April 18, 1967 J. N. DAVIS 3,315,023

TRANSFORMER HOUSING AND LOCKING MEANS THEREFOR

Filed March 23, 1964

2 Sheets-Sheet 1

Fig. 1.

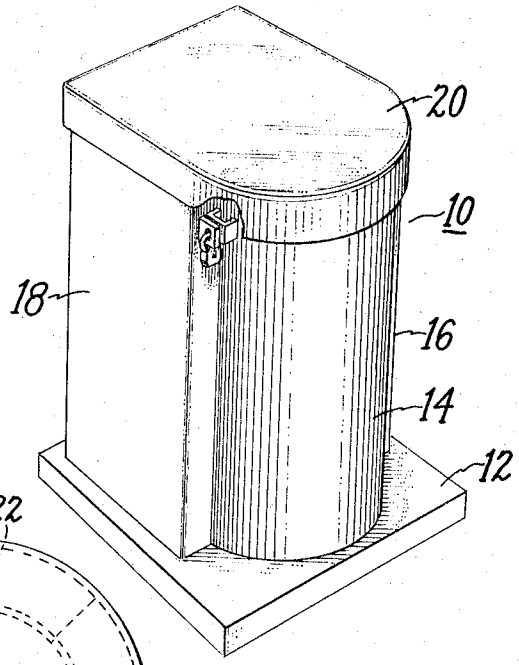


Fig. 2.

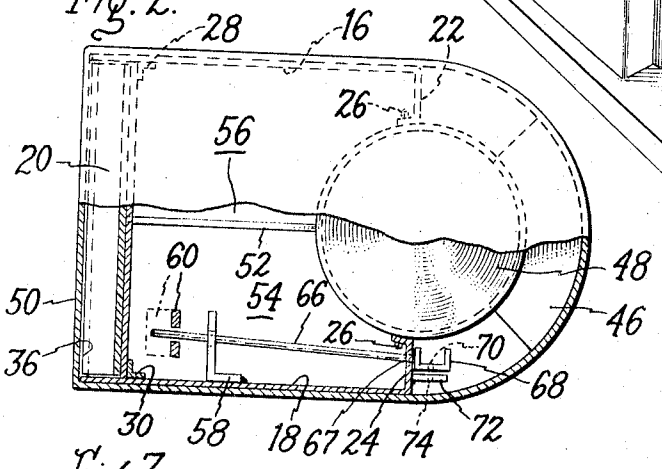
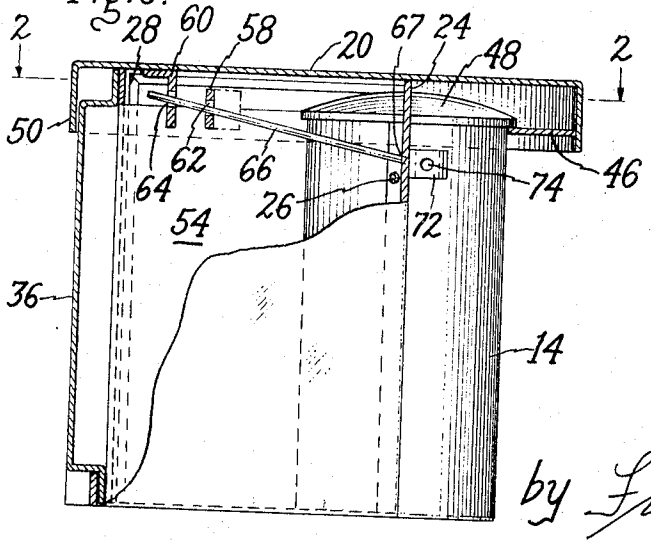


Fig. 3.



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Fig. 4.

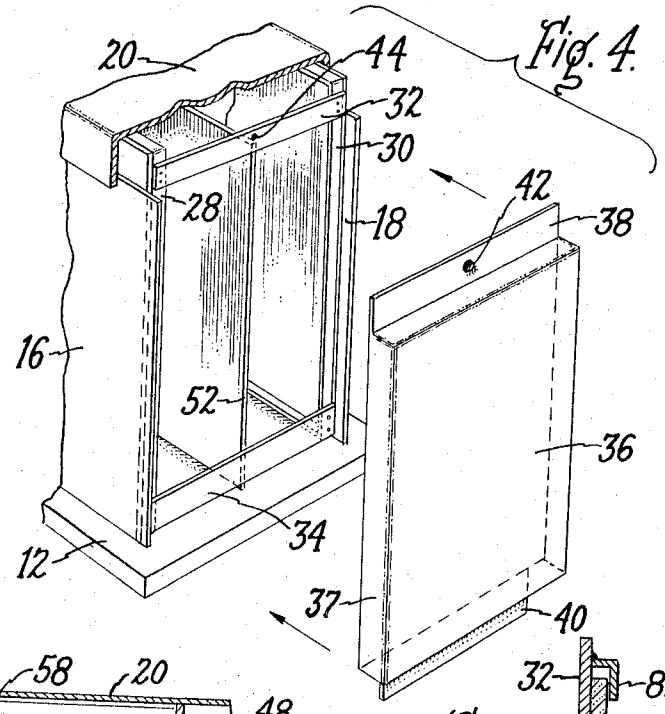


Fig. 5.

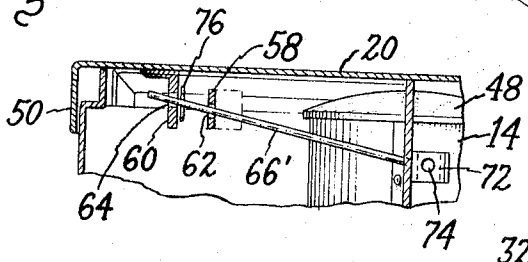


Fig. 8.

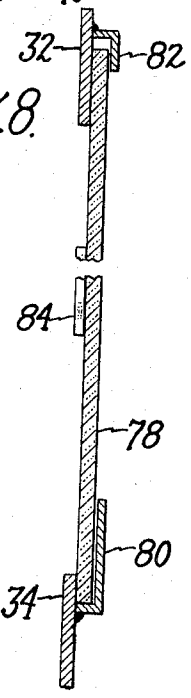


Fig. 6.

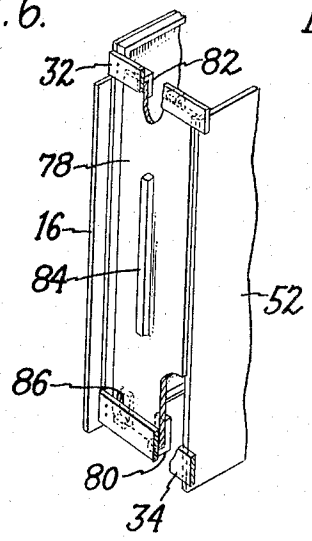
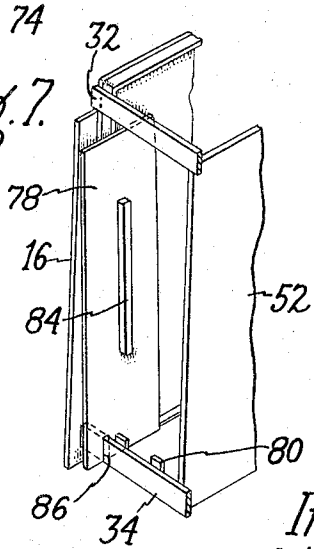


Fig. 7.



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TRANSFORMER HOUSING AND LOCKING MEANS THEREFOR

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8 Claims. (Cl. 174—52)

This invention relates to transformer housings used for pad mounted transformers and more particularly to a novel transformer housing and to a locking means for such housing.

As is well known to those skilled in the transformer art, in recent years the underground distribution system of power has become increasingly in demand, particularly for residential and retail sales developments. In general, this demand has arisen because the underground distribution systems eliminate the overhead wires, the transformers, the poles and other equipment which are necessary for overhead distribution and which are considered unsightly, particularly in the newer developments. In order to provide for adequate underground distribution it is necessary either to bury transformers in vaults or else to mount the transformer directly at ground level. As the art has developed, the ground level mounted transformers have been termed "pad mounted" transformers.

In many types of pad mounted transformers a large rectangular housing or enclosure is provided which is mounted on a concrete pad. A transformer is contained within the housing, sometimes in its own tank or else in a portion of the housing which is specifically built for the transformer. Further, high and low voltage sections are provided in another portion of the housing. Usually all of the wiring to and from the pad mounted housing is carried underground, entering the housing from the prepared openings in the concrete pad. With the wires entering the pad from underground it is desirable to have separate sections within the housing for making the various connections to and from the transformer. Further, since it is necessary to make various connection changes and to perform repairs and maintenance and the like during the use of the transformer, it is necessary that ready access be provided to the transformer housing. Usually such access is provided by means of hinged doors on the front of the housing which provide immediate access to the high and low voltage sections but not to the transformer itself. To prevent unauthorized entry into the transformer housing, particularly in view of the high voltage available within the housing, various types of locking means have been provided on the doors of the housing.

In many residential areas the large housings are considered undesirable because of the extra cost involved in such housing and because the appearance is large and bulky, especially when compared to the modern homes that such type of transformer serves. Therefore, it has been found desirable to devise a small, compact housing for use in such residential areas to make the transformers as inconspicuous as possible. Further, it is considered necessary to make the housing as smooth as possible to prevent injury to children who might play around the tranformer. Also it is necessary to provide adequate locking means to prevent unauthorized entry into the housing where contact with dangerous high voltage could be made. However, as will be understood it is also desirable that authorized entry may readily be made to the housing for maintenance and repairs, as necessary.

It is, therefore, one object of this invention to provide a novel transformer housing that utilizes a portion of the transformer tank as a housing.

A further object of this invention is to provide a simple,

inexpensive transformer housing, containing high and low voltage sections, which is attached directly to the tank of a transformer.

A further object of the invention is to provide a novel transformer housing utilizing the transformer tank which has a novel locking means to prevent unauthorized entry into the housing and yet does not have any undesirable projecting parts.

In carrying out this invention in one form, a transformer housing is provided utilizing portions of a transformer tank. The housing comprises a pair of side wall members which are fastened to opposite sides of the transformer tank and which extend substantially parallel therefrom. Upper and lower sill members are provided, connected to the free ends of the side wall members. A removable front wall is provided which is engaged behind the lower sill member and contacts the upper sill member. A removable cover member is provided having a flange for engaging beneath the transformer tank cover and having a second flange which extends over and engages the removable front wall member.

Locking means are provided in the form of a lug member having a hole therethrough which is secured to and extends from the removable cover into the housing. A second lug having a hole therethrough is secured to a side wall member and extends into the housing in a complementary manner to the first lug. A third lug is provided secured to the outer portion of the same side wall and beneath the removable cover. A movable rod is provided extending from an opening in the side wall adjacent the third lug, the rod extending through the complementary holes in both the first and second lugs. As will be understood, withdrawing the rod from the lug connected to the cover allows the cover to be removed. The end of the movable rod is provided with a locking plate having a hole which is complementary with a hole in the third lug when the rod is in locking position such that a padlock may be inserted through the locking plate and the third lug to securely lock the housing closed.

The invention which it is desired to protect will be specifically pointed out and distinctly claimed in the claims appended hereto. However, it is believed that this invention and the manner in which its various objects and advantages are obtained, as well as other objects and advantages thereof, will be better understood from the following detailed description of a preferred embodiment thereof especially when considered in the light of the accompanying drawings, in which:

FIGURE 1 is a perspective view of one form of transformer housing according to this invention with portions broken away to show a part of a preferred locking means;

FIGURE 2 is a top view of the transformer housing, partially in section, taken along the line 2–2 of FIG. 3, showing certain features of the construction and locking means;

FIGURE 3 is a side view partly in section showing further features of the construction and locking means;

FIGURE 4 is a partial exploded perspective view showing certain features of the removable front wall;

FIGURE 5 is a partial side view similar to FIG. 3 showing a modification of the locking means;

FIGURE 6 is a partial perspective view of the high voltage portion of the transformer housing showing an insulation barrier therefor;

FIGURE 7 is a partial perspective view similar to FIG. 6 showing the barrier in another position; and

FIG. 8 is a sectional view of the barrier showing a preferred form of attachment to the housing.

Reference will now be made to the drawings in which like numerals are used to indicate like parts throughout the various views thereof. Referring first to FIG. 1, there

is shown a preferred form of the transformer housing **10** according to this invention. As shown in FIG. 1, the transformer housing **10** is mounted on a concrete pad **12** and includes a transformer tank **14** having a transformer (not shown) sealed within the tank **14**. In general, the transformer housing comprises the transformer tank **14**, a pair of side walls, **16** and **18**, which are secured to the tank **14** and a removable cover member **20** which extends completely over the side walls **16** and **18** and the top of the transformer tank **14**, in the manner shown in FIG. 1. A removable front wall member completes the housing, as will become apparent from the description following. A locking means, which will be further described is provided which safely locks the removable cover **20** to the side walls **16** and **18**.

The specific construction of the preferred embodiment of the transformer housing **10** can best be seen in FIGS. 2, 3 and 4 to which reference will now be made. As shown in these figures, the housing **10** has the pair of side walls **16** and **18** having flanged members **22** and **24**, respectively, which are secured to the opposite sides of the tank **14**, as shown most particularly in FIG. 2 of the drawings. The side walls **16** and **18** may be secured to tank **14** in any desired manner such as, for example, by welding. As is shown particularly in FIGS. 2 and 3, bolt members **26** may also be utilized for securing side walls **16** and **18** to the transformer tank **14**. If bolts such as **26** are used, the bolts will preferably be welded to the tank **14** and will be fastened within the housing, in the manner shown, to prevent tampering with such bolts.

The side walls **16** and **18** are desirably provided with channel-shaped members **28** and **30** which are secured to the forward free portions of the side walls in the manner shown, especially in FIG. 4. The channel members **28** and **30** desirably extend inwardly from the forward free portions of side walls **16** and **18** as best shown in FIGS. 3 and 4. Removable sill members **32** and **34** are secured to the channel members **28** and **30**, the sill member **32** forming an upper sill while the member **34** forms a lower sill against the bed **12**, particularly as shown in FIG. 4 of the drawings. The sill members **32** and **34** in conjunction with the channel members **28** and **30** are used to aid in securing a removable front wall member to the transformer housing.

As is shown, especially in the exploded view of FIG. 4, the removable front wall **36** has an upper flange portion **38** and a lower flange portion **40**. The upper flanged portion **38** fits against the upper sill **32** while the lower flanged portion **40** fits behind the lower sill member **34**. The removable front wall **36** is preferably formed from a single sheet of metal with flanges **38** and **40** offset from the central portion, as shown especially in FIG. 3. Preferably, side flanges **37** are provided on each side of the central portion. The side flanges **37** of the front cover **36** fit against the channel members **28** and **30** and extend exactly to the end of the walls **16** and **18** to provide a flush-fitting front wall. If desired, the upper flange **38** may be provided with a quick-release member **42** which fits within an opening **44** of the upper sill **32**. As is well understood by those skilled in the art, the quick-release member **42** fits within the opening **44** and by turning approximately a quarter of a turn secures the upper flange **38** to the upper sill **32**. Of course, by merely reversing the quick-release member **42** a quarter turn, the quick-release member **42** will be released from hole **44** to allow the front wall **36** to be withdrawn.

A cover member **20** is provided fitting over the top of the enclosure and also over the top of the tank **14** in the manner particularly shown in FIG. 1 of the drawing. The removable cover **20** is provided with a lower flange member **46** as best shown in FIGS. 2 and 3 which extends beneath the rim of the cover **48** of the tank **14**. Cover **20** also has a forward, downwardly extending member **50** which extends below the edge of the side walls **16** and **18**

and over the front wall **36** in the manner shown particularly in FIG. 3 of the drawings. As will be understood, the cover **20** is placed over the enclosure by sliding it on an angle over the transformer tank **14** and the side walls **16** and **18** until flange **46** buts against the transformer **14**, the cover may then be pushed downward over the side walls **16** and **18** and the front wall **36** in the manner shown. In this way the cover **20** completes the enclosure **10** and firmly secures the front wall to the side walls **16** and **18**. In order to gain access to this transformer housing it is only necessary to reverse the movement; first, lifting the transformer cover upwardly away from the walls **16**, **18** and front walls **36** and then sliding it rearwardly to unhook flange **46** from the cover **48**.

In order to divide the enclosure into a high and low voltage section a dividing wall **52** is provided which is preferably bolted to the tank **14** midway between walls **16** and **18**, particularly in the manner indicated in FIG. 2 of the drawings. The wall **52** extends from the top of tank **14** substantially to the pad **12** thereby dividing the enclosure **10** into a low voltage compartment **54** and a high voltage compartment **56** particularly as indicated in FIGS. 2 and 4 of the drawings. As will be understood, wall **52** can be made of any desired size, consistent with the number and type of high voltage connections used. Various connections extend outwardly from the transformer tank **14** into both the high and low voltage compartments to provide for the desired high and low voltage connections to the transformer within the tank **14**. Inasmuch as these connections form no part of this invention, the various connections to the transformer are not shown in the drawings.

In order to provide a desired locking means for the enclosure **10** to prevent unauthorized entry thereto the novel locking means preferred will now be described. As shown particularly in FIGS. 2 and 3 of the drawings, a lug member **58** is secured to the side wall **18** and extends into the low voltage compartment **54**. A second lug member **60** is secured to the cover **20** and similarly extends into the low voltage compartment **54**. Lug **58** is provided with a hole **62** while lug **60** is provided with a hole **64**. As can be seen, especially from FIG. 3 of the drawings, the holes are complementary and substantially in line with each other. A movable bar member **66** is provided which extends through an opening **67** in flange **24** of side wall **18** and also through openings **62** and **64** in the manner shown in both FIGS. 2 and 3 of the drawings. The bar member **66** is provided with a locking plate **68** at one end thereof, the locking plate having an opening **70** therein. A third lug member **72** is provided which is secured to flange **24** of wall **18** beneath cover **20** in the manner shown particularly in FIGS. 1 and 2 of the drawings. The lug **72** is similarly provided with a hole **74** therein and when the bar member **66** is in its locking position through the openings in lugs **58** and **60** the hole **74** is in line with the hole **72**. A padlock may then be secured through lug **72** and locking plate **70** to firmly lock the bar **66** in its locked position. As can be seen from FIGS. 2 and 3, with the bar **66** extending through the openings in plate **58** and **60** the cover member **20** is securely locked to the side wall **18** and cannot be removed. In this manner a novel locking means is provided which is substantially hidden by the cover **20** providing an easily accessible locking means to allow authorized entry to the enclosure and yet is unobtrusive and has no projecting parts which could injure children who might play about the transformer enclosure **10**. The novel locking means will firmly hold the enclosure securely locked preventing any unauthorized entry and yet readily allows authorized persons to enter the enclosure **10** to perform any desired service or maintenance to the transformer connections within the low or high voltage sections **54** and **56**. Of course it will be understood that entry to the enclosure **10** may be obtained by unlocking the cover by removing bar **66** from lug **60**, then lifting cover **20** and sliding it to the rear suf-

ficiently to clear the front wall **36**. The front wall **36** may then be readily removed and the desired service performed to either the low or high voltage sections **54** and **56**.

FIGURE 5 shows a modification of the locking means in which the bar **66'** is provided, having a pin member **76** which prevents complete removal of the bar **66'**. In this modification, pin member **76** is placed in bar **66'** adjacent the cover lug **60** when bar **66'** is in its locking position as shown in FIG. 5. When bar **66'** is unlocked from the lug **72** the bar may be withdrawn from opening **64** in the cover lug **60** until it clears the cover lug. However, due to pin **76** the bar **66'** may not be withdrawn through the side wall lug **58**. With this modification there is no danger of the bar **66'** dropping into the low voltage section **54** as it is being removed from the lug **58**. Further, since the bar will remain in the transformer housing there will be no problem of misplacing the bar **66'** while the enclosure **10** is open.

Referring to FIGURES 6, 7 and 8 there is shown a preferred barrier member for the high voltage section of the transformer enclosure **10**. As will be understood by those skilled in this art, when the transformer enclosure **10** is opened it is desired that the high voltage section be still inaccessible to prevent accidental contact with any of the high voltage terminals in this section. In order to provide this high voltage barrier, a barrier member **78** may be provided which is made of any insulating fiber or plastic material. The barrier member **78** fits in stirrups **80** in the lower sill **34** and stirrups **82** in the upper sill **32**. A handle member may be provided such as handle **84** in the barrier **78** to allow maneuvering of such barrier. As will be understood, the barrier is placed in position as shown in FIG. 6 by engaging the barrier **78** between stirrups **82** and the upper sill member **32**. The barrier is then raised to its uppermost position between stirrups **82** and sill **32** until the lower end of barrier **78** clears the sill **34**. The barrier is then lowered into the stirrups **80** between the stirrups **80** and the sill **34**. As can be seen, especially in FIG. 8 of the drawings, when the barrier is resting on the stirrups **80** the top portion of barrier **78** is still held between stirrups **82** and the upper sill **32**. Obviously to remove the barrier it is only necessary to reverse the above procedure. It will be understood that sufficient clearance is provided between sill **34** and barrier **78** to allow front wall **36** to be connected as earlier described.

Barrier member **78** is provided with slot **86** in the lower portion of the barrier, as can be most clearly seen from FIGS. 6 and 7. The slot **86** is used in the manner shown in FIG. 7 to provide a dual use of barrier **78**. As shown in FIG. 7, after the barrier is removed from the high voltage section **56** the barrier may be turned 90° and by means of slot **86** placed in a straddle position over the lower sill **34** and against the side wall **16**. In this position of the barrier, service may be provided to the various high voltage connections by means of a hot stick without danger of contacting the side wall **16**. In other words, the barrier **78** in the position shown in FIG. 7 acts as an insulation against the side wall **16**, while electric utility personnel are working on the high voltage connections in the high voltage section. As will be apparent this provides an additional utility to the barrier **78** and also prevents it from being placed on the ground or in other positions where it might become subject to damage while work is being performed within the transformer housing **10**.

While there has been shown and described the present preferred embodiments of the transformer housing of this invention and the preferred locking means for use therewith, it will be understood that various changes may be made in the connections and in the shapes of the various members without departing from the spirit and scope of the invention particularly as is set forth in the claims appended hereto.

What is claimed as new and which it is desired to secure by Letters Patent of the United States is:

1. A transformer housing for use with a pad mounted transformer comprising, in combination, a transformer tank, a pair of side wall members secured to opposite sides of said transformer tank, sill members connecting the free ends of the side walls, a removable front wall member engaging one of said sill members and being in contact with the other sill member, a removable cover member, said removable cover member having a flange in the rear thereof interlocking with the cover of said transformer tank, and the front end of said cover extending over said removable front wall firmly securing said removable front wall to said enclosure.

2. A transformer housing as claimed in claim **1** in which locking means are provided, said locking means including a first lug member secured to said removable cover and extending into said housing, a second lug member secured to one of said side walls and extending into said housing, said first and said second lug members having complementary openings therethrough, a bar member extending through an opening in said one of said side walls and through said complementary openings in said first and said second lug members.

3. A transformer housing as claimed in claim **2** in which said bar member is provided with a locking plate and a third lug member is secured to said one of said side walls on the exterior thereof and adjacent said opening therein, said locking plate and said third lug having complementary openings therethrough for locking said bar in one position.

4. A transformer enclosure for a pad mounted transformer comprising, in combination, a transformer tank having a cover thereon, a pair of side wall members secured to opposite sides of said transformer tank, a third wall member secured to said transformer tank intermediate said side wall members, a pair of sill members secured to the free end of said side wall members, a removable front wall engaging one of said sill members and being in contact with the other sill member, a quick-release connection securing said front wall member to said other sill member, a removable cover, said removable cover having a flange member engaging beneath said cover of said transformer tank, and a downwardly extending portion of said cover member engaging the front wall to firmly secure the enclosure.

5. A transformer enclosure as claimed in claim **4** in which locking means are provided, said locking means including a first lug member secured to said removable cover and extending into said enclosure, a second lug member secured to one of said pair of side wall members and extending into said enclosure, said first and said second lug members having complementary openings therethrough, a bar member extending through an opening in said one of said pair of side wall members and through said complementary openings in said first and said second lug members, a locking plate on said bar member exterior of said enclosure, a third lug member secured to said one of said pair of side walls exteriorly thereof and adjacent said opening therein, said locking plate and said third lug having complementary openings therethrough whereby said bar may be locked against said third lug.

6. A transformer enclosure for a pad mounted transformer comprising, in combination, a transformer tank having a cover thereon, a pair of side wall members secured to opposite sides of said transformer tank, a third wall member secured to said transformer tank intermediate said side wall members, dividing said enclosure in two sections, a pair of sill members secured to the free end of said side wall members, an insulation barrier for one of said two sections, stirrups on each of said sill members at said one section, said insulation barrier held in place by said stirrups and said sill members, a slot in one end of said barrier whereby said barrier may be rotated 90° and straddle one of said sill members, a removable

front wall engaging one of said sill members and being in contact with the other sill member, a quick-release connection securing said front wall member to said other sill member, a removable cover, said removable cover having a flange member engaging beneath said cover of said transformer tank, and a downwardly extending portion of said cover member engaging the front wall to firmly secure the enclosure.

7. A locking means for a transformer housing which includes a pair of side walls, a removable front wall and a removable cover member, said removable cover member having an extending portion engaging said removable front wall, said locking means comprising, in combination, a first lug mounted on one of said side walls and extending into said housing and having an opening therethrough, a second lug member secured to said removable cover and extending into said housing and having an opening therein complementary to said opening in said first lug, a third lug secured to said side wall at the exterior thereof and having an opening therein and a movable bar member extending through an opening in said side wall, said bar extending through said complementary openings in said first and said second lugs, said bar having a locking plate at an end thereof which is complementary with said third lug when said bar member is in locked position, an opening in said locking plate for reception of a padlock for locking said locking plate to said third lug.

8. A locking means for a transformer housing as claimed in claim 7 in which said first lug is intermediate said second lug and said third lug and said bar member is provided with a stop means between said second and said first lug to allow said bar to be withdrawn from said opening in said second lug but preventing said bar from being withdrawn from said opening in said first lug.

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