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(54) Locking device for vehicle panels or doors

(57) The present invention relates to a device for locking a side panel or door of a vehicle. The device comprises a first element (2) for engaging the side panel or door (P) with a vehicle portion, the first element (2) being movable between a locking position, at which opening of the side panel or door is not allowed, and an unlocking position, at which opening of the side panel or door (P) is allowed, and a second element (3), being fastened to the first element (2), which can be manually operated by a user to shift the first element (2) between the locking and unlocking positions. The first element (2) is provided with at least one guide (5,6) and the second element (3) is provided with means (9) suitable to slidingly engage this guide (5,6), the movement of the first element (2) between the locking and unlocking positions depending on the position of the engaging means (9) with respect to the relative guide (5,6).

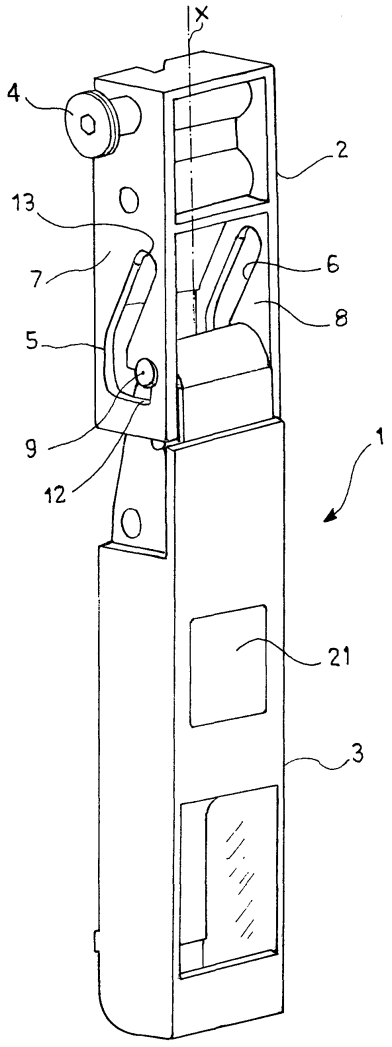

FIG.1

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Description

[0001] The present invention relates to a locking device for side panels or doors of vehicles, particularly for side panels or doors of load surfaces in vehicles.

[0002] The manufacturers of such vehicles as trucks, trailers, vans, etc. use several types of side panels or doors in order to allow or restrict access to the load surfaces of these vehicles, trailers, cabs, etc.

[0003] For example, it is known to use large sized doors for closing the trucks' trailers on the rear side. In vans, the doors are generally small sized, being often provided in the form of dump side panels having the function of enclosing the load surface both on the side and rear side. Furthermore, several types of vans, or cars, are provided with doors allowing access to the passenger compartment from the side, and in this case the doors are in the form of doors being slidingly fastened to the body of the respective vehicles.

[0004] The devices conventionally used for locking side panels and doors, i.e. either locking the side panels or doors in the closing position or allowing them to be opened, suffer from a number of drawbacks. First of all, the conventional devices are complicated to manufacture because they generally consist of a considerable number of elements and require a long time to be assembled, which clearly affects the manufacturing and installation costs.

[0005] Another non-negligible drawback is that the conventional devices can be potentially dangerous for people standing near the vehicle. The conventional locking devices, in fact, are generally provided with handles protruding from the relative doors (or side panels) and can act as a blunt weapon in the event of accidental impact with a person.

[0006] In the following, reference will be made mainly to vehicle doors. Those skilled in the art will recognize that side panels are a particular type of doors.

[0007] The object of the present invention is to provide a device for locking side panels or doors of a vehicle which is inexpensive and easy to use.

[0008] Another object of the present invention is to provide a locking device for a door or side panel of a vehicle being easy to use by a user, while allowing to minimize the hazard of injury to the user that may derive from accidental impact with the device.

[0009] It is a further object of the present invention to provide a locking device for a door or side panel of a vehicle being fitted with a handle that does not protrude in a hazardous manner to the exterior of the vehicle when the device is not being used.

[0010] These and other objects are achieved by the present invention that relates to a locking device for a vehicle door, comprising a first element engaging said door with a portion of said vehicle, said first element being movable between a locking position, at which the opening of said door is not allowed, and an unlocking position, at which the opening of said door is allowed, and a second element being fastened to said first element, which can be manually operated by a user in order to move said first element between said locking position and said unlocking position, said first element and second element being housed within said door or said vehicle portion, characterized in that said first element is provided with at least one guide and said second element is provided with means suitable to slidingly engage said guide, the displacement of said first element between said locking position and said unlocking position depending on the position of said means relative to the corresponding guide.

[0011] The device according to the present invention can be advantageously housed directly within the respective door (or respective side panel), or in a vehicle portion, such as a post adjacent to the door (or side panel). As will be understood from the description below, in fact, both solutions are equivalent to each other.

[0012] For example, when the door or side panel associated to the device according to the present invention is provided with a side post, the device can be housed within the post. The side panels of vans, in fact, are often provided with small side posts defining the relative side panels.

[0013] Advantageously, the coupling between the first and second elements allows to minimize the number of components of the device, with clear advantages in terms of manufacturing and assembly costs of the same. Furthermore, due to this coupling, the structure of the device is particularly simple when compared with that of conventional locking devices for vehicle doors or doors. This allows a quick and easy installation of the device.

[0014] The device according to the present invention has a further advantage over the conventional devices of the same type. It allows to lessen the risk that one or more elements thereof may cause serious injury to a person who accidentally bumps into the door or side panel in the vicinity of the device. The coupling of the second element to one or more guides of the first element, in fact, allows the device to be held in a compact configuration when not in use, thereby avoiding that parts of the device may protrude from their housings in a hazardous manner.

[0015] According to an aspect of the present invention, the first element slides within a housing either formed in a post adjacent to the door (for example in a small sized post integral with the vehicle load surface), or in the door, and the second element is coupled to the door, or post, by means of a mechanical joint.

[0016] Preferably, the second element is a lever. This is provided with the guide-engaging means at a first end thereof and a handle for the user at a second end thereof, opposite the first end. The mechanical joint fastening the lever to the door, or vehicle portion, comprises an arm hinged to the lever intermediate between the first and second ends.

[0017] The first element may have various shapes suitable to allow the sliding of the same within the relative

housing, such as a groove being formed in the door or a recess inside said post. For this reason, the first element is preferably a sliding block and each guide thereof is formed in a portion of the same sliding block substantially orthogonal to the sliding plane within the relative housing.

[0018] According to an embodiment of the present invention, the first element, such as a sliding block, is provided with two guides formed on as many opposing outer surfaces.

[0019] Each guide is preferably generically 7-shaped (number seven), wherein the inclined length substantially extends in the sliding direction of the sliding block and the cross length is close to the lever. In this embodiment, the guide ends are substantially aligned relative to the sliding direction of the sliding block. Particularly, the guide end being at the cross length, close to the lever, is defined as the proximal end, whereas the guide end being at the inclined length thereof is defined as the distal end.

[0020] The lever is aligned with the sliding block and contiguous thereto when the sliding block is in the locking and unlocking positions. When a user acts on the handle, the lever rotates and shifts relative to the sliding block.

[0021] According to a particularly advantageous aspect of the present invention, the second element, a lever in the example, is flush coupled to the door or a door/vehicle post, thereby resulting fastened to a suitable housing through the mechanical joint. In this way, the second element protrudes from its housing, i.e. generally from the vehicle body, only when it is used by the user, on the contrary it is normally housed in the housing such that it does not extend outside the body in a hazardous manner. This characteristic allows to avoid the chance that the second element may accidentally come in contact with and cause injury to people standing near the vehicle.

[0022] The mechanical joint can comprise, besides said arms, a return element having the function of taking the second element back to alignment with the first element, for example the lever into alignment with the sliding block, after the device has been actuated by the user.

[0023] The first element can operatively lock the door in many different ways. For example, the first element can either act as a latch by being at least partially inserted in a recess of the door or relative post, or it can act as an abutment surface preventing the lever from rotating in the opening direction of the door.

[0024] According to a preferred embodiment of the invention, the first element is provided with two guides and the second element is provided with a pivot engaging both guides at the same time. The pivot is selectively displaced between the proximal ends and the distal ends of the guides when the user operates the device. When the pivot is at the distal ends of the guides, the first element locks the door (or side panel). When the pivot engages the proximal ends of the guides, the first element does not lock the door (or side panel), which can be then opened.

[0025] Further aspects and advantages of the present invention will be better understood from the description below, which is intended as being a non-limiting example with reference to the annexed schematic drawings, in which:

- Figure 1 is a perspective view of a device according to the present invention, in a first configuration;
- Figure 2 is a perspective view of the device illustrated in Figure 1, in a second configuration;
- Figure 3 is a perspective view of the device illustrated in Figure 1 while being operated;
- Figure 4 is a further perspective view of the device illustrated in Figure 1 while being operated;
- Figure 5 is a plan view of a first element of the device illustrated in Figure 1;
- Figure 6 is a side view of the element illustrated in Figure 5;
- Figure 7 is a longitudinal sectional view of the element illustrated in Figure 5;
- Figures 8 and 9 are perspective views of the element from Figure 5;
- Figure 10 is a plan view of the inner side of a second element of the device illustrated in Figure 1;
- Figure 11 is a plan view of the external side of the element from Figure 10;
- Figures 12 and 13 are side views of the element from Figure 10;
- Figure 14 is a perspective view of the element from Figure 10;
- Figure 15 is a perspective view of a detail of the element from Figure 10;
- Figure 16 is a further perspective view of the element from figure 10;
- Figure 17 is a perspective view of the device illustrated in Figure 1 being associated with a door;
- Figure 18 is a perspective view of the device illustrated in Figure 2 being associated with a door;
- Figure 19 is a schematic view of a portion of a vehicle provided with the device from Figure 18.

[0026] Figures 1 and 2 illustrate, in perspective, a locking device 1 according to the present invention. Generally, the device 1 comprises a first element, having the function of locking and unlocking the door or side panel of a vehicle, and a second element 3 being fastened to the first element 2, through which a user can selectively move the first element 2 between a locking position, illustrated in Figure 1, at opening the door or side panel is not allowed, and an unlocking position, illustrated in Figure 2, at which opening the door or side panel is allowed.

[0027] The device 1 can be housed in the door to which it is associated, for example a post of the door, or in a suitable housing formed in a vehicle portion adjacent the door, for example in a post being integral with the vehicle. For example, Figures 17 and 18 illustrate the device 1 being housed in a post M of a vehicle (non illustrated) in

the positions shown in Figures 1 and 2, respectively. The post M can be, for example of a type used in vans to allow the abutment of doors P. Alternatively, the device 1 can be housed directly in the door P to be locked. It will be understood that both solutions are equivalent to each other. In the embodiment such as illustrated, in fact, the locking of the door by means of the first element 2 is carried out through the pin 4. In practice, when the first element 2 is in the locking position, the pin 4 engages a corresponding recess in the door P or vehicle depending on the device 1 being housed in a portion of the vehicle M (other than the door P) or directly in the door P, respectively. Alternatively, the first element 2 can be provided with means providing the locking of wings, doorbacks, etc., in a conventional manner.

[0028] As illustrated in Figures 1-4, the coupling of the first element 2 to the second element 3 preferably comprises two guides 5 and 6 being formed at the opposing surfaces 7 and 8 of the element 2, which are engaged by the pivot 9 being integral with the second element 3. Alternatively, the first element 2 can be provided with a single guide 5 or 6.

[0029] The first element 2 is housed in a suitable housing (not illustrated) which is formed in the door or said vehicle portion, in which it is free to slide when the device 1 is actuated by a user through the second element 3. Particularly, the displacement of the first element 2 between the locking and unlocking positions is allowed in the direction X of Figures 1-4. For this reason, the first element 2 can be defined as a sliding block 2 sliding within a suitable housing in a direction X substantially parallel to its axis. This direction can be either substantially horizontal relative to the vehicle, i.e. parallel to the road surface, or substantially vertical relative to the vehicle, i.e. orthogonal to the road surface. For example, in the case where the device 1 is housed in a lateral side panel of the load surface of a truck (Figures 17 and 18), the direction X is substantially vertical.

[0030] Guides 5 and 6 are accordingly formed on the surfaces 7 and 8, respectively, and are generally orthogonal to the sliding plane of the sliding block 2 within the housing thereof. The guides 5 and 6 can be variously shaped. In the embodiment illustrated in the annexed figures, particularly in Figures 6 and 7, the guides 5 and 6 have a generic shape similar to number seven, with a cross length 10 being substantially orthogonal relative to the direction X, being positioned close to the second element 3 and an inclined length 11 starting from the cross length 10 in an inclined direction relative to direction X. The end 12 of the guides 5 and 6 at the cross length 10 is proximal relative to the second element 3, whereas the end 13 at the inclined length 11 is distal relative to the same second element 3 (Figures 1-9).

[0031] As clearly illustrated in Figures 1 and 2, when the pivot 9 of the second element 3 engages the guides 5 and 6 at the proximal end 12, the sliding block 2 is in the locking position (Figure 1), whereas when the pivot 9 engages the guides 5 and 6 at the distal end 13, the sliding block 2 is in the unlocking position (Figure 2). Those skilled in the art will recognize that the guides 5 and 6 can have a shape other than that illustrated. What is important is that the second element 3, through the pivot 9 engaged in a proximal end of a guide 5 or 6, can push the sliding block 2 such as to space it apart in the direction X and, vice versa, can take the sliding block 2 back to the same element 3 in the direction X.

[0032] The second element 3 has a generic elongated shape and when the sliding block 2 is in the locking or unlocking positions, the same element 3 is aligned with the sliding block 2. Preferably, the second element 3 is a lever hinged to the sliding block 2 through the pivot 9. The pivot 9 is fastened to the lever 3 at an end 14 thereof. On the opposite end 15 there is provided a handle 16 providing the user with an effective grip of lever 3. As illustrated in the Figures 3 and 4, the lever 3 is fastened to an outer structure through a mechanical joint 17. The outer structure can be the post M to which the device 1 is associated, or a different vehicle portion, such as a housing S formed in the vehicle body, adjacent to the post M.

[0033] The joint 17 accompanies the rotation of lever 3 relative to the sliding block 2 and comprises an arm 18 being hinged to the outer structure and the same lever 3, in an intermediate position relative to the handle 16 and the pivot 9. The figures 10 to 16 illustrate the lever 3 in detail. The arm 18 is fastened to suitable housings 19 being obtained on a side of lever 3. Preferably, the lever 3 is flush coupled to its housing, be the latter provided in the post M, door P or different vehicle portions, such that it does not protrude from the vehicle body in a hazardous manner.

[0034] Reference is now made to Figures 2, 4, 3 and 1, sequentially. They illustrate the operation of the device 1 in order to bring the sliding block 2 from the starting unlocking to the final locking positions. At first, the pivot 9 engages the distal end 13 of the guides 5 and 6 and the lever 3 is aligned to the sliding block 2, such as illustrated in Figure 2 or in Figure 18. The user, by gripping the handle 16, rotates the lever 3 relative to the sliding block 2 thereby bringing the same to the position illustrated in Figure 4, at which the lever 3 protrudes from its housing. Practically, at this step the pivot 9 moves along the inclined length 11 of guides 5 and 6. A further movement of lever 3, being operated by the user, forces the pivot 9 to move along the cross length 10 of guides 5 and 6 such as to move to the position illustrated in Figure 3, i.e. at the proximal end 12. At this stage, a rotation of lever 3 in the direction of arrow R, i.e. in such a direction to bring the lever 3 back to its housing, causes the sliding block 2 to move in the direction X. The pivot 9, in fact, pushes the sliding block 2 in its housing, thereby moving it away from lever 3 and taking the device 1 in the configuration shown in Figure 1 or Figure 17, i.e. with the sliding block 2 in the locking position and the lever 3 closed.

[0035] The mechanical joint 17 can further comprise a

return element 20, such as a spring, having the function of taking the lever 3 back to its housing S (Figures 17 and 18) when it is not being used by a user, i.e. in the closing position.

[0036] Preferably, such as illustrated in Figures 17-18, the device 1 is housed in a post M, for example a post adjacent to a dump side panel of the type used in industrial vehicles for enclosing the load surface. The device 1 can be generally used also with other types of doors, panels, doorbacks, etc. provided on vehicles. For example, it can be used on trailers to lock the opening of the wings of doorbacks. Figure 19 schematically shows a load surface 30 of a van. The load surface 30 is defined by a plurality of side panels P being coupled with posts M that are integral with the load surface 30, through a plurality of devices 1 according to the present invention.

[0037] The device 1 has a particularly simple structure compared with the devices conventionally used for locking vehicles doors. Furthermore, the device 1 comprises a small number of elements, with clear advantages in terms of manufacturing and assembly costs.

[0038] Installing the device 1 is also quick and easy. With reference to Figures 17 and 18, the sliding block 2 together with the lever 3 being fastened thereto are inserted in the housing S made in the post M. The sliding block 2 is then housed in a portion of the housing S that is closed outside the post M and coupled to the pin 4. The lever 3 is fastened to the housing S through the joint 17.

[0039] The device 1 further allows to improve the safety of people standing near the vehicle. It is provided that, in fact, the lever 3 when not being used is housed in its housing, for example the housing S of Figure 17. In this way, the lever 3 cannot be a blunt weapon, unlike many conventional devices. Accordingly, in the event that an accidental movement of the door P or vehicle brings the device 1 into contact with a person, the lever 3 will not hit this person in a dangerous manner, for example with its end 15, but "sideways" such as through the surface 21.

[0040] The locking device according to the present invention is different from the conventional devices also in that the lever 3, together with the handle 16, are flush housed in their recess when the device is in the locking or unlocking positions.

[0041] It will be understood by those skilled in the art that the device according to the present invention can be made by inverting the kinematics of its components. For example, the guides 5 and 6 can be provided on the lever 3 and the pivot 9 on the sliding block 2.

Claims

1. A locking device (1) for a side panel or a door (P) of a vehicle, comprising :

- a first element (2) engaging said side panel or door (P) with a post (M) of said vehicle, said first element (2) being movable between a locking position, at which the opening of said side panel or door (P) is not allowed, and an unlocking position, at which the opening of said side panel or door (P) is allowed, and
- a second element (3) being fastened to said first element (2) which can be manually operated by a user in order to move said first element (2) between said locking position and said unlocking position,

said first element (2) and second element (3) being housed in said side panel or door (P), **characterized in that**

said first element (2) is provided with at least one guide (5, 6) and said second element (3) is provided with means (9) suitable to slidingly engage said at least one guide (5, 6), the displacement of said first element (2) between said locking position and said unlocking position depending on the position of said means (9) relative to said at least one guide (5, 6).

2. The device (1) according to claim 1, **characterized in that** said first element (2) can slide in a housing (S) being formed in said side panel or door (P), and said second element (3) is coupled with said side panel or said door (P) through a mechanical joint (17).

3. The device (1) according to claim 2, **characterized in that** said second element (3) is a lever provided with said means (9) for engagement with said at least one guide at a first end (14) thereof and provided with a handle (16) at a second end thereof (15) opposing the first end (14) and **in that** said mechanical joint (17) comprises an arm (18) hinged to said side panel or said door (P) and hinged to said lever (3) in an intermediate position between said first end (14) and said second end (15).

4. The device according to claim 2 or claim 3, **characterized in that** said first element (2) is a sliding block and said at least one guide (5, 6) is formed in a portion (7, 8) of said sliding block (2) substantially orthogonal to the sliding plane of the sliding block in its housing (S).

5. The device (1) according to any preceding claim, **characterized in that** said at least one guide (5, 6) is generically 7-shaped, the inclined length (11) thereof substantially extends in the sliding direction (X) of the first element (2) and the cross length thereof (10) is close to the second element (3), the ends (12, 13) of said at least one guide (5, 6) being substantially aligned relative to said sliding direction (X).

6. The device (1) according to claim 4 and claim 5, **characterized in that** said sliding block (2) is pro-

vided with two guides (5, 6) formed on as many counterposed outer surfaces (7,8) of the sliding block (2).

7. The device (1) according to any preceding claim, **characterized in that** said second element (3) is aligned with said first element (2) and contiguous thereto when the first element (2) is in said locking and unlocking positions, the second element (3) being further flush coupled with said side panel or door (P).

8. The device (1) according to claim 7, **characterized in that** said mechanical joint (17) comprises a return element (20) suitable to move said second element (3) back into alignment with said first element (2) after the device has been actuated by said user.

9. The device (1) according to any preceding claim, **characterized in that** said first element (2) is provided with a projection (4) suitable to engage a recess in said side panel or door (P) when the first element (2) in in said locking position and is housed in said side panel or door (P).

10. The device (1) according to any preceding claim 6 to 9, **characterized in that** said engaging means (9) comprise a pivot (9) for each of said two guides (5, 6), the pivot (9) sliding within its guide (5, 6) and selectively engaging the ends thereof (12, 13), and **in that** the displacement of said pivot (9) in its guide is carried out by said user by actuating the second element (3), the first element being in said locking position (2) when said pivot (9) engages the end (12) of the relative guide (5, 6) being proximal relative to said second element (3) and being in said unlocking position when said pivot (9) engages said inclined length (11), at which said second element (3) protrudes from its housing (S), said second element (3) being housed in its housing (S) when said pivot (9) engages the end (13) of the relative distal guide (5, 6) relative to said second element (3).

11. The device (1) according to any preceding claim, **characterized in that** said lever (3) is flush housed in said housing (S) of said side panel or door (P) when said device (1) is in the locking or unlocking position.

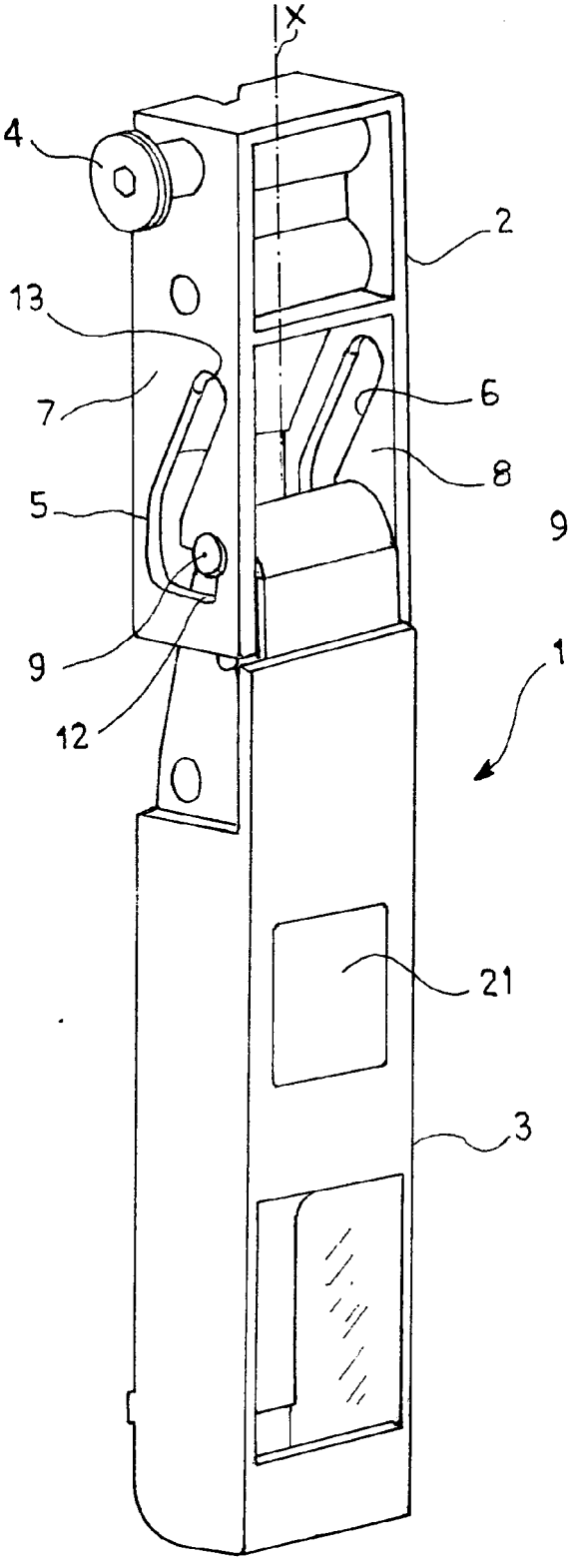

FIG. 1

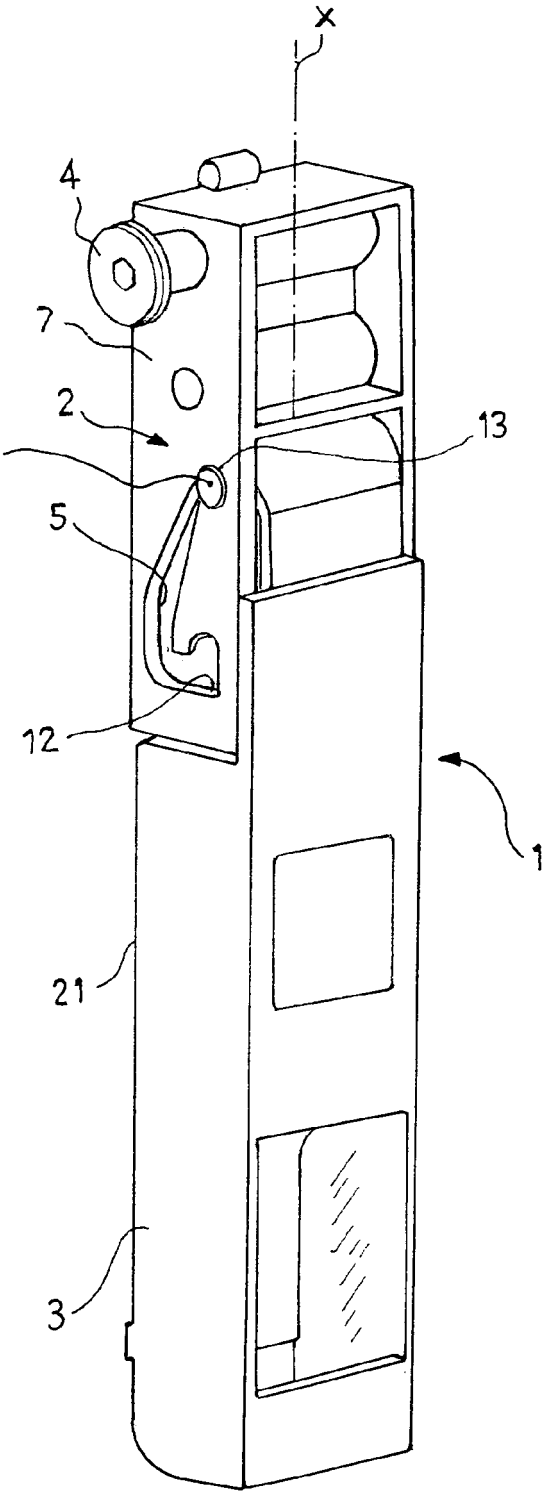

FIG. 2

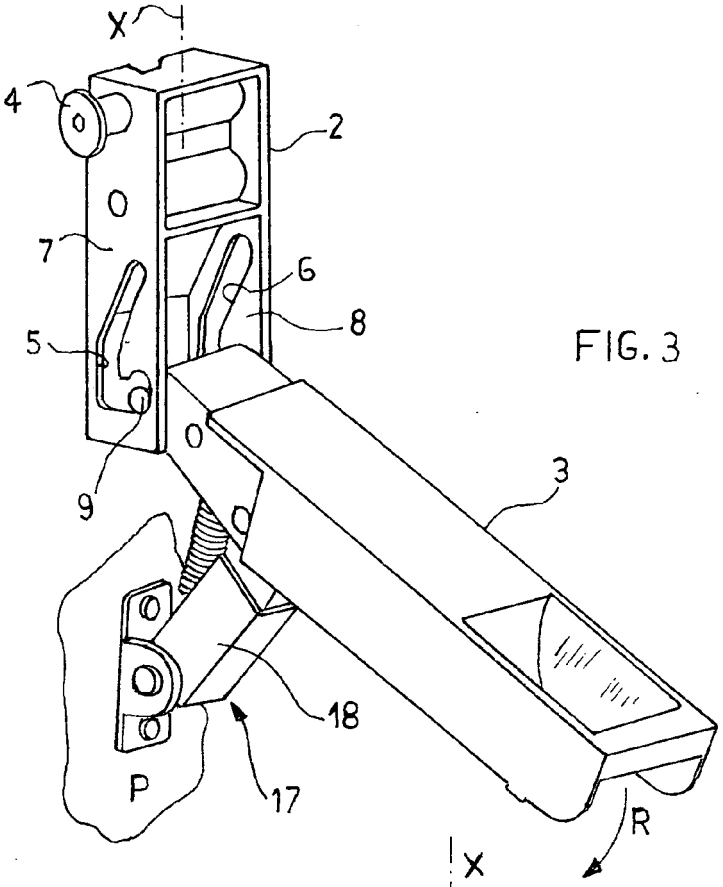

FIG. 3

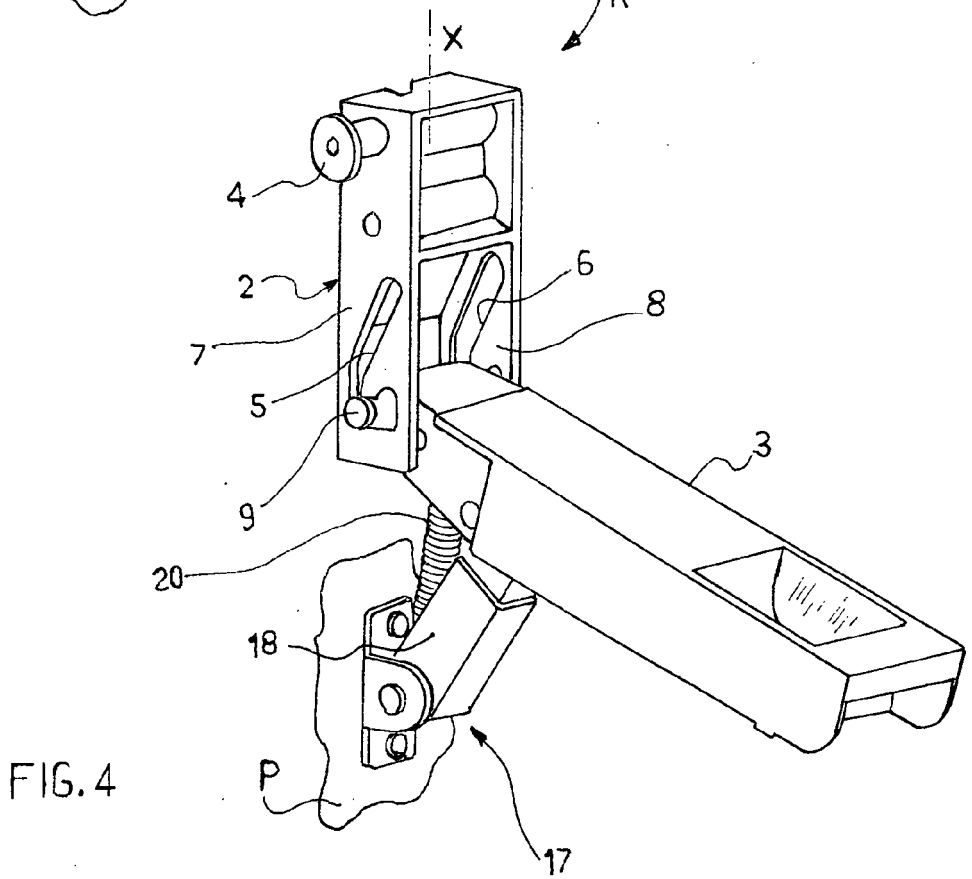

FIG. 4

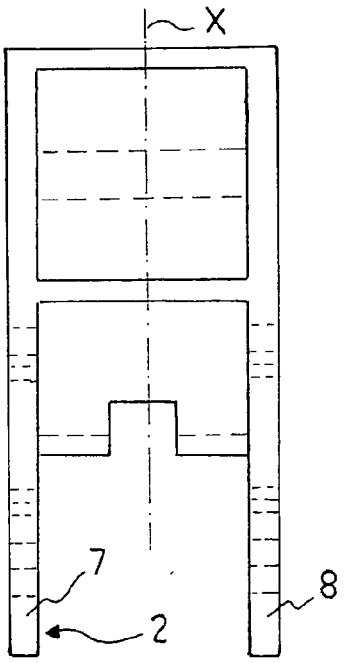

FIG.5

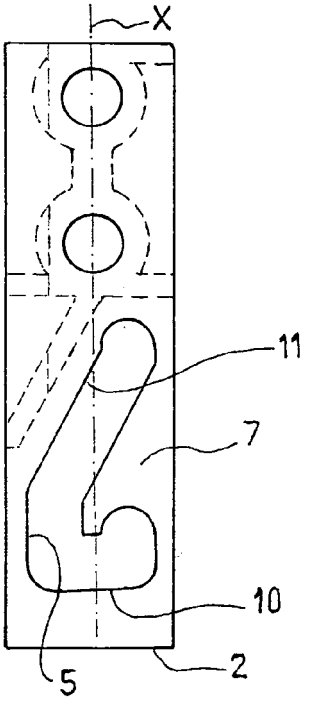

FIG.6

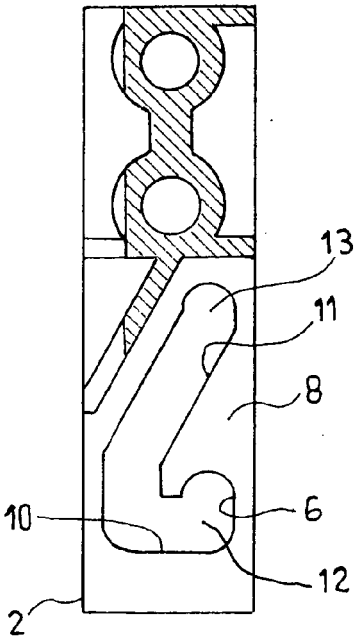

FIG.7

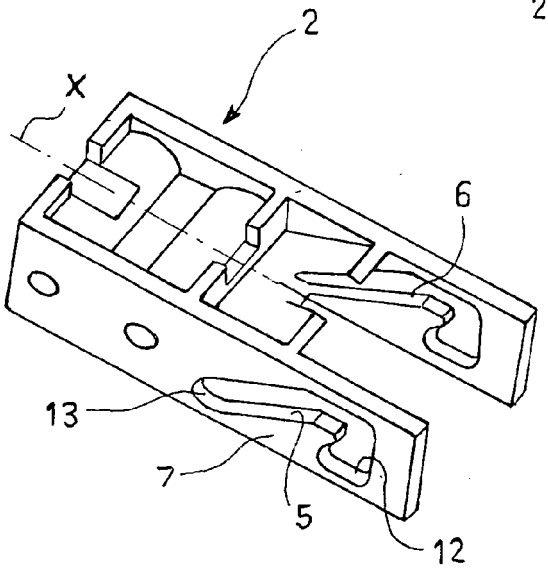

FIG.8

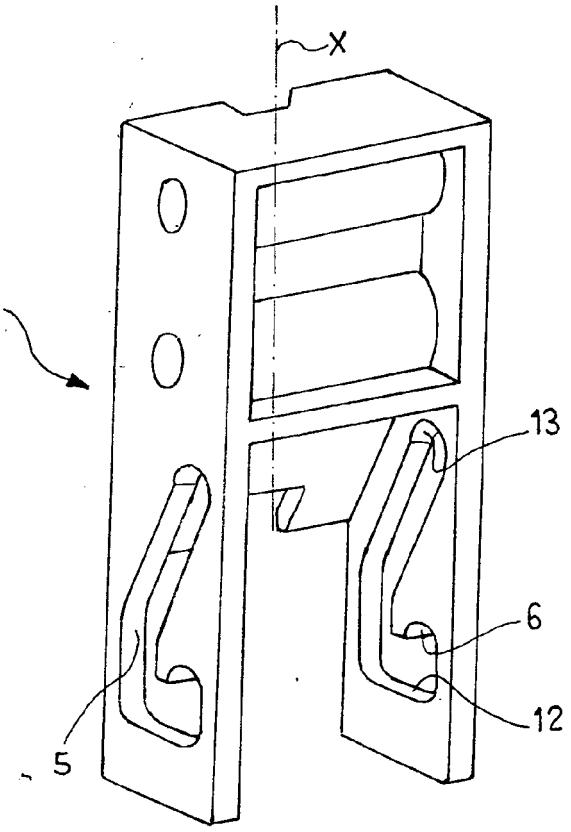

FIG. 9

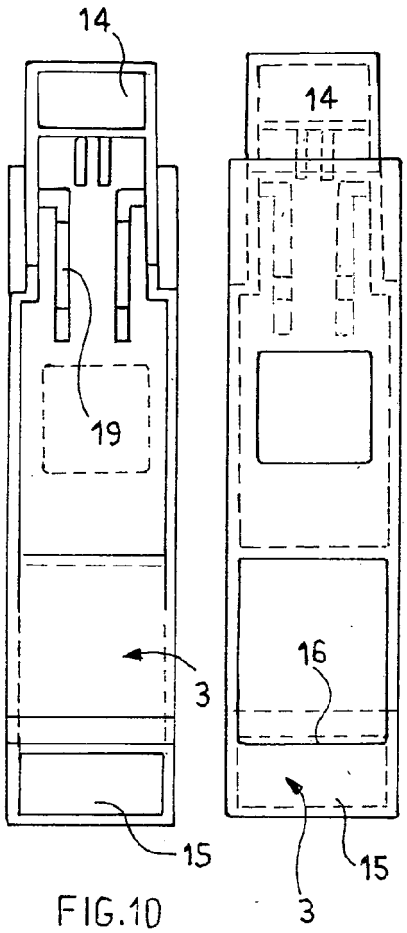

FIG.10

FIG.11

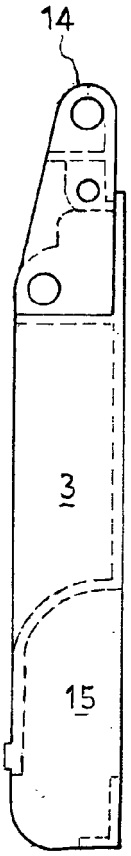

FIG.12

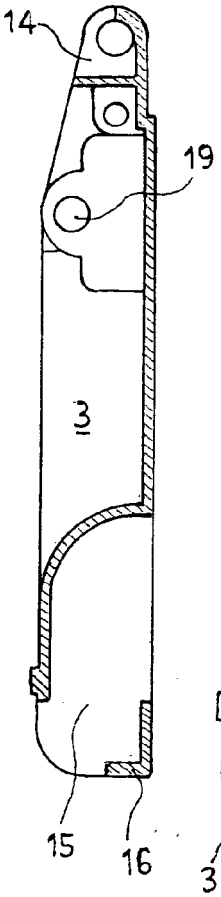

FIG.13

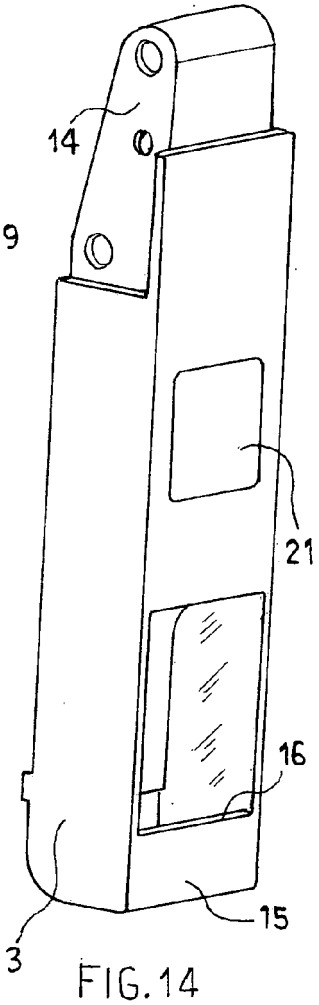

FIG.14

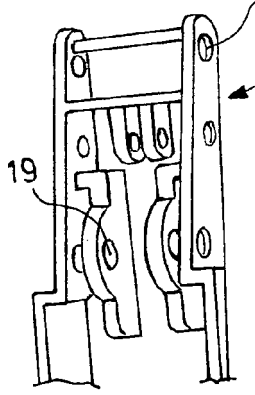

FIG.15

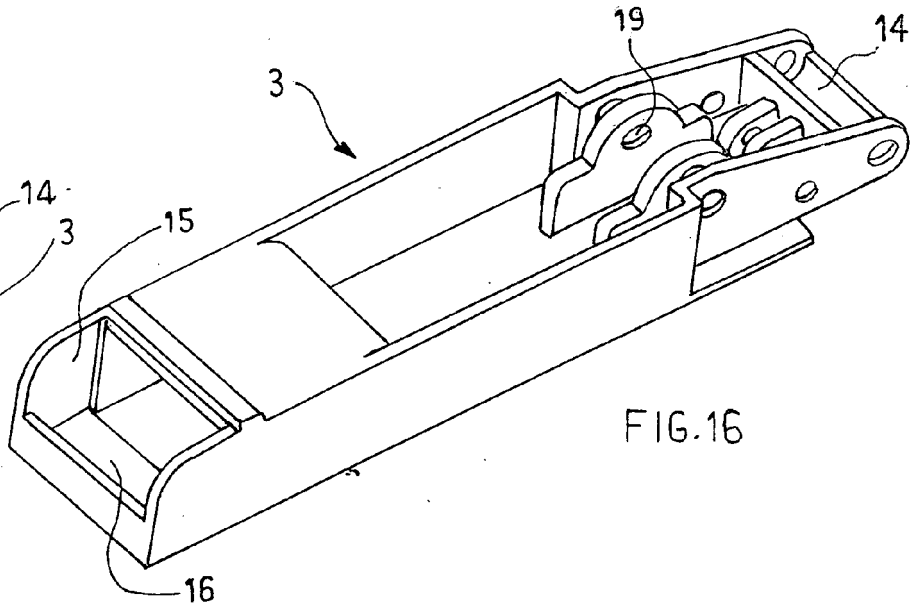

FIG.16

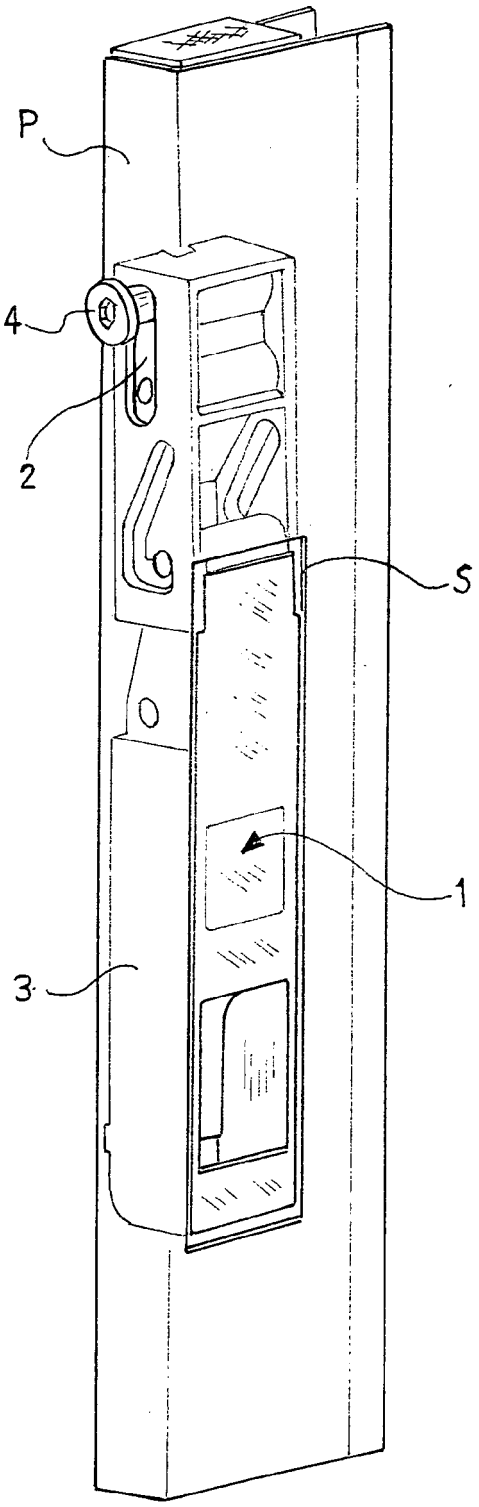

FIG. 17

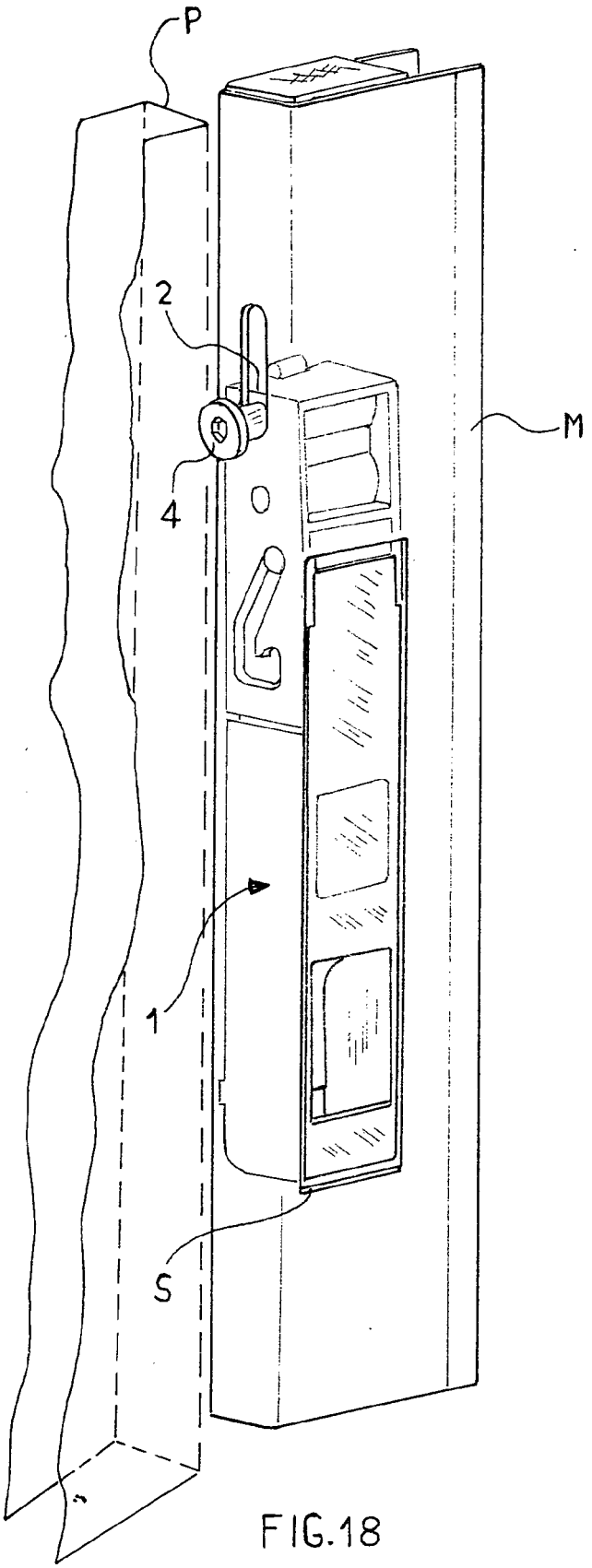

FIG.18

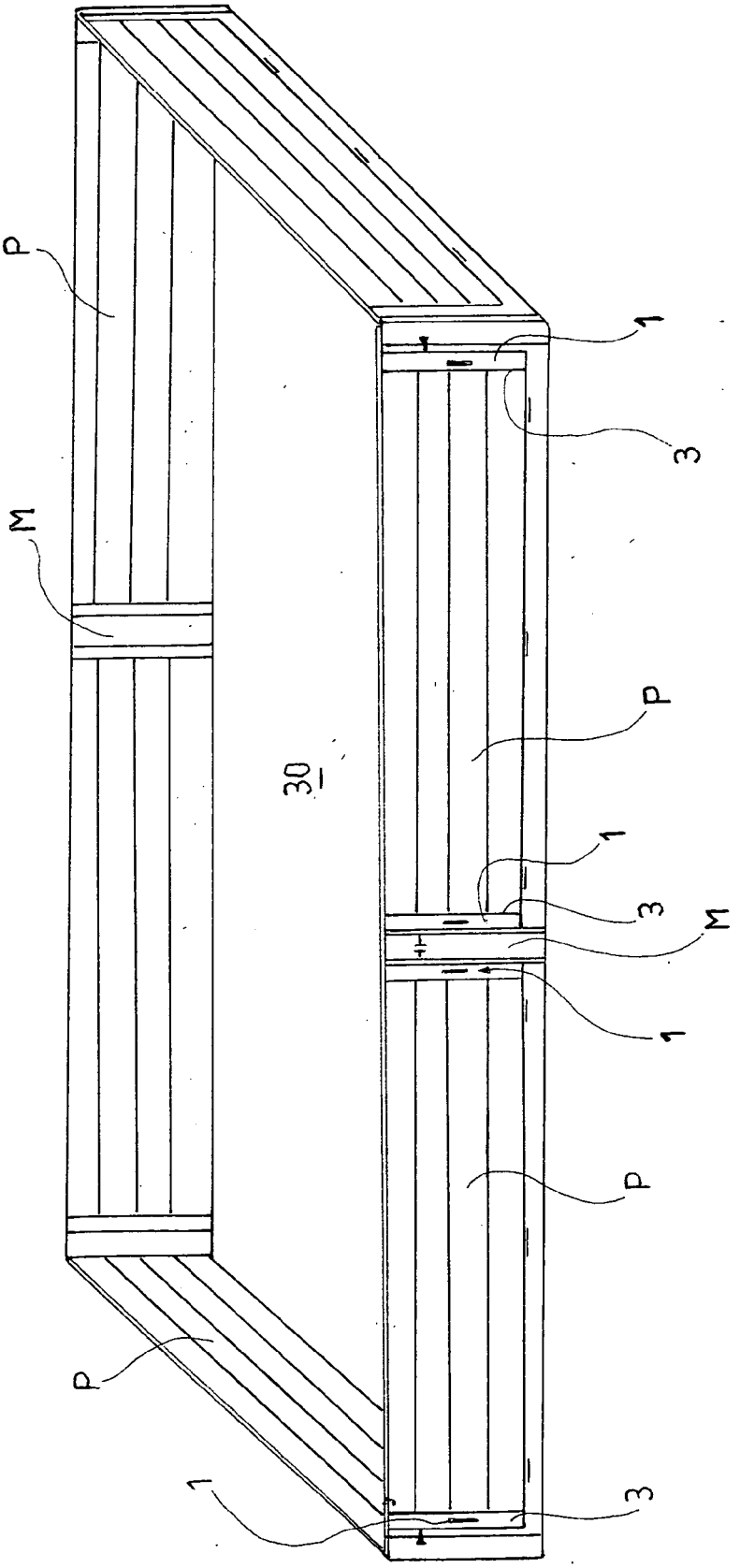

FIG.19

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EUROPEAN SEARCH REPORT

Application Number
EP 04 42 5899

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	12 May 2005	Van Beurden, J

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