Sept. 2, 1969 R. G. JONES 3,464,580

SAFETY SHIELD FOR PAD MOUNTED ELECTRICAL TRANSFORMERS

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Fig. 1.

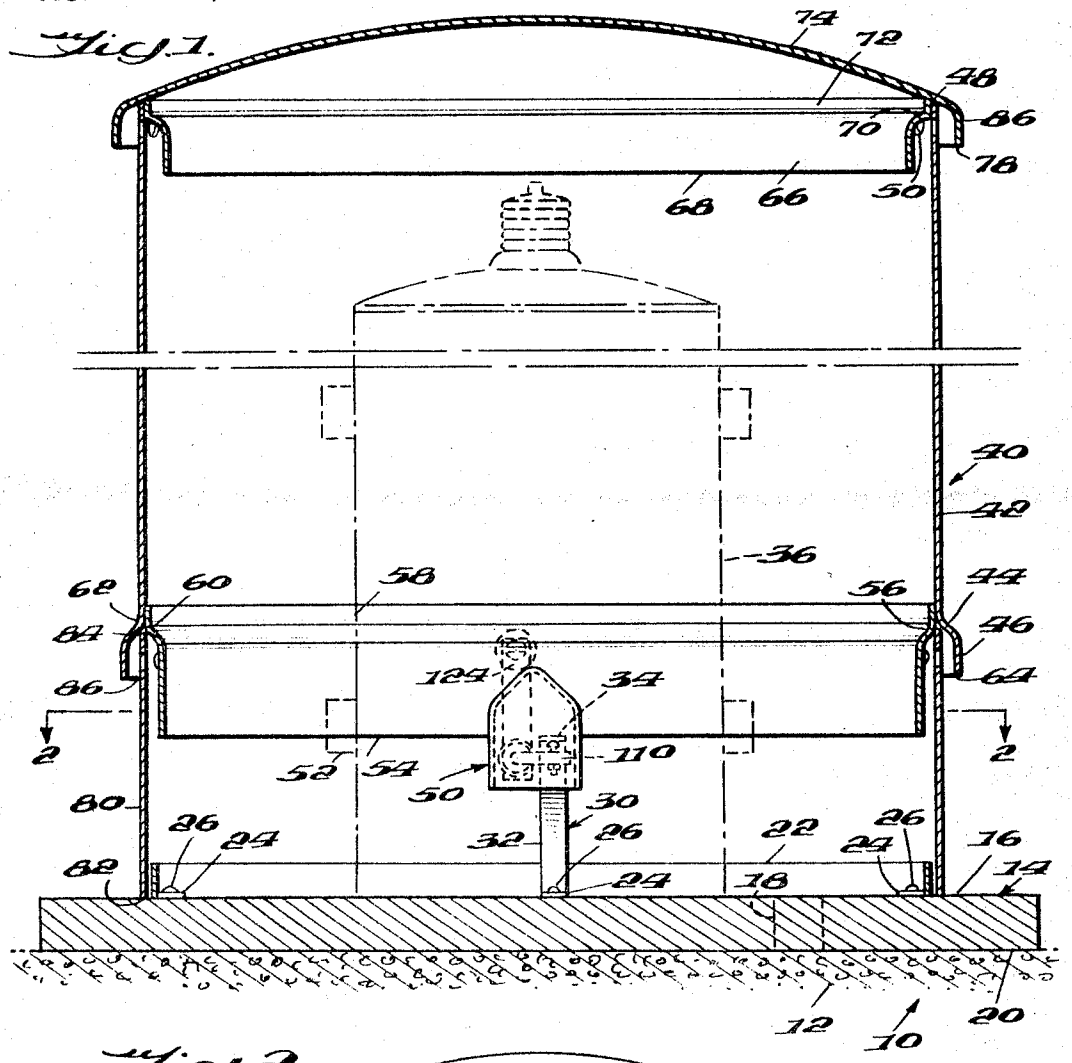
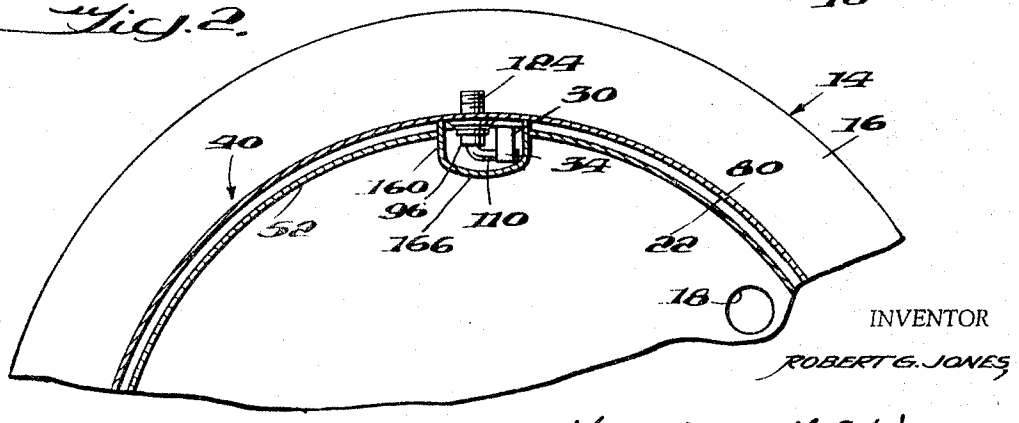


Fig. 2.



INVENTOR
ROBERT G. JONES

BY Kimmel, Crowell & Weaver

ATTORNEYS

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Fig. 3.

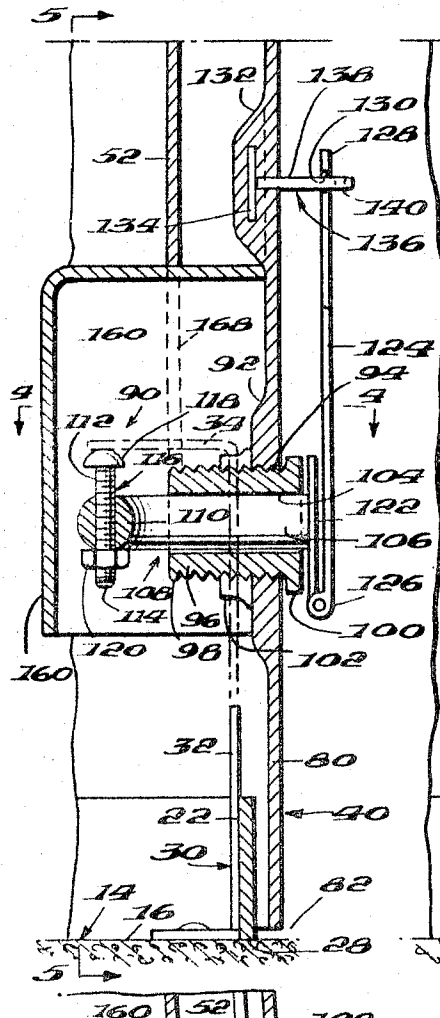


Fig. 5.

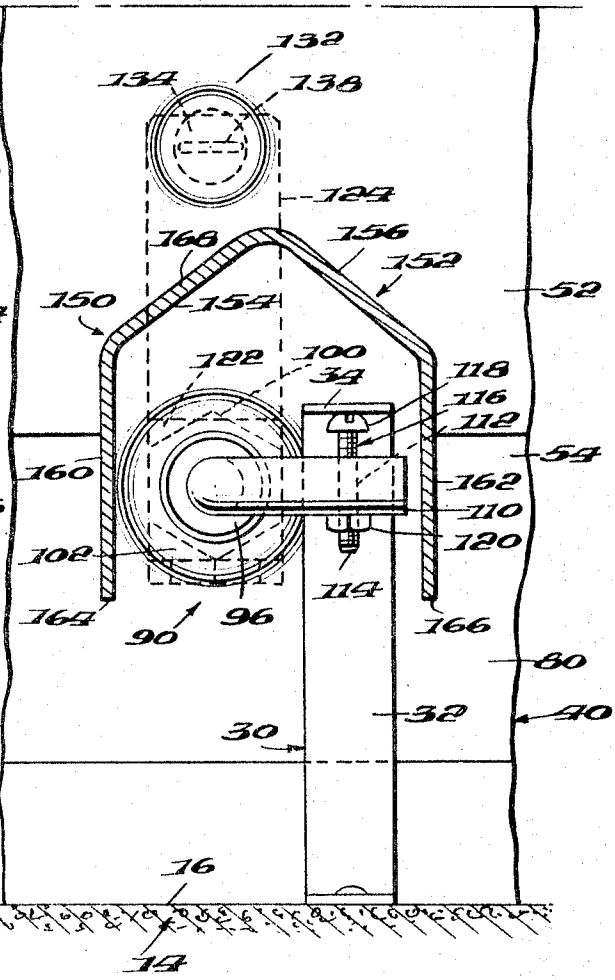
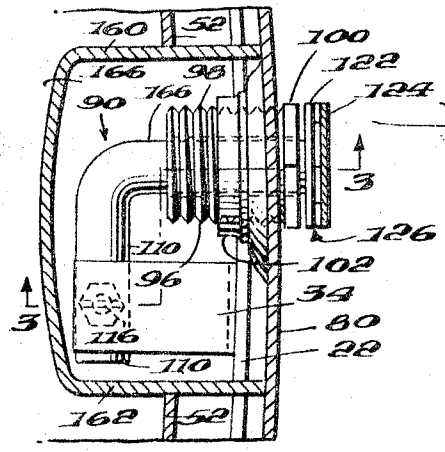


Fig. 4.



INVENTOR
ROBERT G. JONES,

BY Kimmel, Crowell & Weaver

ATTORNEYS

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SAFETY SHIELD FOR PAD MOUNTED ELECTRICAL TRANSFORMERS

Robert G. Jones, Sioux Falls, S. Dak., assignor to Shakstad Electric and Machine Works, Inc., Sioux Falls, S. Dak.

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Int. Cl. B65d 25/12, 25/10
U.S. Cl. 220—18 5 Claims

ABSTRACT OF THE DISCLOSURE

An enclosure for a ground supported electrical transformer including pad mounting means for the transformer, a shield extending around and over the transformer and supported on the pad, means releasably locking the shield on the pad, and means for venting the shield to the ambient atmosphere.

BACKGROUND OF INVENTION

The development of the shield means to which this invention pertains has been spurred primarily by the recent trends in the beautification of congested areas as well as in urban developments. Utility service beautification has been urged recently by power consumers, conservation groups, officials of towns and cities, and by the Federal Government. Development of materials and hardware for underground direct burial of primary and secondary service conductors has also aided in the advancement of powed distribution beautification. However, the transformers used for this service are of special nature and cause problems with regard to economics, service and interchangeability. Two basic designs have been prominently developed for use with underground distribution systems, namely, pad mounted transformers and submersible transformers. This invention involves the former.

In the prior art practices, pad mounted transformers are usually special adaptations of combining sheet metal enclosures with the transformer tank and providing these units require special stocks of these transformers in order to be able to interchange the units when one is damaged or for other service or maintenance requirements. Maintaining a stock of these special transformers is not, at the present, economically feasible.

In the process of designing the shield according to the instant invention, the following factors were of prime consideration. Municipal power utilities, private power utilities, and the rural electric cooperatives, all of which use the standard pole type transformer all maintain adequate stocks of this type of transformer. In addition, many of the above named power distributors maintain repair parts stocks and have educated their personnel in the maintennance and repair of pole type transformers. It is the aim of this invention, therefore, to incorporate as many of the above assets into the new underground trend as is feasible, while still and at the same time directing such developments to the areas of safety, economy, beauty, simplicity and flexibility.

Therefore, one of the primary objects of this invention is to provide a fiberglass reinforced polyester resin material in the construction of the shield to provide both dielectric and mechanical strength.

Another object of this invention is to provide a transformer shield of the type to which reference has been made in which it is impossible for metal parts to contact any electrical wires or devices and provide high potentials to ground which would be dangerous to persons or animals coming in contact with the shield or enclosure.

A further object of this invention is to provide a baffling and ventilation system whereby adequate cooling is provided for the transformer while at the same time eliminating the possibility of children inserting wires and other objects into the ventilator openings and effecting contact with high potential electrical parts within the shield or enclosure.

Still another object of this inventon is to provide a shields may be molded to economically compete with standing high impact forces and severe shocks which may be the outgrowth of rock throwing and other forms of vandalism.

It is a still further object of this invention to provide a transformer shield or enclosure which serves adequately for mechanical protection over extremes of temperature ranges.

Still further, it is another object of this invention to produce shields of the type described supra, wherein the shields may be molded to ecnomically compete with metallic counterparts which do not offer the safety advantages of the nonmetallic shield according to this invention.

Again, it is one of the objects of this invention to provide a molded pigmented premixed polyester resin material to provide easy coloring methods in order to produce a pleasing color for blending purposes in landscaped areas receiving utility services.

Still another object of this invention is to provide a substantially hollow cylindrical transformer shield wherein the geometric configuration, per se, eliminates unaesthetic lines due to the provision of doors, protrusions and other component elements found in conventional enclosures utilized in pad mounted transformer units.

It is a still further object of this invention to provide a low silhouette safety shield for an electric transformer wherein the overall height of the enclosure is lower than the prior art devices while still providing for the economical use of the pole type transformer.

This invention contemplates, as still a further major object thereof, the provision of a transformer safey shield for a pad mounted electric transformer in which simplicity of design and construtcion play dominant parts and is achieved through the use of fiberglass and polyester materials, and this has the further advantage of providing light-weight units which may be easily handled. The simplicity in construtcion avoids complex assembly normally required at the locus of the transformer and involves but a two piece assembly for installation. In emphasizing the simplicity of construction, protective pockets for the releasable latch or locking mechanism also serve as alignment guides to insure immediate and accurate placement of the enclosure over the transformer, and the latching mechanism, per se, is especially designed for simplicity to avoid complex mechanisms which may become fouled, misaligned or damaged.

Still a further object of this invention is to provide a shield of the type generally described above which will not rust, deteriorate, and which is permanently colored thereby eliminating the necessity of maintenance and painting.

Other and further objects and advantages of the instant invention will become more manifest from a consideration of the following specification when read in conjunction with the annexed drawings.

SPECIFICATION

In the drawings:

FIGURE 1 is a detail medial vertical transverse cross-sectional view of a safety shield for a pad mounted electrical transformer, the latter being shown in phantom lines;

FIGURE 2 is a fragmentary detail cross-sectional view of the shield shown in FIGURE 1, FIGURE 2 being

taken substantially on the horizontal plane of line 2—2 of FIGURE 1, looking in the direction of the arrows;

FIGURE 3 is an enlarged fragmentary detail cross-sectional view, FIGURE 3 being taken substantially on the line 3—3 of FIGURE 4, looking in the direction of the arrows;

FIGURE 4 is a fragmentary detail cross-sectional view, FIGURE 4 being taken substantially on the horizontal plane of line 4—4 of FIGURE 3, looking in the direction of the arrows; and

FIGURE 5 is a fragmentary detail transverse cross-sectional view, FIGURE 5 being taken substantially on the vertical plane of line 5—5 of FIGURE 3, looking in the direction of the arrows.

Referring now more specifically to the drawings, reference numeral **10** designates a pre-prepared bed preferably formed of gravel or crushed stone **12** of sufficient depth to support a pole type transformer and the apparatus according to this invention. The bed **10** is also utilized to facilitate drainage.

Superimposed on the bed **10** is a substantially cylindrical cement pad **14** having appreciable thickness and an upper side or surface **16**. For practical purposes, the pad is shown and described herein as being cylindrical although obviously the same may have any configuration as may be dictated by circumstances. The pad **14** construction, per se, is completed by providing at least on transversely extending conduit receiving passage **18** (see FIGURES 1 and 2) which opens at one end into the plane of the upper side or surface **16** and at its other end into the plane of the underside or surface **20** of the pad **14**. The passage **18** receives therethrough one of the ends of an underground primary conductor and of underground secondary leads for service connection, neither the conductor nor leads being shown in the drawings since the same do not comprise subject matter of this invention.

At **22** is denoted a vertically elongated hollow cylindrical hold down ring integrally or otherwise fixedly connected to a plurality of inwardly projecting, preferably radially extending, normally horizontal connector flanges **24**, and the latter, in turn, are fixedly connected to the pad **14** by anchor bolts **26** or other conventional and suitable connector means. The anchorage is such as to cause the lower circumferential edge **28** of the ring **22** to fit substantially coplanar with the plane of the upper surface or side **16** of the pad **14**.

Reference numeral **30** indicates, in general, one of a plurality of hold down brackets each of which, structurally, has an inverted substantially L-shaped configuration including an elongated substantially flat rectangular leg portion **32** having its lower end abutting selected ones of the flanges **24** and superimposed against the inner side of the ring **22** to which the leg portion **32** is fixedly connected by conventional means, not shown. The upper end of each leg portion **32** terminates in a radially inwardly extending foot section **34** integrally or fixedly connected therewith.

As is seen in FIGURES 1 and 2, the passage **18** is disposed inwardly of the hold ring **22** and the latter circumscribes a conventional pole type electrical transformer **36** (shown in phantom lines in FIGURE 1) and which is substantially centered therein.

The safety shield or enclosure constructed in accordance with the teachings of this invention bears the general reference numeral **40**. The shield **40** comprises a vertically elongated substantially hollow cylindrical main body portion **42** integrally connected at its lower peripheral edge with a downwardly and outwardly inclined continuous circumferential flange **44**, and the outer peripheral edge of the latter continues into a depending first cylindrical weather and guard skirt **46** disposed in outwardly spaced concentric relation relative to the main body portion **42**. As is seen in FIGURE 1, the main body portion **42** adjacent its upper end **48** is formed with a plurality of transversely extending circumferentially spaced, at regular intervals, vent openings **50**.

Reference numeral **52** denotes a second substantially hollow cylindrical guard skirt having a diameter somewhat less than the diameter of the main body portion **42**, and a lower peripheral end edge **54**. The upper end of the skirt **52** is integrally connected with an upwardly and outwardly inclined continuous circumferential flange **56**, and the latter, at its upper end is integrally formed with a continuous hollow cylindrical lip **58** concentrically related to the skirt **52** and having an outer diameter substantially equal to the inside diameter of the main body portion **42**.

As is seen in FIGURE 1 of the drawings, the lip **58** is fitted within the lower end of the main body portion **42** and is superimposed on a marginal portion thereof immediately adjacent its junction with the upper end of the flange **44**. The superimposition between the lip **58** and the main body portion **42** is such that a small inner marginal edge portion **60** (see FIGURE 1) of the lip **58** is disposed in confronting spaced relation relative to the upper end of the flange **44** so as to provide a downwardly opening continuous cylindrical pocket **62** to serve a function to be described. The lip **58** and the main body portion **42** are fixedly connected together by conventional means, but the preferred connecting means comprises a polyester cement (not shown). As is seen in FIGURE 1, the lower peripheral edge **54** of the guard skirt **52** is disposed well below the lower peripheral edge **64** of the skirt **46**.

Reference numeral **66** denotes a third hollow cylindrical guard skirt having a lower peripheral marginal edge **68** and which, at its upper end, continues into an upwardly and outwardly inclined continuous circumferential flange **70**, and the outer end of the latter is integrally connected with an upright second continuous hollow cylindrical lip **72** disposed in spaced concentric relationship relative to the skirt **66**. The lip **72** has an outside diameter substantially equal to the outside diameter of the main body portion **42** against which it is superimposed at the marginal edge portion thereof extending above the vent openings **50** and below its upper end **48**. The lip **72** is fixedly connected to the main body portions **42** by conventional means, though as described supra in relation to the connection of the lip **58** with the main body portion **42**, the preferred means comprises a polyester cement. With this connection being effected, the skirt **66** is disposed in inwardly spaced and confronting relationship with respect to the vent openings **50** and, from the foregoing description, it is seen that both the first and second guard skirts **52**, **66**, respectively, are disposed in inwardly spaced concentric relation relative to the main body portion **42**.

The upper end **48** of the main body portion **42** is provided with a transversely extending concave-convex closure plate **74** which rests thereon and which is fixedly and rigidly connected thereto and to the upper end of the lip **72** (which is coplanar with the end **48**) by conventional means such as, the aforementioned polyester cement. As is seen in FIGURE 1, the closure plate **74** is integral with the upper end of a depending continuous hollow cylindrical fourth weather and guard skirt **76** which is disposed in circumscribing circumferential outwardly spaced and concentric relationship relative to the main body portion **42**. The axial length of the skirt **76** is such that its lower end **78** is disposed below the vent openings **50** as is the lower peripheral end **68** of the skirt **66**, and as is seen in FIGURE 1, the end **68** is positioned lower than the end **78** of the skirts **66** and **76**, respectively.

Reference numeral **80** indicates a lower vertically elongated substantially hollow cylindrical sidewall having a lower open peripheral circumferential end **82** and a similar opposed upper end **84**. Vent openings **86** extend transversely through the upper marginal edge of the sidewall **80** in circumferential radially spaced intervals.

The upper end **84** and marginal end portions adjacent thereto are received within the pocket **62** in which they are fixedly connected as by a polyester cement (not shown). The main body portion **42** and the sidewall **80** are coaxially aligned and have identical diameters each of which is greater than the outside diameter of the ring **22**. Thus, with the main body portion **42** and the sidewall **80** connected as described above, and in the assembly of FIGURE 1, a lower marginal end portion of the end wall **80** is disposed in spaced concentric and confronting relationship relative to an adjacent portion of the ring **22**.

As has been mentioned supra, this invention contemplates releasable locking means which is here identified by the general reference numeral **90** and which cooperates, in a manner to be described infra, with the foot section **34** of one or more of the hold down brackets **30**, it being understood that one such means is provided for each bracket, respectively.

At the location of each locking means **90**, the sidewall **80**, intermediate its upper and lower ends **82**, **84**, respectively, is formed with an inwardly projecting integral boss **92** (see FIGURE 3), and the sidewall **80** and the boss **92** are formed with a continuous tapped opening **94** extending transversely therethrough.

An axially elongated cylindrical brass bushing **96** externally threaded at **98** and provided with an enlarged outwardly extending hexagonal flange **100** at one end thereof is threadedly engaged within each of the tapped openings **94** until the flange **100** abuts the outer side of the sidewall **80**. In this position, the bushing **96** has an opposed end extending radially inwardly of the sidewall **80** and beyond the boss **92**, this end of the bushing receiving a brass lock nut **102** thereon to secure the bushing **90** against displacement from within the opening **94**.

The bushing **96** is provided with an axially extendnig smooth cylindrical bore **104** which opens into the planes of the opposed ends thereof and in which the leg portion **106** of a substantially L-shaped latch bar **108**, cylindrical in transverse cross-section, is fitted for rotation about its longitudinal axis. The latch bar **108** also includes an integrally connected laterally projecting foot section **110** having a function to be described below, and from FIGURE 4 it is seen that the longitudinal axis of the leg portion **106** and the foot portion **110** are substantially perpendicular with respect to one another. The distal end of the foot section **110** is formed with a diametrically extending tapped opening **112** having a vertically extending axis when the bar **108** is in its operative positions of FIGURES 3 to 5, inclusive. Threaded into the opening **112** is the externally threaded shank **114** of an elongated screw or bolt **116** having an upper enlarged head **118** slotted as at **120** to receive the blade of a screwdriver or other tool blade whereby axial adjustment of the screw **116** will vertically shift the head **118** to an adjusted position to serve a function to be explained below, and the adjusted position of the bolt **116** and consequently, its head **118**, is maintained by a conventional lock nut **120** threaded on the lower end of the shank **114** and which is moved into tight abutting relationship relative to the underside of the adjacent foot section **110**.

Welded or otherwise fixedly secured to the outer end of the leg portion **106** of the latch **108** is a substantially rectangular hinge plate **122**. At **124** is denoted an elongated substantially rectangular hasp which, in its operative position, extends substantially vertically as viewed in FIGURE 3, and the lower adjacent ends of the hinge plate **122** and hasp **124** are connected together by conventional hinge means **126**. The hinge connection means **126** is such that the other end **128** of the hasp **126** is pivotal about a normally horizontal axis towards and away from its confronting operative position shown in FIGURES 3 to 5, inclusive. To serve a function to be described, the hasp **124** adjacent its upper free end **128** is provided with a transversely extending horizontally elongated slot **130** (see FIGURE 3).

Spaced vertically and above the boss **92** is a second inwardly extending enlarged boss **132** integrally formed with the sidewall **80**. Embedded within the boss **132** is a cylindrical anchor plate **134** from a side of which laterally projects a staple means **136** which includes a substantially flat horizontal rectangular tongue **138** through the distal end of which transversely extends an opening **140** designed to receive any conventional type of mechanical locking means (not shown). The opening **130** is of such size as to conveniently receive the tongue **138** when the hasp **124** is in its operative position of FIGURE 3, but it is not so large as to permit disengagement of the hasp **124** with the tongue **138** when the above-mentioned locking means is positioned within the opening **140**.

The hold-down bracket **30**, the inner end of the bushing **96**, and the inwardly exposed portions of the latch bar **108**, its adjacent screw or bolt **116**, and the lock nut **120** are all protected from such moisture or condensate as may be blown through the vent openings **50** and **86** or which may collect thereon to drip and run thereover, the portection means comprising a housing generally indicated by reference numeral **150**. The housing **150** opens downwardly and may be molded of a plastic material to include an inverted substantially V-shaped top wall **152** having downwardly diverging arms **154**, **156** which, at their remote ends, are integrally connected with a pair of depending flanges **158**, **160**, respectively, the latter terminating in end edges **162**, **164** disposed in a plane positioned below the plane of the peripheral end edge **54** of the skirt **52**. Secured or integrally connected to the arms **154**, **156**, and the flanges **162**, **164** and extending across one side of the housing **150** is a back closure wall **166**. The front edges of the housing **150** are fixedly secured to the sidewall **80** as by a polyester cement (not shown) or other conventional means, and the skirt **52** is provided with downwardly opening complementary openings **168** (only one being shown) to receive the arms **154**, **156** and adjacent portions of the flanges **162**, **164** of each housing **150** therein. If desired, the housing portions confronting the contiguous edge of the openings **168** may be secured thereto as hereinbefore described to provide rigidity for the structure. As is seen in FIGURES 3 and 5, the arms **154**, **156** span the interior components of the locking means **90** and the adjacent hold-down bracket **30** with the flanges **160**, **162** extending across their respective remotely disposed sides.

The main body portion **42** and the components mounted and carried thereon with the exception of the hardware of the lock means **90** are preferably formed of a suitable light-weight plastic material such as, for example, fiberglass polyester resin materials which may be optionally pigmented to fit into the adjacent landscape. Obviously, other materials may be used in the practice of this invention without departing from the spirit and scope thereof.

The utility of this invention is clearly shown in FIGURE 1 of the drawings wherein the transformer **36** is shown within the confines of the shield **40**, and if it be assumed that the latter is locked to the base or pad **14** in its operative position, the component elements of the invention will be in their respective associated positions as is shown in the several figures of the drawings.

To remove the shield **40** from its associated pad **14** it is only necessary to remove the mechanical lock (not shown) from the opening **140** (see FIGURE 3) and to pivot the hasp **124** in clockwise direction about the hinge means **126** and to disengage the hasp **124** from its staple **136**. The hasp **124** is now employed as a manually operable lever to turn the latch bar **108** in a clockwise direction, reference being made to FIGURE 5 of the drawings, to cause the enlarged head **118** to disengage from under the foot section **34** of the hold-down bracket **30** associated therewith, the turning action taking place through an arc of sufficient length in order that in the subsequent lifting of the shield **40** away from its associated pad **14**

to remove the shield upwardly from over the transformer **36**, the adjustment screw **114** and its head **118** clear and will not inadvertently or accidentaly reengage with the foot section **34**. After the transformer **36** has been inspected, repaired, or other work performed in connection therewith, the shield **40** may be quickly and easily replaced and reconnected to its pad **40** by repeating the above steps in the reverse order and direction.

The hold-down tension of the locking means **90** is quickly and easily achieved by the adjustment of the screw **116** to shift the head vertically relative to the foot section **34**.

While the above specification recites separate steps for the cementing of several of the components of the shield **42** with one another, it will be recognized that some ones thereof may take place substantially simultaneously, for example, the lip **58** may be secured to the inner side of the main body portion **42** substantially simultaneously with the cementing of the upper end **84** of the sidewall **80** within the pocket **62**.

The vent openings **50** and the guard and weather skirts **66** and **76** adjacent thereto as well as the vent openings **86** and the weather and guard skirts **46** and **52** cooperate to provide sufficient ventilation for the transformer **36** and reduce to a minimum the amount of dust, dirt and other debris which may be blown into the shield **40**. Additionally, the vertical lengths of the several described skirts are such as to successfully prevent immature persons and/or vandals from introducing wires, sticks, and other elements into the shield to engage with current carrying contacts of the transformer **36** to cause physical injury to such persons and/or to short out or otherwise damage the transformer.

What is claimed is:

1. A shield or enclosure comprising

a base pad;

a substantially hollow member having opposed open ends;

closure means for one open end of said member, the other open end thereof being engaged against said pad;

cooperating latch means on said pad and member and disposed within the latter to releasably secure said member on said pad;

said latch means including

bracket means fixedly connected on said base pad and having a first section thereof disposed in spaced relation relative thereto, a latch bar means rotatably mounted on said member and having a portion thereof disposed inwardly of said member and being rotatable into an out of engagement with said first section; and

lever means connected on said latch bar means externally of said member and operable to effect actuation of said latch bar means.

2. A shield or enclosure comprising

a base pad;

a substantially hollow member having opposed open ends;

closure means for one open end of said member, the other open end thereof being engaged against said pad;

cooperating latch means on said pad and member and disposed within the latter to releasably secure said member on said pad;

said latch means comprises a plurality of inverted substantially L-shaped brackets each having a leg portion and a foot section with said leg portions secured to said base pad and said foot sections converging towards one another in vertically spaced relation relative to said base pad;

said latch means further including a substantially L-shaped latch bar for each cooperating bracket, each of said latch bars including a leg portion journalled for rotation on said member adjacent its cooperating bracket and a foot section disposed inwardly of said member, said foot section of said latch bar being rotatable between said base pad and said bracket foot section to engage said foot section of said bracket;

lever means connected on said leg portion of said latch bar and disposed externally of said member and being operable to effect engagement and disengagement of said latch bar foot section with said bracket foot section.

3. The combination of claim **2** and wherein

said lever comprises a hasp having an end thereof hingedly connected on said leg portion of each latch bar;

staple means on said member; and

means on said hasp releasably receiving said staple therethrough to afford a mechanical connection therebetween.

4. In the combination of claim **3** wherein

adjustable means are mounted on said latch bar foot section for engagement with its associated foot section of the adjacent bracket to clamp said member on said base pad under adjusted degrees of tension.

5. In the combination of claim **4** and

a plurality of circumferentially spaced vent openings formed in said member intermediate the ends thereof; and

guard means fixedly secured to said member, said guard means being disposed internally and externally of said member and in laterally spaced and confronting relationship relative to each of said vent openings.

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GEORGE E. LOWRANCE, Primary Examiner

U.S. Cl. X.R.

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