United States Patent [19]

Haubein

[11] **3,784,727**

[45] **Jan. 8, 1974**

[54] **TAMPER RESISTANT, LOCKABLE ENCLOSURE APPARATUS FOR TRANSFORMERS AND THE LIKE**

[75] Inventor: **Harold Dennis Haubein,** Centralia, Mo.

[73] Assignee: **A. B. Chance Company,** Centralia, Mo.

[22] Filed: **Sept. 1, 1972**

[21] Appl. No.: **285,725**

[52] **U.S. Cl.**..... **174/52 R,** 70/DIG. 57, 174/50, 292/251

[51] **Int. Cl.** **H05k 5/04**

[58] **Field of Search**..... 336/90; 174/50, 52 R; 292/251; 70/58, DIG. 57, DIG. 58

[56] **References Cited**

UNITED STATES PATENTS

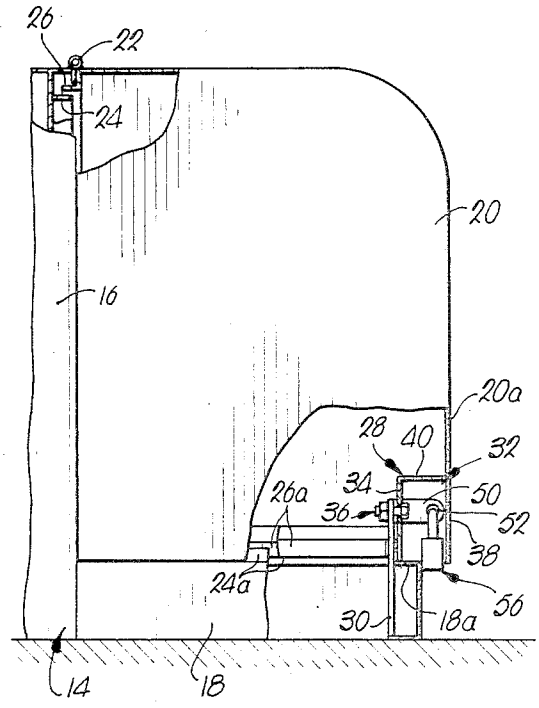
3,210,456	10/1965	Skubal	174/52 R
3,315,023	4/1967	Davis	336/90 X
3,365,535	1/1968	Wilk	336/90 X
3,514,172	5/1970	Buchman	70/58 X
3,625,031	12/1971	Alley	70/58
2,663,768	12/1953	Sorensen	70/DIG. 57

Primary Examiner—Bernard A. Gilheany
Assistant Examiner—David A. Tone
Attorney—Gordon D. Schmidt et al.

[57] **ABSTRACT**

Enclosure apparatus has one member, such as the swingable access hood of an electrical transformer, which may be secured tightly against another member, such as the body of the transformer, and locked in that position without exposing the locking means to tampering. A closed overhang on one member has an inset receptacle which both conceals and protects a threaded fastener interconnecting the member, and a padlock, also removably disposed in the receptacle, blocks an access hole in the overhang for the fastener when the padlock is locked.

14 Claims, 5 Drawing Figures



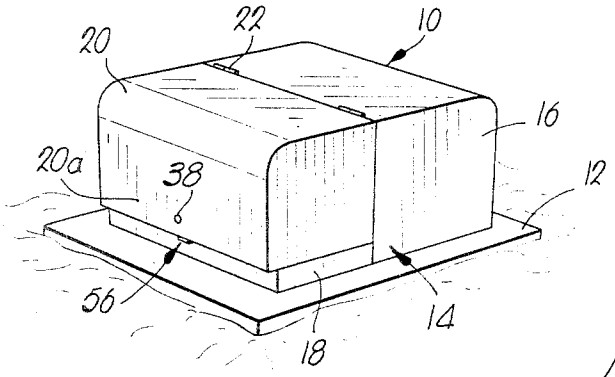


Fig.1.

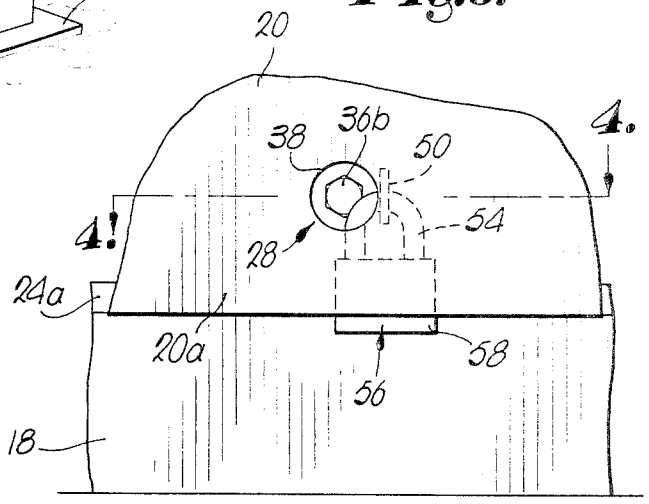


Fig.3.

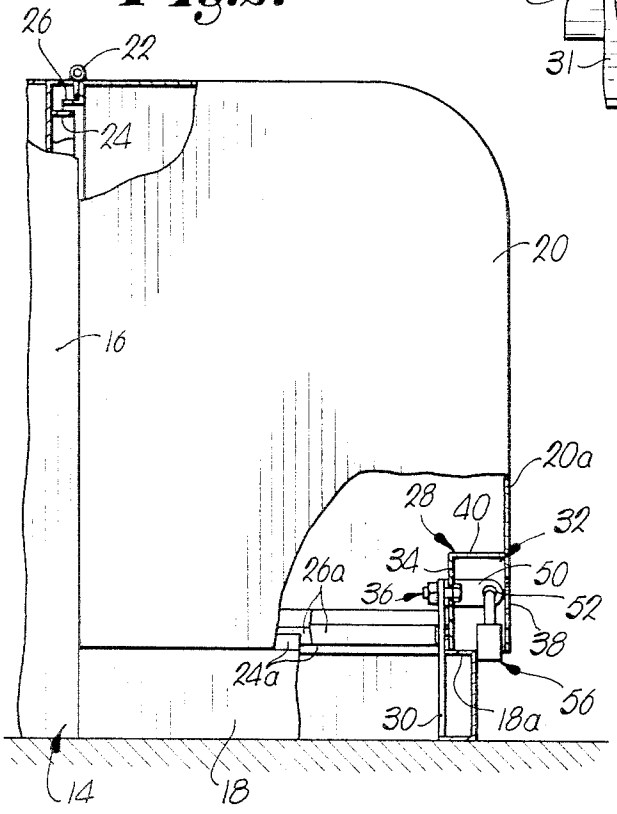


Fig.2.

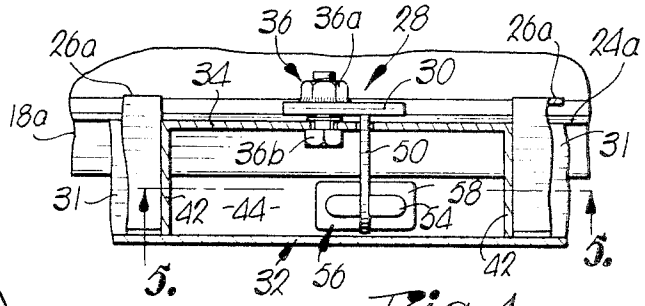


Fig.4.

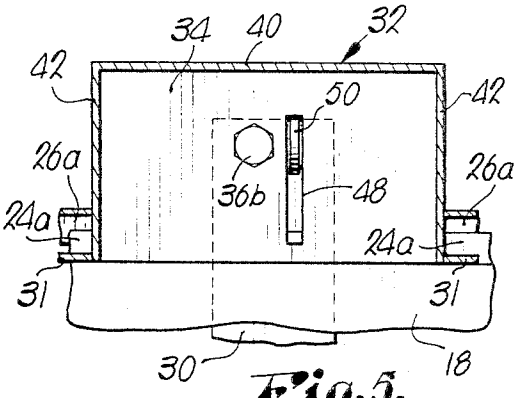


Fig.5.

TAMPER RESISTANT, LOCKABLE ENCLOSURE APPARATUS FOR TRANSFORMERS AND THE LIKE

This invention relates to apparatus which may be locked in a manner to not only resist tampering, but to conceal any outwardly visible means for locking the apparatus as well, having particular utility in applications such as electrical transformers, switchgear, and the like.

By way of example, the description hereinafter set forth and the drawing relate to an electrical transformer for underground residential distributions, but it will be recognized that the principles of the present invention may be applied to other structures as well, such as switchgear, lockers, tool boxes, and other enclosures of various types and configurations.

Transformers for underground residential distributions are disposed on the surface of the ground rather than below ground level or above ground level on a pole or other support. Accordingly, they are vulnerable to the attacks of vandals or the curious probings of children. The exterior of one of the transformers presents no danger to personal safety, since all of the terminal connections for the high voltage distribution lines are disposed well within the interior of the transformer. However, the transformer is provided with an access hood or cover of some form which exposes the terminals when the hood is opened, thus facilitating installation of the transformer and allowing service of the terminal connections after installation has been completed.

One problem lies in providing a hood which can only be opened by authorized personnel since the high voltage terminals present a danger to those untrained in the proper methods for handling equipment of this type. Moreover, another problem is presented in designing a transformer which, by its appearance alone, does not attract or invite attacks upon the locking means therefor.

It is also important that a tight seal is obtained between the body and hood of the transformer when the hood is closed, for resisting the entry of moisture, as well as for reasons of safety. In the latter respect, instances have been reported where children have forced coat hangers or other slender objects through the interface between the hood and the body of the transformer, contacting an electrical terminal.

In view of the above considerations, one object of the present invention is to provide lockable enclosure apparatus which, by the arrangement, location, and relationship of its locking components, is highly resistant to tampering.

Another important object of this invention is to provide lockable, tamper-resistant apparatus wherein the components which effect locking and securance are well hidden from public view to avoid arousing uninvited interest and curiosity which would otherwise exist were the components exposed. In this connection it is an important object to obtain such concealment without protrusions, boxes, hardware or other external attachments which would invite attack.

An additional important object of the invention is to place the locking components in such position that they are not only hidden from public view, but also, that access thereto is extremely limited even after they have been located.

A further important object of this invention is the provision of lockable apparatus which contributes to the maintenance of a substantially tight moisture and tamper-resistant interface between members being secured.

In the drawing:

FIG. 1 is a perspective view of an underground residential distribution transformer employing tamper-resistant apparatus in accordance with the principles of the present invention;

FIG. 2 is an enlarged, fragmentary elevational view of the transformer unit of FIG. 1 with the hood and body thereof partially broken away to reveal details of the locking means;

FIG. 3 is a further enlarged, fragmentary elevational view of the front of the unit illustrating the limited access to the fastener of the locking means and the blocking relationship of the padlock therewith;

FIG. 4 is a fragmentary, cross-sectional view of the locking means and surrounding structure of the transformer taken along line 4—4 of FIG. 3; and

FIG. 5 is a fragmentary, cross-sectional view of the locking means and surrounding structure taken along line 5—5 of FIG. 4 with the padlock removed.

Apparatus in the nature of a transformer **10**, shown perspectively in FIG. 1, is mounted on a suitable base pad **12** and has a body member **14** consisting of a tank **16** and a three-sided front frame **18**. A hood member **20** is pivotally secured to tank **16** by a pair of hinges **22** for swinging movement between a closed position wherein hood **20** overlies frame **18** to cover the area immediately above the latter and in front of tank **16** and an open position wherein hood **20** is swung away from frame **18** and the front of tank **16** to permit access to such area. As shown best in FIG. 2, transformer **10** is provided with a double-wall, taper-resistant construction in the form of a short, outstanding flange wall **24** along the top and two sides of the front face of tank **16** and a flange wall **26** along three corresponding edges of the hood **20** which become disposed in side-by-side relationship when hood **20** is closed. Similar protective flange walls **24***a* and **26***a* are provided along the top surface of frame **18** and the corresponding lower edges of hood **20**, respectively, for effectively blocking access to the interior of hood **20** when the latter is in a closed condition. The presence of these protective flanges, plus the tight interface effected between hood **20**, tank **16** and frame **18** when hood **20** is closed, cooperate to prevent the insertion of a slender object, such as a coat hanger, beneath hood **20**.

Locking means for hood **20** is designated broadly by the numeral **28** and is disposed at the front of hood **20** substantially midway between the opposed ends thereof, although it will be appreciated that the location of means **28** relative to the opposed ends of hood **20** may be varied without impairing the effectiveness of the present invention. Locking means **28** includes latching structure on hood **20** and frame **18** in the nature of a rigid, upstanding bar **30** welded to frame **18** and extending upwardly beyond the upper margin thereof, and an open bottom receptacle **32** inset into an overhang portion **20***a* of hood **20** which is otherwise closed by flat, inturned edges **31** (FIG. 4) which bear against the upper frame stretches **18***a*. A rear wall **34** of receptacle **32** and bar **30** are disposed in opposed relationship when hood **20** is closed, and releasable fastening means in the nature of a bolt and nut assembly

36 interconnect wall 34 and bar 30 for tightly holding hood 20 against tank 16 and frame 18. The nut 36*a* of assembly 36 is rigidly attached to bar 30, while bolt 36*b* is threadably received by nut 36*a* with the enlarged head of bolt 36*b* drawing against the inner surface of housing wall 34. The head of bolt 36*b* could be pentagonal if desired to thereby require a special wrench not usually available to the public.

A hole 38 in overhang 20*a* aligned with bolt 36*b* permits limited access to the latter by a suitable tool such as the socket of a wrench for rotating bolt 36*b* to engage or disengage the latter from nut 36*a*. In keeping with the tamper-proof concepts of the present invention, it is preferred that hole 38 be as small as possible without completely preventing the reception of a suitable tool of predetermined dimensions. Moreover, it is to be emphasized that the greater the spacing between receptacle wall 34 and the front of overhang 20*a*, the more difficult it is to reach bolt 36*b*.

Receptacle 32 is enclosed on three other sides in addition to rear wall 34 by a top wall 40 and a pair of sidewalls 42. As shown in FIGS. 2 and 4, the upper stretch 18*a* of frame 18 underlies approximately half of the receptacle 32, leaving only a relatively small, rectangular open area 44 for access to the interior of receptacle 32 in addition to hole 38.

An elongated, vertically extending slot 48 in receptacle wall 34 adapts the latter to serve as hasp means for receiving staple means in the nature of a horizontally extending, flat post 50 on bar 30. Post 50 projects into the interior of receptacle 32 when hood 20 is closed and has a hole 52 in its outer end for receiving the shackle 54 of a padlock device 56. The post 50 is disposed at the same level as and adjacent to bolt 36*b* when hood 20 is closed and bolt 36*b* is in place, such that shackle 54 is interposed between access hole 38 and the head of bolt 36*b* when padlock 56 is installed, all as clearly shown in FIGS. 2 and 3. The base 58 of padlock 56 is accessible only through open area 44 when padlock 56 is suspended from post 50, whereby to permit the insertion of a suitable key into the locking cylinder (not shown) normally located in the bottom of base 58.

As is apparent from the Figures, especially FIG. 1, bar 30, housing 32, fastening assembly 36, and padlock 56 are covered by overhang 20*a* and virtually completely hidden from view when transformer 10 is locked. The hole 38 in overhang 20*a* and open area 44 of receptacle 32 provide the only means of discovering that assembly 36 even exists. Moreover, once such discovery is made, it is virtually impossible for unauthorized persons to gain access to bolt 36*b*, since the shackle 54 of padlock 56 blocks hole 38 to a sufficient extent to prevent any tool from being inserted therethrough. The base 58 of padlock 56 similarly blocks access to bolt 36*b* through area 44. Thus, only those persons authorized to raise hood 20 are provided with a key to padlock 56, such that the latter may be unlocked and removed from post 50 to permit release of bolt 36*b*. Moreover, the relatively close confines of receptacle 32 and its location within and behind overhang 20*a* make shackle 54 inaccessible to hack saw blades and the like. It is also noteworthy that the lowermost stretches of overhang 20*a*, and in particular open area 44, are disposed only a short distance above pad 12, just sufficient to permit insertion of a key into padlock 56 but not enough to facilitate the manipulation of vandal's tools at this location.

It should now be apparent from the foregoing description and from the drawings that the locking means 28 renders transformer 10 virtually tamper-proof. Fastening assembly 36 permits hood 20 to be very tightly held against tank 16 and frame 18 to resist moisture and to prevent objects from being forced beneath hood 20. In many instances, because of the concealment of locking means 28 by hood 20, the method by which hood 20 may be unlocked and opened may never be detected. Even if means 28 were discovered, its inaccessible location and the manner in which padlock 56 protects bolt 36*b* assure that hood 20 will not be opened unless a person seeking to do so has first been provided with a key to padlock 56 and the proper tool for removing bolt 36*b*.

Further, it will be appreciated that the principles of this invention are not limited to transformer apparatus and other equipment electrical in nature, but may be utilized with success on other enclosures of various character.

What is claimed is:

1. Tamper-resistant, lockable apparatus comprising:
   - a pair of members positionable adjacent one another in a locking relationship, one of said members having an overhang projecting outwardly beyond the other member when the members are in said relationship;
   - means located behind said overhang for releasably holding said member in said relationship,
   - said members at least substantially concealing said releasable means when the members are held thereby in said relationship and having means comprising a hole in said overhang providing limited access to said releasable means for manipulating the same;
   - a locking device; and
   - means supporting said device in disposition for blocking said limited access to said releasable means when the device is locked.

2. Apparatus as claimed in claim 1, wherein said members substantially conceal said device when the members are in said relationship.

3. Apparatus as claimed in claim 1, wherein said locking device is located behind said overhang.

4. Apparatus as claimed in claim 3, wherein said access means comprises a hole in said overhang, said device being disposed between said hole and said releasable means.

5. Apparatus as claimed in claim 3, wherein is provided an access opening to said device between the overhang and said other member.

6. Apparatus as claimed in claim 1, wherein is provided a receptacle on one of said members between the same and the other of said members, said releasable means being located at least in part within said receptacle.

7. Apparatus as claimed in claim 6, wherein said supporting means includes a staple on said other member, said receptacle having staple-receiving hasp means for disposition of said device within said receptacle on said staple.

8. Apparatus as claimed in claim 7, wherein said receptacle is open for access to said device.

9. Apparatus as claimed in claim 7, wherein said access means comprises a hole through said one member into said receptacle.

10. Apparatus as claimed in claim 9, wherein said device comprises a padlock suspended from said staple between said releasable means and said hole.

11. Apparatus as claimed in claim 1, wherein one of said members is provided with a closed overhang projecting outwardly beyond the other of said members when the members are in said relationship, said overhang having an inset receptacle for said releasable means and said device.

12. Apparatus as claimed in claim 11, wherein said receptacle is provided with a wall, said releasable means interconnecting said wall and the other member.

13. Apparatus as claimed in claim 11, wherein said access means includes a hole in said overhang into the receptacle, said device being disposed between said hole and the releasable means.

14. Apparatus as claimed in claim 1, wherein one of said members comprises the swingable hood of an electrical transformer and the other of said members comprises the body of the transformer.

* * * * *