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(54) Title: ANTI-THEFT DEVICE FOR INVERTERS

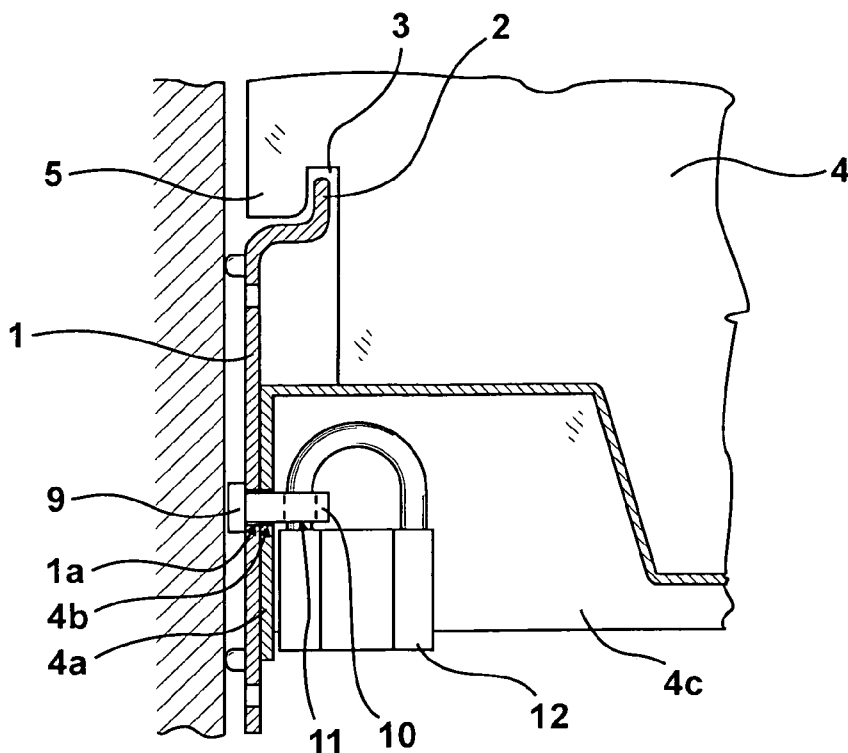


Fig. 2

[Continued on next page]



SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, **Published:**
GW, ML, MR, NE, SN, TD, TG).

— with international search report (Art. 21(3))

(57) Abstract: The subject matter of the present invention is an inverter assembly comprising an inverter having a housing with a rear panel and a mounting plate for attaching the inverter assembly onto a wall, wherein in a mounted position of the inverter one end of the locking pin is connected to the mounting plate, the locking pin extends through a hole in the rear panel of the inverter, the locking pin having an opening at the other end through which a U-lock can be inserted.

ANTI-THEFT DEVICE FOR INVERTERS

The present invention relates to an anti-theft device for an inverter wherein
5 a mounting plate is provided for attaching the housing of the inverter onto a wall or, more specifically, a building and wherein the housing itself features a rear panel and at least one side panel.

As is commonly known, inverters serve to convert direct current into
10 alternating current. Such inverters are used specifically in photovoltaic systems which may be installed in locations that are very difficult to monitor. As a result, theft is a common threat, not only with respect to solar cells and inverters, but even to entire roof-mounted PV systems. In other words, both photovoltaic cells and inverters may be affected by theft. This even holds
15 true when said inverters are installed in buildings remote from residential areas, e.g. in barns. In light of this, it has partly become relatively difficult to insure these kinds of photovoltaic systems against theft.

Regarding photovoltaic cells, measures are already known for preventing or
20 at least hindering their theft.

Inverters feature a housing that can be mounted onto a wall or a pole by means of a mounting plate. Note that a pole intended for use as a solar tree can hold a large number of photovoltaic cells.

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DE 20 2007 003 242.0 U1 documents an anti-theft device for inverters that includes a mounting plate on which the housing of the inverter can be secured via theft protection mechanism. In terms of specifics, the anti-theft device includes a U-shaped guide element on the mounting plate that is
30 open on each side and a strap for securing a U-lock that is located at an angle to the area around the locking element. A screw inserted into the

inverter housing can be found on the rear panel of the inverter. To attach the inverter to the mounting plate, the inverter is pushed onto the mounting plate from the side until the head of the screw is inside the U-shaped locking element. To secure against removal, a U-lock is provided whose shackle is inserted through a hole in the strap and which encompasses the screw as well. As a result, the housing cannot be pulled off the mounting plate from the side and furthermore the inverter cannot be lifted. Although the anti-theft device described here is extremely effective, it is also relatively expensive due to the large number of individual parts needed to manufacture it.

An object of the invention may be to find a device that protects against removal and theft and is cheaper to manufacture given the aforementioned state of technology yet still offers an effective way to prevent an inverter from being stolen.

The invention solves this task by including a locking pin in the mounting plate which protrudes through the rear panel of the housing and comprises an opening on the end facing the housing of the inverter for inserting the U-lock. A pin on the mounting plate with an opening at one end is all that is needed to secure the housing of the inverter and hence the inverter itself. For the second part of this anti-theft mechanism, a single U-lock is inserted through the opening of the locking pin once the inverter housing is attached.

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Based on one special feature of the invention, the mounting plate comprises a threaded element (e.g., a rivet nut) where the locking pin can be screwed in through a hole in the rear panel of the inverter housing. The locking pin is located near at least one side panel in such a way that it cannot rotate once the lock is inserted into it.

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- Even small inverters may have a weight of between 20 and 60 kg. Two people are usually necessary to manually attach the inverter to the wall of a building with the mounting plate. The inverter and its housing is placed onto the mounting plate from above. Once on the mounting plate, the inverter housing can be moved around somewhat for more precise alignment. A hole is located on both the rear panel of the inverter housing and the mounting plate and a threaded element such as a rivet nut is arranged (e.g., welded) onto the mounting plate directly behind the hole.
- As explained above, mounting the inverter includes attaching the housing to the mounting plate from above. This may be called mounted position. The inverter assembly comprises an inverter having a housing with a rear panel and at least one side panel, a mounting plate and a locking pin. Once the hole in the rear panel of the housing is aligned to be flush with the hole in the mounting plate, the screw thread of the locking pin is inserted into the threaded element (e.g., the rivet nut). After screwing the locking pin into the rivet nut, the U-lock is inserted through the opening at the opposite end of the locking pin. When the locking pin is directly adjacent to a side panel of the housing, the inserted U-lock prevents the pin from rotating any further.
- This means that the locking pin is secured by the inverter housing itself when the U-lock is attached. In another variant the locking pin is tightly connected to the mounting plate. This applies insofar that, when mounting the inverter housing, great care may be given to ensure that the hole in the rear panel of the inverter is flush with the locking pin on the mounting plate.
- Attaching the housing of the inverter to the mounting plate in such a way that the locking pin can go through the hole in the rear panel of the housing may be difficult due to the relatively heavy weight of the inverter. The task of mounting the inverter may greatly simplified by attaching it to a mounting plate that allows limited lateral movement since the weight of the inverter is held by the mounting plate itself as soon as the housing of the inverter is placed on the mounting plate.

The drawings below offer a more detailed description of the invention.

- Figure 1 the mounting plate from a perspective view.
5 Figure 2 a side view of the inverter attached to the mounting plate.
Figure 3 a top view.

The mounting plate 1 according to Figure 1 comprises a guide rail 2 on the upper end that runs at a distance from the top side of the mounting plate. In
10 a corresponding manner, the housing 4 of the inverter has a U-shaped cutout 3 in the area of the rear panel while the bracket 5 in the housing 4 of the inverter engages the guide rail as shown in Figure 2.

An object of the invention may be securing the housing of the inverter via
15 the locking pin 10. As depicted in Figure 2, the mounting plate 1 features a hole 1a, whereby the rivet nut 9 is located behind the hole 1a. The rear panel 4a of the inverter housing 4 also features a hole 4b and the locking pin designated with 10 can be inserted through the hole 1a and the hole 4b into the rivet nut 9. The front end of the locking pin 10 (i.e., the end facing
20 the inverter housing) has an opening 11 that is used to attach the U-lock 12 as depicted in Figure 2. These kinds of pins with an opening on one end are available for purchase as eyebolts.

At this point the locking pin 10 is positioned in the housing 4 of the inverter
25 so that it is directly adjacent to the side panel 4c of the inverter housing. In this case, direct proximity to the side panel 4c means that the locking pin 10 with inserted U-lock 12 cannot be removed from the rivet nut 9 if this is prevented by the directly adjacent side panel 4c. The side panel 4c of the inverter housing blocks the locking pin from rotating, when the U-lock is
30 inserted.

When mounting the inverter or inverter housing, proceed in such a manner that the inverter is placed onto the mounting plate from above, i.e. onto the guide rail 2 of the mounting plate 1. Now screw the pin 10 into the rivet nut 9 when the hole 1a is flush with the hole 4b in the rear panel of the housing

- 5 4. Finally, insert the U-lock 12 into the pin.

Claims:

1. Inverter assembly comprising an inverter having a housing with a rear panel and a mounting plate for attaching the inverter assembly onto a wall,
5 wherein in a mounted position of the inverter one end of the locking pin is connected to the mounting plate, the locking pin extends through a hole in the rear panel of the inverter, the locking pin having an opening at the other end through which a U-lock can be inserted.
- 10 2. Inverter assembly according to the claim 1,
wherein the locking pin is tightly connected to the mounting plate.
- 15 3. Inverter assembly according to the claim 1,
wherein the locking pin is removable from the mounting plate.
4. Inverter assembly according to claim 1,
wherein the locking pin comprises a screw thread at least at one end.
- 20 5. Inverter assembly according to one of the preceding claims,
wherein the locking pin comprises a screw thread on one end and an opening at the opposite end.
- 25 6. Inverter assembly according to the preceding claims,
wherein the mounting plate comprises a threaded element.
7. Inverter assembly according to one of the preceding claims,
wherein the locking pin can be screwed through the hole in the rear
30 panel of the inverter into a threaded element fixed at the mounting plate.

8. Inverter assembly according to one of the claims 6 or 7,
wherein the threaded element is a rivet nut.
9. Inverter assembly of one of the preceding claims,
5 wherein the hole in the rear panel of the inverter is positioned
adjacent to at least one side panel of the inverter housing to block
the locking pin from rotating, when the U-lock is inserted.
10. Anti-theft device for an inverter assembly comprising an inverter
10 having a housing with a rear panel, a mounting plate to which the
inverter is attached and a locking pin connected at one end to the
mounting plate and extending through a hole in the rear panel of the
inverter housing when the inverter is in a mounted position, wherein
the locking pin comprises an opening at the other end through which
15 a U-lock can be inserted.

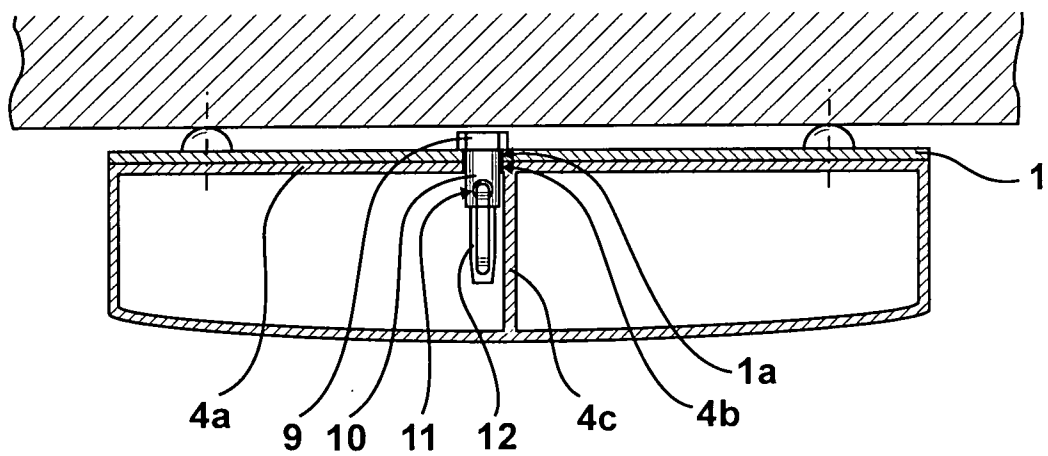


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2010/003116

A. CLASSIFICATION OF SUBJECT MATTER

INV. E05B67/38

ADD. H02M7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E05B H02M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 20 2007 003242 U1 (SMA TECHNOLOGIE AG [DE]) 10 May 2007 (2007-05-10) cited in the application page 3, paragraph 16 - paragraph 17 figures 1-2	1-10
Y	US 4 530 531 A (MANTINI CARL P [US]) 23 July 1985 (1985-07-23) column 4, line 45 - column 5, line 12 figures 7-9	1-10
Y	US 2007/079638 A1 (LEUNG CHI P [HK] LEUNG CHI PANG [HK]) 12 April 2007 (2007-04-12) page 2, paragraph 24 - paragraph 25 figure 4	1-10
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See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

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Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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