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(54) Device for closing a ground level opening and method for lifting an underground waste container into and out of a ground level opening

(57) Device (10) for closing an opening in the ground surface from which an underground waste container (8) has been removed, wherein the device (10) comprises:
- one or more pivotally arranged, upward foldable floor parts (11,12);
- a spring construction arranged in each floor part (11,12) for urging the pivotable floor part (11,12) from the folded-down position to the upward folded position; and
- a locking mechanism (13-16) for respectively locking and unlocking the floor part (11,12) in the position covering the opening, wherein the locking mechanism (13-16) is set into operation once the spring construction has moved along a predetermined path, and the locking mechanism (13-16) can be unlocked by the weight of the underground container (8), or the force exerted by the container (8).

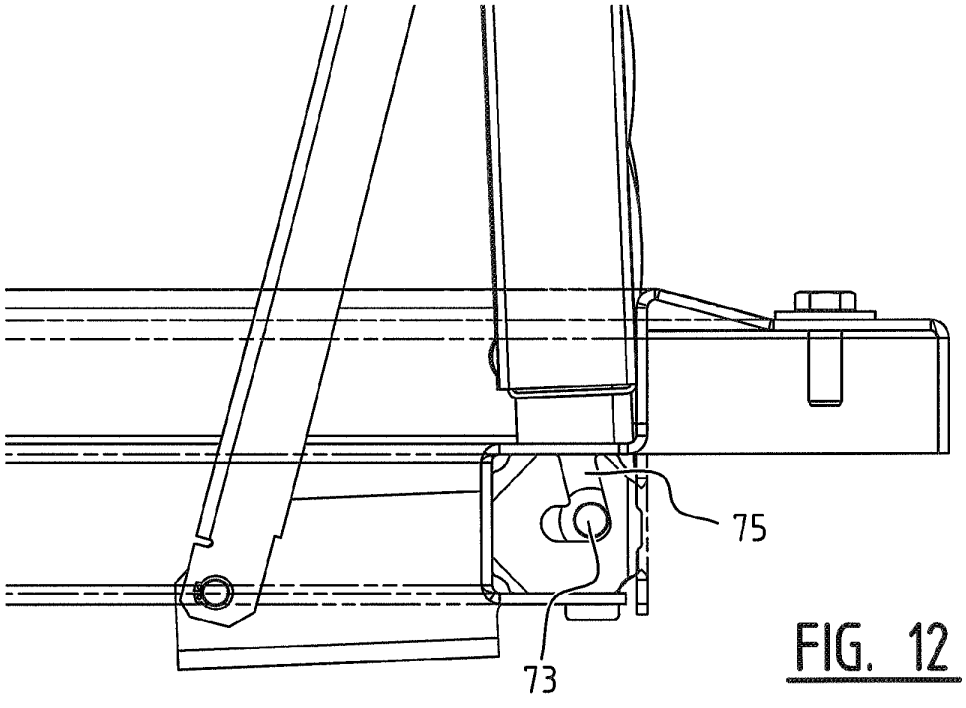

FIG. 12

EP 2 336 053 A2

Description

[0001] Use is being made on increasingly larger scale both in and outside the Netherlands of underground waste containers with an insertion column situated above ground level. Such waste containers have for instance a size of about 2 metres by 2 metres by 4 metres. In order to prevent passers-by running the risk of falling into the underground opening when the waste container has been hoisted upward, use is made of safety provisions such as a rising safety floor or upward movable fences. For reasons of product engineering as well as for maintenance purposes, applicant prefers upward foldable panels which close off the opening in the hoisted position of the waste container.

[0002] The present invention provides a device for closing an opening in the ground surface from which an underground waste container has been removed, wherein the device comprises:

- one or more pivotally arranged, upward foldable floor parts;
- a spring construction arranged in each floor part for urging the pivotable floor part from the folded-down position to the upward folded position; and
- a locking mechanism for respectively locking and unlocking the floor part in the position covering the opening, wherein the locking mechanism is set into operation once the spring construction has moved along a predetermined path, and the locking mechanism can be unlocked by the underground container.

[0003] Owing to the construction according to the present invention a floor part can easily be replaced, wherein the spring construction causing the movement of the floor parts is then also replaced. No additional operations are required for fixing or releasing the floor parts and the spring construction to or from the concrete underground walls. Because the spring construction does not protrude relative to the floor part, or hardly so, it is extremely compact and the moving parts are fully shielded from the container. The floor parts can be positioned almost up to the ground surface, for instance up to about 5 centimetres thereunder, whereby no dangerous steps down are created in the unlikely event a passerby steps onto a floor part. The present invention also provides a method for lifting the waste container into and out of the ground level opening.

[0004] The spring construction preferably comprises one or more helical springs, preferably draw springs, which are deformed during the downward folding away along the pit construction, thereby providing the force required for the upward movement of the floor parts to the position closing the ground level opening.

[0005] The spring construction preferably comprises two draw springs, each arranged at one end on a pin which is displaceable along a metal profile part into a locked position, for which purpose a recess is arranged in the steel plate profile part. Practical tests have shown that two draw springs of limited size can produce sufficient force to unlock a floor part and can be integrated into the construction of the floor part.

[0006] In the locking position the pin preferably urges a locking finger in upward direction; this locking finger is then struck by the waste container when it is being moved downward before this waste container itself folds down the floor part.

[0007] In a further preferred embodiment the draw springs take a narrowed form at the ends in order to reduce friction of the draw springs with the surrounding construction.

[0008] The present invention also provides a method for lifting an underground waste container into and out of the ground level opening, and a method for replacing a floor part.

[0009] Further advantages, features and details are elucidated with reference to the following description of a preferred embodiment thereof; in the drawing:

Fig. 1 shows a schematic illustration of a device and method according to the present invention;
Fig. 2 is a perspective view of the device shown in figure 1, wherein the floor panels have been folded away by the underground container;
Fig. 3 is a perspective, partially broken-away view of detail III of figure 1;
Fig. 4 is a perspective, partially broken-away view of detail IV of figure 3; and
Fig. 5 is a bottom view of the embodiment shown in figure 4 in locked position;
Fig. 6 is a perspective view of a further preferred embodiment of an apparatus according to the present invention;
Fig. 7 is a perspective view of detail VII of Fig. 6;
Fig. 8 is a perspective view of detail VIII of Fig. 7;
Fig. 9 is a perspective view of the preferred embodiment of Fig. 6 in folded away position;
Fig. 10 is a perspective view of the embodiment according to Fig. 6 in folded away position wherein the floor panel has been taken out, and
Fig. 11 and Fig. 12 are a side view of detail XI in two different positions.

[0010] A safety construction 10 (figures 1,2) comprising two upward foldable panels 11, 12 is preferably arranged about 5 centimetres below ground surface 3 on a concrete construction comprising side walls 6,7. An underground waste container 8 comprises an insertion column 9 and a lifting construction 4 for hoisting or lowering the waste container. Side panels 11, 12 are moved to the opened position by the force (weight) of waste container 10, wherein these panels lie against the respective side walls 6, 7.

[0011] In the locked position (fig. 3) locking levers 13, 14 and 15, 16 respectively protrude in upward inclining

direction from each pivotable panel 11, 12. Pivotable panels 11 are attached to the top side of concrete wall 6 via frames 21 with eight screw bolts (not shown).

[0012] In the locked position shown in figure 3 robustly formed arm parts 22 are oriented vertically so as to support via partially reinforced support plates 17-20 against the concrete wall. On one side the inclining arms 27 of pivot construction 31 (fig. 4) are arranged in each case on these vertical arm parts 22 and on the other side on a shaft part 32, on either side of which are arranged draw springs 33, 34 respectively. The helical springs are attached at the ends with screw bolts 35, 36 to the steel profile plates 38 provided with two channels. Shaft 32 urges locking lever 14 into the upward inclining raised position, in which position shaft 32 is located in two recesses in the flanges of profile part 38, and thereby keeps the floor panels locked.

[0013] During lowering of waste container 8 the locking fingers 13-15 are first moved downward, whereby shafts 32 are moved out of the locking recess and floor parts 11, 12 are moved downward by the weight of the waste container itself (the force exerted thereby). The position shown in figure 5 is eventually reached, wherein helical springs 33, 34 are (considerably) deformed relative to the position shown in figure 4 and locking finger 14 is folded inward. During lifting out of the container the extended draw springs 33, 34 urge the floor panels upward into the position shown in figure 3.

[0014] The above described preferred embodiment of the present invention provides a number of significant advantages. The floor parts can be arranged up to 5 cm or less below the ground surface. The floor parts can be easily arranged on the pit construction using screw bolts placed through a frame part. The whole folding mechanism is accommodated in a floor part, whereby it can be replaced as one service element; the construction is extremely compact, this being advantageous for transport, while the moving parts are shielded from the container. Operation and play of the floor part in the closing position depends to a great extent on the pit construction, since the floor part is fixedly connected to the pit construction only via the frame part. The floor part can easily be folded upward so that, if necessary, inspection and/or maintenance can take place in the pit.

[0015] The further embodiment according to Fig. 6 are foldable panels 61, 62 provided with finger constructions 63 which correspond to the construction shown in the first preferred embodiment. In element 63 (Fig. 7) two draw springs 64, 65 are mounted of which one end (Fig. 8) is tapered such as to remain free of the remaining steel construction and to prevent that the fricktion forces could falter the folding of the floor panels. In the further embodiment (Fig. 9 and 10) the floor panel can easily be taken out of the pivot construction 71 (see especially Fig. 10). Because of this construction which is provided at the upper side of openings 62 through which pins 63, 64 can be taken out in folded position, a panel which may be damaged, can easily be replaced.

[0016] As it is clear from detail of Fig. 11 and 12, the pivot construction 71 is provided with a cam disc 75 which is provided such that the axis of the floor panel 62 can be taken out through the curve path 76 in upwards direction such that the panel can be taken away easily. It will be apparent to a skilled person that the present patent application must be read in its entirety. All features and components of the description are interpreted by a skilled person as being a feature which, either separately or in association with any other component or feature of the present patent application, can be combined and included in the claims.

[0017] The present invention is not limited to the above described preferred embodiment; the rights sought are defined by the following claims, within which modifications can be envisaged.

Claims

1. Device for closing an opening in the ground surface from which an underground waste container has been removed, wherein the device comprises:

   - one or more pivotally arranged, upward foldable floor parts;
   - a spring construction arranged in each floor part for urging the pivotable floor part from the folded-down position to the upward folded position; and
   - a locking mechanism for respectively locking and unlocking the floor part in the position covering the opening, wherein the locking mechanism is set into operation once the spring construction has moved along a predetermined path, and the locking mechanism can be unlocked by the weight of the underground container, or the force exerted by the container.

2. Device as claimed in claim 1, wherein the spring construction comprises one or more draw springs.

3. Device as claimed in claim 2, wherein the spring construction comprises two helical draw springs, each attached at one end to a pin which is displaceable along a profile part.

4. Device as claimed in claim 3, wherein in the locked position the pin engages in recesses in the profile part.

5. Device as claimed in claim 4, wherein the pin urges a hinge for a locking finger arranged on the floor part into an upward directed position, wherein using a waste container which is moving downward the pin is unlocked by means of this locking finger.

6. Device as claimed in one or more of the claims 2-5,

wherein the draw springs take a narrowed form toward the ends.

7. Method for lifting a waste container into and out of a ground level opening, wherein one or more pivots associated with the foldable floor parts extend along a side wall of the opening in the position in which the waste container is lowered into the opening, and wherein in the lifted-out position of the waste container the floor parts are moved upward into a locked position under the influence of an integrated spring construction.

8. Method as claimed in claim 7, wherein a device according to claims 1-5 is applied.

9. Method for replacing a floor part of a device as claimed in one or more of the foregoing claims, wherein a number of downward oriented screw bolts are unscrewed from an upper edge of a pit construction, the floor panel is taken out and the replacement floor panel is placed and fixed to the pit construction with the same screw bolts or corresponding screw bolts.

10. Method for carrying out inspection and/or maintenance of an opening in the ground surface provided with a device as claimed in one or more of the claims 1-6, wherein the floor parts are folded upward so that access to an opening is left clear.

11. Method for replacing a floor panel of an operative according to one of the preceding claims, wherein the floor panel can be taken out of a pivot construction in the floor panel is folded upwards through one or more openings in the pivot construction, and wherein the floor panel is maintained in the pivot construction when pivoted downwards.

12. Construction for use and method according to claim 11, wherein the pivot construction is provided with an opening through which axes of the floor panel can be moved in upward direction when the panel is pivoted in the upward most position.

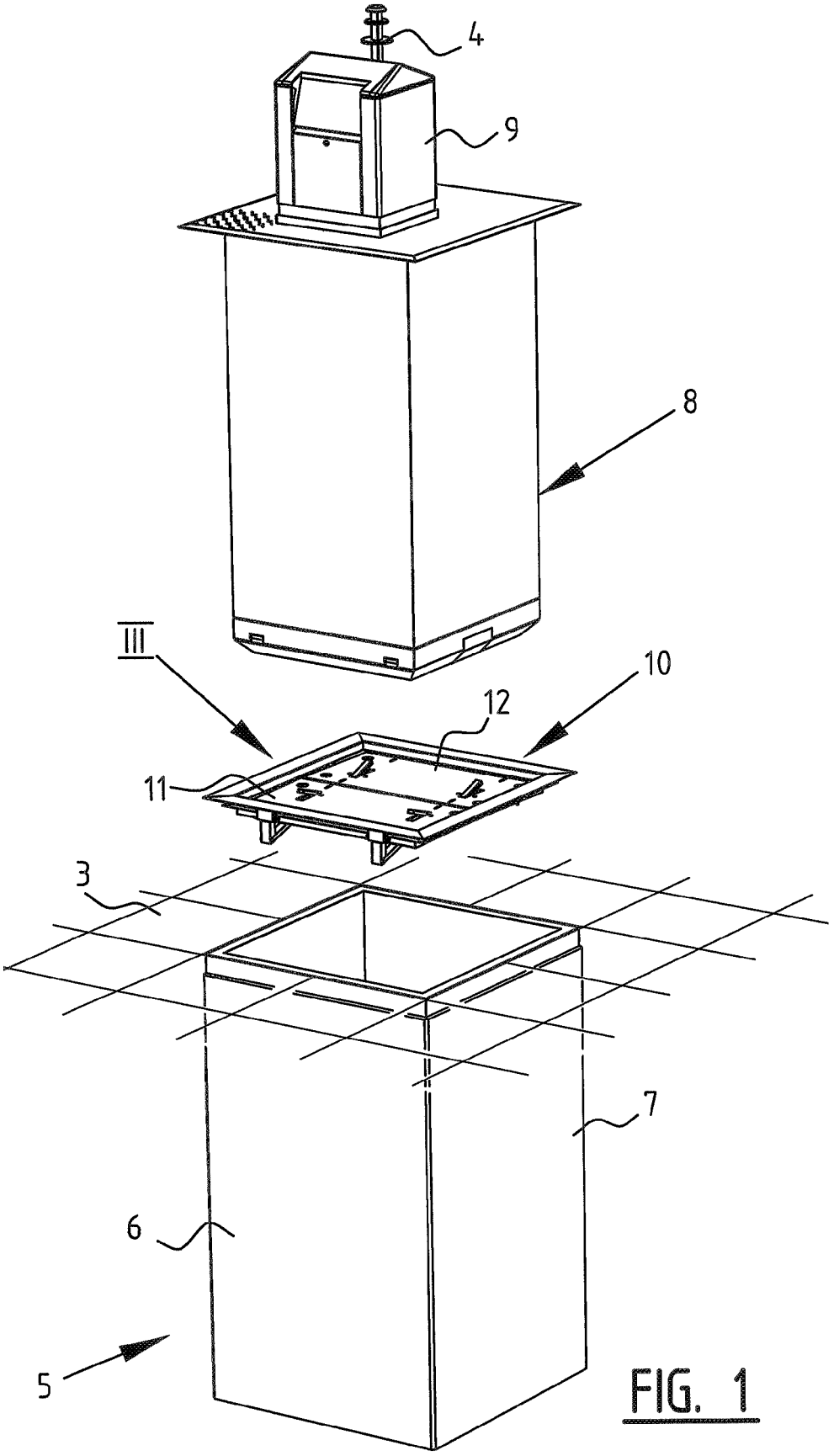

FIG. 1

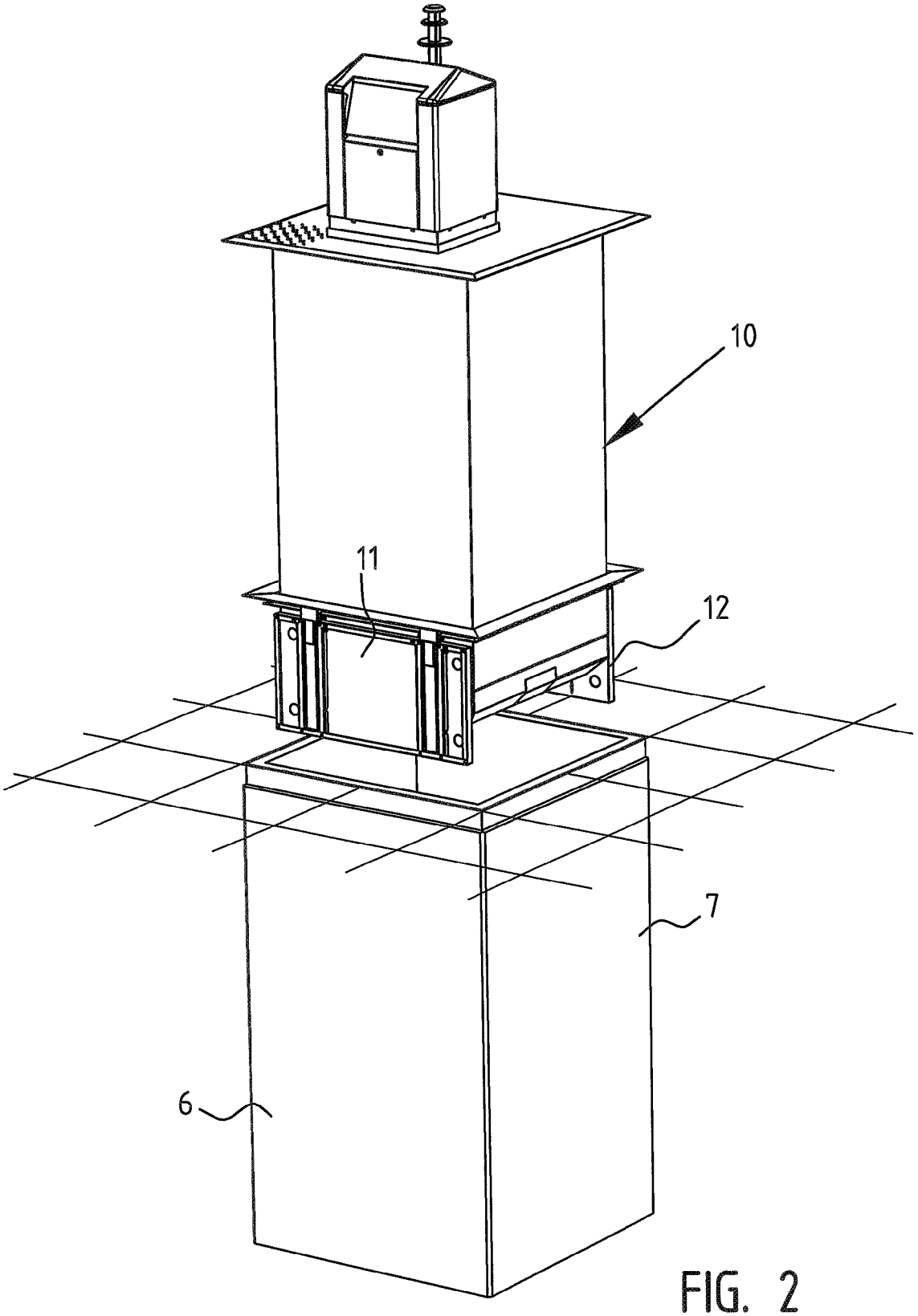

FIG. 2

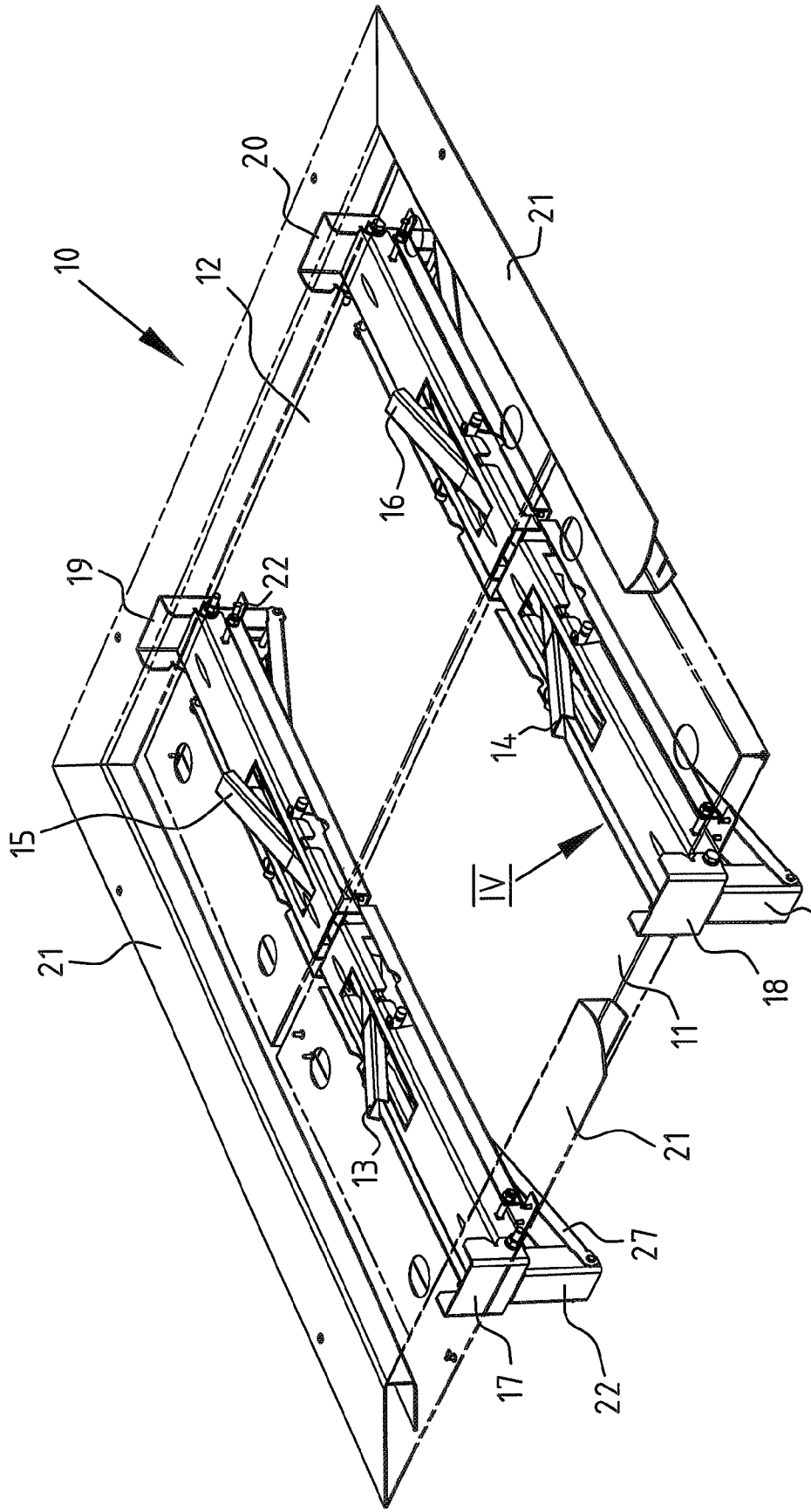

FIG. 3

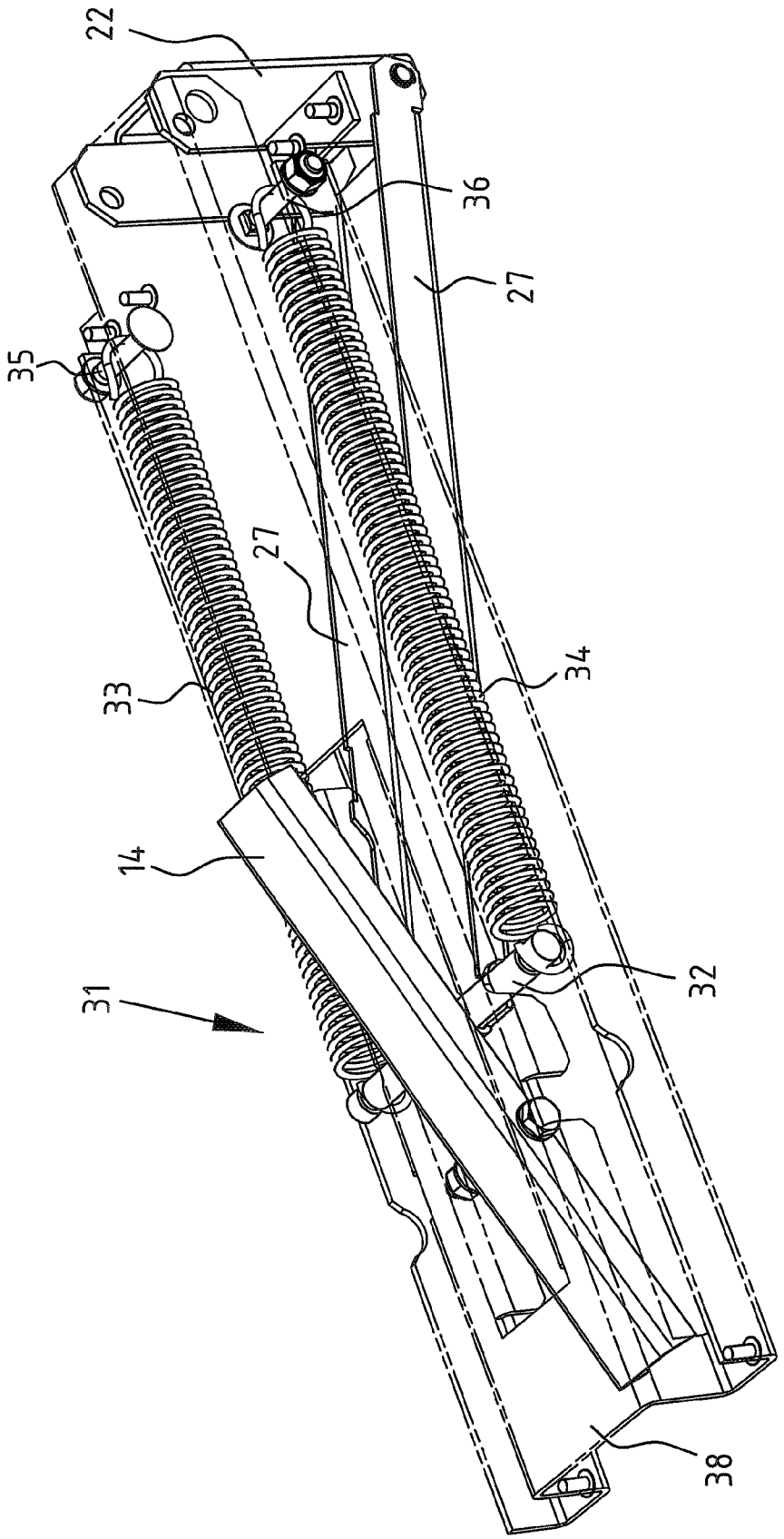

FIG. 4

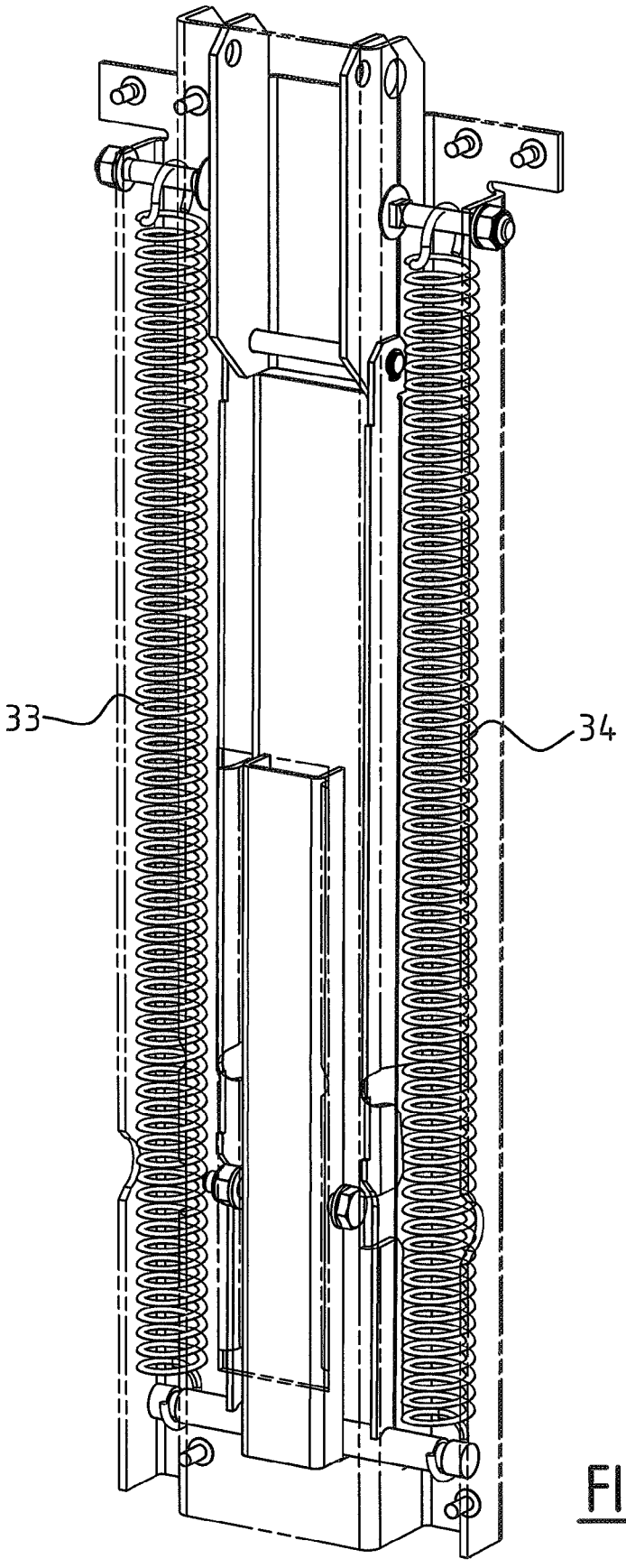

FIG. 5

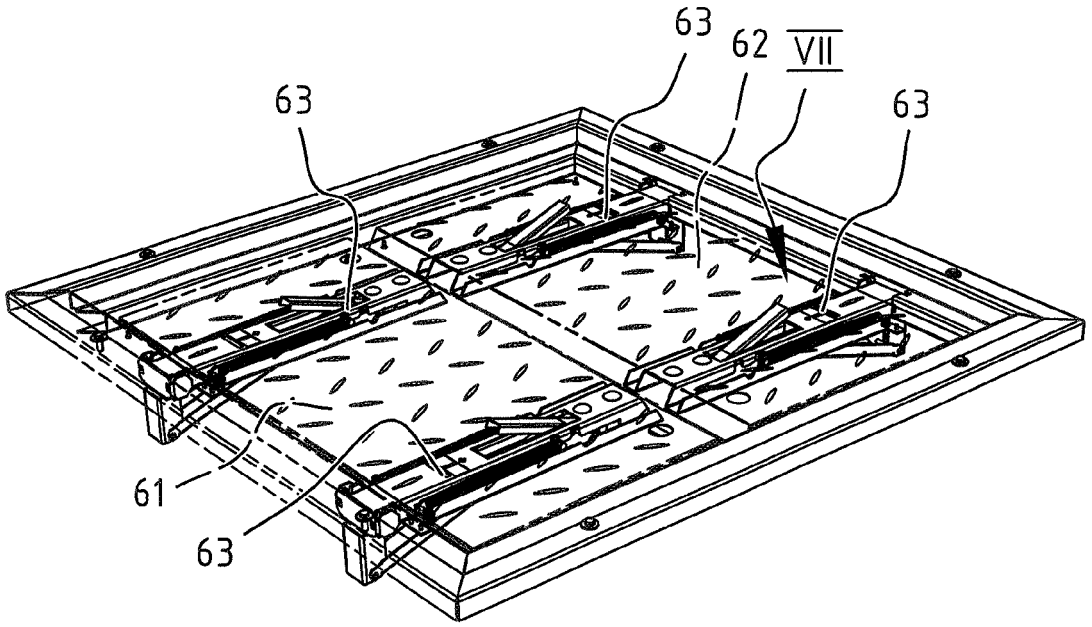

FIG. 6

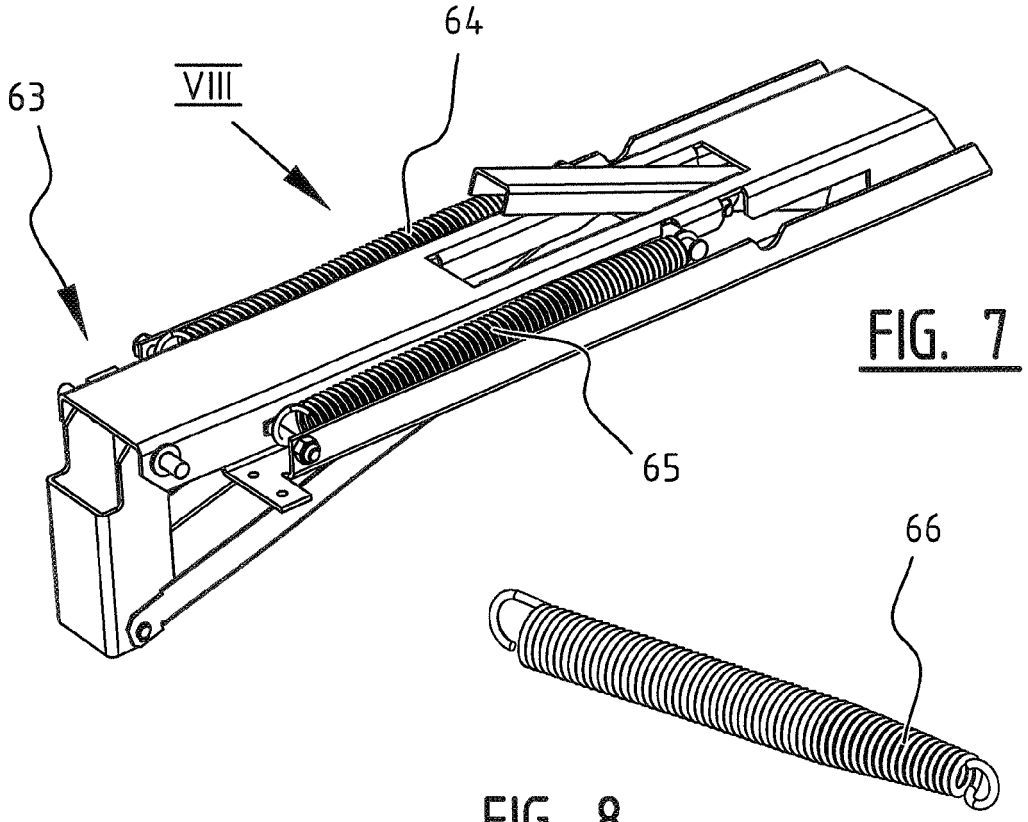

FIG. 7

FIG. 8

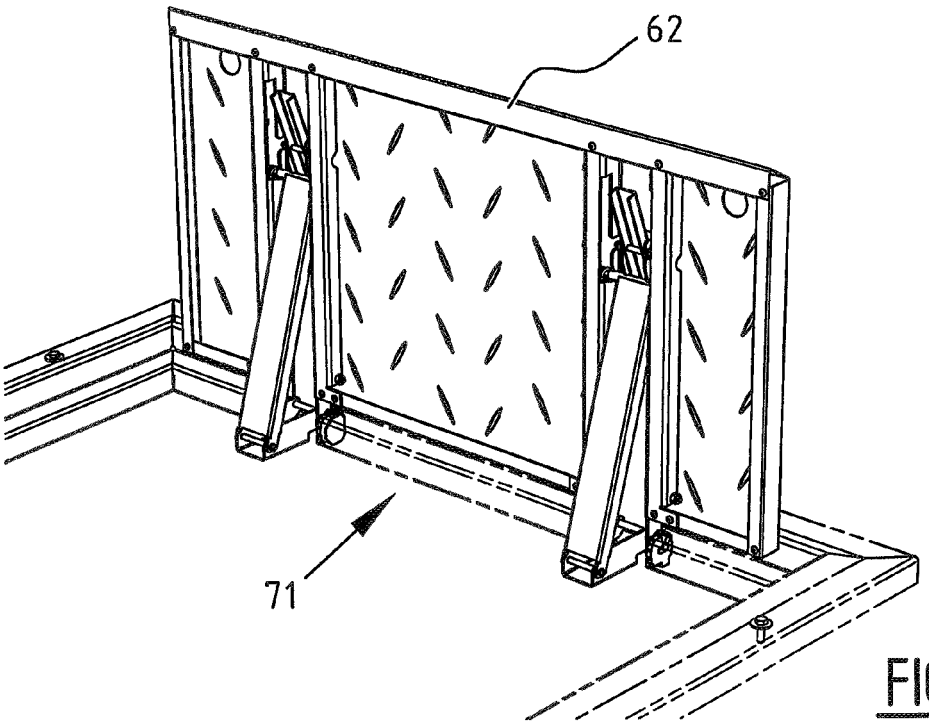

FIG. 9

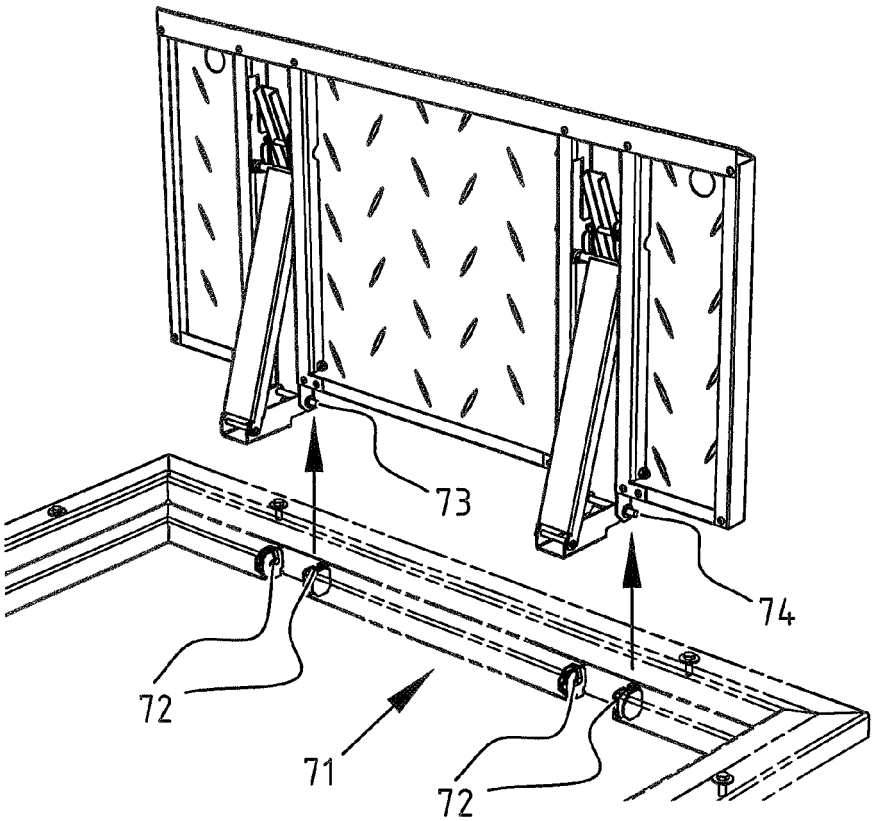

FIG. 10

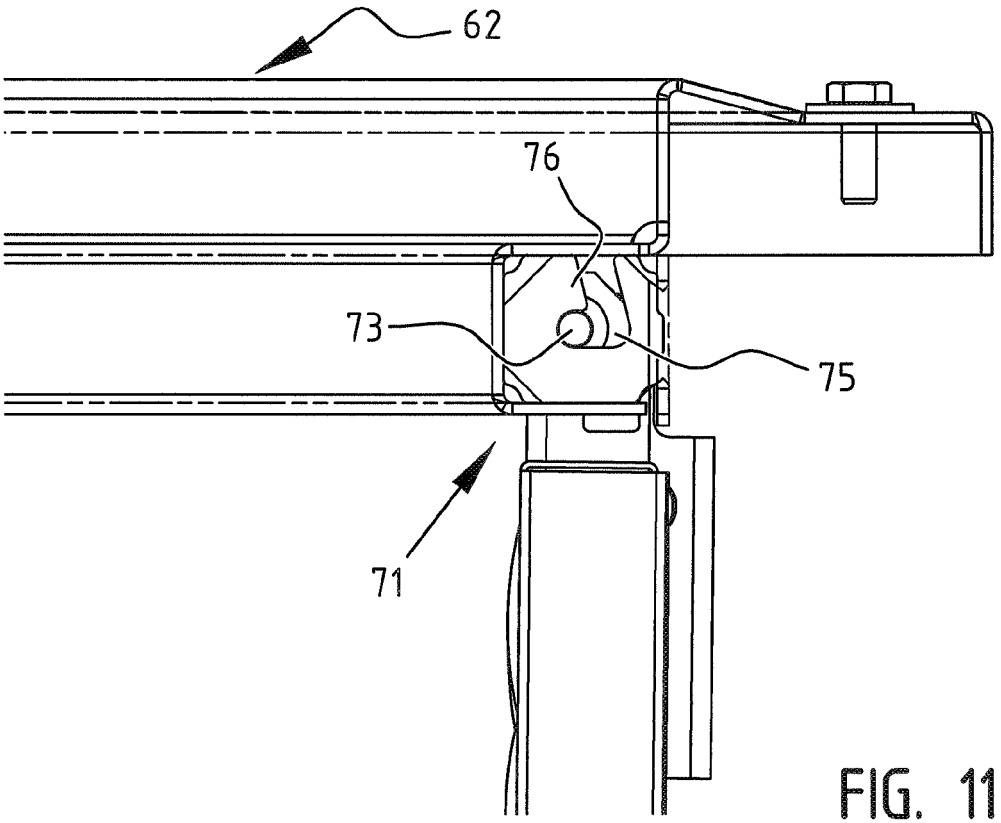

FIG. 11

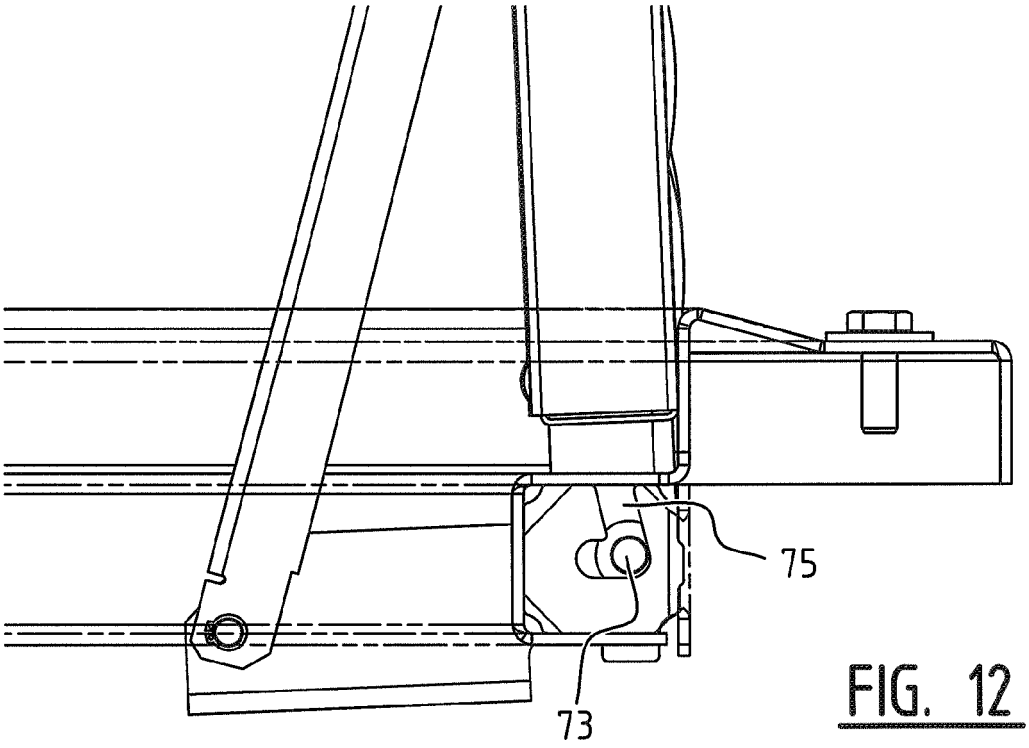

FIG. 12