(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 767 064 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
20.01.2021 Bulletin 2021/03

(51) Int Cl.:
E06B 9/00 *(2006.01)*

(21) Application number: **20185944.4**

(22) Date of filing: **15.07.2020**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **18.07.2019 IT 201900002415 U**

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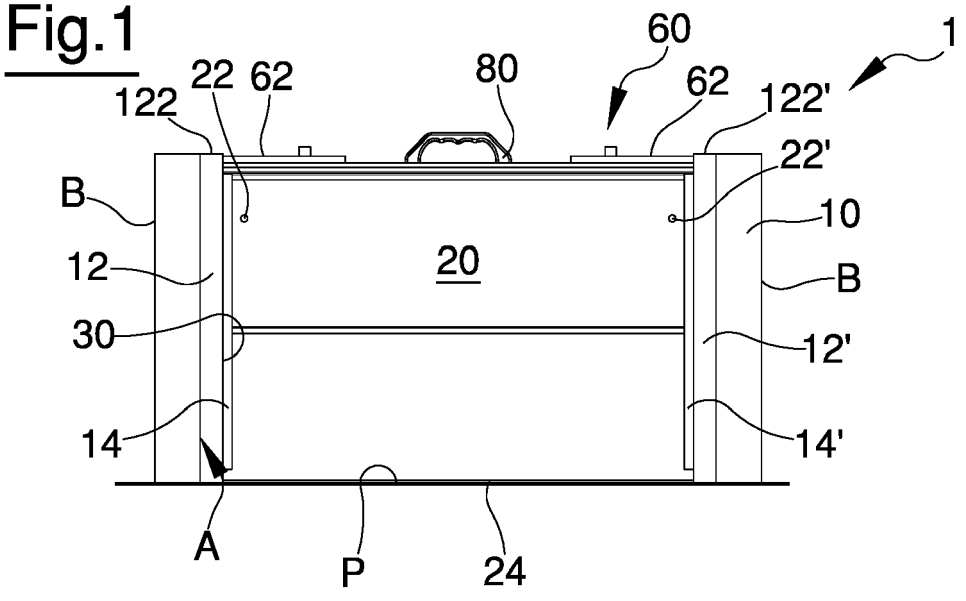
(54) **ANTI-FLOOD DEVICE**

(57) An anti-flood device (1) comprising: a frame (10) provided with a pair of lateral contrast elements (12, 12'), which extend in a given direction (D) starting from a base (14, 14') in contact with a floor (P) and are set facing each other, each contrast element (12, 12') having a longitudinal abutment (120, 120'); and a flood barrier (20), laterally delimited by two sides (22, 22') shaped so as to be set up against the abutments (120, 120') and a bottom edge (24) shaped for coupling with the floor (P) between the contrast elements (12, 12'), elastic sealing members (30) being arranged longitudinally between each abutment (120, 120') and each edge (22, 22') for coupling at the front the flood barrier (20) and the contrast elements (12, 12') in a hydraulically sealed manner, sealing members (40) being arranged between the flood barrier (20) and the floor (P) for exerting a sealing action at the level of the bottom edge (24), engagement members (50) being carried by the contrast elements (12, 12') for holding the flood barrier (20) at the front against the countering action of the elastic sealing members (30).

Fig.1



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Description

[0001] The present invention relates to an anti-flood device. In particular, the present invention regards an anti-flood device prearranged for isolating buildings from water. In greater detail, the present invention regards an anti-flood device prearranged for isolating buildings from water using at least one mobile flood barrier.

DESCRIPTION OF THE PRIOR ART

[0002] When a building is erected in areas where there is a risk of water courses or canals overflowing, the openings at ground-floor level for doors or windows are normally provided with guides for mobile flood barriers, usually having a rectangular shape, which are normally stored in the cellar or basement, and, in the case of danger of flooding, are positioned between the guides. It is readily understandable that the weight of the flood barrier and the type of coupling of the flood barrier with the guides and with the floor portion set between the guides determines the quality of hydraulic sealing. The greater the pressure of contact of the sides of the flood barrier with the guides and the base of the flood barrier with the floor portion, the greater the quality of the hydraulic sealing ensured globally by the flood barrier itself.

[0003] It may be readily understood that the hydraulic sealing is further improved by the use of pressure members that force contact between the sides of the flood barrier and the guides and between the base of the flood barrier and the floor portion.

[0004] On the other hand, it may well be understood that the simple force of gravity is not sufficient to hold the flood barrier in place downwards. As a result, to strengthen the connection between the flood barrier and the guides, in addition to providing each side of the flood barrier with respective strips of deformable elastomeric material laterally and in the base portion against the floor, normally the guides are equipped with brackets, and so also the flood barrier, which as far as possible are set facing one another and possibly in mutual contact when the flood barrier is installed; the brackets are connected through via padlocks so as to prevent relative deviation due to floating of the flood barrier between the guides or limit any transverse play and relative seepage that are even so present.

[0005] To limit these problems it is possible to use wedge-shaped members that are interposed in the gaps between the sides of the flood barrier and the guides so as to minimize the risk of front seepage, and devices are used designed to exert pressure downwards on the flood barrier to limit the risk of seepage between the base of the flood barrier and the floor.

[0006] From the foregoing, it is readily understandable that the application of the above wedge-shaped elements completes installation of the flood barrier between the guides but requires an additional time for installing each wedge-shaped element and is all the more effective, the greater the force of contact achieved between the matching surfaces, and consequently, the greater the energy exerted on the wedge-shaped elements by the operator. On the other hand, considering that the brackets do not generally manage to determine a condition of total stability of installation of the flood barrier between the guides, in the case of wave motion release of the wedge-shaped elements is likely to occur, with the consequence that the flood barrier can assume positions different from the one that ensures hydraulic sealing with the bottom or with the guides, causing formation of gaps and, consequently, bringing about seepage.

[0007] From the foregoing, the problem of having available an anti-flood device that is hydraulically effective and practical in use is currently unsolved and represents an interesting challenge for the present applicant.

[0008] Considering the situation described above it would be desirable to have available an anti-flood device that, in addition to making it possible to limit and possibly overcome the drawbacks typical of the prior art illustrated above, will define a new standard for these types of device that will be easy to install at the base of each opening exposed to the risk of penetration of flood water or the like.

SUMMARY OF THE PRESENT INVENTION

[0009] The present invention relates to an anti-flood device. In particular, the present invention regards an anti-flood device prearranged for isolating buildings from water. In greater detail, the present invention regards an anti-flood device prearranged for isolating buildings from water using at least one mobile flood barrier.

[0010] The problems set forth above are solved by the present invention according to at least one of the ensuing claims. According to some embodiments of the present invention, an anti-flood device is provided, which comprises: a frame provided with a pair of lateral contrast elements that extend in a given direction starting from a base in contact with a floor and are set facing each other, each said contrast element having a longitudinal abutment, the two said abutments identifying a reference plane developing in said given direction; a flood barrier delimited laterally by two sides shaped being set up against said abutments; and a bottom edge shaped for coupling with said floor between said contrast elements, elastic sealing means being arranged longitudinally between each said abutment and each said edge for coupling said flood barrier and said contrast elements at the front in a hydraulically sealed manner, sealing means being arranged between said flood barrier and said floor to exert a sealing action at the level of said bottom edge, attachment means being carried by said contrast elements for holding said flood barrier at the front against the countering action of said elastic sealing means.

[0011] In some embodiments of the present invention, the aforesaid attachment means comprise a pin for each of said bases, which is brought up against said abutment to delimit a space, the depth of which approximates a

thickness of the corresponding side of said flood barrier.

[0012] According to a possible variant embodiment of the present invention, safety means are provided designed to block said sides of said flood barrier against said abutments and said edge against said floor.

[0013] In certain cases, each of said sides is delimited at the top by a hollow portion, which houses a roller carried in a rotatable manner in a direction transverse to said direction; each said contrast element being delimited at the top by a head piece having a width greater than the thickness of said flood barrier and having thrust means designed to press said flood barrier towards said floor.

[0014] In other cases, said thrust means comprise a substantially cylindrical central seat for said roller and a front portion for attachment of said head piece having a thickness that increases in the direction of said seat.

[0015] According to a possible variant embodiment of the present invention, said safety means comprise at least one latch carried at the top by said flood barrier in a position corresponding to said side so that it faces the respective said head piece, the bolt of the latch being mobile between a neutral position where it does not project beyond said flood barrier and an operative position where it partially projects with respect to said flood barrier and interferes with said corresponding head piece in a respective housing.

[0016] In some cases, the aforesaid edge is convex and V-shaped; a sectional bar with V-shaped section being provided between said bases of said contrast elements at the level of said floor and being provided with a concave portion prearranged for housing said edge in a hydraulically sealed manner.

[0017] In other cases, a strip of elastomeric material is provided between said bar and said edge.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] Further characteristics and advantages of the anti-flood device according to the present invention will emerge more clearly from the ensuing description, provided with reference to the attached drawings, which illustrate some non-limiting examples of embodiment thereof and in which identical or corresponding parts of the device itself are designated by the same reference numbers. In particular:

- Figure 1 is a view in front elevation of an anti-flood device according to the present invention set installed in a first operating condition;
- Figure 2 is a first detail drawn from Figure 1 and represented on an enlarged scale;
- Figure 3 is a plan view of the detail of Figure 2;
- Figure 4 is a view on an enlarged scale of a second detail drawn from Figure 1 in a second operating condition;
- Figure 5 is a rear view of the device of Figure 1;
- Figure 6 illustrates a detail of Figure 5 on an enlarged scale and with parts removed for the sake of clarity;
- Figure 7 illustrates the detail of Figure 5 with parts removed for the sake of clarity;
- Figure 8 shows what is represented in Figure 7 on an enlarged scale and with parts removed for the sake of clarity;
- Figure 9 is a plan view of the device of Figure 1 in a third operating condition;
- Figure 10 is a schematic perspective side view of a top portion of what is represented in Figure 9;
- Figure 11 shows what is represented in Figure 10 in top plan view, with parts removed for the sake of clarity;
- Figure 12 is a side view of Figure 11;
- Figure 13 is a cross-sectional view of a detail of Figure 12 on an enlarged scale;
- Figure 14 is a view of a top lateral portion of Figure 1 sectioned with a vertical and transverse plane of Figure 1, represented on an enlarged scale and with parts removed for the sake of clarity;
- Figure 15 is a longitudinal sectional view of what is represented in Figure 14;
- Figure 16 is a view in a horizontal plane of a lateral portion of the device represented in Figure 1 on an enlarged scale and with parts removed for the sake of clarity; and
- Figure 17 is a schematic view in front elevation of a variant of Figure 1.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0019] In Figure 1, designated as a whole by 1 is an anti-flood device. Once again with reference to Figure 1, the device 1 comprises a frame 10 provided with a pair of lateral contrast elements 12, 12' applied to the side edges B of an opening A of a known building, where said lateral contrast elements 12, 12' extend in a given direction D starting from a base 14, 14' set in substantial contact with a floor P. It is worthwhile pointing out that the floor P is illustrated in the attached figures as a box-shaped body having a flattened rectangular section, without thereby conditioning the scope of the present invention. The two contrast elements 12 and 12' are obtained with two sectional bodies having an L section.

[0020] The two contrast elements 12 and 12' are set facing one another, and each of them has a plane and longitudinal abutment 120, 120', set at the front in Figures 1-4. The two abutments 120, 120' identify as a whole a reference plane M (Figure 3), which is internally tangential to the abutments 120 and 120' and develops according to the given direction D. The device 1 further comprises a flood barrier 20, which is laterally delimited by two sides 22, 22', shaped being set up against the abutments 120, 120', and a bottom edge 24. Said bottom edge 24 is shaped for coupling with the floor P between the contrast elements 12, 12' and can have a cross section shaped in a substantially rectangular or semi-circular

manner, or having a V-shape, according to the conformation of the floor P between the two contrast elements 12 and 12'. In the version of the flood barrier 20 illustrated in the attached figures, the edge 24 is rectangular, without this in any way limiting the scope of the present invention.

[0021] With particular reference to Figures 9-12, the device 1 comprises elastic sealing members 30, which are arranged longitudinally between each abutment 120, 120' and each edge 22, 22' for coupling at the front the flood barrier 20 and the contrast elements 12, 12' in a hydraulically sealed manner. With particular reference to Figures 1 and 2, the flood barrier 20 has a sealing element 40 constituted by a strip of elastomeric material, which, for practical reasons is designated by the same reference number 40 and has the purpose of exerting a sealing action at the level of the bottom edge 24. In actual fact, this strip 40 must necessarily be set at the interface between the flood barrier 20 and the floor P to exert its own hydraulic sealing action at the base of the flood barrier 20, so that falling within the scope of the present invention is also the version of the device 1 in which said strip 40 is applied to the floor P at the moment of installation of the device 1 itself.

[0022] The device 1 further comprises engagement members 50, which are carried by the contrast elements 12, 12' for holding the flood barrier 20 at the front against the countering action of the elastic sealing means 30. The engagement members 50 comprise a pin 52 for each base 14, where said pin is carried parallel to and longitudinally facing the respective abutment 120/120' for delimiting, together with the latter, a space, the depth of which locally approximates the thickness of the corresponding side 22, 22' of the flood barrier 20.

[0023] Each side 22, 22' of the flood barrier 20 is delimited at the top by a hollow portion 220, 220', which houses a roller 222/222', rotatably carried in a direction transverse to the direction D. Each contrast element 12, 12' is delimited at the top by a head piece 122, 122', the width of which is greater than a thickness of the flood barrier 20. Each head piece 122/122' (Figure 13) has thrust members 1220, 1220' designed to press the flood barrier against the floor P. These thrust members 1220/1220' are designed to act by shape fitting and, in particular, they comprise a substantially cylindrical central seat 1222, 1222' for the roller 222, 222' and a front portion 1224, 1224', which is provided for attachment of the head piece 122, 122' and has a thickness that increases in the direction of the seat 1220, 1220', and is hence shaped like an inclined plane.

[0024] With particular reference to Figures 1-4, the device 1 comprises safety members 60 designed to block the sides 22, 22' of the flood barrier 20 against the abutments 120, 120' and, at the same time, the edge 24 against the floor P. In particular, the safety members 60 comprise a latch 62 for each side of the flood barrier 20, where each latch is carried at the top by the flood barrier 20 in a position facing the respective head piece 122, 122' with the bolt mobile between a neutral position where it does not project beyond the flood barrier 20 and an operative position where it partially projects with respect to the flood barrier 20 and interferes with the corresponding head piece 122, 122' in a respective housing 1226, 1226'.

[0025] For practical reasons, at least one handle 80 is applied to the flood barrier; in Figure 1, the handle 80 is single, given the small dimensions of the flood barrier 20 that used as model for illustrating the structural characteristics of the present invention.

[0026] Use of the device 1 can be readily understood and does not require any further explanations. On the other hand, it is to be pointed out that installation of the flood barrier 20 between the contrast elements 12 and 12' is obtained easily using any handle 80 that makes it possible to support the flood barrier 20 and move it until it is set with its edge 24 between the contrast elements inside the space delimited by the abutments 120 and 120' and by the pins 52. In this position, visible in Figure 9, the flood barrier 20 is inclined, and the handle 80 makes it possible to support it, with the rollers 222 and 222' facing the head pieces 122 and 122'. In this operative condition, the flood barrier 20 is arranged neatly with the sides 22 and 22' inclined with respect to the contrast elements 12 and 12', and the handle 80 can be used to turn the flood barrier 20 itself in the clockwise direction as viewed in Figure 10, after it has been brought into contact with the front portion 1222/1222' of each head piece 122/122'. The freedom of rotation of the rollers 222 and 222' with respect to the corresponding pin 2220/2220' (visible in Figure 15), combined with the elasticity of the strip 40 of elastomeric material, enables the flood barrier 20 to be pushed downwards during the clockwise rotation referred to above and be held in a position of compression against the floor P even when the roller stably engages the seat 1220, 1220' of the respective head piece 122/122', thus bringing about a stable operating condition for the flood barrier 20. Use of the latches 62 enables definitive stabilization of this operating condition, which - it may be pointed out - has been brought about by exerting an action of pressure sufficient to overcome the elastic resistance of the elastic sealing members 30, which are in fact arranged longitudinally between each abutment 120, 120' and each edge 22, 22', with the effect of coupling at the front the flood barrier 20 and the sealing contrast elements 12, 12'.

[0027] Finally, it is clear that modifications and variations may be made to the device 1 described and illustrated herein, without thereby departing from the scope of the present invention. For instance, it is worthwhile pointing out that, in the case where the edge 24 is convex and V-shaped, it is advisable to make a furrow in the floor P between the bases 14, 14' of the contrast elements 12, 12', where said furrow has a shape matching the edge 24 or, even better, designed to house a sectional bar with V-shaped section provided, in turn, with a concave portion prearranged for housing the edge 24 in a matching manner at least along a line in order to ensure hydraulic

sealing with the floor P. What has been said with reference to the furrow and to the bar is readily understandable and does not require the support of a graphic representation, which is omitted for economy of illustration.

[0028] Of course, the anti-flood device 1 can be used not only to prevent entry of water through the openings (doors or windows) of a building, by providing sealed stretches in combination with the side edges B and the respective floor portions P, but also to prevent access of liquids into subways, tunnels, or underground passages, which are provided with parallel sides or sides rendered such at least for the vertical extension of the flood barriers used.

[0029] Figure 17 illustrates an opening A particularly extensive in width. In this case, the flow of the liquid to be stopped could be particularly significant, both in terms of mass and in terms of power associated with the incoming mass of liquid. For this reason, it may be convenient to counter deflection of the flood barrier 20, and the consequent loss of effectiveness of the anti-flood device 1 as a whole, equipping the device 1 with an anti-deflection unit 90 comprising a plurality of vertical latches 91 distributed at the bottom along the flood barrier 20 and provided with bolts 92 mobile in a vertical direction selectively between a neutral position and a position of engagement of a hole 94, made in the floor P in front of or behind the projection on the ground of the flood barrier 20. Each hole 94 houses a bushing 96 of a known type, vertically accessible by a bolt 92 but normally closed by a base (known and not illustrated) mobile vertically towards the bottom of the bushing 96 following upon displacement of the respective bolt 92 from a neutral position to a position of engagement against the thrust of a spring, known and not illustrated. It may well be understood that the purpose of the mobile base of each bushing 96 is to prevent intrusion of dirt or obstructing bodies into the bushing 96 itself.

[0030] According to what has been described above, it may be readily understood that the anti-flood device 1 can be validly used for overcoming the drawbacks of the prior art illustrated above in a simple and inexpensive manner, thanks to the structural characteristics described above, which can be modified, without thereby departing from the scope of the present invention.

Claims

1. An anti-flood device (1) comprising a frame (10) provided with a pair of lateral contrast elements (12, 12'), which are elongated in a given direction (D) starting from a base (14, 14') in contact with a floor (P) and are mutually facing each other, each said contrast element (12, 12') having a longitudinal abutment (120, 120'), the two said abutments (120, 120') identifying a reference plane (M) developed according to said given direction (D); and a flood barrier (20) laterally delimited by two sides (22, 22') shaped to be facing said abutments (120, 120') and a bottom edge (24) shaped for coupling with said floor (P) between said contrast elements (12, 12'); elastic sealing means (30) being arranged longitudinally between each said abutment (120, 120') and each said edge (22, 22') for coupling said flood barrier (20) at the front and said contrast elements (12, 12') in a hydraulically sealed manner, sealing means (40) being arranged between said flood barrier (20) and said floor (P) for exerting a sealing action on said bottom edge (24), attachment means (50) being carried by said contrast elements (12, 12') for holding said flood barrier (20) at the front against the countering action of said elastic sealing means (30).

2. The device according to claim 1, **characterized in that** said attachment means (50) comprise a pin (52) for each of said bases (14) carried facing said abutment (120, 120') to delimit a space, the depth of which approximates a thickness of the corresponding side (22, 22') of said flood barrier (20).

3. The device according to any one of the preceding claims, **characterized in that** it comprises safety means (60) designed to block said sides (22, 22') of said flood barrier (20) against said abutments (120, 120') and said edge (24) against said floor (P).

4. The device according to any one of the claims 1 to 3, **characterized in that** each said side (22, 22') is delimited at the top by a hollow portion (220, 220') that houses a roller (222, 222') carried in a rotatable manner in a direction transverse to said direction (D); each said contrast element (12, 12') being delimited at the top by a head piece (122, 122') having a width greater than said flood barrier (20) and having thrust means (1222, 1222') designed to press said flood barrier against said floor (P).

5. The device according to claim 4, **characterized in that** said thrust means (1222, 1222') comprise a substantially cylindrical central seat (1220, 1220') for said roller (222, 222') and a front portion (1224, 1224') for attachment of said head piece (122, 122') that has a thickness that increases in the direction of said seat (1220, 1220').

6. The device according to claim 5, **characterized in that** said safety means (60) comprise at least one latch (62) carried at the top by said flood barrier (20) on said side (22, 22') in an overlooking position of the respective said head piece (122, 122') mobile between a complete overlapping neutral position with said flood barrier (20) and a partially overlapping operating position with said flood barrier (20) and an interference position with said corresponding head piece (122, 122') in a respective housing (1224, 1224').

7. The device according to any one of the preceding claims, **characterized in that** said edge (24) is convex and V-shaped, a sectional bar (70) with a V-shaped section being provided between said bases (14, 14') of said contrast elements (12, 12') of said floor (P) and having a concave portion (72) prearranged for housing said edge (24) in a hydraulically sealed manner.

8. The device according to claim 7, **characterized in that** it comprises a strip (40) of elastomeric material between said bar (70) and said edge (24).

9. The device according to any one of the preceding claims, **characterized in that** it comprises anti-deflection means (90) associated with said flood barrier (20) and provided with a plurality of latches (91) distributed along said flood barrier (20) and provided with bolts (92) designed to selectively engage a hole (94) made in said floor (P).

10. The device according to claim 9, **characterized in that** at least one said hole (94) houses a normally closed bushing (96) vertically accessible against the thrust of a spring.

Fig.2

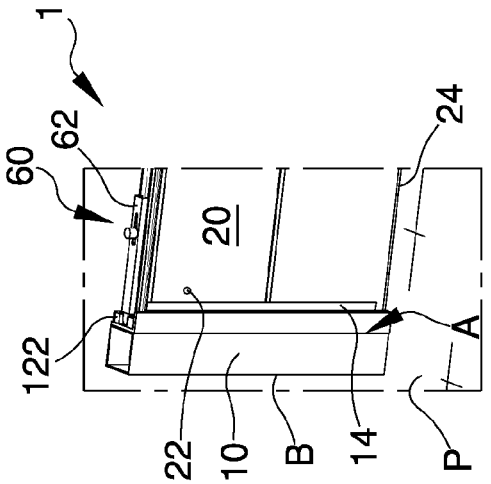


Fig.4

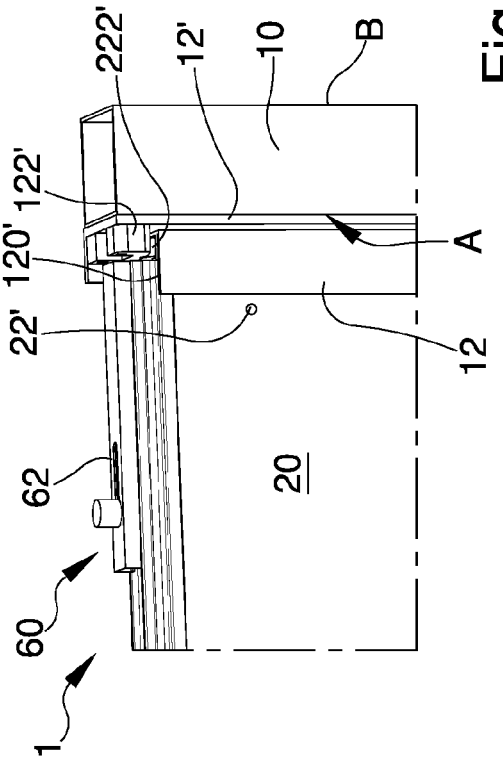


Fig.1

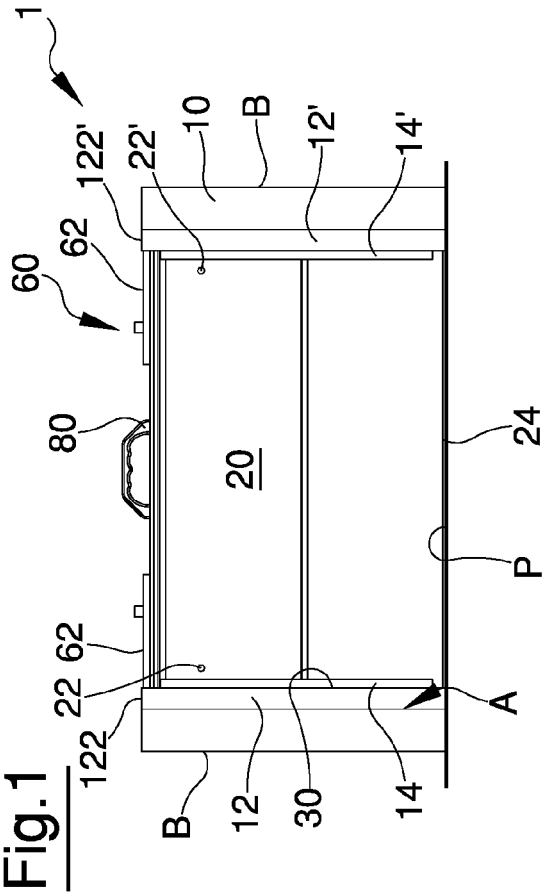


Fig.3

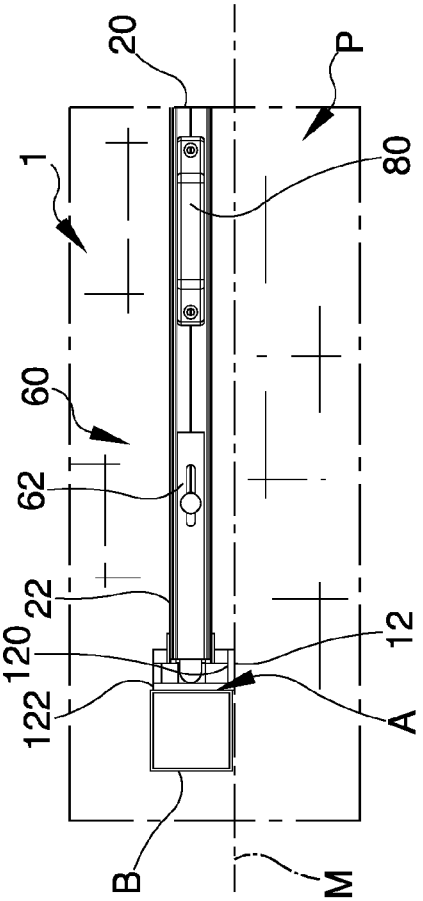


Fig.7

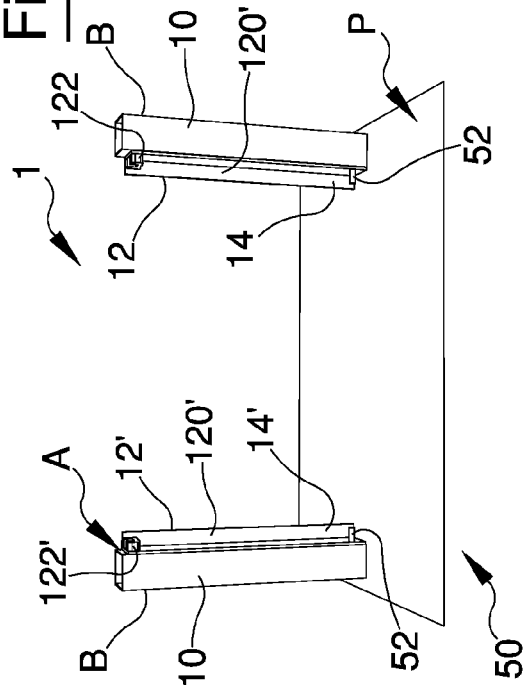


Fig.8

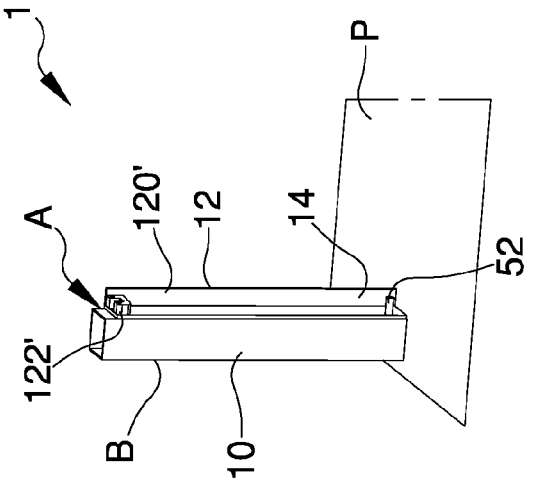


Fig.5

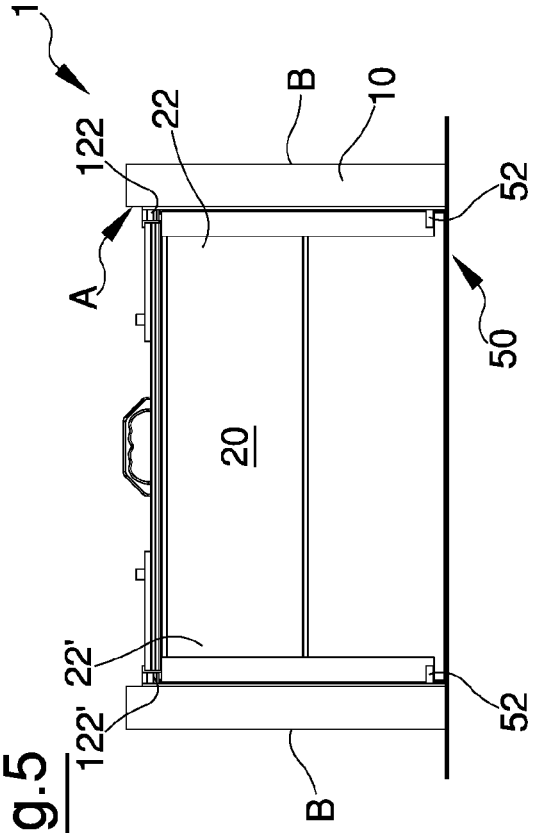
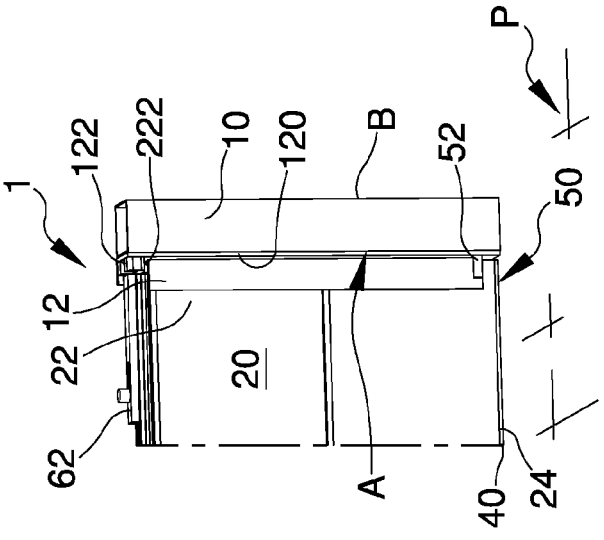


Fig.6



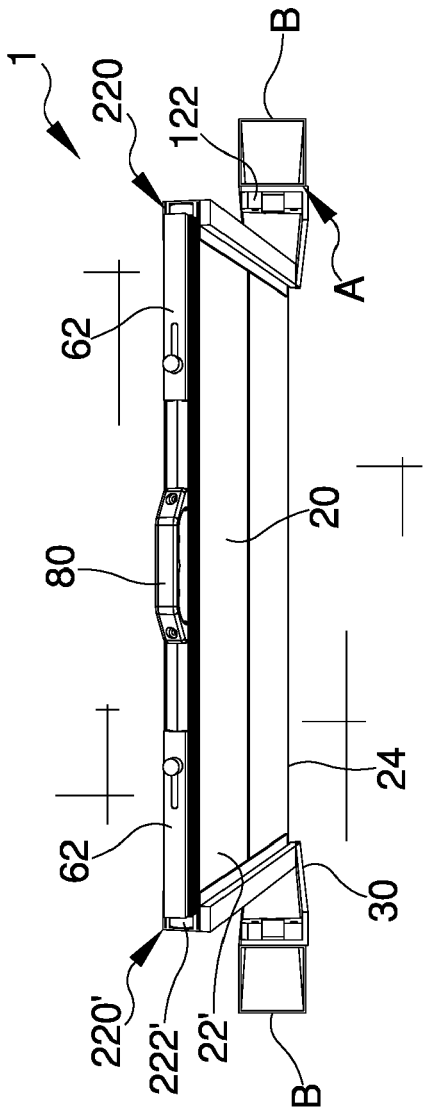


Fig.9

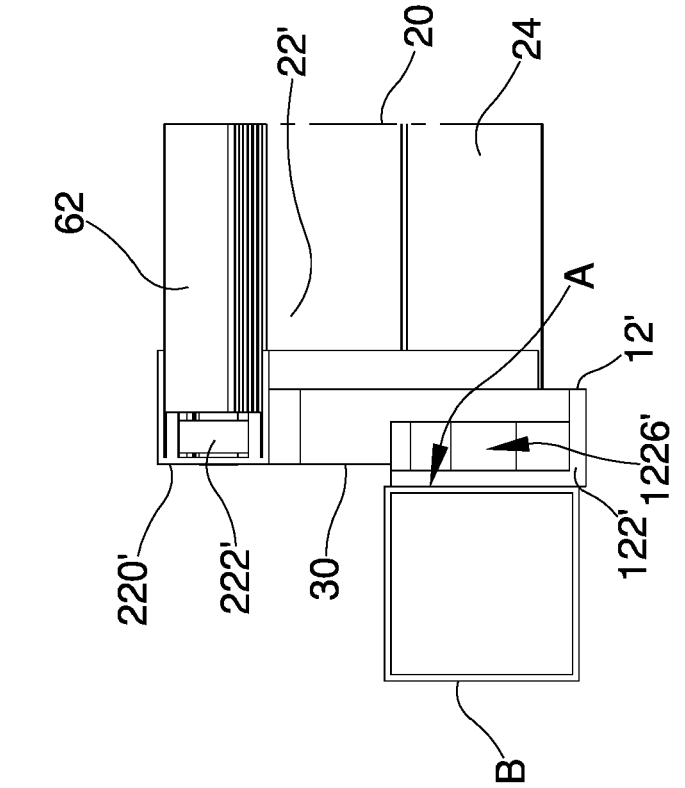


Fig.11

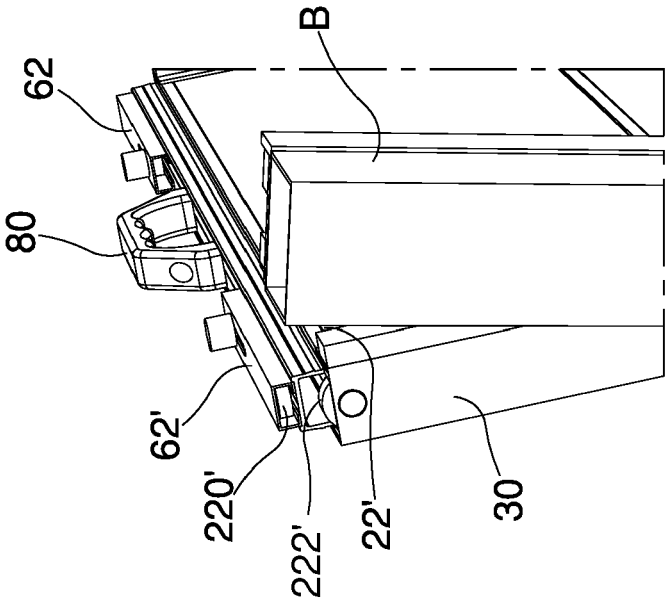


Fig.10

Fig.12

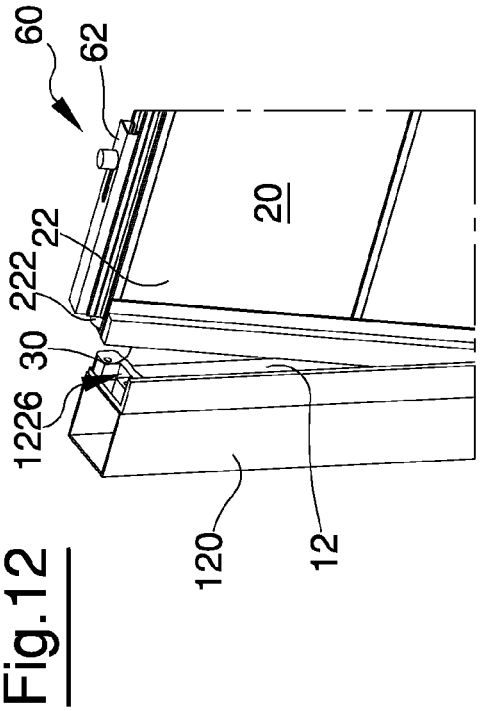


Fig.13

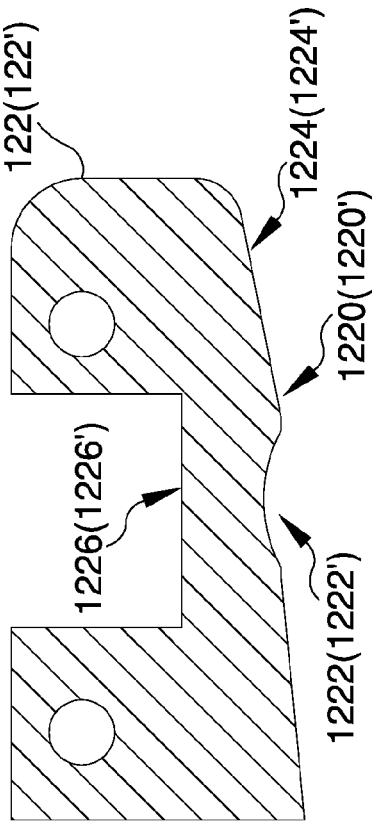


Fig.14

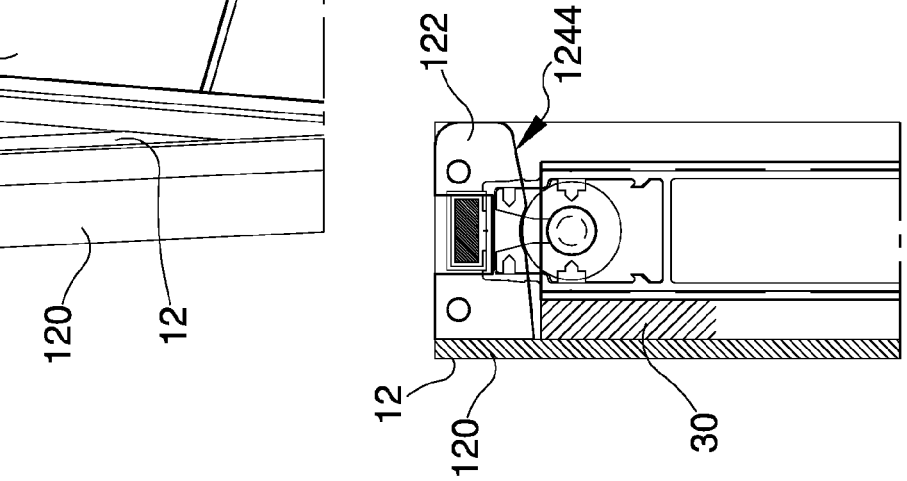


Fig.15

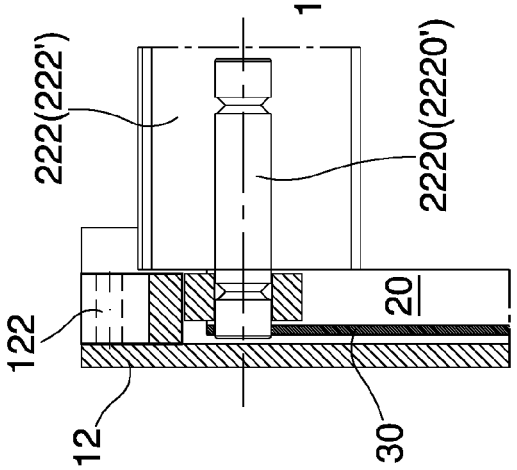
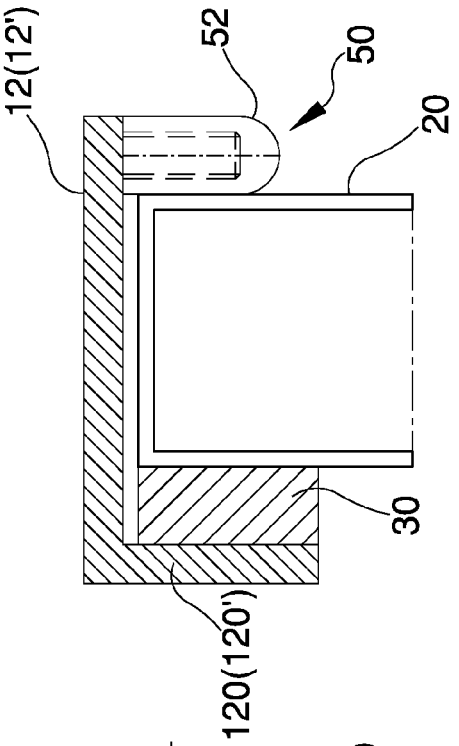


Fig.16



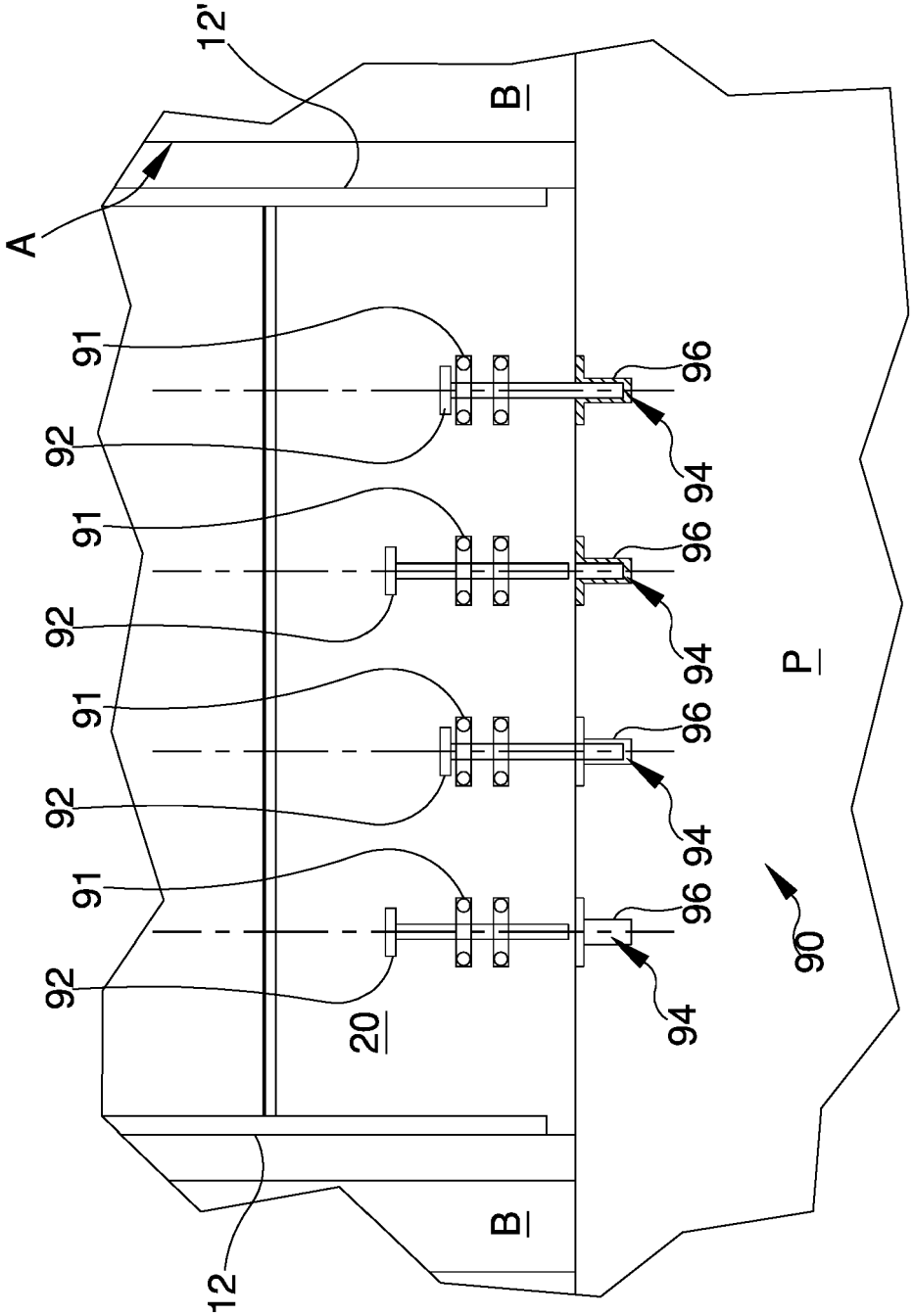


Fig.17