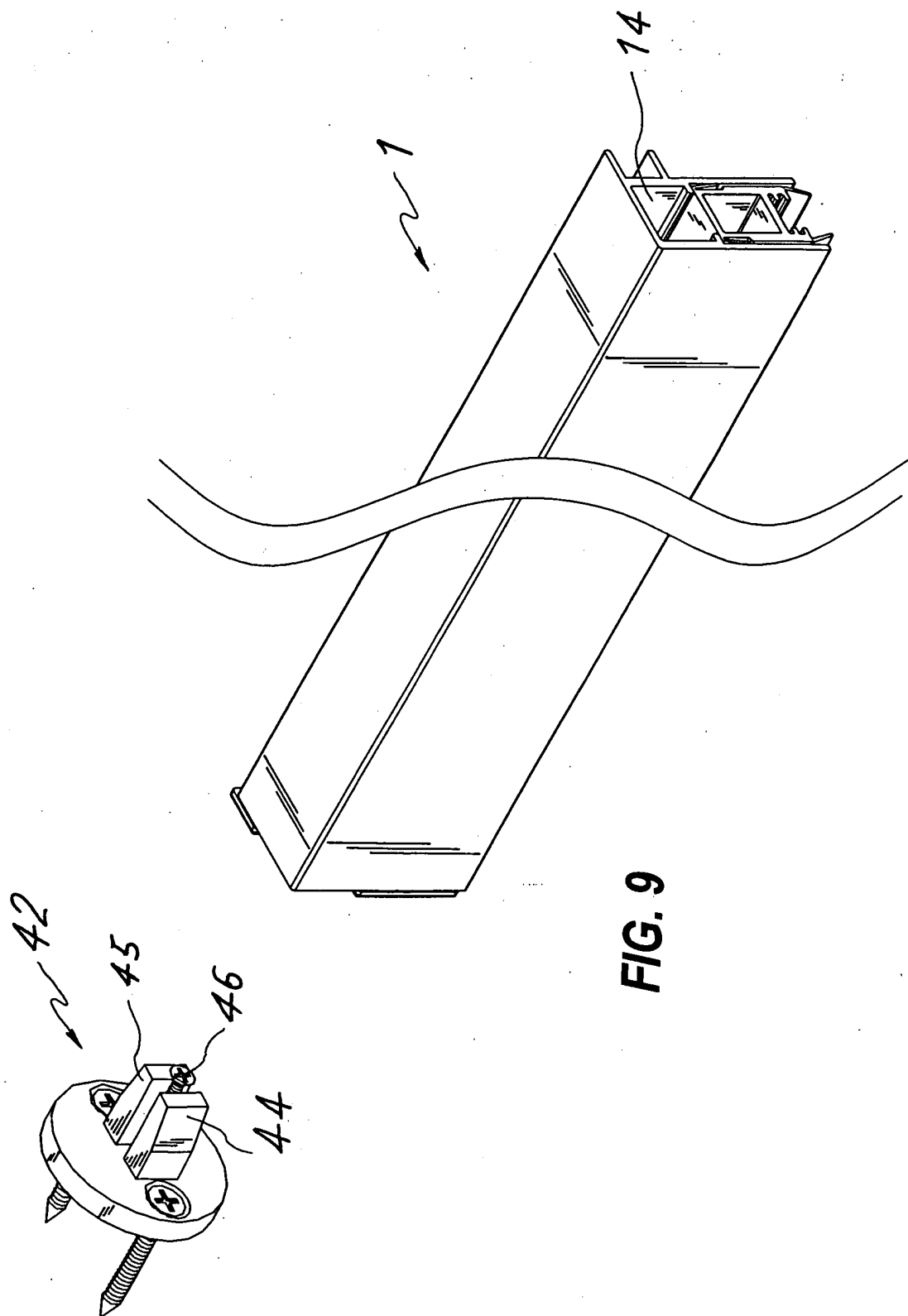


FIG. 8



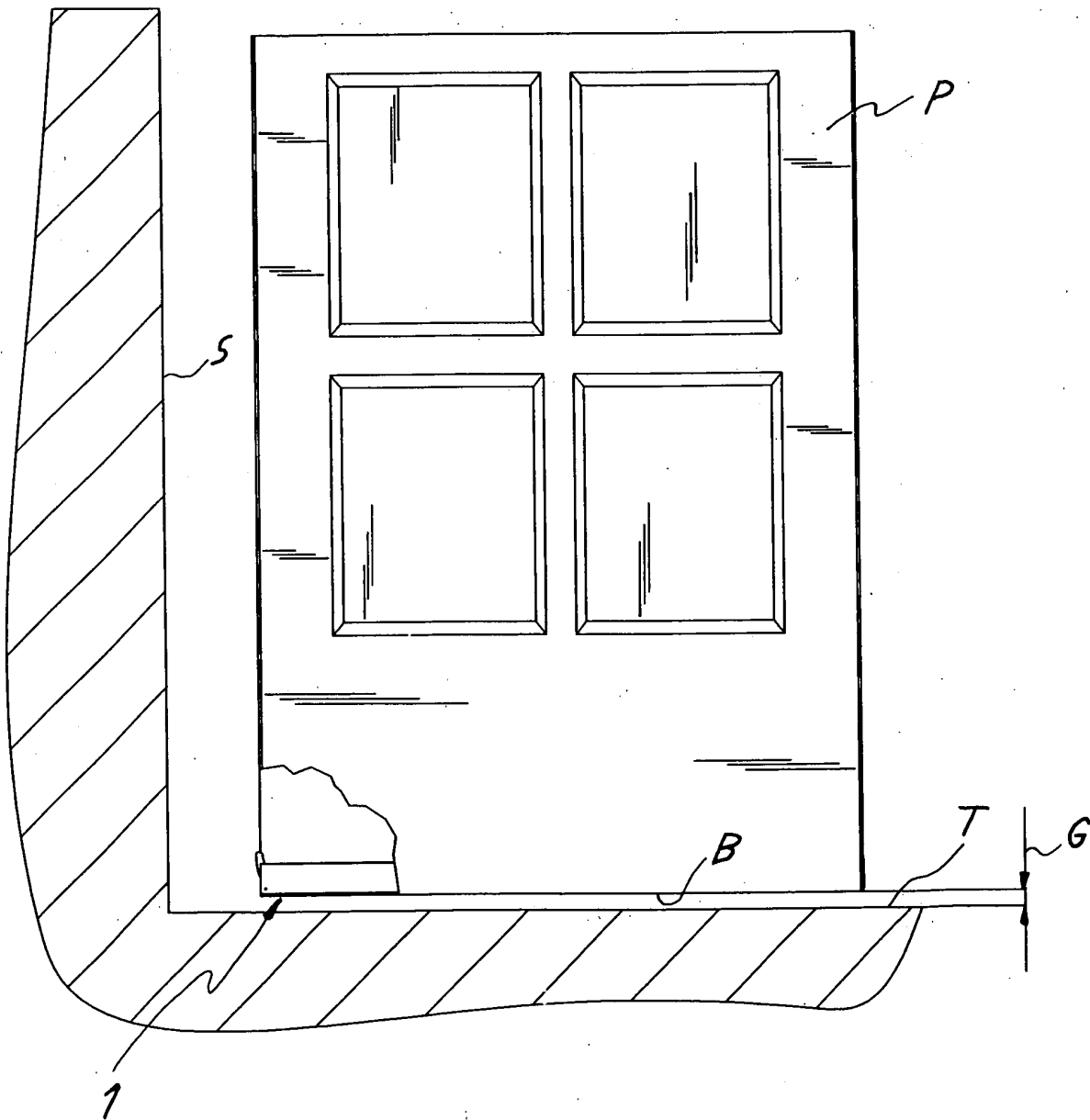


FIG. 10

