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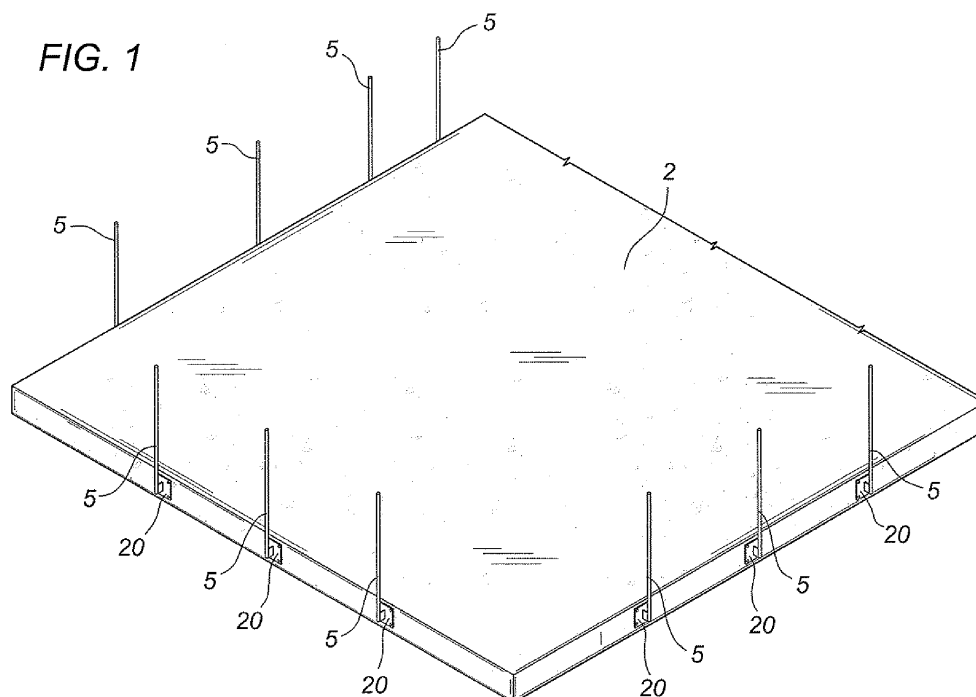
Claims 16-30 are deemed to be abandoned due to non-payment of the claims fees (Rule 45(3) EPC).

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(54) **Modular parapet providing temporary protection on structures**

(57) A modular parapet (1) providing temporary protection against accidental falls from structures (2) equipped with fixed, long anchoring elements (5) comprises a protective barrier (3) in the form of a framework,

at least one supporting upright (4) that can be associated with a corresponding anchoring element (5), and means (6; 8, 9) for attaching the barrier (3) to each upright (4) rigidly but in such a way that they can be adjusted relative to each other.



Description

[0001] This invention relates to a modular parapet used to provide temporary protection against accidental falls from structures, especially raised structures on building constructions.

[0002] In the construction or repair of raised structures, such as the roofs of buildings for example, it is common practice to use protective guards in the form of temporary parapets round the structural parts to construct a protective barrier against falling. The parapets are attached to suitable anchoring means provided for the purpose on the structure itself.

[0003] In prior art, these anchoring means may be embodied by fixed tubes which, in the case of building roofs, are normally distributed at regular intervals along the edge round the roof, are supported in cantilever fashion by the roof and are rigidly attached to the roof by robust brackets.

[0004] The prior art knows several protection systems based on prefabricated, modular metal components, for example, comprising tubes of various lengths and ready-made couplers which can be assembled and attached to the structure to form temporary parapets while work is in progress and which can be removed when work has been completed.

[0005] A disadvantage of prior art is that it requires keeping a relatively wide range of components, such as tubes of different lengths, from which the ones most suitable for erecting parapets to meet specific working requirements can be selected when necessary.

[0006] Another disadvantage is that erection and dismantling of the protection requires the use of tools and personnel skilled in the construction of protections of this kind: this is the case, for example, when couplers equipped with bolts are used.

[0007] This invention therefore proposes a modular parapet used to provide temporary protection against accidental falls from structures equipped with fixed, long anchoring elements, the parapet being characterized in that it comprises a protective barrier, at least one supporting upright that can be associated with a corresponding anchoring element, and means for attaching the barrier to the upright in such a way that it can be engaged and disengaged.

[0008] This enables the parapet according to the invention to be easily erected and dismantled.

[0009] Other advantageous aspects of the parapet according to the invention are described in the other claims. The invention also provides an advantageous method for erecting the parapet.

[0010] The advantages of the parapet are apparent from the detailed description which follows, with reference to the accompanying drawings which illustrate preferred non-restricting embodiments of it and in which:

- Figure 1 is an overall assembly view of a building structure where a parapet according to the invention

can be erected;

- Figure 2 is an elevation view of a parapet according to the invention associated with the structure of a building;
- 5 - Figure 3 is a side view of the parapet of Figure 2;
- Figure 4 is an elevation view of a protection obtained by assembling two or more parapets according to the invention;
- 10 - Figure 5 is a scaled-up view of a constructional detail from Figure 3;
- Figures 6 and 7 are, respectively, scaled-up elevation and plan views of a detail of the invention;
- Figure 8 illustrates a method for erecting the parapet in situ, through a sequence of steps identified in the sections from A to E;
- 15 - Figures 9 and 10 are, respectively, elevation and side views of a protection system made by overlapping some of the components of the parapet according to the invention.

[0011] With reference to the accompanying drawings, the numeral 1 denotes in its entirety a modular parapet used to provide temporary protection against accidental falls from structures 2, especially raised structures on building constructions, such as the roofs of buildings for example. Protection of this kind is advantageously used in particular during the construction or repair of the structure 2.

[0012] Figure 1 shows that the building structures 2 - which this specification refers by way of example and without limiting the scope of the invention - are customarily equipped with fixed, long elements 5, which are cantilever-mounted on, or project from, the structures 2 themselves and which are attached to the latter by means of robust brackets 20.

[0013] The long elements 5 are distributed at regular intervals along the edge running all round the structures 2 to provide suitable means for anchoring the parapets 1 or equivalent accident prevention means.

[0014] As shown in more detail in Figure 2, the parapet 1 according to the invention essentially comprises a barrier, or barrier body 3, in the form of a framework, and uprights 4 designed to connect the barrier 3 to the long anchoring elements 5 mounted on the structure 2. The barrier 3 and the uprights 4 can be easily assembled and dismantled so that the parapet 1 can be quickly erected when work is in progress and just as quickly removed when no longer required.

[0015] The barrier 3, preferably of a plastic material, is in the form of a framework made as a single part extending principally in two dimensions and essentially comprising, for example, three horizontal rails 7 and four vertical stiles 19, all stably interconnected with one another.

[0016] The tubular uprights 4 are box shaped, open at their opposite ends, and can be associated individually to a corresponding anchoring element 5, in such a way that they are axial with each other, by slidably coupling

the inside surfaces of each upright 4 to the outside surface of the anchoring element 5.

[0017] The uprights 4 are also fitted with outside connecting means 6 or 8 and 9, integral with the uprights 4 themselves and designed to rigidly, but adjustably relative to one another, join the barrier 3 to each of the uprights 4 by clamping on the rails 7 at any point along their length depending only on the specific requirements of the site where the parapet 1 is being erected.

[0018] As shown in particular in Figure 3, the connecting means 6 or 8 and 9 essentially comprise a pair of retaining members 8 and 9 located substantially at the ends of the upright 4.

[0019] A first retaining member 8 is formed as a single part with the tubular upright 4, to which it is rigidly connected for example by welding.

[0020] A second retaining member 9 is pivotally mounted on the upright 4 which, for this purpose, is equipped with a support 21 for mounting a hinge pin 22.

[0021] The second member 9 swings between two end positions, at a first of which the retaining member 9 is inoperative and away from the respective rail 7 of the barrier 3. At the second end position, on the other hand, the retaining member 9 is associated with the edge of the rail 7, in a working condition, as will become clearer as this description continues.

[0022] The retaining members 8 and 9 have concave profiles 8a and 9a, opposite one another. The profiles 8a and 9a are also shaped to closely match at least parts of the edge of the rails 7. The retaining members 8 and 9 are therefore able to encompass the edge of the respective rails 7 and to fit snugly round one rail 7 or the other in a pair forming part of the frame, in particular, the top rail 7 and the bottom rail 7 of the barrier 3, illustrated in Figure 2. Preferably, the profiles 8a and 9a and the edge parts of the longitudinal rails 7 have the shape of matching wedges.

[0023] The parapet 1 also comprises means 12 and 4 for locking the second retaining member 9 to the respective parapet rail 7 in the working condition, said means being integral with the second retaining member 9.

[0024] As shown in Figure 3, and in even more detail in Figure 5, the locking means 12 and 4 comprise a hole 13 which passes through the second retaining member 9 and which, when the second retaining member 9 swings relative to the tubular upright 4, can be oriented in such a way as to align it coaxially with the long anchoring elements 5 of the parapet 1.

[0025] Thus, when the parapet 1 and the upright 4 are made to slide on the long anchoring element 5, a condition of coaxiality is reached whereby the long anchoring element 5 goes through the hole 13 and is locked in place in such a way as to prevent the second retaining member 9 from rotating relative to the upright 4.

[0026] As illustrated in Figure 6, the barrier 3, in the form of a framework, is also equipped with coupling means, labelled 14 in their entirety, mounted at a pair of sides parallel to the tubular upright 4, said coupling

means 14 being designed to enable one barrier 3 to be joined continuously with another barrier 3 to lengthen it in such a way as to create extended accident prevention protection systems like the one shown by way of example in Figure 4.

[0027] Figures 6 and 9 show that the coupling means 14 more specifically comprise coupling protrusions 15 and matching cavities 16 which fit into each other in the plane in which the barrier 3 lies.

[0028] The protrusions 15 have through holes 17 made in them, which are aligned along a shared axis when the protrusions 15 and cavities 16 of two consecutive barriers 3 are fitted into each other: a rod-shaped element 18 can then be inserted into the holes 17 in the respective protrusions 15 on the two barriers 3 in such a way as to structurally join one barrier 3 to another barrier 3 following it (see also Figure 7).

[0029] In the example of Figure 7, the barriers 3 are joined continuously with one another. It is, however, obvious that the parapets 1 according to the invention may also be used to form discontinuous barriers 3, though placed one after the other; as well as barriers 3 which are both discontinuous and interconnected, arranged in such a way as to converge at right angles or at any other angle to one another.

[0030] The rod-shaped element 18 may be embodied by a single long anchoring element 5, obviously if the anchoring elements 5 are located round the edge of the building structure 2 at intervals equal to, or a multiple of, the length of the barriers 3. If this is not the case, the element 18 may be embodied by another, independent rod, that is inserted into the aligned holes 17 in the coupling protrusions 15 in such a way as to join consecutive barriers 3 of the parapet 1.

[0031] In an alternative embodiment of the parapet 1, illustrated in Figures 9 and 10, when the prefabricated barriers 3 are not congruent in length with the centre distances between the fixed anchoring elements 5, protection systems can nevertheless be made using parapets 1 adapted to diverse situations by erecting at least two barriers 3 in such a way as to overlap. In this case, it is sufficient for the connecting means 6 or 8 and 9 mounted on the uprights 4 where the barriers 3 are overlapped to be shaped in such a way that their profiles 8a and 9a are wider to enable them to interact simultaneously with two overlapping rails 7 corresponding to the barriers 3.

[0032] Figure 8 shows a sequence of steps, labelled A to E in the erection of a modular parapet 1 according to the invention.

[0033] With reference to Figure 8A, the first step is to take a tubular upright 4 and position it in such a way that the pivotally-mounted second retaining member 9 vertically substantially overlaps the first, fixed retaining member 8.

[0034] The tubular upright 4 is then slipped onto a corresponding long anchoring element 5 and moved down coaxially along the anchoring element 5 towards the structure 2. The downward movement is permitted until

the position of the tubular upright 4 relative to the through hole 13 in the mobile retaining member 9 is such that further movement of the upright 4 relative to the fixed anchoring element 5 is prevented and the upright 4 is locked in place on the anchoring element 5. This interference fit is shown in Figure 5, from which it may be inferred that the interference fit is the direct result of the angle of the pivotally-mounted retaining member 9 relative to the fixed retaining member 8 which causes the anchoring element 5 to be locked against the hole 13.

[0035] Once the upright 4 has locked in place on the fixed element 5, a single operator working on his own can easily place a barrier 3 against the upright 4 between the retaining members 8 and 9 while keeping the latter in a mutually diverging condition (Figure 8B).

[0036] As shown in Figure 8C, by sliding the tubular upright 4 and the barrier 3 together away from the structure 2, the through hole 13 in the second retaining member 9 can be aligned axially with the long anchoring element 5. In this way, the second, pivotally-mounted retaining member 9 can be turned into the position where it is parallel to the first, fixed retaining member 8.

[0037] This step, which may be inferred by comparing the Figures 8C and 8D, causes the second member 9 to snap the barrier 3 firmly into place - opposing the reaction of the first, fixed member - thus holding it securely on the upright 4.

[0038] Once the barrier 3 is securely in place, the upright 4 can continue to slide (Figure 8E) so that the entire parapet 1 can move finally until it reaches the structure 2 below. Erection of the parapet 1 is thus completed.

[0039] It should be noticed that the special design of the means 6 or 8 and 9 of the barrier 3, while locking the barrier 3 to the respective upright 4, allows the barrier 3 to be slid lengthways along the rails 7 in order to correct assembling mistakes and/or compensate for any errors in the positioning of the long anchoring elements 5.

[0040] This feature makes it possible to overcome the problems, difficulties and limitations encountered during erection as a consequence of possible irregularities during the step of placing of the anchoring elements 5. At the same time, it offers a great advantage during the completing step of placing the anchoring elements 5, making it possible to choose the most convenient positions without being bound by mandatory spacing specifications requiring the anchoring elements 5 to be placed at exactly regular intervals.

[0041] The parapet according to the invention thus provides an accident prevention system that not only meets stringent safety regulations and requirements but can also be quickly and easily erected and dismantled, without tools, even by personnel without special skills.

[0042] Moreover, the parapet provided can be attached to the anchoring elements on the building structure extremely easily and without limitations of any kind, even if the spacing of the anchoring elements varies from one structure to another or is not perfectly regular.

[0043] Another advantage of the parapet according to

the invention is that it can be used to erect protection systems of any length and including parts at an angle to each other, where the angle can be of any required size.

[0044] Furthermore, when necessary, in some circumstances depending on applications, parts of the protection system can be made by overlapping the parapets.

[0045] Advantageously, it is possible to obtain a wide range of protections in various different shapes using temporary, modular parapets which are themselves composed of a very limited number of standard parts.

[0046] The invention described above is susceptible of industrial application and may be modified and adapted in several ways without thereby departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted by technically equivalent elements.

Claims

1. A modular parapet providing temporary protection against accidental falls from structures (2) equipped with fixed, long anchoring elements (5), the parapet being **characterized in that** it comprises a protective barrier (3), at least one supporting upright (4) that can be associated with a corresponding anchoring element (5), and connecting means (6; 8, 9) for joining the barrier (3) to the upright (4) in such a way that it can be engaged and disengaged.
2. The parapet according to claim 1 or according to the preamble to claim 1, **characterized in that** it comprises a supporting upright (4) in the form of a tubular element.
3. The parapet according to either of the foregoing claims or according to the preamble to claim 1, **characterized in that** it comprises a supporting upright (4) that can be coaxially associated with the anchoring element (5).
4. The parapet according to any of the foregoing claims or according to the preamble to claim 1, **characterized in that** the barrier (3) comprises at least a first and a second longitudinal frame rail (7) transversal to the supporting upright (4).
5. The parapet according to claim 4, **characterized in that** the barrier (3) comprises at least a first and a second frame rail (7) vertically aligned with each other.
6. The parapet according to claim 4 or 5, **characterized in that** the barrier (3) comprises at least a first and a second longitudinal frame rail (7) which are connected to each other.
7. The parapet according to any of the foregoing claims

or according to the preamble to claim 1, **characterized in that** it comprises barrier (3) connecting means (6; 8, 9) which can be associated with the barrier (3) at any point along their length.

8. The parapet according to any of the foregoing claims or according to the preamble to claim 1, **characterized in that** it comprises connecting means (6; 8, 9) which are fixed to the supporting upright (4).
9. The parapet according to any of the foregoing claims or according to the preamble to claim 1, **characterized in that** it comprises connecting means (6; 8, 9) which in turn comprise a pair of retaining members (8, 9) which can be associated with opposite sides of the barrier (3).
10. The parapet according to claim 9, **characterized in that** the retaining members (8, 9) have concave profiles (8a, 9a) opposite one another.
11. The parapet according to claim 9 or 10, **characterized in that** the profiles (8a, 9a) are shaped to match at least parts of the edge of the barrier (3).
12. The parapet according to any of the foregoing claims from 9 to 11, **characterized in that** the profiles (8a, 9a) and the edge parts of the barrier (3) have the shape of matching wedges.
13. The parapet according to any of the foregoing claims or according to the preamble to claim 1, **characterized in that** it comprises connecting means which in turn comprise a retaining member (8) made as a single part with the tubular upright (4).
14. The parapet according to any of the foregoing claims or according to the preamble to claim 1, **characterized in that** it comprises connecting means which in turn comprise a retaining member (9) that is pivotally-mounted on the upright (4) in such a way that it can move between two end positions, at a first of which the retaining member (9) is inoperative, and at its second end position, the retaining member (9) being associated with the edge of the barrier (3), in a working condition.
15. The parapet according to claim 14, **characterized in that** it comprises means (12, 4) for locking the mobile retaining member (9) to the respective parapet barrier (3) in the working condition.
16. The parapet according to claim 15, **characterized in that** the locking means (12, 4) are integral with the second retaining member (9).
17. The parapet according to claim 15 or 16, **characterized in that** the locking means (12, 4) comprise a

hole (13) that passes through the retaining member (9).

18. The parapet according to claim 17, **characterized in that** the through hole (13) in the locking means (12, 4) of the retaining member (9), when the retaining member (9) swings relative to the tubular upright (4), can be oriented in such a way as to align it coaxially with the long anchoring element (5).
19. The parapet according to claim 17 or 18, **characterized in that**, in the engaged working condition, the long anchoring element (5) passes through the hole (13) and is locked in place in such a way as to prevent the second retaining member (9) from rotating relative to the upright (4).
20. The parapet according to any of the foregoing claims or according to the preamble to claim 1, **characterized in that** the barrier (3), in the form of a framework, is equipped with coupling means (14; 17, 18) for joining the barrier (3) continuously with another barrier (3) adjacent to it.
21. The parapet according to claim 20, **characterized in that** the barrier (3), in the form of a framework, is equipped with coupling means (14; 17, 18) mounted at a pair of sides parallel to the supporting upright (4).
22. The parapet according to claim 20 or 21, **characterized in that** the coupling means (14; 17, 18) comprise coupling protrusions (15) and matching cavities (16) which fit into each other in the plane in which the barrier (3) lies, said protrusions (15) having through holes (17) made in them, which can be aligned along a shared axis when the protrusions (15) and cavities (16) of two consecutive barriers (3) are fitted into each other, it being then possible to insert a rod-shaped element (18) into the holes (17) in the protrusions (15) in such a way as to structurally join one barrier (3) to another barrier (3) adjacent to it.
23. The parapet according to claim 22, **characterized in that** the rod-shape element (18) is embodied by one of the anchoring elements (5).
24. The parapet according to any of the foregoing claims, **characterized in that** it comprises at least two overlapping barriers (3), the connecting means (6; 8, 9) being shaped in such a way as to interact with two corresponding overlapping rails (7) of the barriers (3).
25. The parapet according to any of the foregoing claims, **characterized in that** at least the barrier (3) is made of a plastic material.
26. The parapet according to any of the foregoing claims,

characterized in that the supporting upright (4) is made of a plastic material.

27. The parapet according to any of the foregoing claims, **characterized in that** the connecting means (8, 9) are made of a plastic material. 5
28. The parapet according to any of the foregoing claims, **characterized in that** the barrier (3) is made in the form of a single framework comprising three horizontal rails (7) monolithically interconnected by four vertical stiles (19). 10
29. The parapet according to any of the foregoing claims, **characterized in that** the tubular upright (4) is box-shaped. 15
30. A method for erecting a modular parapet (1) that can be associated with long anchoring elements (5) mounted on a structure (2) to be provided with protection against accidental falls, the method being **characterized in that** it comprises the steps of: 20
- taking a tubular upright (4) equipped at one end with a first, fixed retaining member (8) and, at the other end, with a second, pivotally-mounted retaining member (9) having a through hole (13) made in it, and positioning said second pivotally-mounted retaining member (9) in such a way that it vertically overlaps the first, fixed retaining member (8); 25 30
 - placing the tubular upright (4) on a corresponding long anchoring element (5) making it slide coaxially along the anchoring element (5) towards the structure (2) until reaching a condition of interference between the tubular upright (4) and the through hole (13) in the mobile retaining member (9), where further movement is automatically prevented, and the pivotally-mounted retaining member (9) is oriented obliquely relative to the fixed retaining member (8); 35 40
 - placing a barrier (3), in the form of a framework, between the retaining members (8, 9), against the upright or uprights (4); sliding the tubular upright (4) and the barrier (3) together away from the structure (2) until the through hole (13) in the second retaining member (9) is aligned axially with the long anchoring element (5), and so that said pivotally-mounted retaining member (9) is parallel to the fixed retaining member (8), thereby enabling the locking means (12, 4) to lock the barrier (3) in place on the upright (4)); and 45 50
 - moving the upright (4) and the barrier (3) towards the structure (2) again. 55

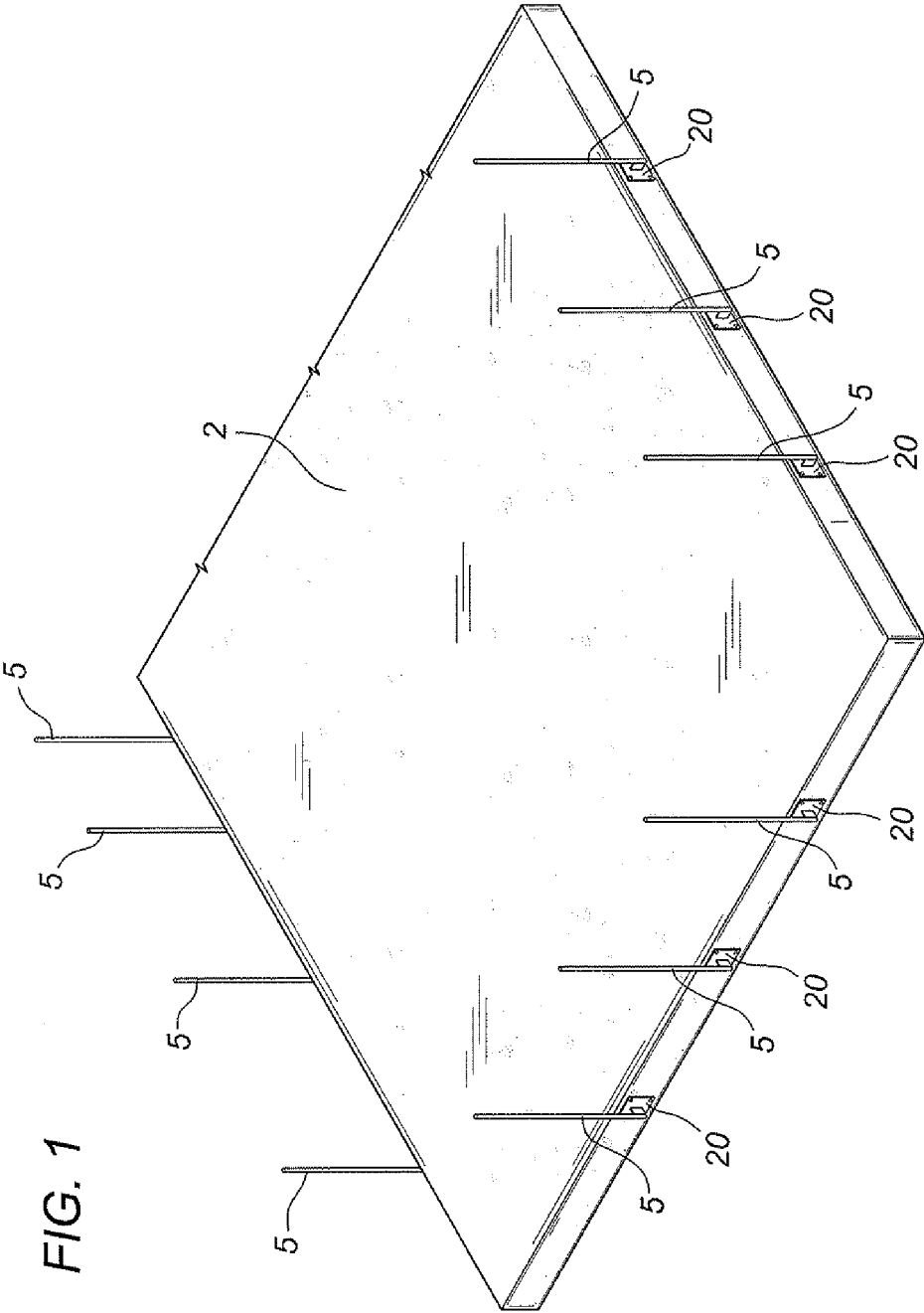


FIG. 2

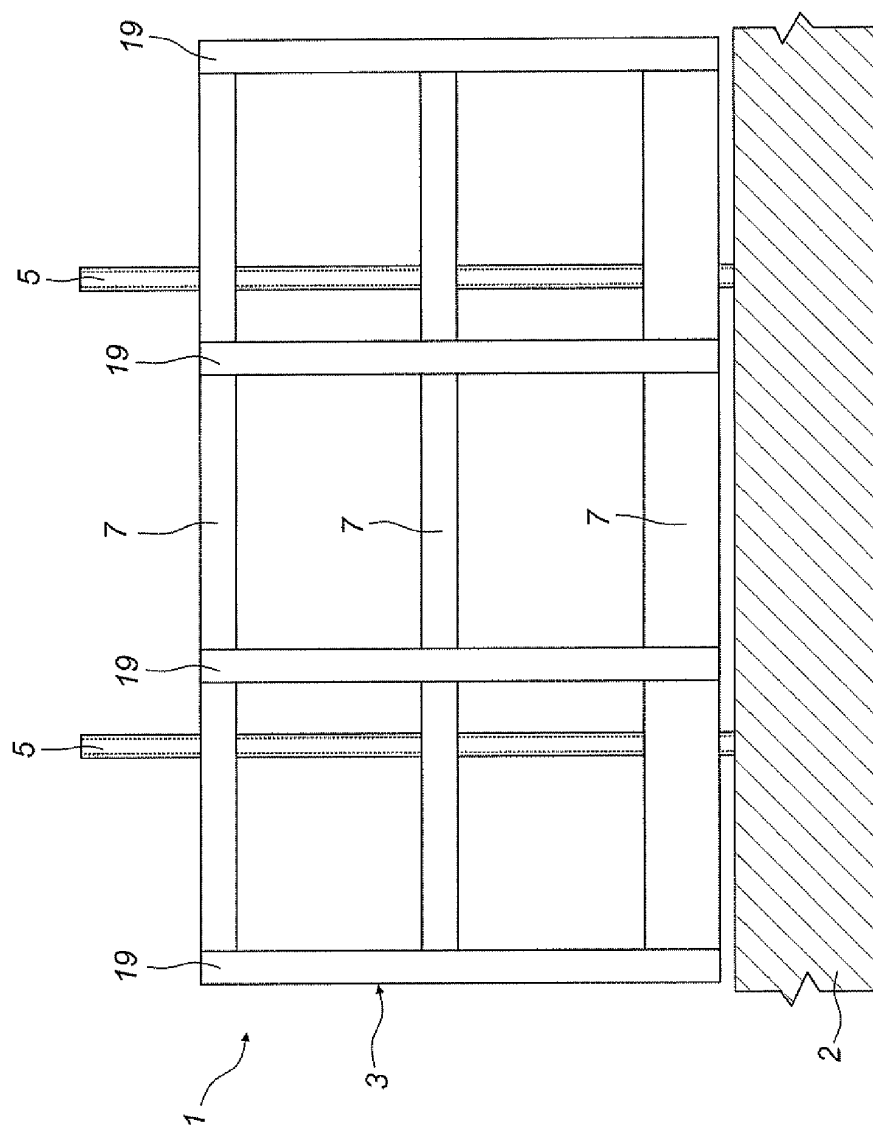


FIG. 3

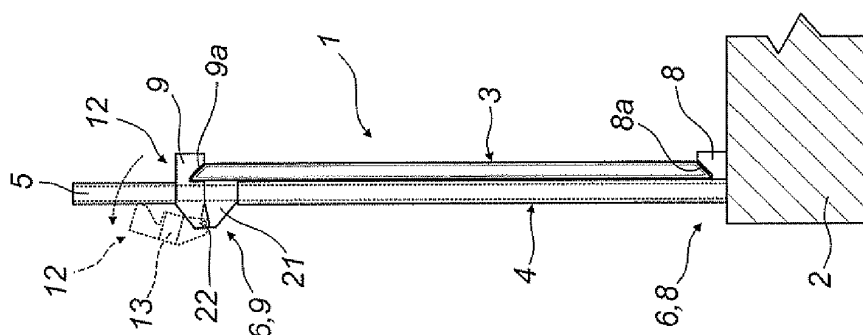


FIG. 4

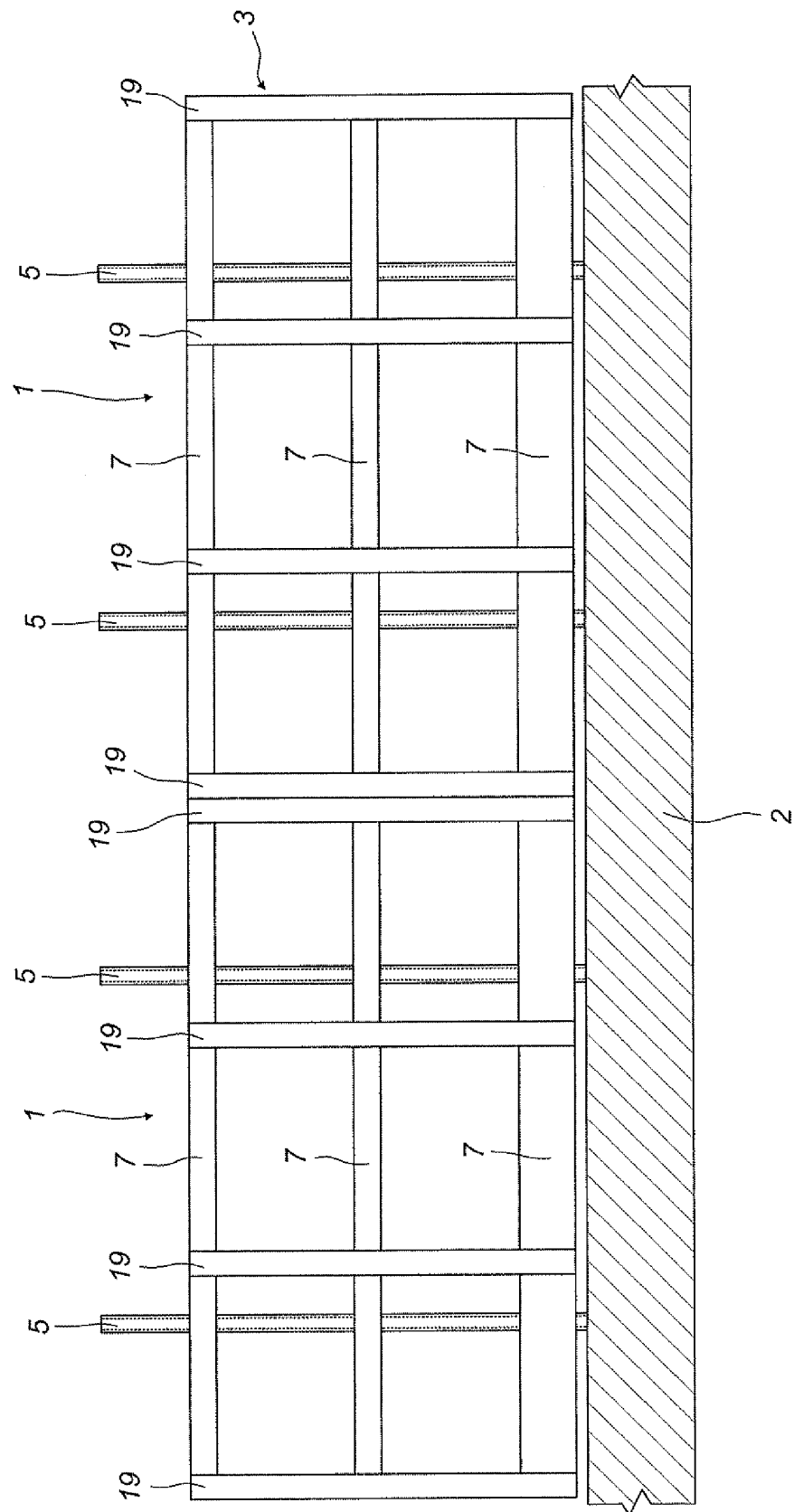


FIG. 5

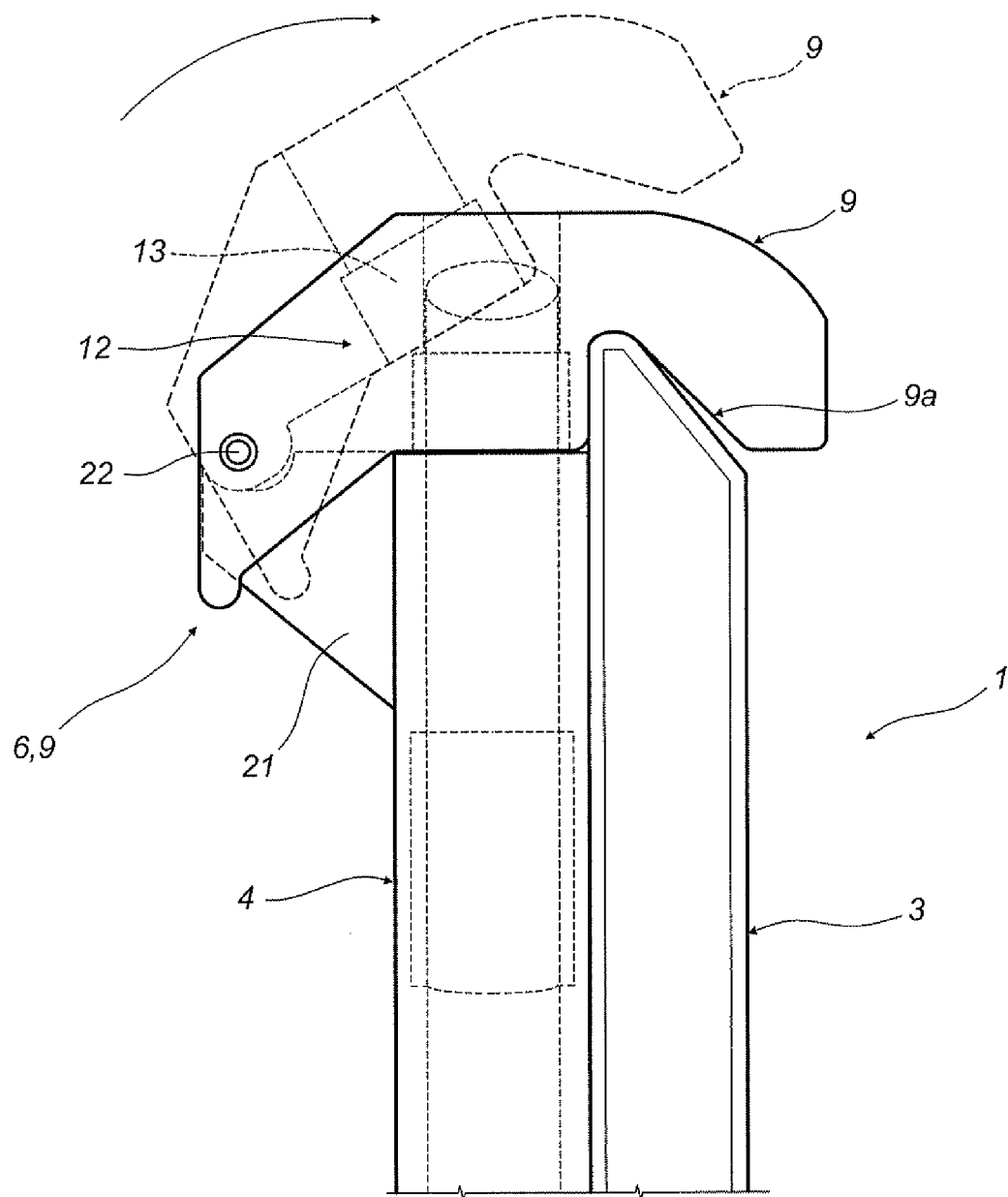


FIG. 6

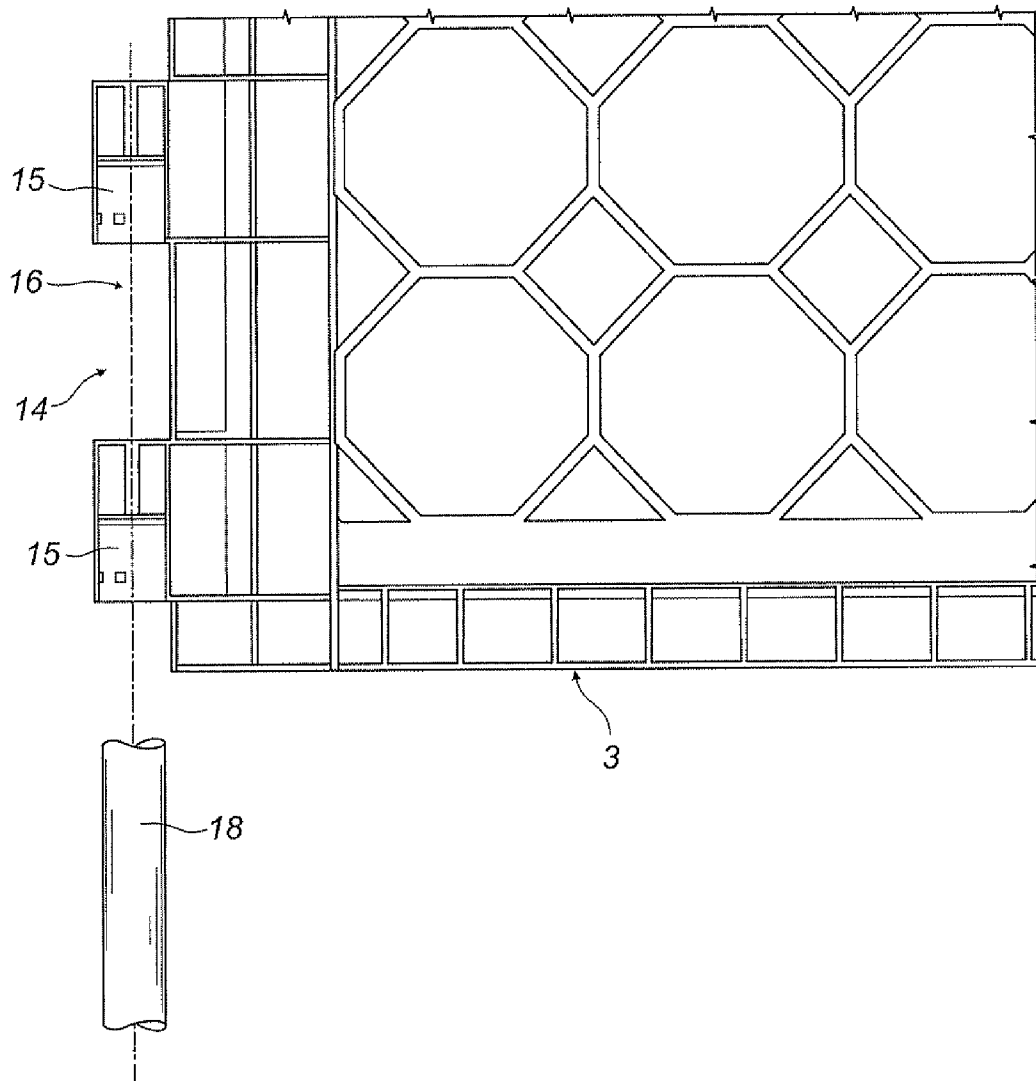


FIG. 7

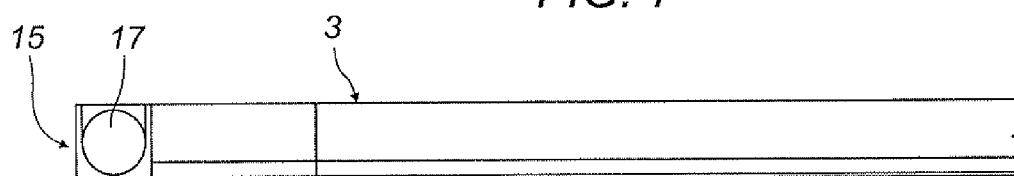


FIG. 8

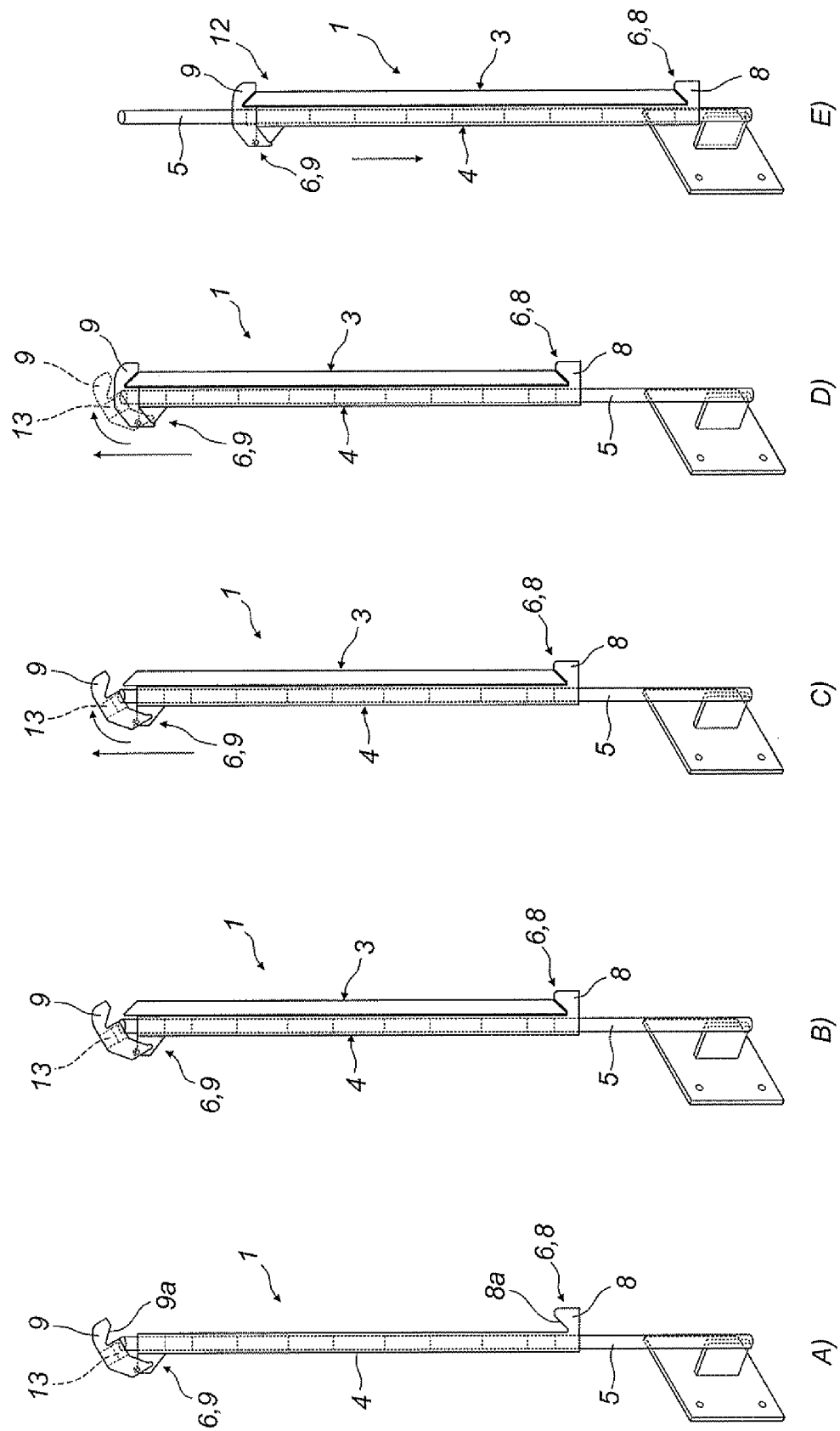


FIG. 9

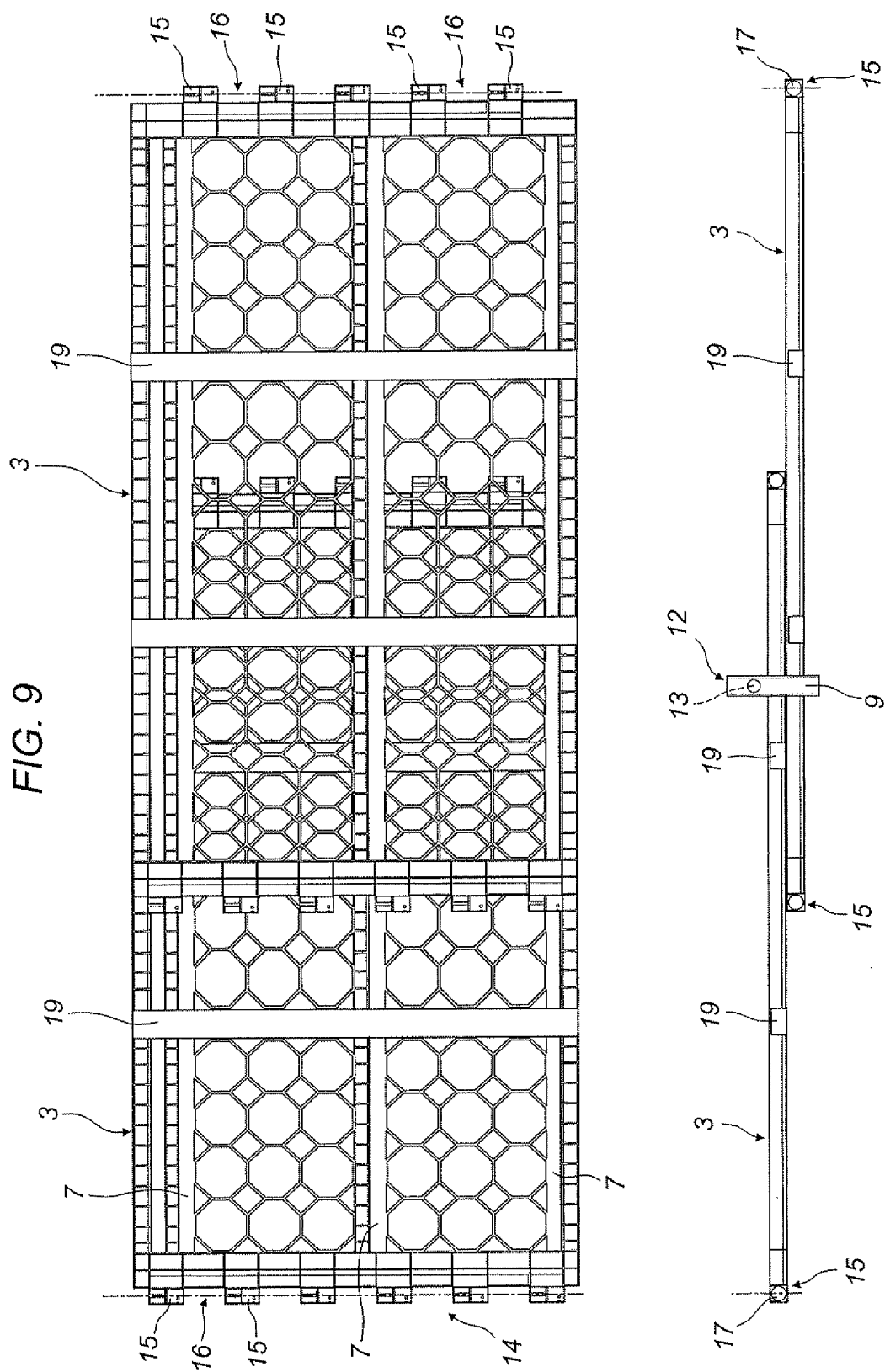


FIG. 10

