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(54) Titre : DISPOSITIF DE MONTAGE D'UNITE DE STOCKAGE D'ENERGIE ET SA DISPOSITION ET UNITES DE STOCKAGE D'ENERGIE MULTIPLES

(54) Title: ENERGY STORAGE UNIT MOUNTING FACILITY AND ARRANGEMENT OF THE SAME AND MULTIPLE ENERGY STORAGE UNITS

(57) **Abrégé/Abstract:**

An energy storage unit mounting facility (10), having a rack-like or frame-like basic body (12), which defines multiple mounting regions (16) arranged vertically on top of one another for at least one electric energy storage unit (11) each, wherein the respective electric energy storage unit (11) is introducible into the respective mounting region (16) in the horizontal direction and removable from the respective mounting region (16) in the horizontal direction, and having securing devices (14, 15, 18) in order to secure the respective electric energy storage unit (11) introduced into the respective mounting region (16) in the respective mounting region (16).

Abstract

An energy storage unit mounting facility (10), having a rack-like or frame-like basic body (12), which defines multiple mounting regions (16) arranged vertically on top of one another for at least one electric energy storage unit (11) each, wherein the respective electric energy storage unit (11) is introducible into the respective mounting region (16) in the horizontal direction and removable from the respective mounting region (16) in the horizontal direction, and having securing devices (14, 15, 18) in order to secure the respective electric energy storage unit (11) introduced into the respective mounting region (16) in the respective mounting region (16). (Fig. 1)

ENERGY STORAGE UNIT MOUNTING FACILITY AND ARRANGEMENT  
5 OF THE SAME AND MULTIPLE ENERGY STORAGE UNITS

The invention relates to an energy storage unit  
mounting facility and to an arrangement of the energy  
storage unit mounting facility and multiple energy  
10 storage units.

In maritime and stationary applications there is  
increasingly a need for storing electric energy and  
utilise the stored electric energy for example as  
15 traction energy or also for supplying an on-board  
electrical system. In particular when relatively large  
and heavy electric energy storage units are employed,  
the handling of the same has proved to be difficult up  
to now. For this reason, only relatively small and  
20 light energy storage units are being utilised up to now  
in order to be able to comfortably handle the same. It  
has not been possible up to now to suitably handle  
large and heavy energy storage units, in particular  
electric energy storage units which are being employed  
25 as traction batteries in motor vehicles up to now.

There is therefore a need for an energy storage unit  
mounting facility which makes possible also handling  
large and heavy electric energy storage units.  
30

Starting out from this, the invention is based on the  
object of creating a new type of energy storage unit  
mounting facility.

35 This object is solved through an energy storage unit  
mounting facility according to Claim 1.

The energy storage unit mounting facility according to the invention comprises rack-like or frame-like basic body which defines multiple mounting regions arranged vertically on top of one another for at least one  
5 electric energy storage unit each. The respective electric energy storage unit is introducible into the respective mounting region in the horizontal direction and removable from the respective mounting region in the horizontal direction.

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The energy storage unit mounting facility according to the invention furthermore comprises safety devices in order to secure the respective electric energy storage unit introduced into the respective mounting region in  
15 the respective mounting region.

The energy storage unit mounting region according to the invention allows a safe handling of relatively large and relatively heavy energy storage units, such  
20 as for example automotive batteries, which have been employed as traction battery in electric and hybrid vehicles up to now. Multiple such electric energy storage units can be received and placed vertically on top of one another in the mounting regions of the  
25 energy storage unit mounting facility. For access to individual energy storage units, the same can be removed from the respective mounting region and introduced into the respecting mounting region in the horizontal direction.

30

Preferentially, the energy storage unit mounting region comprises conveyors in order to introduce the respective electric energy storage unit into and remove the respective electric energy storage unit from the  
35 respective mounting region in the horizontal direction. The conveyors support the movement of the respective electric energy module in the horizontal direction

while the same are introduced into or removed from the respective mounting region. By way of this, the handling of energy storage units in the region of the energy storage unit mounting facility is facilitated.

5

Preferentially, securing devices fix the respective electric energy storage unit on the rack-like or frame-like basic body. Alternatively or preferentially additionally, securing devices hold the respective electric energy storage unit in a state fixed to the basic body and not fixed to the basic body in the respective mounting region. By way of the securing devices, electric energy storage units which are arranged in corresponding mounting regions of the energy storage unit mounting facility are secured in their position. An unintentional moving-out of an energy storage unit from its respective mounting region can thereby be prevented.

20 Multiple energy storage units can also communicate by means of a so-called energy management system (EMS) by way of a control unit. The control unit combines the signals of individual energy storage units and transmits combined signals to the EMS. A further functionality of the control unit then is the switching-on and isolating of individual energy storage units and the simulation of a vehicle environment by means of signals.

30 The arrangement of the energy storage unit mounting facility and the multiple energy storage units is defined in Claim 11.

Preferred further developments of the invention are obtained from the subclaims and the following description. Exemplary embodiments of the invention are

explained in more detail by way of the drawing without being restricted to this. There it shows:

- 5 Fig. 1 a first embodiment of an energy storage unit mounting facility according to the invention in a perspective view without energy storage unit,
- 10 Fig. 2 an arrangement of the energy storage unit mounting facility of Fig. 1 and multiple energy storage units,
- 15 Fig. 3 an energy storage unit in sole representation,
- Fig. 4 to 6 views of the energy storage unit mounting facility of Fig. 1,
- 20 Fig. 7 to 9 views of the arrangement of Fig. 2,
- Fig. 10 a second embodiment of an energy storage unit mounting facility according to the invention in a perspective view without energy storage unit,
- 25 Fig. 11 an arrangement of the energy storage unit mounting facility of Fig. 10 and multiple energy storage units,
- 30 Fig. 12 and 13 multiple views of an energy storage unit,
- 35 Fig. 14 and 15 views of the energy storage unit mounting facility of Fig. 10,

Fig. 16 and 17 views of the arrangement of Fig. 11.

Fig. 1 to 9 show different views of a first embodiment of an energy storage unit mounting facility 10 in terms of the invention present here, namely Fig. 1, 4, 5 and 6 each without electric energy storage unit 11 and Fig. 2, 7, 8 and 9 each with multiple electric energy storage units 11. Fig. 3 shows an electric energy storage unit 11 in sole representation.

10

The energy storage unit mounting facility 10 comprises a rack-like or frame-like basic body 12 having multiple stanchions 13 extending in the vertical direction and multiple crosspieces 14, 15 extending in the horizontal direction between the stanchions 13. Between the stanchions 13 extending in the vertical direction, crosspieces 14 and 15 running parallel to one another extend on opposite sides in each case.

20

The rack-like or frame-like basic body 12 defines multiple mounting regions 16 for electric energy storage units, which are arranged vertically on top of one another. In the shown exemplary embodiment, the rack-like or frame-like basic body 12 provides 5 mounting regions 16 arranged vertically on top of one another each for an electric energy storage unit 11.

25

The respective electric energy storage unit 11 can be introduced into the respective mounting region 16 in the horizontal direction and removed from the respective mounting region 16 in the horizontal direction, namely in a direction that is parallel to the crosspieces 14 extending in the horizontal direction.

35

Introducing and removing the respective electric energy storage unit 11 from the respective mounting region 16

is preferably effected exclusively on a single side of the basic body 12, namely on the respective left side of the basic body 12 shown in Fig. 1 and 2. On this side, the crosspieces 15 extending transversely to the introduction and removing direction are demountable in order to either introduce an electric energy storage unit 11 into the respective mounting region 16 or remove an electric energy storage unit 11 from the respective mounting region 16.

5

On the opposite side of the basic body 12, by contrast, the crosspieces 15 are mounted fixed to the stanchions 13, so that on this opposite side the electric energy storage units 11 cannot be moved out of the mounting regions 16 or introduced into the same.

10

In the exemplary embodiment of Fig. 1 to 9, the energy storage unit mounting facility 10 according to the invention comprises conveyors in order to introduce and remove the respective electric energy storage unit 11 into and from the respective mounting region 16 in the horizontal direction, wherein this conveyor in the exemplary embodiment of Fig. 1 to 9 comprises conveyor rollers 17 which are rotatably mounted in each case on two crosspieces 14 of the basic body 12 running parallel to one another. By way of these rollers 17, the energy storage units 11 can be easily moved in the horizontal direction relative to the basic body 12 in order to introduce or remove the same into or from a respective mounting region 16.

20

25

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The energy storage unit mounting facility 10 comprises securing devices 14, 15, 18 in order to secure the respective energy storage unit 11 in their respective mounting region 16.

35

First securing elements 18 act on crosspieces 14 of the rack-like or frame-like basic body 12, which extend parallel to the crosspieces 14, on which the conveyor rollers 17 are rotatably mounted. Those first securing elements 18, via which an electric energy storage unit 11 positioned in a respective mounting region 16 is to be secured in its position in the mounting region 16 are arranged above the conveyor rollers 17, by way of which the respective electric energy storage unit 11 can be introduced into and removed from this mounting region 16.

These first securing elements 18 serve for fastening the respective electric energy storage unit 11 to the rack-like or frame-like basic body 12, wherein these first securing elements 18 interact with holders 19 fastened to the respective electric energy storage unit 11.

Those holders 19 of the respective electric energy storage unit 11, which interact with the first securing elements 18, have an angled section 19a, via which the respective holder 19 and thereby the respective electric energy storage unit 11 can be screwed to the respective first securing device 18.

The holders 19, which are fastened to the electric energy storage units 11, furthermore, serve as connecting elements for a vertical conveyor, in particular for a crane.

On sections 19b of the holders 19, which opposite the electric energy storage unit 11 project vertically upwards, eyes are formed, into which a transport chain can be threaded in order to thereby couple an electric energy storage unit 11 to a crane and move a respective electric energy storage unit 11 by way of the crane

either into the region of the energy storage unit mounting facility 10 or away from the same.

5 Second securing devices hold the respective electric energy storage unit 11 in a state fixed on the basic body 12 and not fixed on the basic body 12 in the respective mounting region 16, wherein these second securing devices in the exemplary embodiment of Fig. 1 to 9 are provided by the crosspieces 14, 15, which  
10 laterally hold the respective energy storage unit 11 in the respective mounting region 16. While Fig. 1 and 2 show perspective views of the first embodiment of the energy storage unit mounting facility 10 or an energy storage unit mounting facility 10 loaded with electric  
15 energy storage units 11, Fig. 5, 6 and Fig. 8, 9 each show lateral views of the energy storage unit mounting facility 10 or the arrangement of the energy storage unit mounting facility 10 and the electric energy storage units 11 offset by  $90^\circ$  relative to one another,  
20 wherein Fig. 4 shows the cross section IV-IV of Fig. 5 and Fig. 7 the cross section VII-VII of Fig. 8.

Fig. 10 to 17 show different views of a second exemplary embodiment of an energy storage unit mounting  
25 facility 20 according to the invention, wherein the energy storage unit mounting facility 20 of the version of Fig. 10 to 17 also accommodates multiple electric energy storage units 21.

30 The energy storage unit mounting facility 20 of the exemplary embodiment of Fig. 10 to 17 in turn comprises a rack-like or frame-like basic body 22 of stanchions 23 extending in the vertical direction and of crosspieces 24, 25 extending between the stanchions 23  
35 in the horizontal direction. Here, the crosspieces 24 positioned at the top and the bottom of the basic body

22 and the crosspieces 25 running on the sides each extend parallel to one another.

5 The rack 22 of the energy storage unit mounting facility 20 in turn defines multiple mounting regions 26 vertically on top of one another for the electric energy storage units 21 to be positioned vertically on top of one another, wherein each electric energy storage unit 21 is introducible into and removable from  
10 its respective mounting region 26 in the horizontal direction, namely in a direction parallel to the crosspieces 25.

15 In the exemplary embodiment of Fig. 10 to 17, the energy storage unit mounting facility 20 does not have a separate conveyor, but the energy storage units 21 in the exemplary embodiment of Fig. 10 to 17 according to Fig. 12 and 13 are mounted on pallet-like support bodies 27, via which the electric energy storage units  
20 21 can be lifted for example by means of a lifting element and introduced into the mounting regions 26.

25 The electric energy storage units 21 mounted on the pallet-like support bodies 27 can then, when the same have been introduced into the mounting regions 26, support themselves on the crosspieces 25 via the support body 27, be screwed to the crosspieces 25, in order to secure the electric energy storage units 21 in their respective mounting regions 26 in this way.

30 Accordingly, the crosspieces 25 in the shown exemplary embodiment provide the first and second securing devices via which the respective energy storage units 21 can be connected, via the pallet-like support bodies  
35 27, on which the same are mounted to the rack-like or frame-like basic body 22. Furthermore, the crosspieces 25 hold the respective electric energy storage unit 21

in a state in which it is fixed on the rack-like or  
frame-like basic body 22 and a state in which it is not  
fixed on the rack-like or frame-like basic body 22 in  
the respective mounting region 26. In a further  
5 embodiment of the invention which is not shown it is  
possible that the energy storage unit mounting facility  
comprises conveyors designed in the manner of drawers  
wherein the energy storage units are then inserted into  
such drawers. By horizontally moving the drawers, the  
10 electric energy storage units can then be moved out of  
their mounting regions or into the same.

With the invention it is possible to easily handle  
large and heavy electric energy storage units 11, 21  
15 having a weight of in particular more than 150 kg, in  
order to also make possible an individual electric  
energy storage units 11, 21 positioned in the energy  
storage unit mounting facility 10, 20 according to the  
invention.

20

List of reference numbers

	10	Energy storage unit mounting facility
	11	Energy storage unit
5	12	Basic body
	13	Stanchion
	14	Crosspiece/securing device
	15	Crosspiece/securing device
	16	Mounting region
10	17	Conveyor roller
	18	Securing device
	19	Holder
	20	Energy storage unit mounting facility
	21	Energy storage unit
15	22	Basic body
	23	Stanchion
	24	Crosspiece
	25	Crosspiece/securing device
	26	Mounting region
20	27	Support body

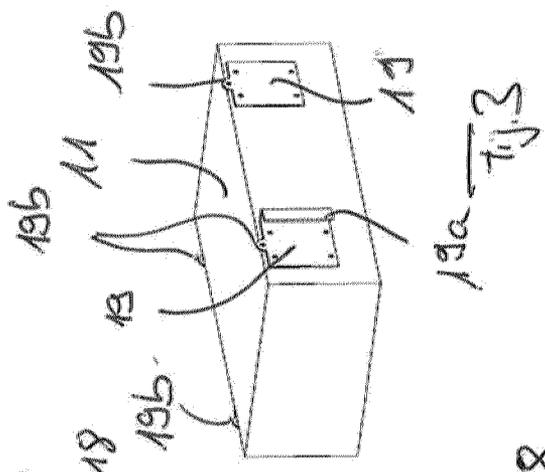
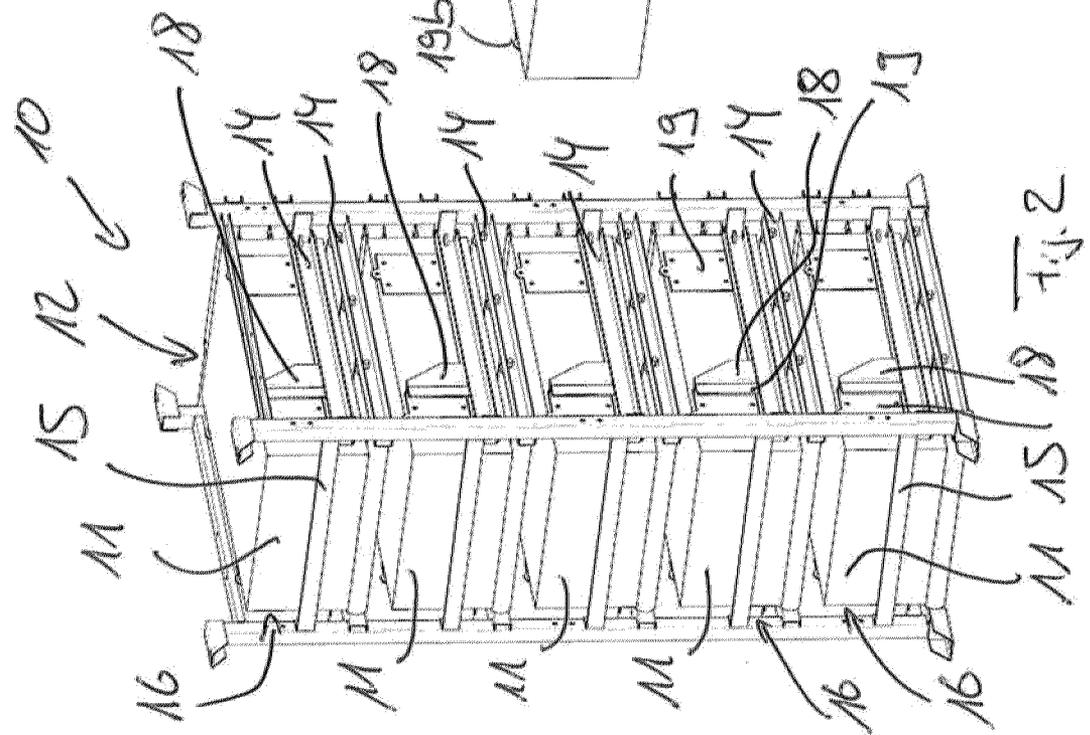
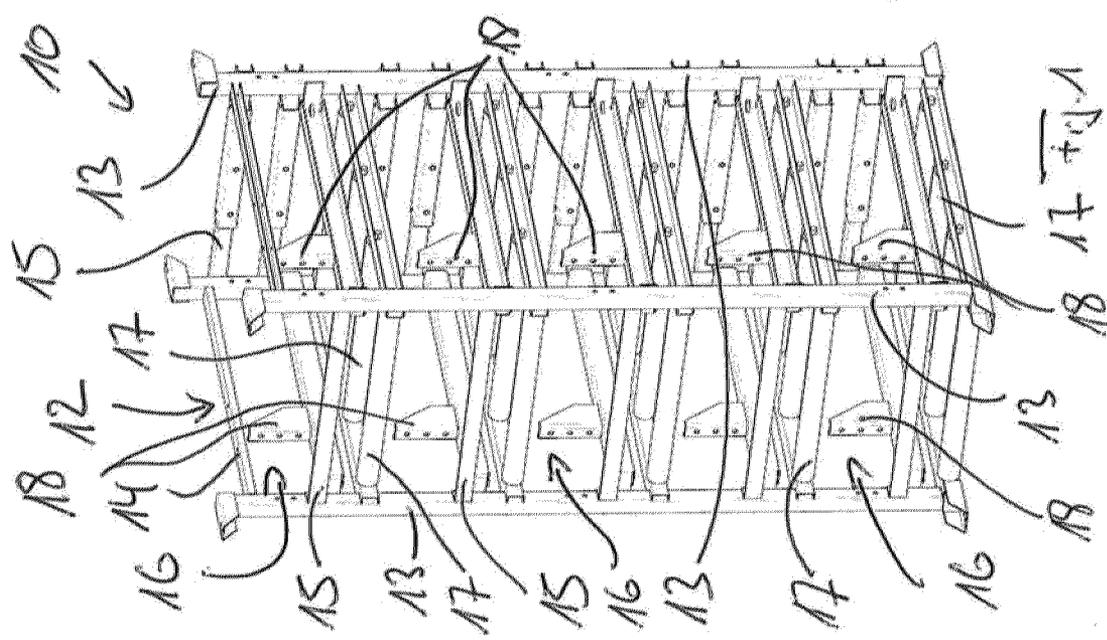
Claims

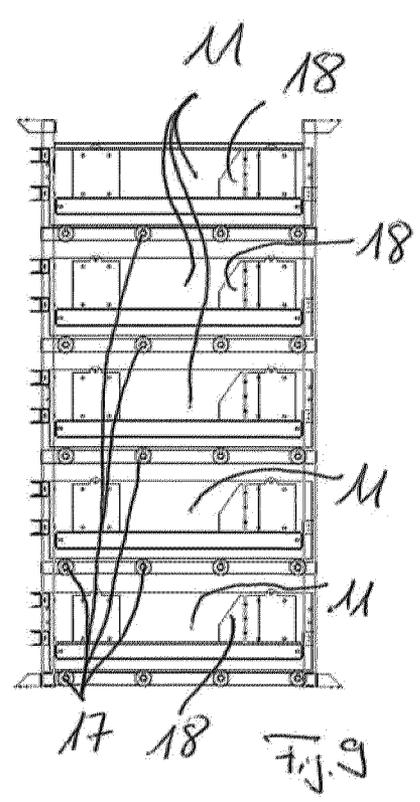
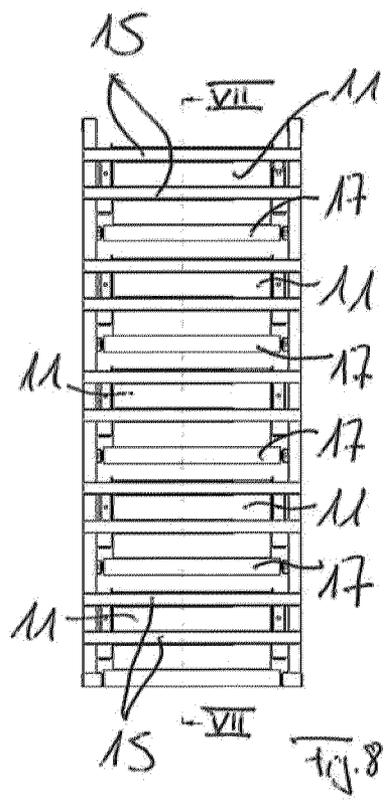
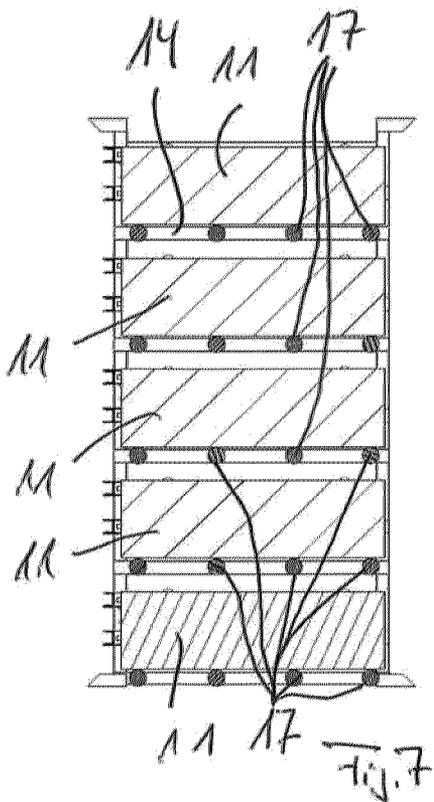
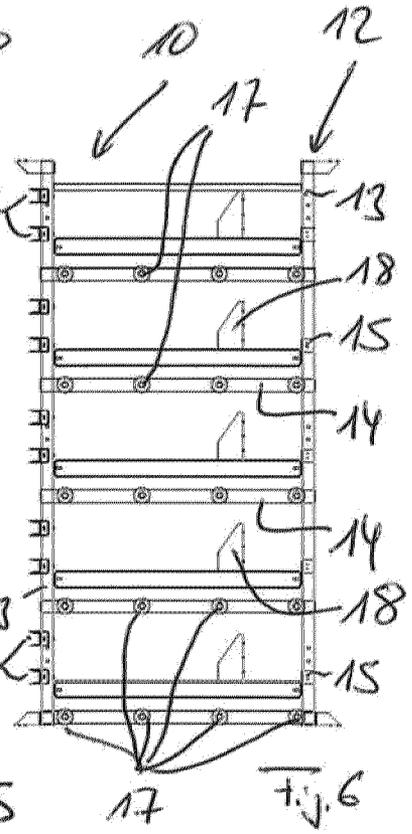
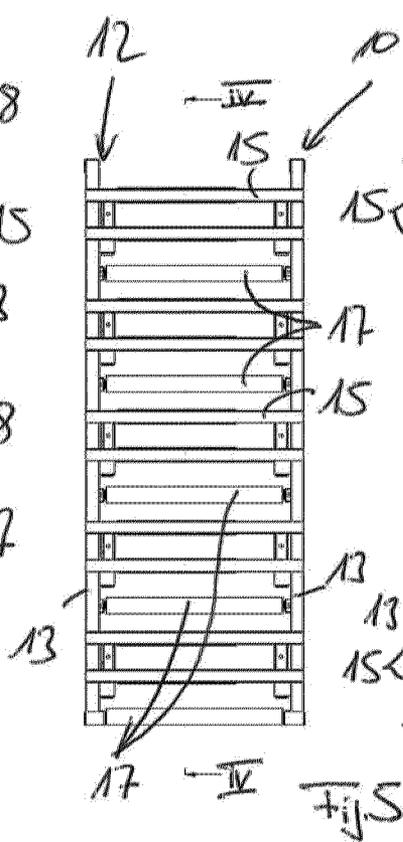
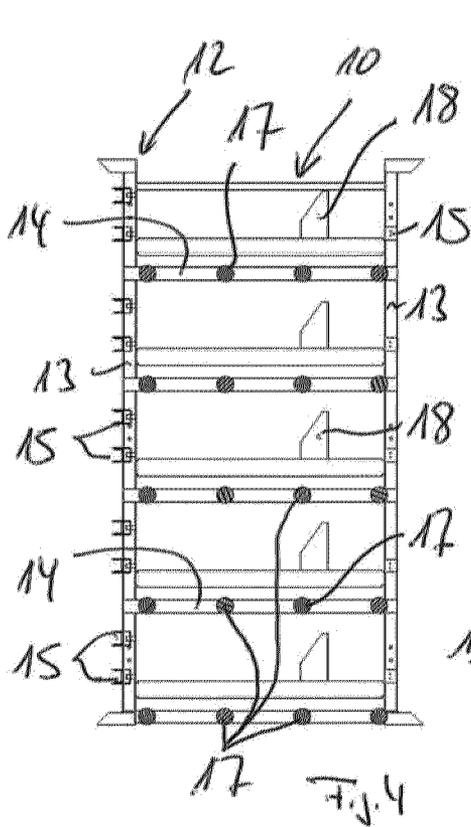
1. An energy storage unit mounting facility (10, 20),  
5 having a rack-like or frame-like basic body  
(12, 22), which defines multiple mounting regions  
(16, 26) arranged vertically on top of one another  
for at least one electric energy storage unit (11,  
21) each,  
10 wherein the respective electric energy storage  
unit is introducible into and removable from the  
respective mounting region (16, 26) in the  
horizontal direction,  
15 having securing devices (14, 15, 18, 25) in  
order to secure the respective electric energy  
storage unit (11, 21) introduced into the  
respective mounting region (16, 26) in the  
respective mounting region (16, 26).
2. The energy storage unit mounting facility (10, 20)  
20 according to Claim 1, **characterized in that** the  
rack-like or frame-like basic body (12, 22)  
comprises stanchions (13, 23) extending in the  
vertical direction and crosspieces (14, 15, 24,  
25) extending between the stanchions (13, 23) in  
the horizontal direction.
3. The energy storage unit mounting facility (10)  
30 according to Claim 1 or 2, **characterized by**  
conveyors in order to introduce and remove the  
respective electric energy storage unit (11, 12)  
into and from the respective mounting region (16)  
in the horizontal direction.
4. The energy storage unit mounting facility (10)  
35 according to Claim 3, **characterized in that** the  
conveyor comprises conveyor rollers (17) which are  
rotatably mounted on crosspieces (14) running

parallel to one another of the rack-like or frame-like basic body (11).

5. The energy storage unit mounting facility according to Claim 3, **characterized in that** the conveyors are formed in the manner of drawers.
6. The energy storage unit mounting facility (10, 20) according to any one of the Claims 1 to 5, **characterized in that** securing devices (18, 25) fix the respective electric energy storage unit (11, 21) on the rack-like or frame-like basic body (12, 22).
7. The energy storage unit mounting facility (10, 20) according to Claim 6, **characterized in that** the securing devices (18, 25) are connected to holders (19) or supports (27) acting on the electric energy storage unit (11, 21).
8. The energy storage unit mounting facility (10, 20) according to Claim 7, **characterized in that** the holders (19) or supports (27) acting on the respective electric energy storage unit (11, 21) are further designed as connecting elements for a vertical conveyor.
9. The energy storage unit mounting facility (10) according to any one of the Claims 1 to 8, **characterized in that** securing devices (14, 15, 25) hold the respective electric energy storage unit (11, 21) in a state in the respective mounting region (16, 26) in which it is fixed to the rack-like or frame-like basic body (12, 21) and not fixed to the rack-like or frame-like basic body (12, 22).

10. The energy storage unit mounting facility according to any one of the Claims 1 to 9, **characterized in that** the respective electric energy storage unit (11) is introducible into and removable from the respective mounting region (16) exclusively on one side of the same.
- 5
11. An arrangement of an energy storage unit mounting facility (10, 20) according to any one of the Claims 1 to 10 and multiple electric energy storage units (11, 21) accommodated by the same.
- 10





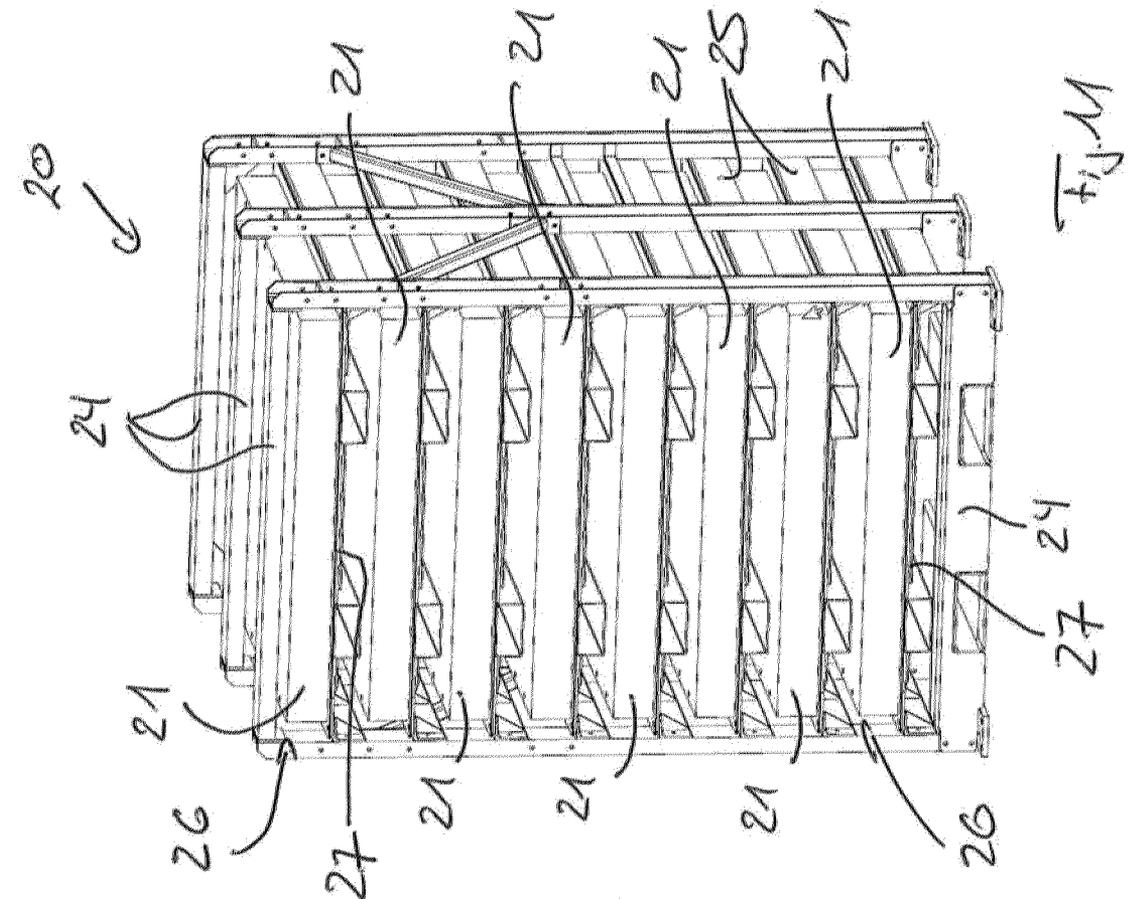


FIG. 11

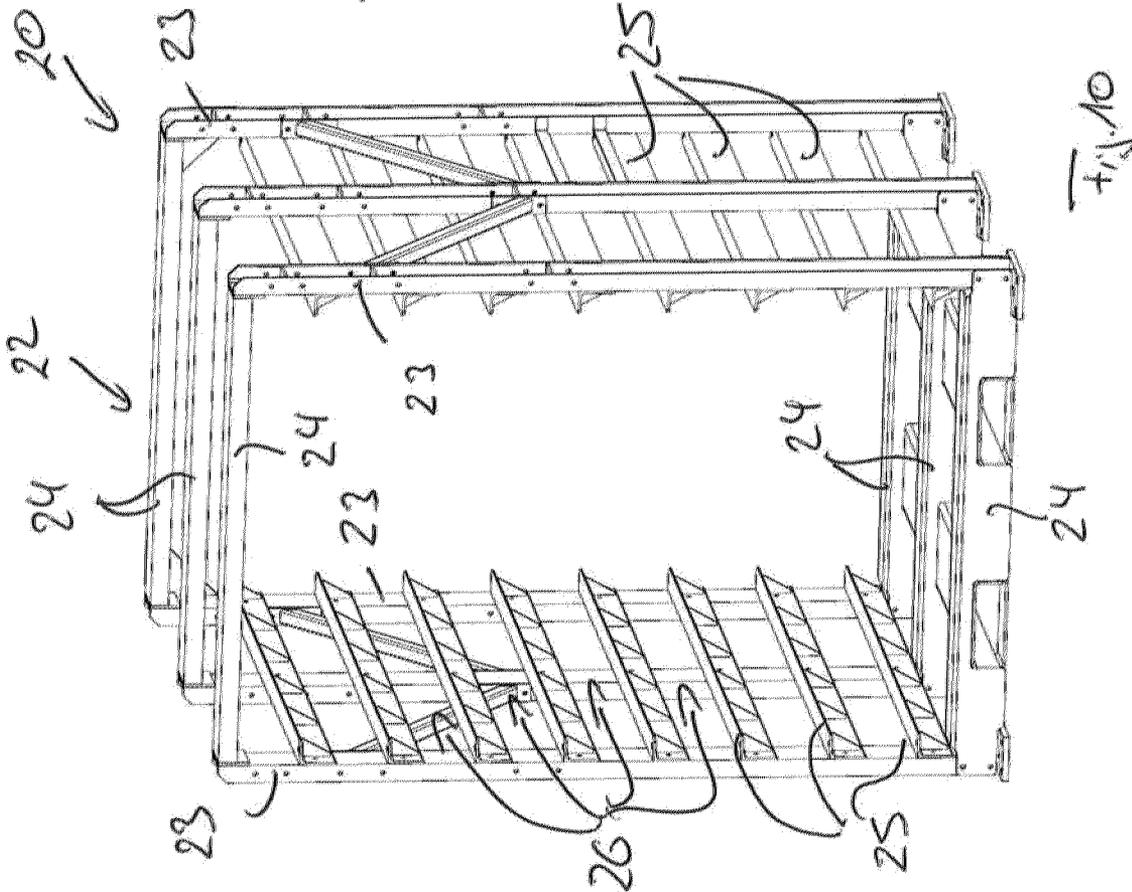


FIG. 10

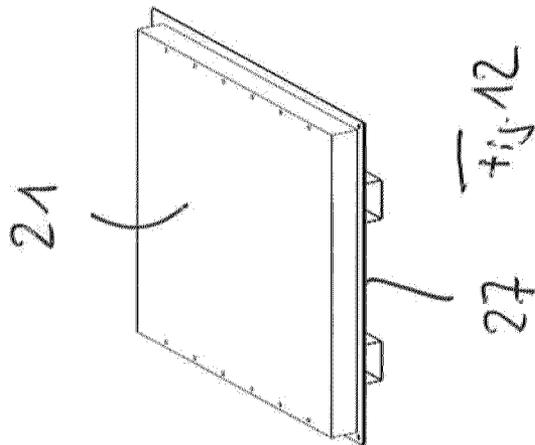
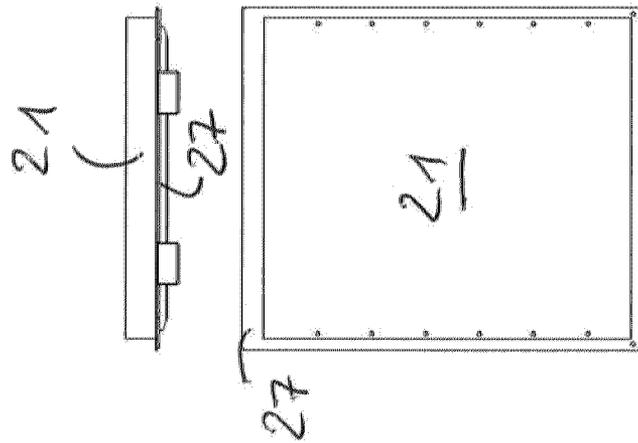
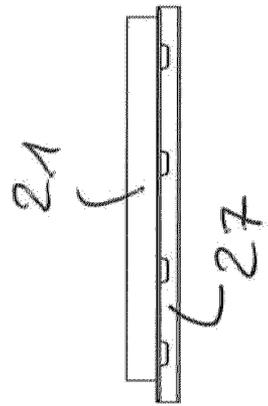


FIG. 13

FIG. 12

