May 16, 1944. J. H. REYNOLDS ET AL 2,348,755

TERMINAL BLOCK FOR WATT-HOUR METERS

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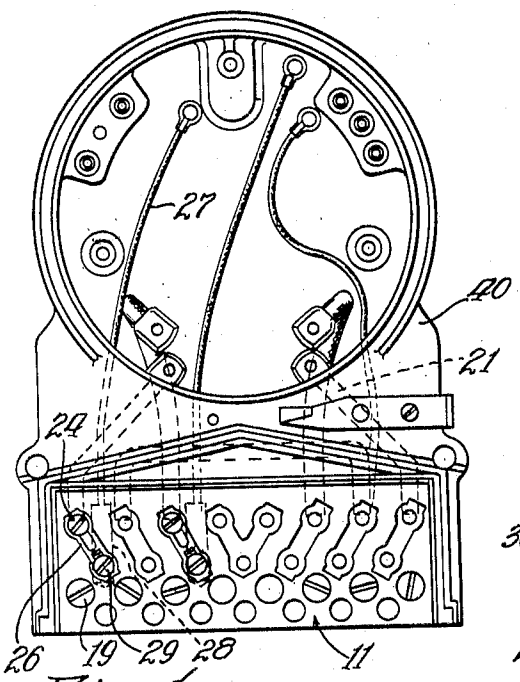


Fig. 1.

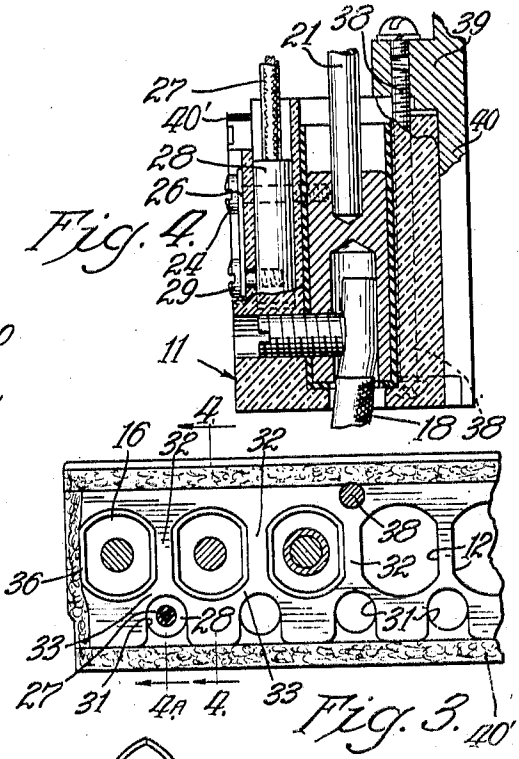


Fig. 4.

Fig. 3.

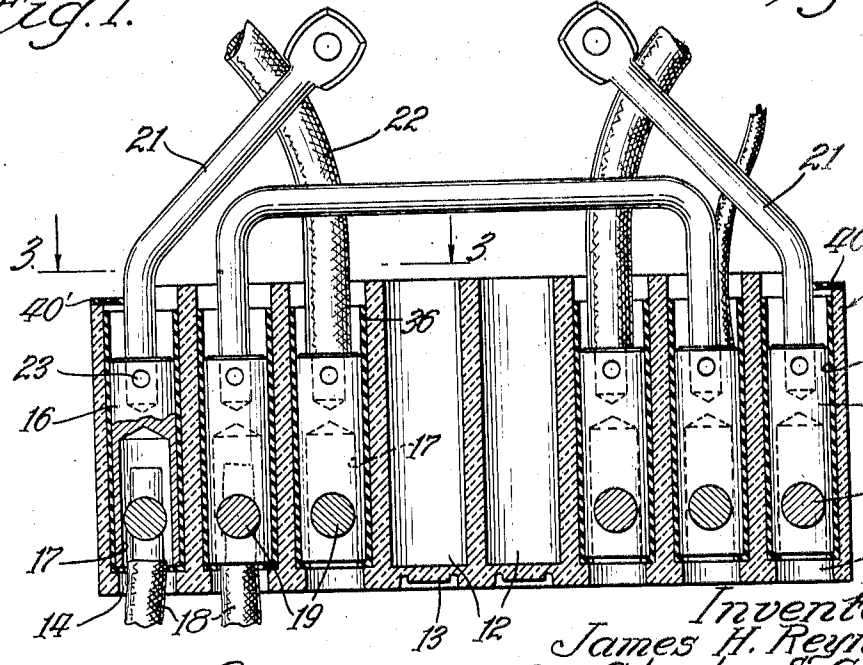


Fig. 2.

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Fig. 5.

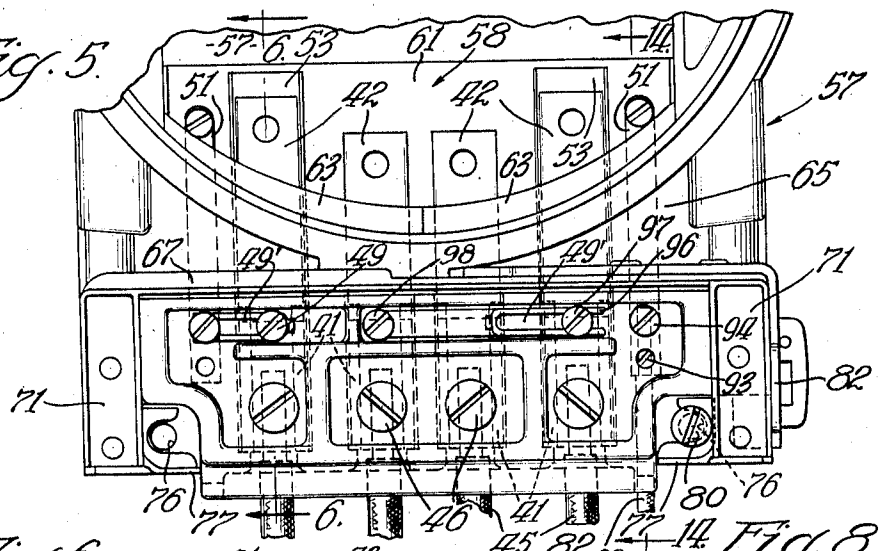


Fig. 6.

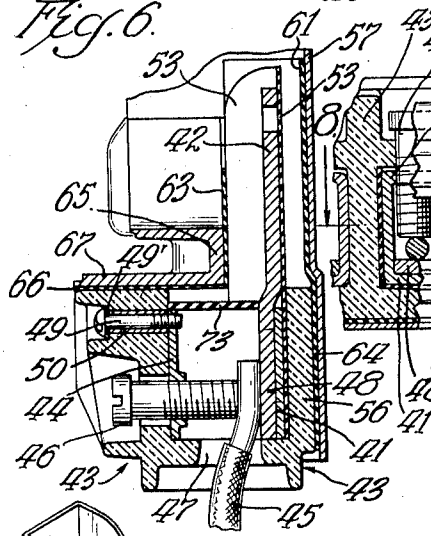


Fig. 7.

Fig. 8.

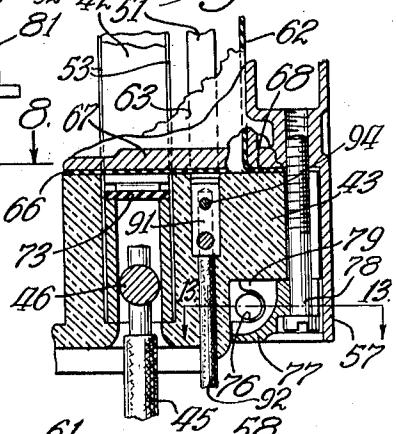
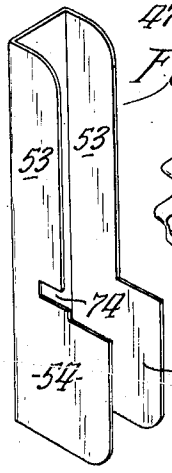


Fig. 9.



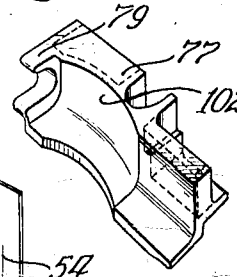


Fig. 11.

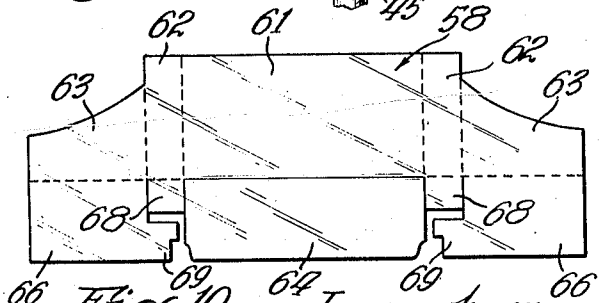


Fig. 10.

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TERMINAL BLOCK FOR WATT-HOUR METERS

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Fig. 12.

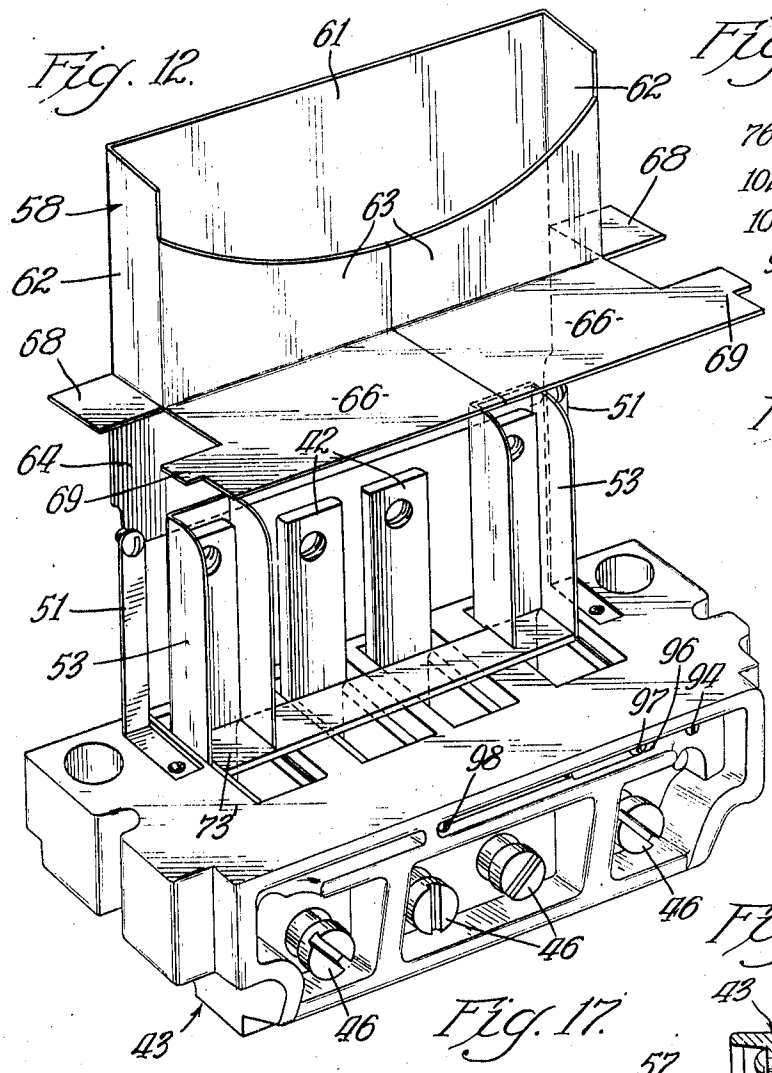


Fig. 13.

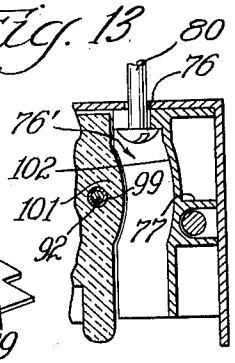


Fig. 15.

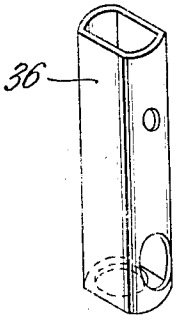


Fig. 14.

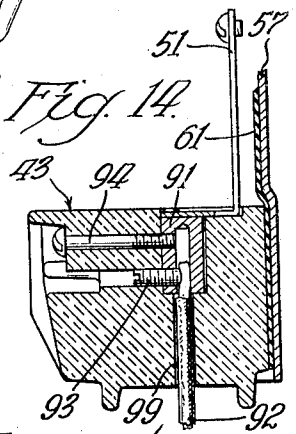


Fig. 17.

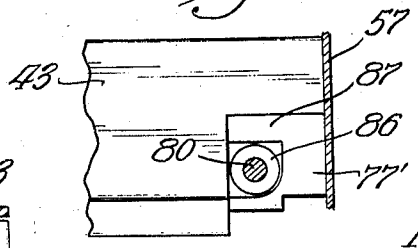
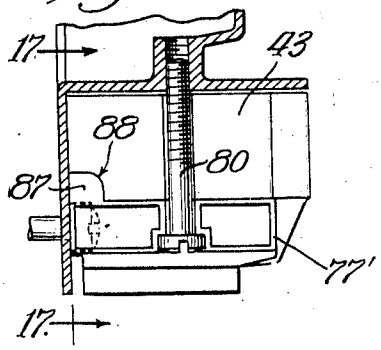


Fig. 16.



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UNITED STATES PATENT OFFICE

2,348,755

TERMINAL BLOCK FOR WATT-HOUR METERS

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Application February 5, 1940, Serial No. 317,374

28 Claims. (Cl. 175—222)

At the point where the electric wiring is connected to watt-hour meters the meters are commonly provided with a group of connectors, each adapted to be secured at one end to one of the meter elements and at the other end to one of the service wires, either a line wire supplying electricity from the power source or a load wire, namely a wire of the circuit being measured. The connectors are commonly mounted in a block of insulation, and the assembly or the block is called a terminal block.

The connectors in the terminal block must be thoroughly insulated from one another, although they are positioned in closely spaced relationship on account of the space limitations of the meter case. Of the two most common types of appropriate insulation, porcelain and "Bakelite," Bakelite has been chosen before this invention because of the ease and reliability with which it is molded and the ease with which porcelain may be broken. Once the insulation is broken or cracked between the connectors, the connectors would be inadequately insulated from one another in view of their close spacing. It has long been recognized, however, that materials such as Bakelite were not entirely satisfactory for this purpose because of an inherent serious defect known as tracking. A current which in any manner is caused to flow momentarily across the surface of Bakelite will ordinarily cause the Bakelite to carbonize along the path of the current, and, since the carbonized Bakelite is a conductor, the Bakelite itself will continue to carry a current between the two ends of the path.

For example, if a meter inspector, perhaps in tracing the circuit of the meter, should carelessly draw his pencil from one conductor to another along the surface of the Bakelite, the pencil mark would form an initial conductive path, current would flow through the pencil mark, and this current would in turn carbonize the Bakelite in contact with the pencil mark so that a permanent conductive path would be set up. More often the carbonizing of the Bakelite is started by an arc which may be due to lightning or due to a dust deposit on the Bakelite. The conductive carbonized path would be objectionable because of waste of current, but much more important is the fact that the effect is cumulative. Once the current starts flowing more and more Bakelite is carbonized so that the path becomes larger and larger. Furthermore, the resistance of carbon is lowered as its temperature rises so that the current flowing through the carbonized path, in heating the Bakelite, will lower the resistance of the carbonized path so that more and more current will flow for a given cross section of path. The current can thus build up very rapidly until it reaches such a value that it vaporizes the carbon and in effect causes an explosion of the carbonized Bakelite. The modern trend toward connecting meters ahead of the fuses, so that there is no fuse to blow out before the amperage becomes dangerously high, has aggravated the difficulty.

Serious accidents have been caused as a result of the tracking or carbonizing of Bakelite. Nevertheless, Bakelite terminal blocks have been commonly used prior to this invention, because, in spite of this one serious defect, the Bakelite blocks were the best available. In fact, Bakelite is still one of the best materials available for many insulating purposes.

It has long been recognized that ceramic materials, such as porcelain, were not subject to tracking. Their use would therefore overcome the tracking defect. However, ceramic materials are not as readily molded as Bakelite and are more easily cracked. Ceramic terminal blocks were therefore considered by the industry to be out of the question because of the fact that they would frequently fail due to a crack which might be caused by accident after installation or might have resulted from a molding defect. On account of the close spacing of the conductors, a surge of high voltage such as might be produced by lightning could arc through such a crack, and the arc could be maintained by the line voltage after the surge had passed. Whenever the arc can be maintained by line voltage, there is danger of severe damage or even an explosion. At the least the conductors may be melted away until the arc stops, perhaps being stopped only because of the melting away of the conductors. If a high current value is available from the line, there may be an explosion due to vaporization of the metal.

Nevertheless, according to the present invention, satisfactory terminal blocks have been devised which are made mainly of ceramic material such as porcelain. Tracking with its attendant danger of explosions is thus completely eliminated. The danger of arcing due to defects in the ceramic is also eliminated by supplementing the ceramic with some other material so that, even though a crack or flaw occurs in the ceramic, the conductors will be adequately insulated. In one illustrated form of the invention the supplementary material comprises paper inserts, while in the other illustrated form of the invention the supplementary material comprises thin-walled inserts of a molded composition.

Additional objects and advantages of the invention will be apparent from the following description and from the drawings, in which:

Fig. 1 is a front elevation of one form of meter case and terminal block chosen for illustration of this invention, the wires extending into the meter chamber being displaced for the sake of clarity.

Fig. 2 is a longitudinal vertical section through the terminal block of Fig. 1.

Fig. 3 is a fragmentary plan view of the terminal block taken on the line 3—3 of Fig. 2.

Fig. 4 is a sectional view taken approximately on the line 4—4 of Fig. 3, with a portion broken away to show simultaneously a section on the line 4—4A.

Fig. 5 is a fragmentary front view showing another form of the invention chosen for illustration.

Fig. 6 is a vertical sectional view taken approximately on the line 6—6 of Fig. 5.

Fig. 7 is a fragmentary bottom view of the structure shown in Fig. 5, partly broken away to show the connector.

Fig. 8 is a fragmentary section approximately on the line 8—8 of Fig. 7.

Fig. 9 is a perspective view of the paper insulator used in the structure of Fig. 5 for individual connectors.

Fig. 10 is a view of the paper blank from which is folded the outer paper insulator of Figs. 5 to 8.

Fig. 11 is a perspective view of a plate for protecting a mounting screw and clamping the block into the case.

Fig. 12 is an exploded perspective view of the terminal block and insulators of Figs. 5 to 11, with a single strip of insulation in lieu of four small pieces.

Figs. 13 and 14 are fragmentary cross sectional views taken on the lines 13—13 and 14—14 of Figs. 8 and 5 respectively.

Fig. 15 is a perspective view of the insulating tube of Figs. 1 to 4.

Figs. 16 and 17 are fragmentary perspective views of another modification of the invention, Fig. 17 being taken on line 17—17 of Fig. 16.

Three forms of the invention have been chosen for illustration and description, in compliance with Section 4888 of the Revised Statutes, but persons skilled in the art will readily perceive other means for accomplishing the same results, and the claims are therefore to be construed as broadly as possible, consistent with the prior art.

In Figs. 1 to 4 the invention has been illustrated as applied to polyphase watt-hour meters. The terminal block difficulties are particularly severe in polyphase meters because of the relatively numerous connections which must ordinarily be made through such terminal blocks in a limited space. As a matter of fact, the general arrangement of terminal blocks both for polyphase and single phase meters is at present predetermined by the desire of the power supply organizations for standardization. In fact, for some years prior to this application, the polyphase meter base shown in Fig. 1 and the single-phase meter base shown in Fig. 5 have been completely standardized with respect to their respective terminal chambers, not only with respect to the general arrangement of the terminal blocks but also with respect to the space provided for them. Thus the length of the terminal chamber in the standard polyphase meter base shown in Fig. 1 has been approximately six and three-sixteenths inches, the block itself, of course, being somewhat shorter to allow for tolerances. Likewise the single phase terminal chamber of the base shown in Fig. 5 has been approximately five and one-sixteenth inches long. The spacing of the various conductors in the two blocks has also been standardized as illustrated so that, in the single phase meter for example, the terminal clamps or connectors for the four main wires extending thereto must be within approximately three inches. Accordingly, the present inventors were confronted with the problem of producing terminal blocks of the general connecting arrangements shown but which would be free from the very dangerous objection previously described with respect to tracking of a Bakelite terminal block in which the surface of the Bakelite under special conditions becomes conductive and then more and more conductive, possibly building up the current value until an explosion occurs.

As seen best in Fig. 2, the standardized terminal block 11 for polyphase meters includes therein eight main connector pockets 12, some or all of which may initially be provided with knockouts 13 to close the bottom of these pockets except when they are needed. In Fig. 2 the two center pockets 12 are thus shown as closed off and unused. The remaining six pockets are provided with openings 14 at their lower ends, through which the wires 18 to which the meter is connected would be extended. Each of these wires is connected to a connector 16. Each connector 16 has an upwardly extending recess 17 therein, seen best in the case of the left-hand connector in Fig. 2, which has been broken away to be shown partly in section and to show a wire 18 extending up into the recess 17. The wires 18 are secured in the connectors 16 by means of screws 19, one screw screwing through the front wall of each connector and clamping the wire against the rear wall thereof. Each connector is provided with an upward extension 21 which may be in the form of a round copper bus bar or terminal strap, as illustrated, and each of which may be soldered within a socket in the main portion of the connector 16. To the extent necessary to properly insulate the extensions or bus bars 21, they may be covered with insulation 22.

Each of the connectors 16 is also provided with a threaded hole 23 into which a connecting screw 24 may be screwed. As seen in Fig. 1, the connecting screw 24 engages a disconnect link 26 which normally connects its associated connector 16 to a voltage lead wire 27 which will be suitably connected to a voltage coil of the meter and which is adequately insulated with conventional insulation. As seen in Fig. 4, the voltage connecting wire 27 is soldered in a socket in the voltage connector 28, into which a screw 29 is threaded, this screw engaging the link 26. The terminal block is provided with a plurality of pockets 31 staggered with respect to the pockets 12, as seen in Fig. 3, these pockets being adapted to receive connectors 28 wherever they may be required.

From Figs. 2 and 3 particularly, it is seen that the connectors 16 are positioned quite close together and also close to the voltage connectors 28. The connectors 16 could not be spread farther apart without increasing the width of the meter, and this would be undesirable not only because it would require larger and more expensive cases but also because more wall space would be required, especially when there are banks of a plurality of such meters. The commercial spacing of these

connectors is such that if an arc were once started between two connectors, the arc would be maintained by the line voltage under some conditions. This is obviously undesirable and dangerous. Normally the insulating material of which the block is made would prevent such arcing, but with respect to this material reliance must be placed on walls 32 between connectors 16, and walls 33 between connectors 16 and 28. It has been customary in the past to mold these blocks of Bakelite, but according to the present invention, in order to avoid the dangerous tracking which sometimes occurs with Bakelite, these blocks are made of a ceramic material such as that known as molded dry-process porcelain, which is preferred. A heat-resisting glass or "Rossite" (shale and cement) may be used. Any insulating material which does not become conductive as by tracking, which has sufficient strength and rigidity at the temperatures reached by the terminal blocks in meter operation, which can adequately withstand heat (not being ignited by a momentary arc to such extent as to maintain combustion) and which is sufficiently moldable would do and may be considered a suitable insulating material. Because of the thinness of the walls 32 and 33, it is difficult or impossible to mold them of porcelain with dependable perfection. Accordingly, there will occasionally be flaws in these walls which would leave the connectors improperly insulated from one another. Even if flaws did not occasionally result from manufacturing, these walls might occasionally become cracked in service or at least might occasionally be cracked through the carelessness of men installing or otherwise working on the meters. Whenever, due to a crack or any other form of flaw, the connectors were improperly insulated, an arc could be started by a bolt of lightning and continued by line voltage under certain conditions. This consideration probably accounts for the fact that experts in the meter industry have heretofore considered porcelain terminal blocks to be out of the question.

According to the present invention this apparently insuperable obstacle to the use of porcelain terminal blocks has been overcome by the provision of additional insulation between the connectors. In the illustrated form of the invention (Figs. 1 to 4 and 15) this additional insulation is in the form of insulating tubes 36 which surround each of the connectors 16. These additional insulators may be formed of almost any material, although they are preferably formed of a material which is somewhat flexible so that it will not be cracked by any forces which crack the terminal block 11. Furthermore, because of the space requirements, the insulators 36 need to be quite thin and hence should be made of a material which can be molded into thin forms and has high dielectric strength (ability to resist breakdown under voltage and thus prevent arcing). Any insulating plastics, but particularly any which combine these characteristics, may be used. Some of them have the characteristics to a higher degree than others and are therefore preferred. The cellulose compositions which do not readily burn, particularly the cellulose acetate plastics, such as that known commercially as "Tenite," are within this preferred grouping, Tenite having been found to be very satisfactory. "Polystyrene" (not a cellulose but a vinyl benzene resin) or ethyl cellulose is also satisfactory, and may be found even more satisfactory than Tenite.

It will be observed that, although the materials specifically named are all essentially non-carbonizing, other suitable materials may not all be free from the defects of carbonizing. However, inasmuch as these auxiliary insulators are never in contact with more than one connector, it is not possible for a conductive path to be formed from one connector to another by tracking, and, accordingly, the trackability of this material is not objectionable, particularly since the volume in the thin walls is too small to be dangerous. In short, the connectors are insulated by a wall of non-trackable material and are independently insulated by a wall of material which is not likely to be subject to any molding defect or to crack if the main insulating body cracks. Hence, the main wall insulates against tracking and usually against arcing, while the auxiliary insulation additionally insulates against arcing.

Since the materials which were specifically named are non-carbonizing and readily moldable and have high insulating values, it might be supposed that they could be used for the main body of the terminal block. The difficulty with them for this purpose is that they soften at temperatures which may be encountered in meter operation. When such temperatures are encountered, these materials would lack the rigidity necessary to hold the parts properly spaced. In their use according to the present invention, however, their rigidity is not important and they are not relied upon for support in any way. Since they are non-trackable it is not essential that the main terminal block 11 be non-trackable, and some of the advantages of this invention could be obtained by using one of them (or other non-trackable insulation) with a Bakelite block.

The terminal block 11 may be secured in place in a conventional manner as by a screw 38 extending through a hole therein and screwing into a lug 39 on the metallic meter base 40, a felt sealing washer 40' preferably being provided between the meter case and the block.

The structure shown in Figs. 5 to 14 is primarily for single phase meters and is provided with only four main connectors 41, each including an extension or terminal strap 42. These connectors are carried by the terminal block 43, which is formed of any suitable ceramic, preferably molded dry-process porcelain.

Each connector 41 is formed as a box-like structure, as seen best in Fig 7 where the front wall is designated 44. In each connector a service wire 45 would be secured by a screw screwed through front wall 44. The wire 45 extends up through an opening 47 in the terminal block 43, as seen in Fig. 6, the screw 46 pressing the wire against the plate 48 which may be the bottom portion of the terminal strap 42. The terminal strap 42 is illustrated as fitted into the box connector 41, being either welded thereto or held therein by friction.

Screws 49 may also be threaded into the connectors 41 for making voltage connections through suitable linkage 49' which may include disconnect features for testing. Bushings 50 are customary but are not necessary if the porcelain fits close to the screws 49. The screws 49 are connected to potential terminal straps 51. Although the space limitations are not quite as severe in this instance as in the form shown in Figs. 1 to 4, the fact remains that the various terminal straps 42 and 51 are relatively close together, as are the box-like portions of the connectors 41. It may be noted, incidentally, that the uneven spacing of the main terminal straps

42 is due to the fact that the two center terminal straps are usually of the same or substantially the same potential and hence present no severe insulating problem. As would be apparent to one skilled in the art, the terminal straps 42 with their box-like connectors 41 and the terminal straps 51 are exactly the same both in their shape and spacing, as those which have been used heretofore, the widest spacing between the connectors 41 being approximately five sixteenths of an inch.

According to the present invention, where insulation in addition to the porcelain terminal block is needed it is supplied as in Figs. 1 to 4 by auxiliary insulators (Fig. 15). In this form of the invention illustrated in Figs. 5 to 14, however, the insulation between the connectors is in the form of the paper insulators 53, one of which is seen in perspective in Fig. 9. These insulators are folded to a U-shape and are preferably long enough to extend a little more than the full length of the terminal strap which they house. The lower portions of these paper insulators are provided with elongated legs 54 which extend substantially all along the side of the enclosed connector 41 so that this connector is substantially completely insulated from the connectors on either side of it, independently of the porcelain.

The U-shape of the paper insulators 53 has several advantages. It facilitates the positioning of these insulators around the connectors 41 and the holding of these insulators in place. It also gives the insulators a fair degree of rigidity so that the upstanding portion thereof surrounding the terminal strap 42 is sufficiently held in place during assembly.

As in the form of the invention shown in Figs. 1 to 4, the terminal block of Figs. 5 to 14 includes as its main insulation a body of material which is non-trackable and in addition an auxiliary insulation formed of material which is not subject to the formation of flaws or cracks, either in manufacture or in use. Thus, the auxiliary insulation makes possible the use of porcelain, which in turn avoids the danger of tracking. It should be noted, incidentally, that the paper is also nontrackable so that the use of these paper insulators would be a partial cure for tracking even if the main insulating material were trackable. In fact, the paper could be so arranged as to prevent tracking between any two connectors or conductors, in which case tracking could be eliminated in this manner. The use of the porcelain block, however, is believed to be a more dependable and more economical way of accomplishing this result. It has the further advantage that, because the porcelain will not creep or flow under pressure, it is especially suitable for incorporation of the invention disclosed in Patent No. 2,055,687, issued on September 29, 1936, to Stanley S. Green, one of the present inventors.

It will be observed from Fig. 6 that the back wall 56 of the terminal block 43 is a fairly thin wall and, incidentally, that the terminal straps 42 and 51, and particularly the screws therein, extend quite close to the meter base 57 which is conventionally formed of metal. Since these meter bases are desirably grounded, it is apparent that arcing could occur between the connectors 41 or the terminal straps 42 or 51 and the metal base 57. To prevent this, an additional paper insulator 58 is provided, which, as seen best in Fig. 5, extends between all of the terminal straps 42 and 51 and the meter base. This insulator 58 is formed from a blank shown in Fig. 10. The main section 61 of this blank forms the insulator between the terminal straps and the back wall of the base. The side panels 62 form insulators between the terminal straps 51 and the sides of the base, and the end flaps 63 are folded inwardly to form insulation between the terminal straps 42 and 51 and the front portion 65 of the metal base. In addition, the portion 61 is provided with an extension 64 which extends downwardly to supplement the insulation of the wall 56 and independently insulate the connectors 41 from the meter base 57. Also, the front flaps 63 are provided with extensions 66 which extend forwardly, as seen best in Figs. 6 and 12, to insulate the connectors 41 and the screws 49 from the upper wall 67 of the terminal chamber. Flaps 68 fold around a corner of the metal base adjacent the terminal straps 51 so as to leave no portion of this metal exposed to the terminal straps. Extensions 69 on flaps 66 interengage with the walls 71 (Fig. 5) to help hold the paper in place.

A fiber insulator 73 (Figs. 6 and 8) may be set on top of each of the box-like portions of the connectors 41 in order to prevent the insertion of a wire up through these connectors into the main meter chamber. This renders the meter more completely tamper-proof than it would be otherwise. If preferred, a single strip 73' could be used in place of the separate insulators 73, as seen in Fig. 12, such single strip being inserted into slots 74 provided in paper insulator 53 for this purpose. Neither the right-hand fold of the right-hand insulator 53 nor the left-hand fold of the left-hand insulator 53 needs to have this notch. The strip 73' may either be narrow enough to fit inside front flaps 72 or it may be countersunk into the terminal block.

One of the difficulties in connection with the porcelain terminal block is in providing means for protecting the meter mounting screws against tampering. These screws commonly extend through the holes 76, seen in Figs. 5 and 13, and a channel 76' for them must extend to the front of the terminal block. It is impractical to have a wall of the porcelain block extend below these holes because such a wall would be so thin that it would be practically impossible to mold and would be very fragile after molding. According to the present invention, a metallic plate 77, which may be cast of aluminum, is provided. This plate is generally angular in cross section, as seen best in Fig. 8. It is secured in place by a screw 78 and bears against the terminal block 43 so that the screw 78 also secures the terminal block 43 in place. The terminal block 43 is slotted to receive the screw 78, as is plate 77. It may be noted that the plate 77 may be cast hollow or with open recesses, as indicated by the dotted lines in Fig. 11.

In some meter installations the bottom of the terminal block is left exposed. With such installations it would be possible to remove the screw 78 and the plate 77 in an effort to tamper with the meter, except that, according to the present invention, means are provided whereby such efforts will be forestalled even if the screw 78 is removed. Thus, the plate 77 is provided with an end flange 79 which fits around the hole 76 and over the shank of the mounting screw 80 (Fig. 7) which passes through the hole 76 so that the head of this screw will clamp the flange 79 against the base 57 and secure plate

77 in place independently of the screw 78. The plate 77 may further be held in place by fitting under the bottom flange of the terminal chamber cover 81, shown fragmentarily in Fig. 7. Thus, with the terminal chamber cover 81 in place, it will be impossible to get to the mounting screw extending through the hole 76 and it will likewise be impossible to remove the plate 77. A sealing lug 82 extends through the cover 81, and removal of the cover to tamper with the meter is prevented by a conventional twisted sealing wire extending through the lug 82 and closed in a loop with a lead slug.

Another method of preventing tampering with the mounting screws 80 is illustrated in Figs. 16 and 17. In this instance the plate 77' has no lug 79 adapted to fit under the head 86 of screw 80, but instead has a lug 87 which fits above the screw head in a recess 88 in the porcelain block 43. From Fig. 16 it is seen that the interlocking between recess 88 and lug 87 prevents forward movement (to the right as seen in Fig. 16) of plate 77' and also prevents any twisting movement of the plate 77'. Downward movement of the plate 77' is prevented by interlocking of the lug 87 and the head 86 of screw 80, as seen best in Fig. 17. Of course, any lateral movement or rearward movement is prevented by the walls of the meter base. A possible advantage of this construction shown in Figs. 16 and 17 over that shown in Fig. 8 is that there is no part of the plate 77' on which the point of the screw 80 can catch. Except for the absence of the flange forming lug 79 and the addition of lug 87, the plate 77' is the same as the plate 77.

As seen best in Figs. 8 and 14, the potential terminal strap 51 is secured to a dual purpose connector 91. This connector may be connected to an external wire 92 by a screw 93. Alternatively, it may be connected by a screw 94 to a disconnect link 96 which in Fig. 5 is shown in a disconnected position. Link 96 is slidably secured by a short screw 97 to the adjacent link 49' which is connected by screw 98 to a connector 41. It is possible to use the connection shown with wire 92 for connecting a three-wire meter temporarily in a two-wire circuit. The meter can then be converted for three-wire use without change in its internal connections, and in this case the useful disconnect link 96 may be used instead of wire 92. Furthermore, there are some other meter uses for which an external potential connection, as through wire 92, is required, although, if it is not required, the disconnect link 96 is usually preferred if the terminal strap 51 is to be used. The present invention therefore permits the same parts to be provided for both types of use. If the meter is to be put to only one use, the passage 99, through which wire 92 extends, need not be formed or may be closed with a knockout, or the disconnect link 96 and its associated link 49' may be omitted.

To form an insulating wall around passage 99, a bulge 101, as seen best in Figs. 7 and 13, is formed on the terminal block. To keep this bulge from obstructing the insertion of mounting screw 80, the plate 77 is formed with a concave portion 102 which may be approximately complemental to the curvature of bulge 101. As seen in Fig. 13, this provides a path which is at all points adequately wide for the screw 80 even though the path 76' is somewhat curved. The curvature shown has been found to be unobjectionable.

From the foregoing it is seen that a meter is provided in which the terminal block is free from tracking, being made chiefly from a ceramic material, and yet is also free from the defects which have heretofore seemed to make ceramic material unsuitable for use as a terminal block. In short, a terminal block is provided which is both non-trackable and effectively insulated against arcing. Furthermore, the construction is one which is adequately tamper-proof.

We claim:

1. A terminal block for watt-hour meters and the like, including a block molded of suitable ceramic material, a plurality of connectors carried within the block and separated by a thin wall of the ceramic material, and an auxiliary insulator of a different material additionally separating at least one of the connectors from another, with the shortest line between said connectors extending through both the ceramic wall and the auxiliary insulator.

2. A terminal block for watt-hour meters and the like, including a block molded of suitable ceramic material, connectors within the block, closely spaced from one another, adapted to be connected to conductors of different potential, and separated by a wall of the ceramic material, and additional insulating means for at least one of the connectors comprising a thin wall of a different insulating material positioned alongside the wall between said connector and the other connector.

3. A terminal block for watt-hour meters and the like, including a block of insulating material, connectors within the block, closely spaced from one another, adapted to be connected to conductors of different potential, and separated by a wall of the insulating material, and additional insulating means for at least one of the connectors comprising a thin wall of a different insulating material positioned alongside the wall between said connector and the other connector, at least one of the insulating materials being non-trackable.

4. A terminal block for watt-hour meters and the like, including a block molded of suitable ceramic material, connectors within the block, closely spaced from one another, adapted to be connected to conductors of different potential, and separated by a wall of the ceramic material, and additional insulating means for at least one of the connectors comprising a thin wall of paper positioned alongside the wall between said connector and the other connector.

5. A terminal block for watt-hour meters and the like, including a block molded of suitable ceramic material, connectors within the block, closely spaced from one another, adapted to be connected to conductors of different potential, and separated by a wall of the ceramic material, and additional insulating means for at least one of the connectors comprising a thin wall of a flexible material positioned alongside the wall between said connector and the other connector.

6. A terminal block for watt-hour meters and the like, including a block molded of suitable ceramic material, connectors within the block, closely spaced from one another, adapted to be connected to conductors of different potential, and separated by a wall of the ceramic material, and additional insulating means for at least one of the connectors comprising a thin wall of a molded flexible material positioned alongside the wall between said connector and the other connector.

7. A terminal block for watt-hour meters and the like, including a block molded of suitable ceramic material, connectors within the block, closely spaced from one another, adapted to be connected to conductors of different potential, and separated by a wall of the ceramic material, and additional insulating means for at least one of the connectors comprising a thin wall of a molded cellulose composition positioned alongside the wall between said connector and the other connector.

8. A terminal block for watt-hour meters and the like, including a block molded of suitable ceramic material, connectors within the block, closely spaced from one another, adapted to be connected to conductors of different potential, and separated by a wall of the ceramic material, and additional insulating means for at least one of the connectors comprising a thin wall of a different insulating material positioned alongside the wall between said connector and the other connector and extended beyond the ceramic block to insulate conductors extending therefrom.

9. A watt-hour meter case and terminal block, including a metallic case, a ceramic block positioned in the case, connectors positioned in the ceramic block and separated by a wall thereof, and additional insulating means insulating the connectors from one another independently of the wall and insulating the connectors from the nearest portion of the case independently of the ceramic block, with the shortest line between the connectors extending through both the ceramic wall and the additional insulating means.

10. A watt-hour meter case and terminal block, including a metallic case, a ceramic block positioned in the case, connectors positioned in the ceramic block and separated by a wall thereof, and a paper folded around one of the connectors and positioned between it and the adjacent connector, with the shortest line between the connectors extending through both the wall and the paper.

11. A watt-hour meter case and terminal block, including a metallic case, a ceramic block positioned in the case, connectors positioned in the ceramic block and separated by a wall thereof, and additional insulating means insulating the connectors from one another independently of the wall and insulating the connectors from the nearest portion of the case independently of the ceramic block, said connectors including a portion extending away from the block, and said insulating means including a sheet of paper folded to substantially surround the extending portions of the connectors and having an extension positioned between the ceramic block and the case.

12. A watt-hour meter case and terminal block, including a metallic case, a ceramic block positioned in the case, connectors positioned in the ceramic block and separated by a wall thereof, and additional insulating means insulating the connectors from the nearest portion of the case independently of the ceramic block, said connectors including a portion extending away from the block, and said insulating means including a sheet of paper folded to substantially surround the extending portions of the connectors and having an extension positioned between the ceramic block and the case.

13. A combined case and terminal block for watt-hour meters and the like, including a metallic case, an insulating block within the case, connectors in the block insulated from one another by the block and extending away from the block within the case, and an insulator comprising a paper folded to form a tube substantially surrounding the extending portions of the connectors, having an extension from one side to separate the insulating block from the case, and having flaps folded from another side to separate another side of the insulating block from the case.

14. A terminal block for watt-hour meters and the like, including an insulating block, connectors in the block insulated from one another by the block and extending away from the block, and an insulator comprising a paper folded around a connector, held thus folded within the block, extending beyond the block, and positioned between two connectors both within and beyond the block.

15. The combination of a meter case and a terminal block, including a metallic case, an insulating block within the case molded of ceramic material, and means for securing the block within the case and simultaneously forming a passage for a screw for securing the case to a wall including a metal plate angular in cross section to form a passage between the plate and the block and formed with another passage for a screw for securing the plate to the case.

16. The combination of a meter case and a terminal block, including a metallic case, an insulating block within the case molded of ceramic material, means for securing the block within the case and simultaneously forming a passage for a screw for securing the case to a wall including a metal plate angular in cross section to form a passage between the plate and the block and formed with another passage for a screw for securing the plate to the case and with a lug adapted to rest under the head of a screw extending through said first-named passage for securing the meter to the wall to prevent removal of said plate without removing said last-named screw, and a cover adapted to be sealed to the case and cooperating with the plate for preventing access to said last-named screw.

17. The combination of a meter case and a terminal block, including a metallic case having a mounting hole therethrough, a terminal block within the case molded of ceramic material and having an open recess formed adjacent one edge to form a passage in alignment with said hole, a metal plate bearing against one wall of the recess to hold the terminal block in the case and extending to the opposite wall of the recess to form a closed passage for the introduction of a mounting screw extending through said hole for restricting access to said screw, and means for securing the plate to the case.

18. A terminal block for watt-hour meters and the like, including a block formed of an insulating material which is readily moldable, and which in the finished block is rigid, does not materially soften at temperatures encountered in meter service and will not sustain combustion, connectors within the block, closely spaced from one another, adapted to be connected to conductors of different potential, and separated by a wall of the insulating material, and additional insulating means for at least one of the connectors comprising a thin wall of a different insulating material positioned between said connector and the other connector, at least one of the insulating materials being non-trackable, and the shortest line between said connectors

extending through both the wall and the additional insulating means.

19. The combination of a meter case and a terminal block, including a metallic case having passages therethrough for mounting screws, a terminal block within the case molded of ceramic material, having a plurality of main connectors therein, and being of generally rectangular shape in vertical cross section but with the lower corners omitted to form open-sided and open-ended recesses along lower edges of the block laterally outside of said connectors and in alinement with said passages to permit the introduction of screws therethrough to said passages, and a metal plate closing one open side of each recess, and the other open side of each recess being closed by the case to substantially prevent access to the screws except from the front of the block.

20. The combination of a meter case and a terminal block, including a metallic case having passages therethrough for mounting screws, a terminal block within the case molded of ceramic material, having a plurality of main connectors therein, and being of generally rectangular shape in vertical cross section but with the lower corners omitted to form open-sided and open-ended recesses along lower edges of the block laterally outside of said connectors and in alinement with said passages to permit the introduction of screws therethrough to said passages, a metal plate closing one open side of each recess and the other open side of each recess being closed by the case to substantially prevent access to the screws except from the front of the block, and an additional connector in the block positioned in part at least approximately above one of said recesses to leave maximum room for the main connectors between said recesses.

21. A base for watt-hour meters, forming a meter chamber and a terminal portion, connecting conductors extending from the meter chamber to the terminal portion and each having a terminal clamp connected thereto at the outer end thereof, said terminal clamps being tubular and opening at inner and outer ends, ceramic insulating means forming part of the terminal portion of the base and comprising an integral structure extending between and surrounding all of said terminal clamps, said base also including insulating means which at least partially blocks the inner open end of the terminal clamp, and outer insulating means protecting the outer ends of the terminal clamps and adapted to prevent outward removal of the terminal clamps from the base, said outer insulating means for all of the terminal clamps being integral.

22. A base for watt-hour meters, forming a meter chamber and a terminal portion, four connecting conductors extending from the meter chamber to the terminal portion and each having a terminal clamp connected thereto at the outer end thereof, said terminal clamps being tubular and opening at inner and outer ends and positioned in lateral alinement within approximately three inches, ceramic insulating means forming part of the terminal portion of the base and comprising an integral structure extending between and surrounding all of said terminal clamps, with the walls between two terminal clamps adapted to be connected to conductors of different potential having a thickness not over approximately one-fourth of an inch, said base also including insulating means which at least partially blocks the inner open end of the terminal clamp, and outer insulating means protecting the outer ends of the terminal clamps and adapted to prevent outward removal of the terminal clamps from the base, said outer insulating means for all of the terminal clamps being integral.

23. A base for watt-hour meters, forming a meter chamber and a terminal portion, four connecting conductors extending from the meter chamber to the terminal portion and each having a terminal clamp connected thereto at the outer end thereof, said terminal clamps being tubular and opening at inner and outer ends and positioned in lateral alinement within approximately three inches, ceramic insulating means forming part of the terminal portion of the base and comprising an integral structure forming a wall between the terminal clamps of each pair of terminal clamps adapted to be connected to conductors of substantially different potential, said base also including insulating means which at least partially blocks the inner open end of the terminal clamp, and outer insulating means protecting the outer ends of the terminal clamps and adapted to prevent outward removal of the terminal clamps from the base, said outer insulating means for all of the terminal clamps being integral.

24. A base for watt-hour meters, forming a meter chamber and a terminal portion, four connecting conductors extending from the meter chamber to the terminal portion and each having a terminal clamp connected thereto at the outer end thereof, said terminal clamps being positioned in lateral alinement within approximately three inches, ceramic insulating means forming part of the terminal portion of the base and comprising an integral structure extending between and surrounding all of said terminal clamps, with the walls between two terminal clamps adapted to be connected to conductors of different potential having a thickness not over approximately one-fourth of an inch, and outer insulating means protecting the outer ends of the terminal clamps and adapted to prevent outward removal of the terminal clamps from the base, said outer insulating means for all of the terminal clamps being integral.

25. A base for watt-hour meters, forming a meter chamber and a terminal portion, four connecting conductors extending from the meter chamber to the terminal portion and each having a terminal clamp connected thereto at the outer end thereof, said terminal clamps being tubular and opening at inner and outer ends and positioned in lateral alinement along one side of the meter base, ceramic insulating means forming part of the terminal portion of the base and comprising an integral structure forming a wall between the terminal clamps of each pair of terminal clamps adapted to be connected to conductors of substantially different potential, said base also including insulating means which at least partially blocks the inner open end of the terminal clamp, and outer insulating means protecting the outer ends of the terminal clamps and adapted to prevent outward removal of the terminal clamps from the base, said outer insulating means for all of the terminal clamps being integral.

26. A base for watt-hour meters, forming a meter chamber and a terminal portion, four connecting conductors extending from the meter chamber to the terminal portion and each having a terminal clamp connected thereto at the outer end thereof, said terminal clamps being posi-

tioned in lateral alinement along one side of the meter base, ceramic insulating means forming part of the terminal portion of the base and comprising an integral structure extending between and surrounding all of said terminal clamps, with the walls between two terminal clamps adapted to be connected to conductors of different potential having a thickness not over approximately one-fourth of an inch, and outer insulating means protecting the outer ends of the terminal clamps and adapted to prevent outward removal of the terminal clamps from the base, said outer insulating means for all of the terminal clamps being integral.

27. A base for watt-hour meters, forming a meter chamber and a terminal portion, four connecting conductors extending from the meter chamber to the terminal portion and each having a terminal clamp connected thereto at the outer end thereof, said terminal clamps being positioned in lateral alinment along one side of the meter base, ceramic insulating means forming part of the terminal portion of the base and comprising an integral structure extending between and surrounding all of said terminal clamps, with the walls between two terminal clamps adapted to be connected to conductors of different potential having a thickness not over approximately one-fourth of an inch, said ceramic insulating means having a mounting-screw recess formed therein at each side of the group of terminal clamps, a metallic member closing-off each recess to form a passage for the mounting screw therein and having rigidly associated with one end thereof a member adapted to lie under the head of the mounting screw, and a cover for the terminal portion adapted to be sealed to the base, telescoping over the other end of each of said metallic members and cooperating with it to prevent access to said mounting screw.

28. A base for watt-hour meters, forming a meter chamber and a terminal portion, four connecting conductors extending from the meter chamber to the terminal portion and each having a terminal clamp connected thereto at the outer end thereof, said terminal clamps being positioned in lateral alinement along one side of the meter base, ceramic insulating means forming part of the terminal portion of the base and comprising an integral structure extending between and surrounding all of said terminal clamps, with the walls between two terminal clamps adapted to be connected to conductors of different potential having a thickness not over approximately one-fourth of an inch, said ceramic insulating means having a mounting-screw recess formed therein at each side of the group of terminal clamps, a metallic member of generally angular cross-section closing-off each recess to form a passage for the mounting screw therein and having rigidly associated with one end thereof a member adapted to lie under the head of the mounting screw, and a cover for the terminal portion adapted to be sealed to the base, telescoping over the other end of each of said metallic members and cooperating with it to prevent access to said mounting screw.

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