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(54) Grate device which can be opened

(57) Grate device which may be opened comprising a set of vertical rods (2) hollow and parallel, associated to a casing (3) in a sliding manner between a closing condition, in which such vertical rod (2) are at the maximum mutual distance preventing the passage through the casing, and an opening condition, in which they are at the minimal mutual distance, and vice versa. Such device (1) further comprises a set of connecting rods (4) for the connection of the adjacent vertical rods. Each one of said connecting rods (4) having a first end (5) bound inside the longitudinal end central cavity (6) and through a respective first slot (7)of vertical rod (2) made in such vertical rod (2). The second end (8) of each connecting rod (4) is bound inside the cavity (6) of a vertical rod (2) adjacent to that one of the first end, through a respective second slot (9) of this latter vertical rod (2). At least the first end (5) of each connecting rod (4) is connected in a rotating manner, by means of a respective mobile pin (10), to a closing means (11) sliding within the longitudinal cavity (6) of the respective vertical rod (2) and fit, in the closed condition of the device (1), to close the correspondent first slot (7).

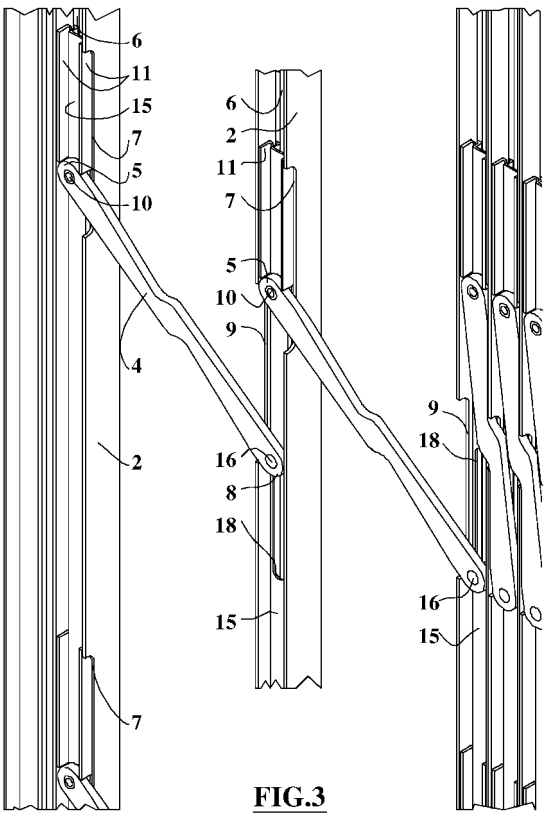

FIG.3

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Description

[0001] The present invention refers to the doors or windows for buildings, and in particular it refers to a safety grate device that can be opened, associable to doors and windows openings in order to make them impassable in a closing condition and to make them passable in an opening condition.

[0002] There are known grates, that may be opened, comprising a casing fixed to the edge of the opening of the vertical window or of the door and a set of vertical rods sliding in respect to the casing in horizontal direction.

[0003] Contiguous vertical rods are interconnected by a set of rectilinear connecting rods that have also the aim to prevent the mutual removal between the vertical rods.

[0004] Generally, such connecting rods are almost vertical in the opened condition and tilted, of about 45°, in the closed condition

[0005] The ends of said connecting rods are connected inside the vertical rods, which are equipped with long longitudinal slots for the passage of said ends in all the angles.

[0006] A disadvantage of such known grates, which may be opened, consists in the fact that in the closed condition, one of the two slots for each connecting rod is easy accessible and can constitute a point of weakness of the grate that can be used in order to force it.

[0007] Other disadvantage consists in the fact that such longitudinal slots, because of the shape of the connecting rods and their almost vertical position, are very long.

[0008] Further disadvantage consists in the fact that such lo ng slots weaken the vertical rods.

[0009] An object of the present invention is to propose a grate device which can be opened and in which the more accessible and exposed to the housebreaking risks longitudinal slots are closed in a mutual removal condition of the vertical rods, or in the closing condition of the grate.

[0010] Another object is to propose a grate device with shorter slots than the known ones.

[0011] A further object is to propose a grate with elements fit to reinforce the rods at the slot level.

[0012] The above mentioned objects are achieved according to the content of the claims.

[0013] The characteristics of the invention are highlighted in the following with particular reference with the attached drawings, in which:

- figure 1 shows a frontal schematic view of the grate device, object of the present invention, in a condition of partial opening;
- figure 2 shows an axonometric view of the device of figure 1 sectioned according a median plan;
- figure 3 shows an enlarged view of a detail of figure 2;
- figure 4 shows an axonometric, enlarged and complete view of a closing means only partially visible in figure 3, because sectioned;
- figure 5 shows a not in scale view sectioned according to the plane V - V of figure 1;
- figure 6 shows an enlarged view of a detail of figure 5;
- figure 7 shows an axonometric view of a connecting rod of figure 1.

[0014] With reference to the figures from 1 to 7, with 1 is indicated the grate device object of the present invention

[0015] The device 1 comprising a set of hollow and parallel each other vertical rods 2, preferably consisting in aluminium section bars, whose lower and upper bars slide in horizontal guides of a casing 3 fixed to the perimeter of a window, a door or the like.

[0016] The vertical rods slide along the guides between a closing condition, in which they are at the maximum mutual distance preventing the passage through the casing and therefore closing the door or the window, and a complete opened condition, in which they are at the minimum mutual distance, and vice versa.

[0017] Such device 1 further comprises a set of connecting rods 4 for the connection of adjacent vertical rods.

[0018] The first upper end 5 and the second lower end 8 of each of such connecting rods 4, as an example made of aluminium, steel or other metallic material, have a respective pass-through hole with axis perpendicular to the longitudinal axis of the connecting rod.

[0019] The first end 5 is bound inside the longitudinal and central cavity 6 of a vertical rod 2 by means of a respective first slot 7 made in such vertical rod 2.

[0020] The second end 8 is bound inside the cavity 6 of a vertical rod 2 adjacent to the vertical rod of the first end, by means of a respective second slot 9 of the latter vertical rod 2. Such second slot 9 is lower in respect to the first slot of the connecting rod.

[0021] The first end 5 of each connecting rod 4 is connected in a rotating manner, by means of a respective mobile pin 10 inserted in the pass-through hole of said first end, to a closing means 11, as an example made of steel, aluminium or other resistant material.

[0022] The closing means 11 is sliding within the longitudinal cavity 6 of the respective vertical rod 2 and is fit, in the closed condition of the device 1, to close the correspondent first slot 7.

[0023] The second end 8 of each connecting rod 4 is connected to the respective vertical rod 2 by means of a respective fixed pin 16 engaged in the pass-through hole of such second end.

[0024] The closing means 11 has a transversal section shaped almost like an "U"; in particular the closing means 11 is lengthened shaped, with a longitudinal median side 13 whose longitudinal edges have longitudinal sides perpendicular to the median side 13.

[0025] The closing means 11 has a pass-through hole 14, for respective mobile pin 10, realized in a protruding portion 12 of the median side 13 of the closing means 11.

[0026] Alternatively the closing means 11 may have one transversal section shaped almost like a "L" with one

of the two edges fit to close the respective slot.

[0027] It is important to notice that the first slot 7, being the upper one, is not protect from the respective connecting rod but that the closing means 11 closes it, protecting the vertical rod from lock-picking attempts, preventing the insertion of levers or similar in such first slot.

[0028] Each connecting rod 4 is shaped approximately like a lengthened "S" in order to allow the stagger of the slots 7, 9 of opposite sides of the same vertical rod.

[0029] Such stagger prevent vertical rod from lock-picking attempts also in absence of closing means 11 because it prevents the insertion of levers through the section of vertical rod and avoids that such section is weakened by the presence of two faced slots. Moreover the "S" shaping allows to realize shorter slots.

[0030] The portions 30, 31 of the faces of the connecting rod 4 that, in the opened condition, are faced to the slots first 7 second 9, are tilted approximately towards the centre of the connecting rod, while the remaining portions of the same faces are mutually parallel and aligned to the geometric axis of the connecting rod.

[0031] Alternatively the connecting rod 4 may almost be shaped with the lateral portions having almost the same length, parallel each other, staggered and joined by a short central portion tilted in respect to them.

[0032] A further alternative provides that the connecting rods 4 maybe almost straight.

[0033] Each vertical rod 2 is equipped with a respective connection means 15, as an example made of metal or synthetic material, having lengthened shape and sliding inside the cavity 6 of the vertical rod 2.

[0034] Said connection means 15 is connected to the closing means 11 of the respective vertical rod 2 maintaining them at an almost constant mutual distance. The connection means 15 are connected to the closing means 11 of the respective vertical rod 2 by means of the mobile pins 10 of the closing means 11.

[0035] Each connection means 15 has a transversal section having approximately a squared "? " shape (omega shape), with the convex central longitudinal portion inserted between longitudinal sides of each corresponding closing means 11.

[0036] The longitudinal edges of each "? " connection means 15 are housed in a sliding manner in respective longitudinal grooves 17 realized in the vertical rod 2 inside the respective cavity.

[0037] Each connection means 15 is provided with a set of lengthened openings 18, shaped as a pass-through slit, each one for a correspondent fixed pin 16. Such openings 18 avoid the interference between the fixed pins and the connection means 15 allowing the sliding thereof

[0038] The ends of each mobile pin 10 have respective burglar-resistant bushing 19, 20, as an example made of metal or synthetic material, engaged in a sliding manner in respective longitudinal housing 21, 22 made in the cavity 6 of the vertical rod 4.

[0039] Each vertical rod 4 further has two longitudinal lateral cavities 23, 24 each one fit to house a set of cut resistant rods 25, as an example made of steel.

[0040] The ends of each fixed pin 16 for the fixing of the second end 8 of the respective connecting rod 4 have respective shaped elements 26 complementary and engaged to the cut resistant rods 25.

[0041] In the opened condition, each connecting rod 4 is almost parallel to the vertical rod 2 and, in the closed condition, the angle comprised between such connecting rod 2 and each one of the respective vertical rod 2 is comprised between almost 30° and 90°, preferably almost 45°.

[0042] Alternatively to the above disclosed embodiment which provides, for each vertical rod, a connection means to which distinct closing means are fixed each one of which is fit to close a respective first slot of said vertical rod, the invention provides that all the closing means 11 of a vertical rod are made integral, as an example by a removal working of material in a single elongated member fixed to the connection means 15.

[0043] Another alternative provides that the closing means 11 and the connection means 15 of each vertical rod are made integral as an example by working of a single lengthened member, as a tubular section bar.

[0044] The operation of the device provides that starting from the opened condition, the progressive removal of vertical rods causes the inclination of the connecting rods and the going down of the closing means until these latter, in the closed condition of the device, close the first slots.

[0045] An advantage of the present invention is to provide a grate device which may be opened and in which the longitudinal slots are more accessible and exposed to the housebreaking risks, are closed in the mutual removal condition of the vertical rods, that is in the closing condition of the grate. Other advantage is to provide a grate device with shorter slots in respect to the known ones .

[0046] Further advantage is to provide a grate with elements fit to reinforce the vertical rods at the slots level.

Claims

1. Grate device which can be opened comprising a set of vertical rods (2) hollow and parallel each other, associated to a casing (3) in a sliding manner between a closing condition, in which such vertical rods (2) are at the maximum mutual distance preventing the passage through the casing, and an opening condition, in which the vertical rods (2) are at the minimum mutual distance, and vice versa; such device (1) further comprises a set of connecting rods (4) for the connection of the adjacent vertical rods; each one of said connecting rods (4) having a first end (5) bound inside the longitudinal and central cavity (6) of a vertical rod (2) through a respective first slot (7) made in such vertical rod (2) and a second end (8)

bound inside the cavity (6) of a vertical rod (2) adjacent to said vertical rod of the first end (5), through a respective second slot (9) of the vertical rod (2) of the first end (5); said device (1) being **characterized in that** at least the first end (5) of each connecting rod (4) is connected in a rotating way, by means of a respective mobile pin (10), to a closing means (11) sliding within the longitudinal cavity (6) of the respective vertical rod (2) and fit, in the closed condition of the device (1), to close the correspondent first slot (7).

2. Device according to claim 1 **characterized in that** an end of the closing means (11) has a pass-through hole (14) for the respective mobile pin (10).

3. Device according to claim 2 **characterized in that** each closing means (11) has a lengthened shape, with a longitudinal median side (13) whose longitudinal edges have longitudinal side perpendicular to the median side (13), such closing means (11) having therefore a transversal section shaped almost like an "U".

4. Device according to claim 3 **characterized in that** the pass-through hole (14) for the respective mobile pin (10) is made in a protruding portion (12) of the median side (13) of the closing means (11)

5. Device according to claim 1 **characterized in that** each vertical rod (2) is equipped with a respective connection means (15), lengthened shaped and sliding inside the cavity (6) of the vertical rod (2), said connection means (15) is connected to the closing means (11) of such respective vertical rod (2) maintaining them to an almost constant mutual distance.

6. Device according to claims 2 and 5 **characterized in that** the connection means (15) is connected to the closing means (11) of the respective vertical rod (2) by means of the mobile pins (10) of said closing means (11).

7. Device according to claims 3 and 5 **characterized in that** each connection means (15) has a transversal section shaped almost like a squared "? ", with the convex longitudinal central portion inserted among the longitudinal sides of each corresponding closing means (11).

8. Device according to claim 7 **characterized in that** the longitudinal edges of each "? " shaped connection means (15) are housed in a sliding manner in respective longitudinal grooves (17) made in the vertical rod (2) inside the respective cavity.

9. Device according to claim 1 **characterized in that** the second end (8) of each connecting rod (4) is connected to the respective vertical rod (2) by means of a respective fixed pin (16).

10. Device according to claims 3 and 5 **characterized in that** each connection means (15) is provided with a set of lengthened openings (18) each one for a correspondent fixed pin (16) and fit to allow the sliding of said connection means (15).

11. Device according to claim 1 **characterized in that** each connecting rod (4) is almost straight.

12. Device according to claim 1 **characterized in that** the ends of each mobile pin (10) have respective burglar-resistant bushings (19, 20) engaged in a sliding manner in respective longitudinal housings (21, 22) made in the cavity (6) of the vertical rod (4).

13. Device according to claim 1 **characterized in that** each vertical rod (4) has two longitudinal lateral cavities (23, 24) each one fit to house a set of cut resistant rods (25).

14. Device according to claims 9 and 13 **characterized in that** the ends of each fixed pin (16) for the fixing of the second end (8) of the respective connecting rod (4) have respective shaped elements (26) complementary and engaged to the cut resistant rods (25).

15. Grate device which can be opened comprising a set of vertical rods (2) hollow and parallel each other, associated to a casing (3) in a sliding manner between a closing condition, in which such vertical rods are at the maximum mutual distance preventing the passage through the casing, and an opening condition, in which the vertical rods (2) are at the minimum mutual distance, and vice versa; such device (1) further comprises a set of connecting rods (4) for the connection of adjacent vertical rod; each one of such connecting rods (4) has a first end (5) bound inside the longitudinal and central cavity (6) of a vertical rod (2) through a respective first slot (7) made in such vertical rod (2) and a second end (8) bound inside the cavity (6) of a vertical rod (2) adjacent to said vertical rod (2) of the first end (5), through a respective second slot (9) of the vertical rod (2) of the first end (5); said device (1) being **characterized in that** each connecting rod (4) is shaped almost like a lengthened "S" in order to allow to stagger the slots (7, 9) of opposite sides of the same vertical rod.

16. Device according to claim 15 **characterized in that** the portions (30, 31) of the faces of the connecting rod (4) that, in the opened condition, are faced to the slots first (7) and second (9), are tilted almost towards the centre of the connecting rod (4).

17. Device according to claim 15 **characterized in that** the connecting rod (4) is shaped with the lateral portions having almost the same length, being almost parallel each other, staggered and joined by a short central portion tilted in respect to them

18. Device according to any of the claims 1-15 and any of the claims 15-17 **characterized in that** in the opened condition, each connecting rod (4) is almost parallel to the vertical rods (2) and, in the closed condition, the angle comprised between such connecting rod (4) and each one of the respective vertical rods (2) is comprised between about 30° and 90°, preferably about 45°.

19. Device according to any of the claims 1-18 **characterized in that** all the closing means (11) of a vertical rod are made integral, carrying out a single elongated member.

20. Device according to claims 5 and 19 **characterized in that** the member that forms the closing means (11) of a vertical rod is fixed to the connection means (15).

21. Device according to claim 15 and any of the remaining claims **characterized in that** the closing means (11) and the connection means (15) of each vertical rod are made integral forming a single elongated member.

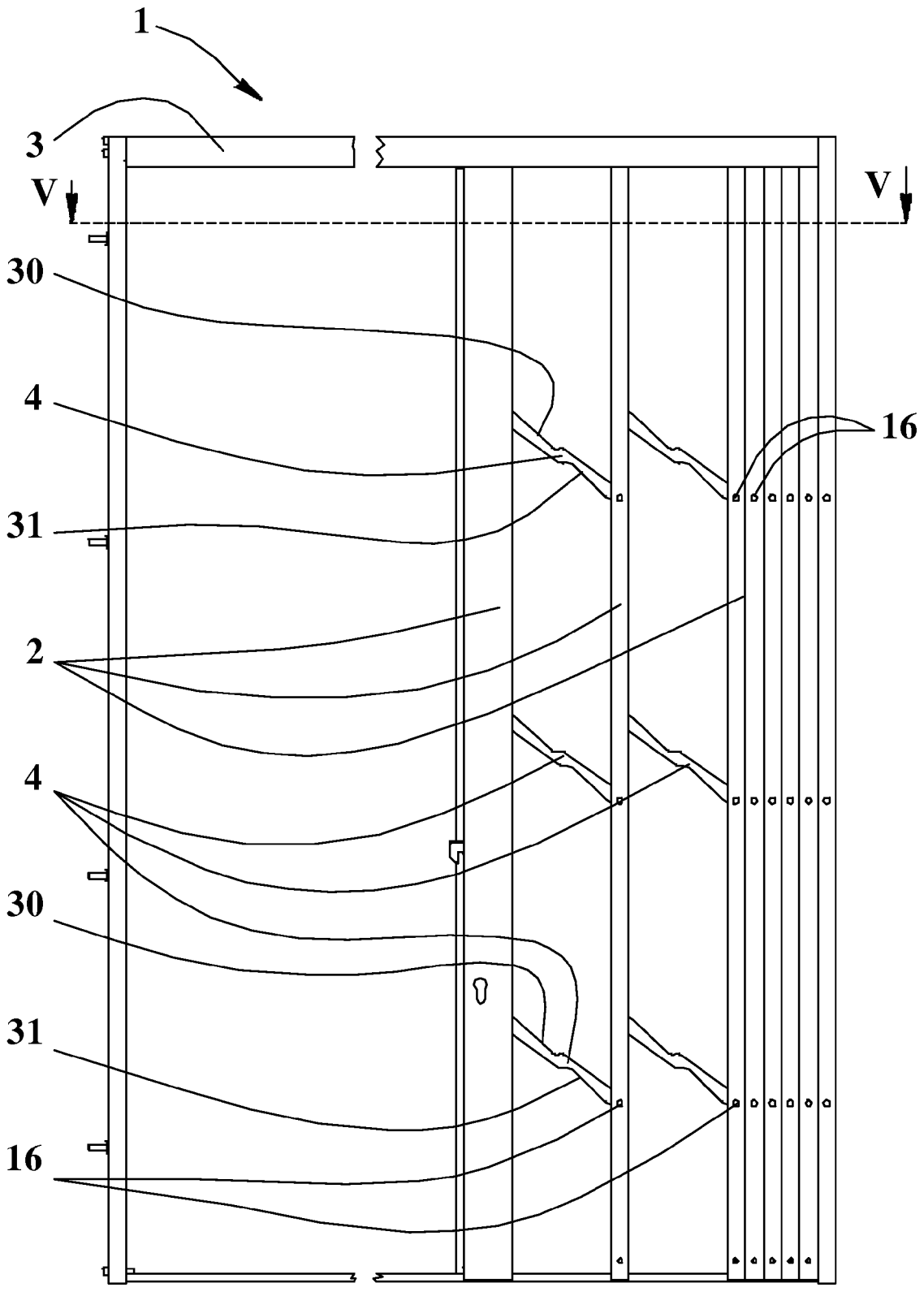

FIG.1

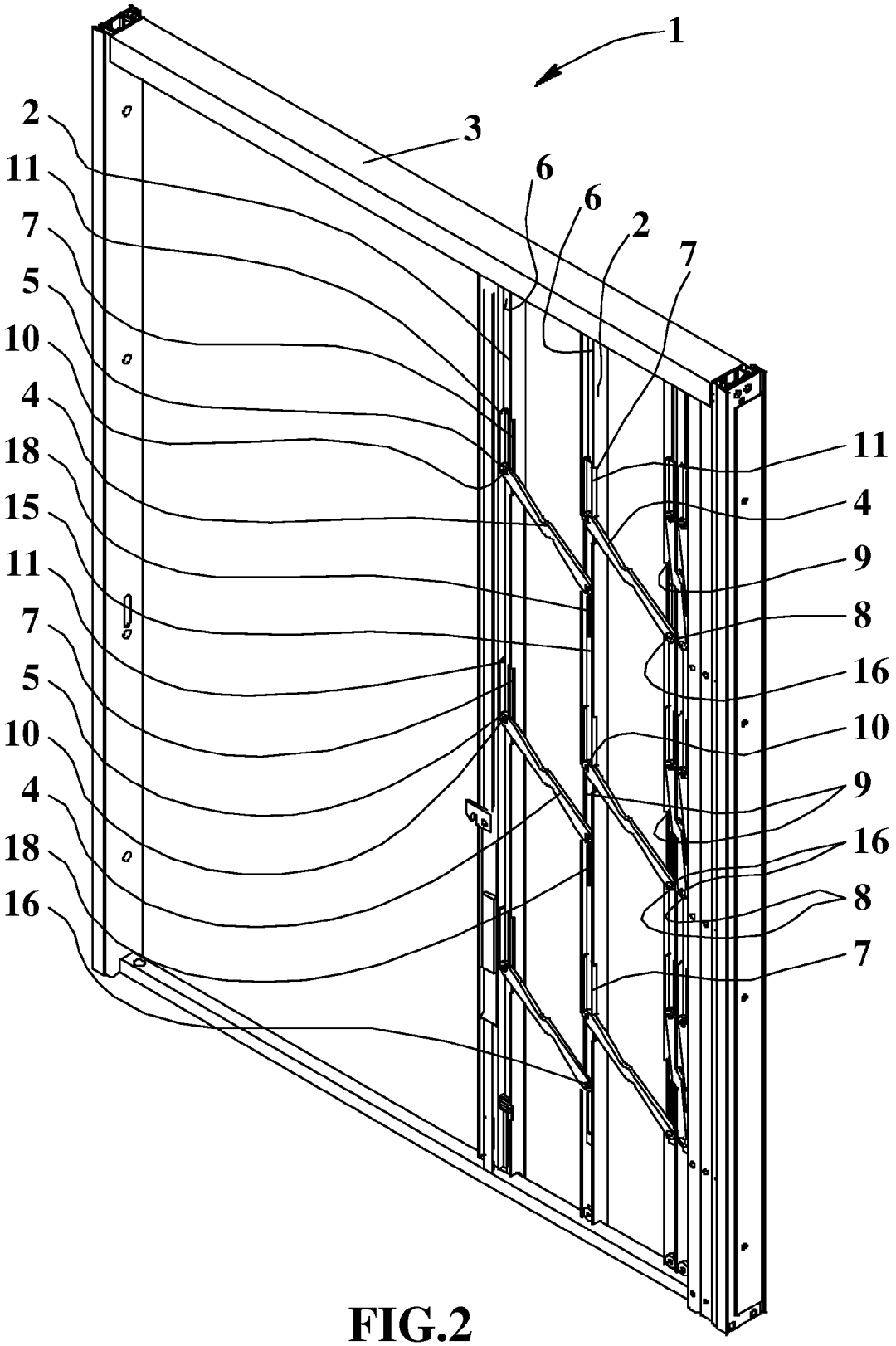

FIG.2

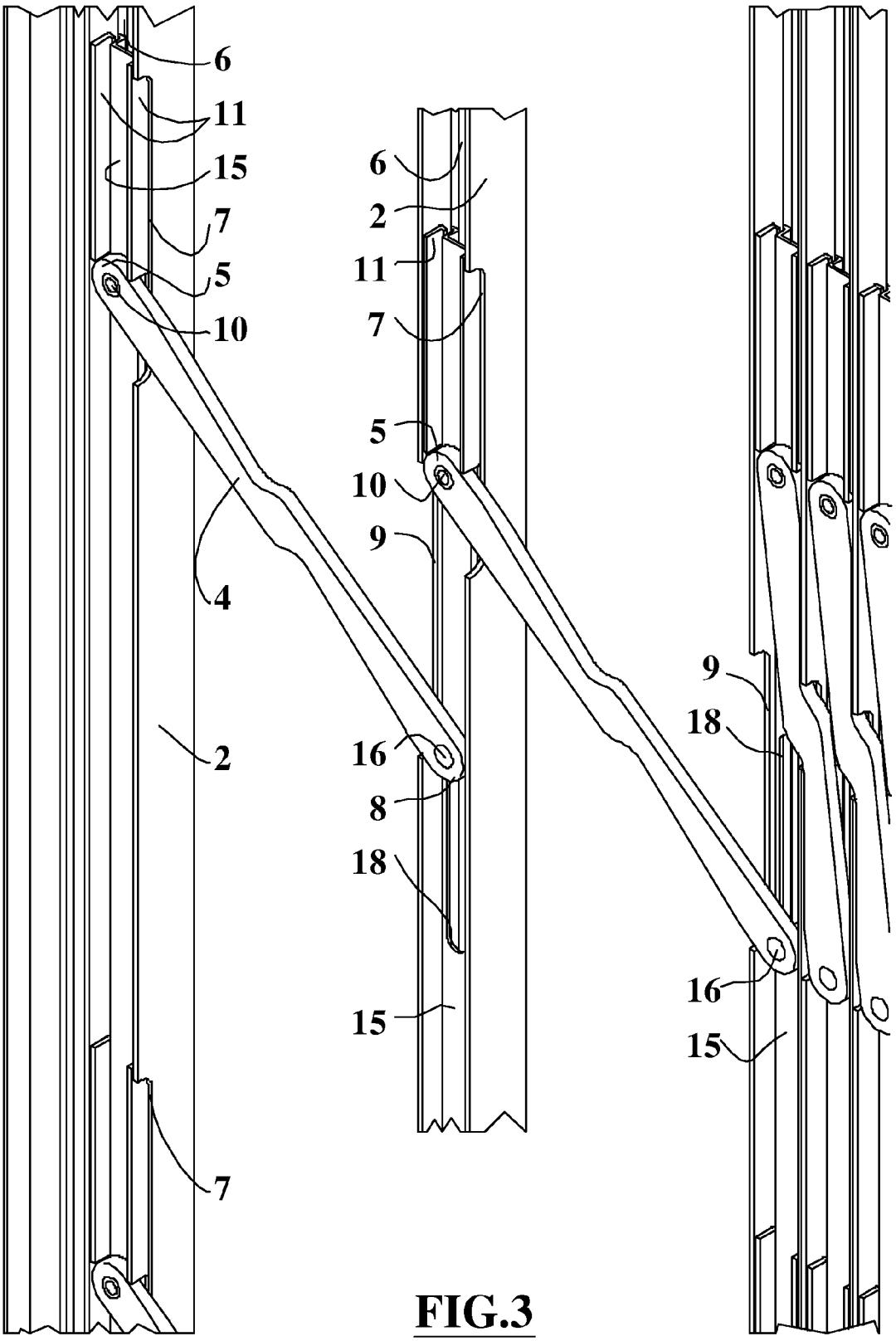

FIG.3

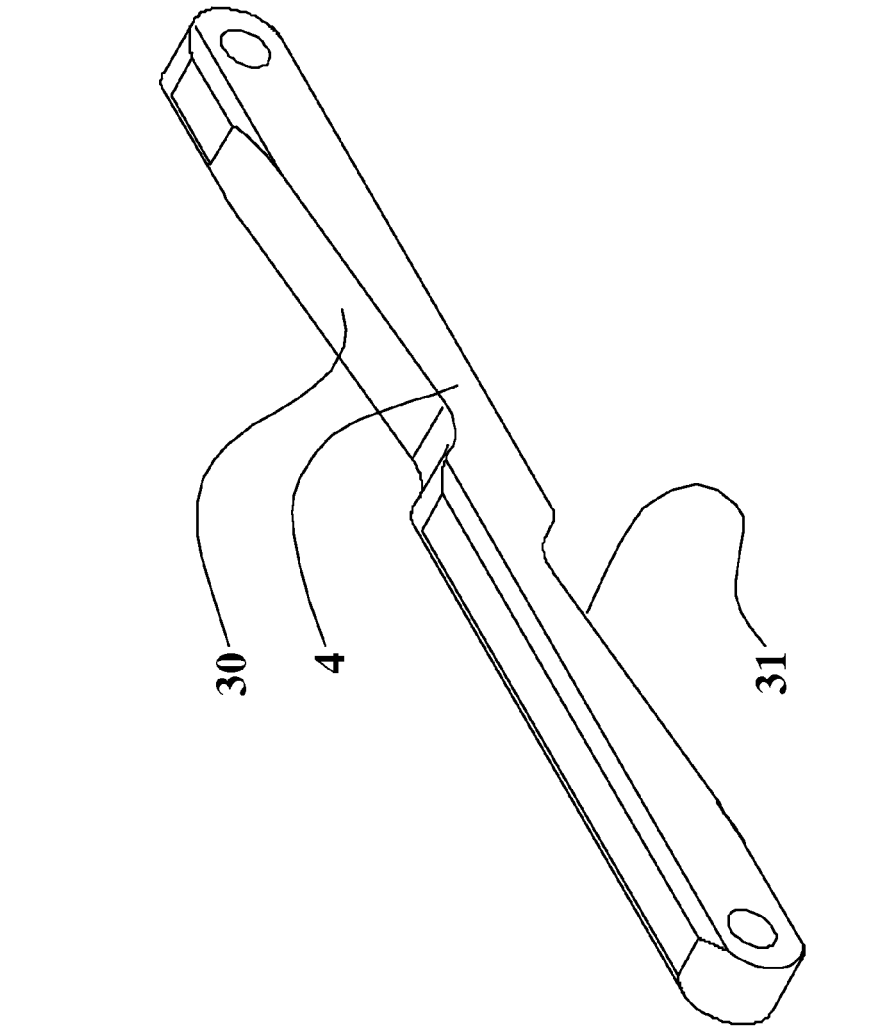

FIG.7

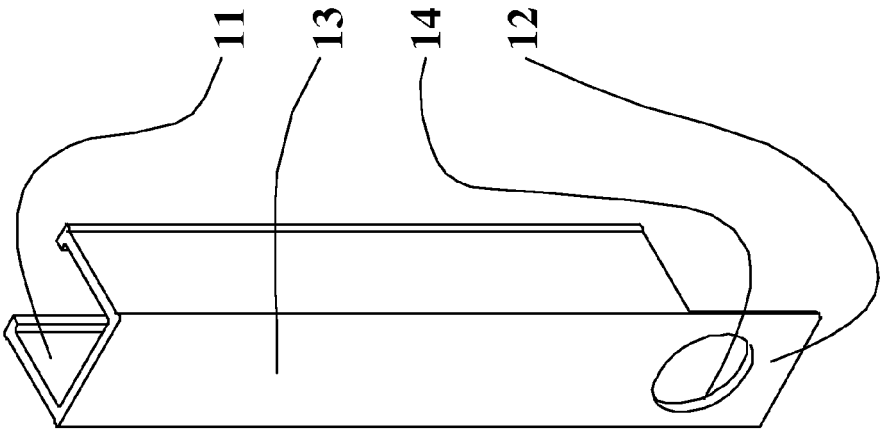

FIG.4

FIG.5

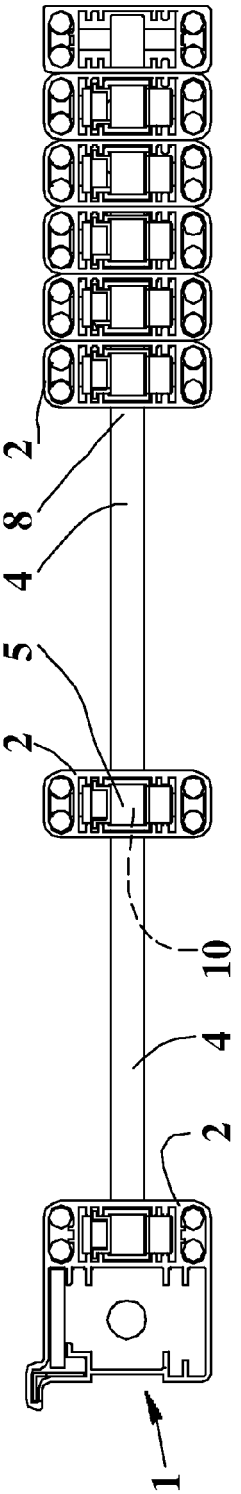
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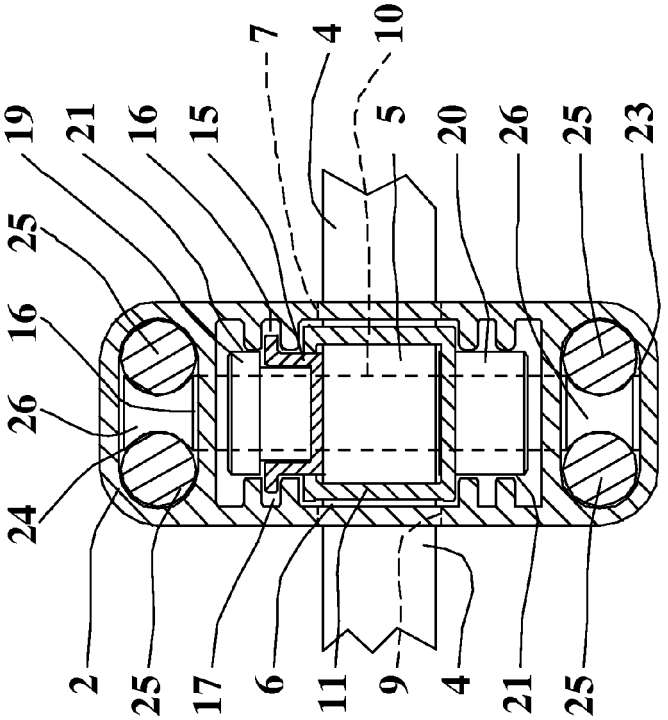
FIG.6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