

Stationary shelter for storing at least one electrical energy storage unit

GENERAL TECHNICAL FIELD

The invention relates to the field of autonomous and stationary electrical installations, that is, fixed installations, which couple energy
5 production means, such as solar panels or wind turbines for example, with storage units of the resulting electrical energy.

The invention relates more particularly to a stationary shelter for storing at least one such energy storage unit, this shelter containing at least one element for receiving said unit and being equipped with a device for lifting and
10 handling this unit.

PRIOR ART

The abovementioned electrical installations are intended to be
15 installed in remote areas, difficult to access, for example but not exclusively in Africa.

"Shelters" house not only at least one energy storage unit, but also various devices ensuring electronic management of their operation and their safety.

20 Stationary storage shelters of at least one energy storage unit are known, which comprise at least one placement for receiving said unit, preferably several, superposed and/or juxtaposed.

In practice, introducing energy storage units into the stationary shelter is done as follows. Said units are transported in cases. A transporter
25 unloads said cases near the shelter. The cases are opened, then the operator inserts said units into the stationary shelter by means of a manual or motorised forklift truck (elevator dolly).

However, this operation needs to provide a loading zone adapted to the forklift truck around the stationary shelter, in terms of levelling of the
30 ground and nature of the latter.

When the storage shelter is installed in areas difficult to access, it can be on any type of ground, for example uneven, pebbly, and it can even be on ground at a height different to that accessible by the forklift truck. In these

different cases, and also given meteorological conditions, the applicant has noticed that the loading and unloading of energy storage units in and out of the storage shelter can prove dangerous and highly complex.

Also, it should be remembered that these energy storage units can
5 be fairly heavy, for example of the order of 300 kg to 400 kg, or even 500 kg.

PRESENTATION OF THE INVENTION

The aim of the invention therefore is to resolve the above
10 drawbacks of the prior art and especially to allow loading or unloading of the energy storage units in and out of the shelter, which is safe for the operator, without the risk of damage to this unit or this shelter, and even if the ground around the shelter is not amenable to a forklift truck.

The aim of the invention is also to simplify these handling
15 operations and allows them to be executed with few tools and a sole operator.

For this purpose, the invention relates to a stationary storage shelter of at least one electrical energy storage unit.

In accordance with the invention, this shelter comprises at least one element for receiving said unit, configured so that said unit can be inserted
20 into it or extracted from it, and this via an access opening made in a wall of said stationary shelter, and it comprises a device for lifting and handling said unit, which allows loading and unloading of the latter in and out of the receiving element, this device for lifting and handling being assembled with at least one external surface of said shelter by assembly means.

Based on these characteristics of the invention, the ground near
25 the shelter no longer needs to be stable and flat to be able to take up a forklift truck. The energy storage units can be unloaded further away from the shelter. The device for lifting and handling shifts said energy storage units and introduces them into or extracts them from the shelter.

According to other advantageous and non-limiting characteristics
30 of the invention, taken singly or in combination:

- said at least one receiving element is fixed inside the shelter and is configured so that said electrical energy storage unit can be inserted into it or extracted from it via its end leading opposite
35 said access opening;

- said receiving element comprises two parallel brackets arranged opposite each other and at the same height;
- said brackets are coated at least in part by a layer of material for easy introduction and sliding of said unit in said receiving element;
- 5 - said at least one receiving element is sliding, such that it can slide via said access opening between a retracted position inside said shelter and an extended position outside the latter, and this sliding receiving element is configured so that said electrical energy storage unit can be inserted into it or extracted from it
- 10 from the top, when it is in extended position;
- said device for lifting and handling comprises a gallows, a hoist, or a winch, and a hooking mechanism of said storage unit;
- said hooking mechanism of the unit is a frame fitted in its centre with a fastening point on the hoist, or winch, and at its four
- 15 corners with hooking means of said unit;
- said hooking mechanism of the electrical energy storage unit is a fork fitted at its upper end with a fastening point to the hoist or winch;
- said gallows comprises a vertical stanchion to which a horizontal
- 20 crossbar is fixed, this stanchion and this crossbar being optionally connected by an oblique support bar, the free end of the horizontal crossbar bearing hooking means of said hoist or winch and the lower end of said stanchion being assembled with a point of said external surface of the shelter by said assembly means;
- 25 - the gallows is mounted pivoting in a barrel provided in the outer wall of the shelter or fixed on the latter;
- said gallows comprises a horizontal support whereof the two ends are recurved and assembled with the upper wall of the shelter by said assembly means and a longitudinal bar arranged
- 30 perpendicularly to the support, whereof the free end supports a hoist or a winch and whereof the fixed end is assembled with the upper wall of the shelter by said assembly means, the longitudinal bar being fixed between its two ends on the support, perpendicularly to the latter;
- 35 - the gallows comprises a horizontal support whereof the two ends are recurved and assembled with the upper wall of the shelter by

said assembly means and an L-shaped longitudinal bar whereof the vertical branch is mounted pivoting in the upper wall of the shelter by said assembly means and whereof the horizontal branch can slide on said horizontal support during rotation of the gallows;

5 - the horizontal crossbar or the longitudinal bar comprises at its free end an element mobile in translation, such as a dolly or a telescopic portion, the hoist or winch being fixed on this element mobile in translation;

- the assembly means are removable assembly means;
10 - said removable assembly means comprise a barrel and this barrel is configured so that the base of the gallows can be inserted into it and extracted from it removably;

- the assembly means are permanent assembly means;
15 - said assembly means are positioned at a point of the upper surface of the shelter, such as the upper wall, an upper spar, an upper crossbar or the apex of a stanchion;

- said assembly means are positioned at a point of the lateral surface of the shelter, such as the lateral wall or a vertical stanchion;

20 - the assembly means are a barrel formed in the thickness of the upper surface of the shelter;

- the assembly means are a barrel formed in a separate piece, attached to the wall of the shelter, such as a corner piece; and

25 - the barrel is fixed at the centre of a shear load cross whereof the four ends are assembled by means of removable or permanent assembly means to the upper wall of said shelter.

PRESENTATION OF FIGURES

30 Other characteristics and advantages of the invention will emerge from the description which will now be given in reference to the appended drawings which illustrate different possible embodiments by way of indication but non-limiting, in which:

35 - figures 1 to 8 are perspective views illustrating different embodiments of the stationary storage shelter, according to the invention,

- figure 9 is a perspective view of a corner fitted with a barrel for receiving gallows of said shelter,
- figure 10 is a perspective view of a hooking frame of an energy storage unit,
- 5 - figure 11 is a perspective view of a hooking fork of an energy storage unit, and
- figure 12 is a schematic side elevation of a device for lifting and handling according to the invention.

10 DETAILED DESCRIPTION

 In reference to figure 1, this shows a stationary storage shelter 1 of at least one electrical energy storage unit U, this shelter being equipped with a device for lifting and handling 2 of said unit.

15 Without this being limiting, it is evident that the electrical energy storage units U forming the subject of the present application are preferably electrical energy storage batteries, of LMP[®] type (for Lithium Metal Polymer) or of lithium ion type, weighing under 500 kg, preferably of the order of 300 kg to 400 kg.

20 This shelter 1 is intended inter alia to protect units U from bad weather and offer a climatically stable enclosure.

 The storage shelter 1 is called "stationary", in the sense that it rests on the ground and is not embedded on a mobile vehicle.

25 The stationary shelter 1 is a structure whereof the general form is preferably that of a cubic or rectangular parallelepiped.

 This structure preferably comprises four vertical stanchions, called rear stanchions 101, for the two located on either side of an access opening 11 inside the shelter 1, and called front stanchions 102, for the two others.

30 In conventional terms, the side of the shelter 1 via which an operator can enter is called front AV, and the opposite side is called rear AR, which is also that via which the units U can be introduced into or extracted out of the shelter 1.

 The rear 101 and front 102 stanchions are also joined together in pairs by an upper spar 121 and a lower spar 122.

35 Also, the rear stanchions 101 are joined together by a rear upper crossbar 131 and a rear lower crossbar 132, while the front stanchions 102 are

joined together by a front upper crossbar 141 and by a front lower crossbar not seen in the figures.

The shelter 1 also has an upper wall 15, two lateral walls 16 one only of which is visible in the figures, a base and a front wall, not shown in the figures. Finally, the access opening 11 is preferably blocked by at least one door, here two swing doors referenced 17.

The different walls of the shelter 1 jointly delimit an enclosure, inside which is arranged a support structure 3, intended to receive at least one electrical energy storage unit U.

10 This support structure 3 is preferably attached to the shelter 1 and is generally fixed to the inner face of the walls of the latter.

According to a first embodiment, this support structure 3 comprises at least one sliding element 30 for receiving an electrical energy storage unit U and, preferably, several of these sliding elements, superposed on each other, as seen in the figures, or even juxtaposed, in variant embodiments, not shown.

In its simplest embodiment, shown in figures 1 and 3 to 8, this sliding element 30 can be in the form of two slides, arranged at the same height, opposite each other, each slide bearing a support bracket of said energy storage unit U. These slides are configured to receive said unit from the top.

In more developed embodiments, this sliding element 30 can be in the form of a cradle or a drawer, or any other device for receiving a unit U.

Irrespective of the embodiment of the sliding element 30, the latter can slide through the access opening 11 between a retracted position inside the shelter 1, which is that shown for example in the upper or lower parts of figure 1, and an extended position outside the shelter 1, which is that shown for the unit U placed at the centre in figure 1. Also, this sliding element 30 is configured so that the unit U can be inserted into it from the top or extracted from it via the top, that is, vertically.

30 According to a second embodiment, shown in figure 2, the support structure 3 comprises at least one fixed receiving element 31, preferably several superposed receiving elements 31, or juxtaposed in variant embodiments not shown. Each receiving element 31 comprises for example two parallel support brackets 310, arranged so that their horizontal wings are located at the same height, opposite each other and spaced apart by a distance corresponding at least to the width of the electrical energy storage unit U.

These two brackets can also be replaced, for example, by a shelf or by fixed guide rails in which a roller member (such as a shoe or a wheel) attached to lateral winglets of the unit U slides.

5 The unit U is inserted into the receiving element 31 by horizontal sliding on the brackets 310, from the rear AR of the shelter 1 to the front AV and is extracted from there according to a reverse movement.

By way of advantage, the brackets 310 can be coated at least in part by a layer of material for easy sliding of the unit U, such as a polymer material with low-friction surface, for example polytetrafluoroethylene (or
10 PTFE). This layer of material can also be arranged under the lateral winglets of the unit U.

The device for lifting and handling 2 is assembled with the external surface of the stationary shelter 1 by assembly means. "External surface" means the upper wall 15, a lateral wall 16, an upper spar 121, an upper crossbar 131,
15 141, a vertical stanchion 101, 102 or a corner of the parallelepiped shelter 1.

As will be seen later, these assembly means are preferably removable, that is, it is possible to separate the device lifting 2 from the shelter 1 without damaging it.

But they could also be non-removable, that is, permanent.

20 Preferably, and as can be seen for example in figure 1, the device for lifting and handling 2 comprises a gallows 21, a hoist 22 (or a winch) and a hooking mechanism 23, 25 of the electrical energy storage unit U.

The hoist or the winch 22 can be manual or motorised.

The hooking mechanism can for example be a lifting frame 23,
25 such as that shown in figure 10.

Such a lifting frame 23 preferably has at its four corners 231, chains or hooks or rods 232 for hooking four points of an electrical energy storage unit U and shifting it vertically while keeping it horizontal. This frame 23 is also fitted at its centre with a fastening point 233 of the hoist 22, such as a ring.

30 The hooking mechanism can also be a fork 25 fitted with two parallel horizontal branches 251 capable of being slid under the unit U and fitted at its upper part with a fastening point 252 (such as a hook or ring) to said hoist or winch 22.

35 The frame 23 or the fork 25 are also configured to resist shifting of heavy loads, preferably under around 500 kg, the units U generally weighing between 300 kg and 400 kg, as mentioned previously.

It will be evident that the lifting frame 23 is used when the receiving element is sliding (element 30) and the loading/unloading of the unit U is done via the top of this element 30. Inversely, the fork 25 is used when the receiving element is fixed (element 31) and the loading/unloading of the unit U is done via the rear and horizontally (sliding on the brackets 310).

First embodiments of the gallows 21 will now be described in relation to figures 1 to 6 and 12, according to different configurations.

In figure 2, the gallows 21 comprises a vertical stanchion 211, on which is fixed a perpendicular horizontal crossbar 212, these two pieces being optionally connected by an oblique support bar 213.

The hoist or winch 22 is hooked onto the free end 214 of the crossbar 212, this end being fitted for example with a hook or lifting ring 215.

The base 217 of the gallows (that is, more precisely the lower end of the vertical stanchion 211 seen in figure 12) is assembled with a point of the external surface of the shelter 1.

This assembling is preferably carried out by means of a barrel 18, that is, a hollow structure, having a form complementary to that of the base 217 of the gallows, for example a cylindrical or oblong form.

The barrel 18 constitutes an exemplary embodiment of the assembly means of the gallows 21 with the shelter 1.

In the event where the assembly means are removable, the base 217 of the gallows 21 is simply inserted inside the barrel 18, the length of the base and the depth of the barrel 18 being sized so that the gallows 21 do not come out from the barrel when a load (unit U) is hooked onto the hoist 22 or the frame 23.

Such removable assembly means let the user move the device for lifting and handling 2 and stow it away, for example inside the shelter 1 before and after its use. Also, this allows moving the shelter 1, for example to transport it as far as its installation site, without the device 2 being in place and impairing handling of the shelter 1.

In the event where the assembly means are permanent, the base 217 of the gallows 21 is fixed permanently on the shelter 1, for example welded in the barrel 18.

The gallows 21 can be mounted static or pivoting about its vertical stanchion 211 (see for example in figure 2 the double arrow F which shows the

angular travel range of said gallows). In this latter case, the base of the gallows 21 can for example pivot inside the barrel 18.

The height of the stanchion 211 is adapted to allow loading or unloading of the electrical energy storage unit U which is in the highest position inside the shelter 1.

The height of the stanchion 211 is also adapted to the positioning of the gallows. In this way, when the gallows 21 is mounted on the upper part of the shelter 1, as shown in figures 1 to 3, its height will be less than when the gallows is mounted on a lateral wall of the shelter 1, as shown in figure 4.

Also, the length of the crossbar 212 is adapted to the radius of action which should be able to be around the shelter 1, and also to the position of the lifting device 2 on the shelter 1. In this way, for example, when the gallows 21 is positioned towards the front, as seen in figure 3, the crossbar 212 can be shorter than when the gallows is arranged at the centre of the upper part of the shelter 1, as seen in figure 2.

Either way, the device for lifting and handling 2 exhibits sufficient mechanical resistance to supporting a heavy load, preferably under 500 kg.

The barrel 18 can be provided directly in the walls of the shelter 1, for example in the thickness of the upper wall 15 of the shelter 1, at all points of the latter, and for example in its centre, as shown in figure 2.

The barrel 18 can also be provided in one of the upper spars 121 or in one of the rear 131 or front 141 upper crossbars (see figure 3).

Finally, as evident in figure 1, the barrel 18 can also be provided at the level of the upper end of one of the vertical stanchions, preferably one of the rear stanchions 101, the upper ends of these vertical stanchions being equipped with a corner 6.

Such a corner is for example a corner called "ISO", responding to a standard ISO, and shown in figure 9.

As shown in figure 6, the barrel 18 can also be fixed at the centre of a shear load cross 7, this cross 7 extending over at least one part of the upper face 15 of the shelter 1 and its four ends being assembled removably or permanently in the upper wall 15.

According to yet another variant embodiment illustrated in figure 5, the barrel 18 is fixed to a lateral support 8, the latter being fixed for example at its two ends to the upper angles of the shelter 1. In this

configuration, the gallows 21 rests solely against the lateral wall 16 of the shelter 1 and the lateral support 8 is suspended.

As seen in figure 4, the barrel 18 can also be fixed directly on the lateral wall 16 of the shelter 1 at any point of the latter, for example towards the rear and substantially at mid-height. Reinforcement means of the wall 16 of the shelter 1 can be provided to ensure that fastening of this barrel 18 will not cause deformation of said wall 16.

Second embodiments of the device for lifting and handling 2, according to two other configurations will now be described in connection with figures 7 and 8. In these configurations, the gallows is also equipped with a hoist or winch 22 and a hooking mechanism 23 or 25, even though the latter are not shown in these figures.

In the variant of figure 7, the gallows is referenced 24 and comprises a horizontal support 241, such as a bar, whereof the two ends are recurved or folded and assembled with the upper wall 15 of the shelter 1, for example by the removable or permanent assembly means described previously (receiving barrel of said ends). This horizontal bar 241 extends a certain distance (height) from the upper wall 15 of the shelter 1.

In the variant of figure 7, the gallows 24 also comprise a rectilinear longitudinal bar 242, whereof the fixed (or lower) end 243 is assembled with the upper wall 15 of the shelter 1 by the removable or permanent assembly means, such as a barrel 18, whereof the free (or upper) end 244 supports a hook or fastening ring of the winch or hoist 22 (not visible in the figure) and whereof the median part is fixed perpendicularly to said horizontal support 241, such that this bar 242 is inclined relative to the horizontal.

The variant of figure 8 differs from that of figure 7 in that the gallows which is referenced 24' comprises a longitudinal L-shaped bar 245, whereof the base of the vertical branch 246 is taken up in a barrel 18 and whereof the horizontal branch 247 rests in its median part on the support 241. The free end of the horizontal branch 247 also bears a support ring or hook of the hoist or winch 22. The bar 245 is mounted pivoting around the vertical branch 246 such that it can pivot in a horizontal plane, the branch 245 resting and sliding on the support 241.

According to a variant embodiment shown in figure 12, the free end 214 of the crossbar 212 supports an element mobile in translation or sliding dolly 216. It can be shifted manually or motorised. The hoist or winch 22 is fixed

to this element 216. This dolly 216 contributes a degree of liberty in the horizontal direction (arrows G) and allows horizontal displacement of the unit U. This dolly is particularly advantageous when combined with the fork 25, as it allows loading of the unit U by sliding in a fixed receiving element 31. This dolly
5 216, combined with the hoist or winch 22 which enables vertical movement (arrows H), increases the field of action of the device for lifting and handling 2.

This dolly 216 could be replaced by a telescopic portion of the crossbar 212.

This dolly 216 or this telescopic portion could also be fitted to the
10 end of the longitudinal bars 242, 247 of the gallows 24, 24'.

The method for loading an electrical energy storage unit U inside the shelter 1 is as follows.

The operator places the case C (figures 2 and 3) containing the unit U by means of an appropriate tool in the unloading zone arranged near the
15 shelter 1. He opens the case C and anchors the hooking mechanism 23 or 25 to the unit U. If necessary he then moves the gallows so as to bring the hoist or the winch 22 above the tool 23, 25 and hooks the hoist or winch onto this tool.

As a function of the different embodiments of the invention, the operator moves the gallows or not, actuates the dolly 216 and the hoist 22 and
20 guides the unit U near the receiving element 30, 31. If the receiving support is sliding, he brings it out of the shelter 1, optionally locks the support 30 in extended position, deposits the electrical energy storage unit U inside the top, then detaches the hooking mechanism 23, 25, brings the sliding element 30 back and the unit U into the retracted position inside the shelter 1.

25 If the fixed receiving support 31 is involved, he slides the unit U on the brackets 310 by means of the fork 25.

Only one person is needed to complete this manoeuvre. From a safety viewpoint, there is no further risk linked to the status of the loading zone which extends around the shelter.

30

CLAIMS

1. A stationary shelter for storing at least one electrical energy storage unit, characterized in that it comprises at least one element for receiving said unit, configured so that said unit can be inserted into it or extracted from it, via an access opening made in a wall of said stationary shelter,
5 and in that it comprises a device for lifting and handling said unit, which allows the loading and unloading of the latter in and out of the receiving element, this device for lifting and handling being assembled with at least one external surface of said shelter by assembly means.

2. The shelter according to Claim 1, characterized in that said at
10 least one receiving element is fixed inside the shelter and is configured so that said electrical energy storage unit can be inserted into it or extracted from it via its end leading opposite said access opening.

3. The shelter according to the preceding claim, characterized in that said receiving element comprises two parallel brackets arranged opposite
15 each other and at the same height.

4. The shelter according to the preceding claim, characterized in that said brackets are coated at least in part by a layer of material for easy introduction and sliding of said unit in said receiving element.

5. The shelter according to Claim 1, characterized in that said at
20 least one receiving element is sliding, such that it can slide via said access opening between a retracted position inside said shelter and an extended position outside the latter, and in that this sliding receiving element is configured so that said electrical energy storage unit can be inserted into it or extracted from it from the top, when it is in extended position.

25 6. The shelter according to any one of the preceding claims, characterized in that said device for lifting and handling comprises a gallows, a hoist, or a winch, and a hooking mechanism of the storage unit.

7. The shelter according to Claim 6, characterized in that said
30 hooking mechanism of the unit is a frame fitted in its centre with a fastening point on the hoist, or winch, and at its four corners with hooking means of said unit.

8. The shelter according to Claim 6, characterized in that said hooking mechanism of the electrical energy storage unit is a fork fitted at its upper end with a fastening point to the hoist or winch.

5 9. The shelter according to any one of Claims 6 to 8, characterized in that said gallows comprises a vertical stanchion to which a horizontal crossbar is fixed, this stanchion and this crossbar being optionally connected by an oblique support bar, the free end of the horizontal crossbar bearing hooking means of said hoist or winch and the lower end of said stanchion being assembled with a point of said external surface of the shelter by said
10 assembly means.

10. The shelter according to Claim 9, characterized in that the gallows is mounted pivoting in a barrel provided in the outer wall of the shelter or fixed on the latter.

15 11. The shelter according to any one of Claims 6 to 8, characterized in that said gallows comprises a horizontal support whereof the two ends are recurved and assembled with the upper wall of the shelter by said assembly means and a longitudinal bar arranged perpendicularly to the support, whereof the free end supports a hoist or a winch and whereof the fixed end is assembled with the upper wall of the shelter by said assembly means, the
20 longitudinal bar being fixed between its two ends on the support, perpendicularly to the latter.

25 12. The shelter according to any one of Claims 6 to 8, characterized in that the gallows comprises a horizontal support whereof the two ends are recurved and assembled with the upper wall of the shelter by said assembly means and an L-shaped longitudinal bar whereof the vertical branch is mounted pivoting in the upper wall of the shelter by said assembly means and whereof the horizontal branch can slide on said horizontal support during rotation of the gallows.

30 13. The shelter according to any one of Claims 9 to 12, characterized in that the horizontal crossbar or the longitudinal bar comprises at its free end an element mobile in translation, such as a dolly or a telescopic portion, the hoist or winch being fixed on this element mobile in translation.

14. The shelter according to any one of the preceding claims, characterized in that the assembly means are removable assembly means.

5 **15.** The shelter according to Claims 6 and 14, characterized in that said removable assembly means comprise a barrel and in that this barrel is configured so that the base of the gallows can be inserted into it and extracted from it removably.

16. The shelter according to any one of Claims 1 to 13, characterized in that the assembly means are permanent assembly means.

10 **17.** The shelter according to any one of the preceding claims, characterized in that said assembly means are positioned at a point of the upper surface of the shelter, such as the upper wall, an upper spar, an upper crossbar or the apex of a stanchion.

15 **18.** The shelter according to any one of Claims 1 to 16, characterized in that said assembly means are positioned at a point of the lateral surface of the shelter, such as the lateral wall or a vertical stanchion.

19. The shelter according to Claim 17, characterized in that the assembly means are a barrel formed in the thickness of the upper surface of the shelter.

20 **20.** The shelter according to Claim 17 or 18, characterized in that the assembly means are a barrel formed in a separate piece, attached to the wall of the shelter, such as a corner piece.

25 **21.** The shelter according to Claim 15, characterized in that the barrel is fixed at the centre of a shear load cross whereof the four ends are assembled by means of removable or permanent assembly means to the upper wall of said shelter.