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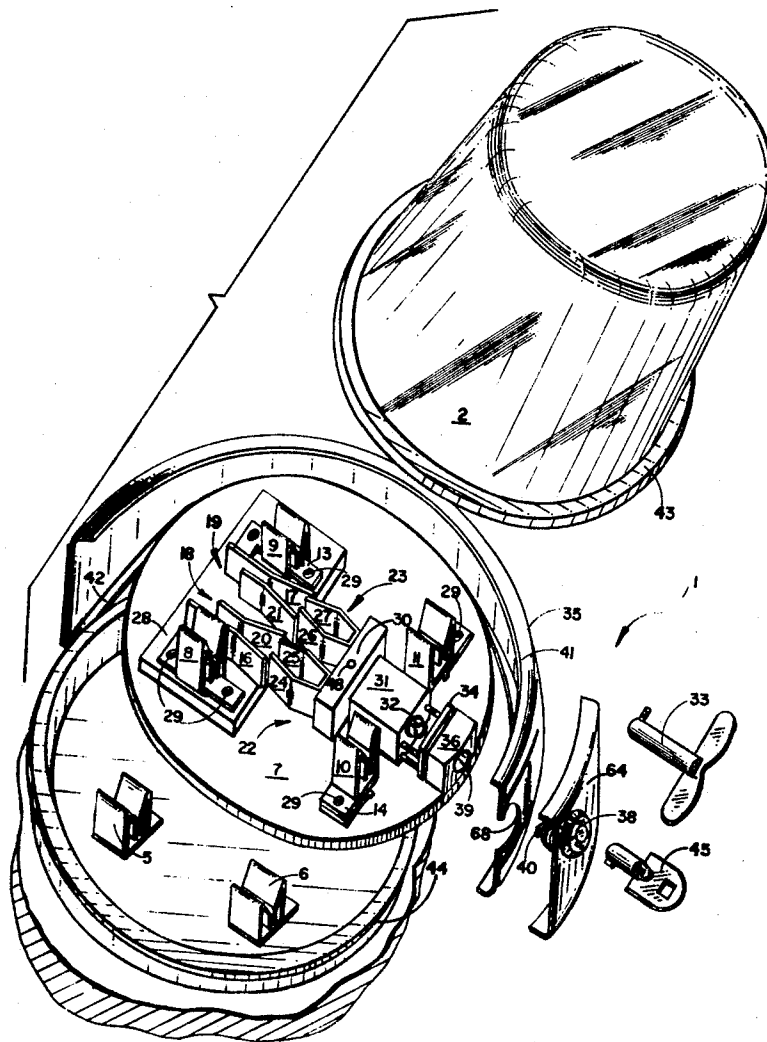
[54] **LOCKABLE SWITCH FOR POWER METERS**  
10 Claims, 8 Drawing Figs.

[52] U.S. Cl. .... 317/108,  
200/44  
[51] Int. Cl. .... E05b 35/12  
[50] Field of Search. .... 200/42, 44;  
317/107, 108

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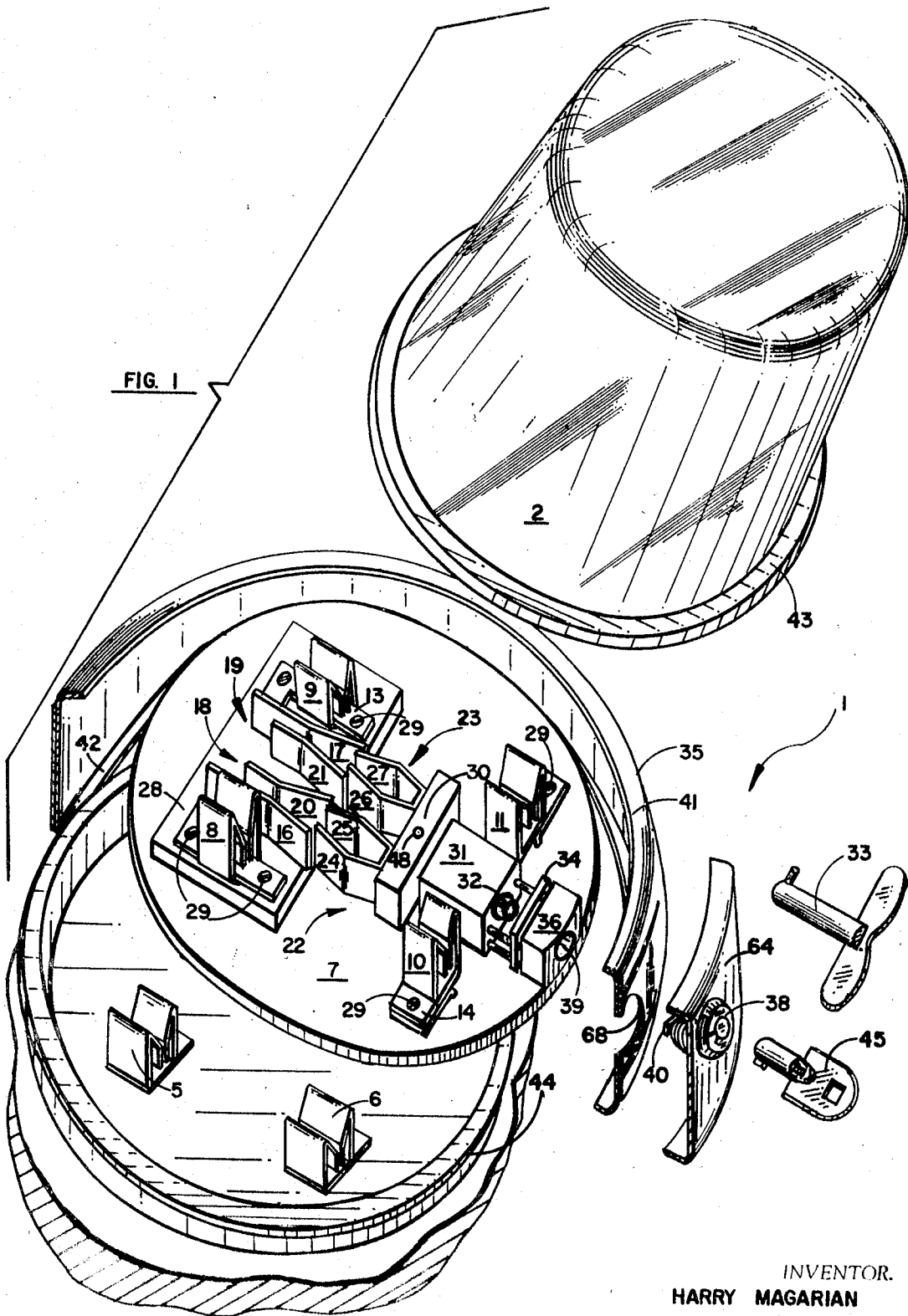
**ABSTRACT:** The switch is inserted into the socket on a facility to which power is being supplied. The prongs of the power meter are inserted into mating clamps of the switch. The assembly is secured together by a lockable metal band that encloses the switch and flanges on the socket and the meter. When it is desired to engage the switch so that power is connected through the meter into the facility, a key is inserted through an opening in the band and rotated to engage contacts of the switch. Thereafter, the key is removed and the band relocked so that power can only be disconnected by authorized personnel.



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SHEET 1 OF 4



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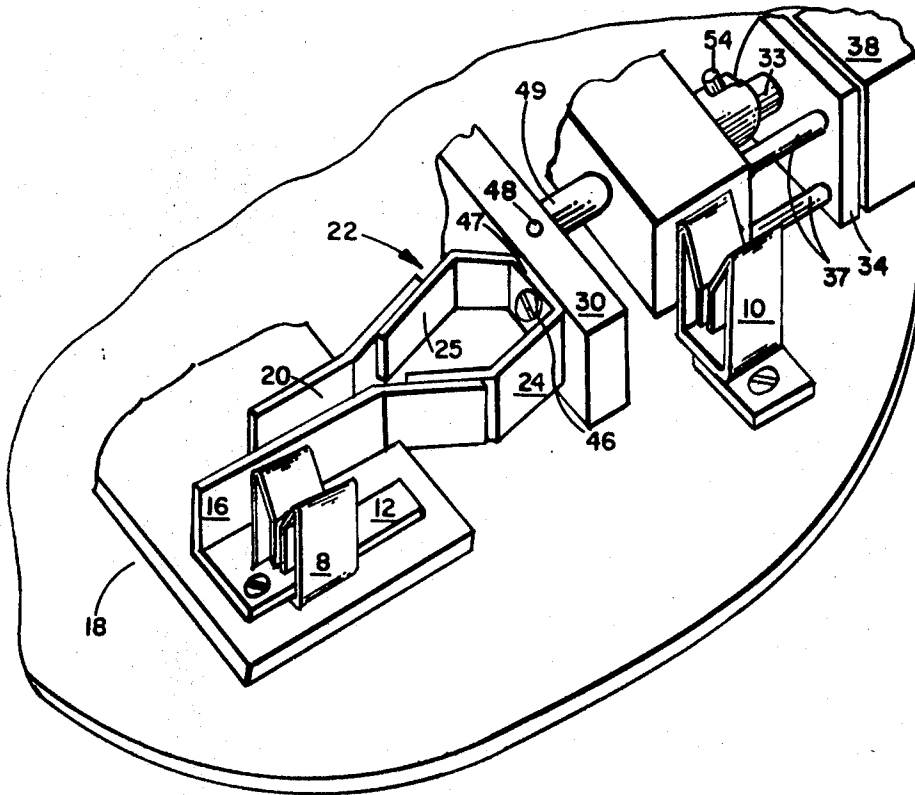


FIG. 2

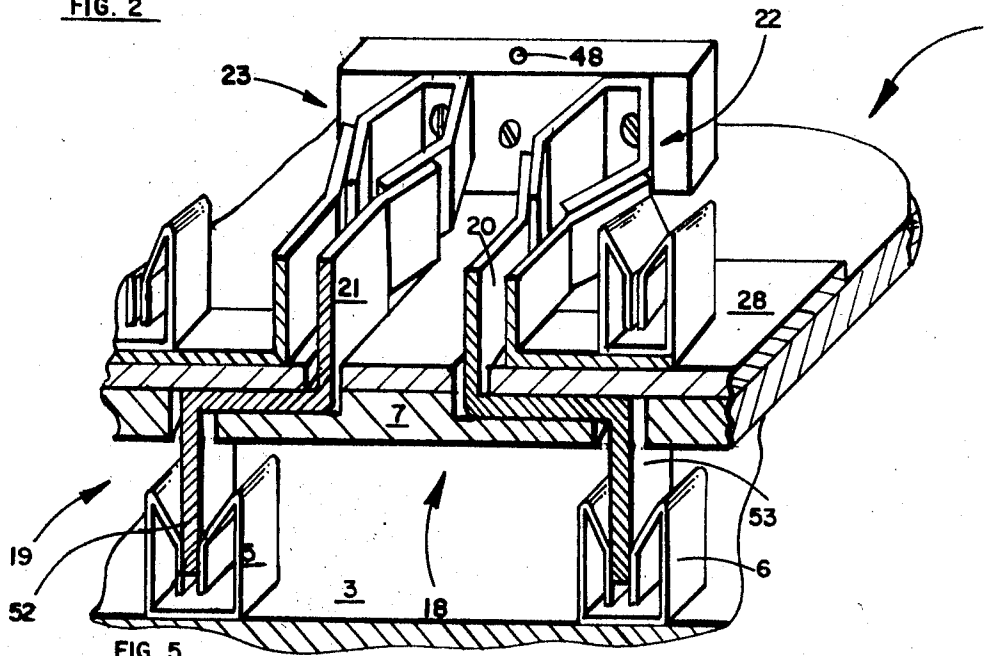


FIG. 5

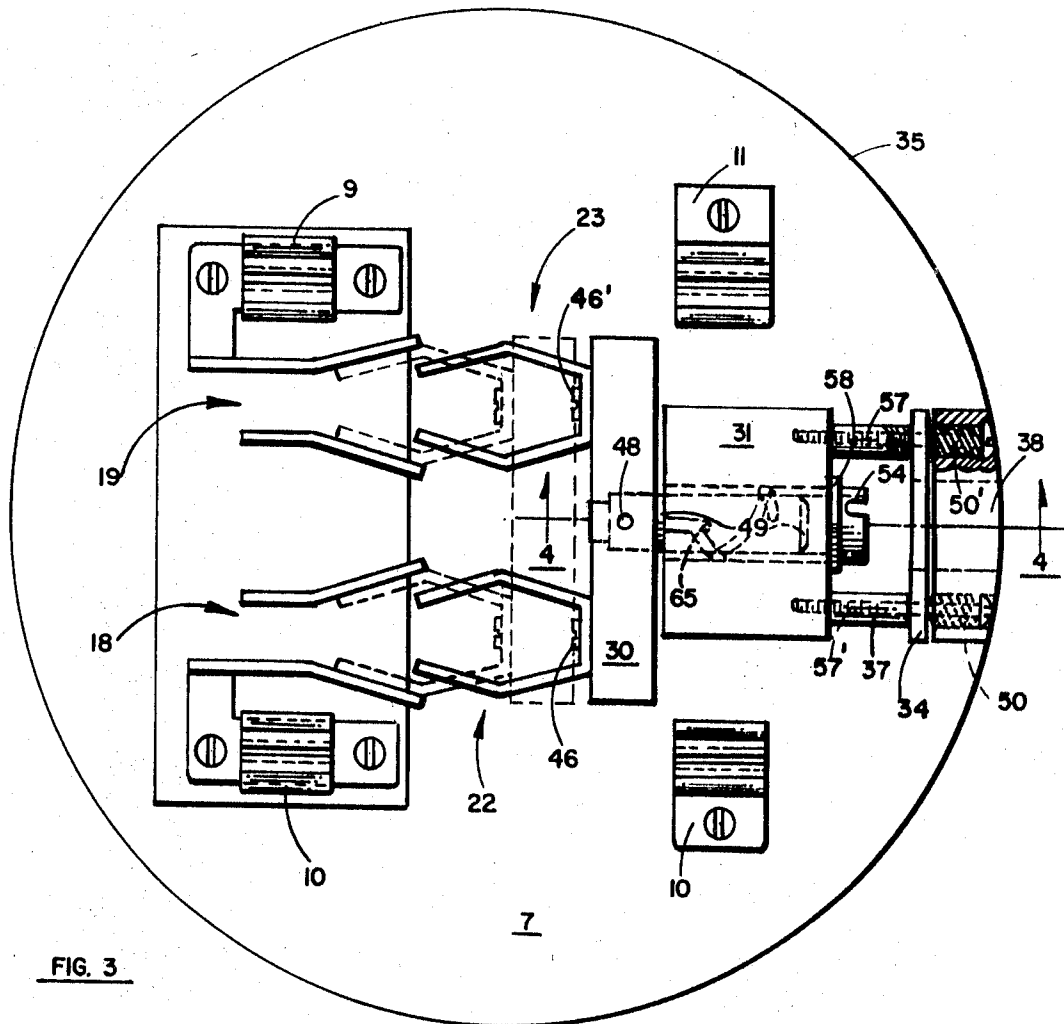
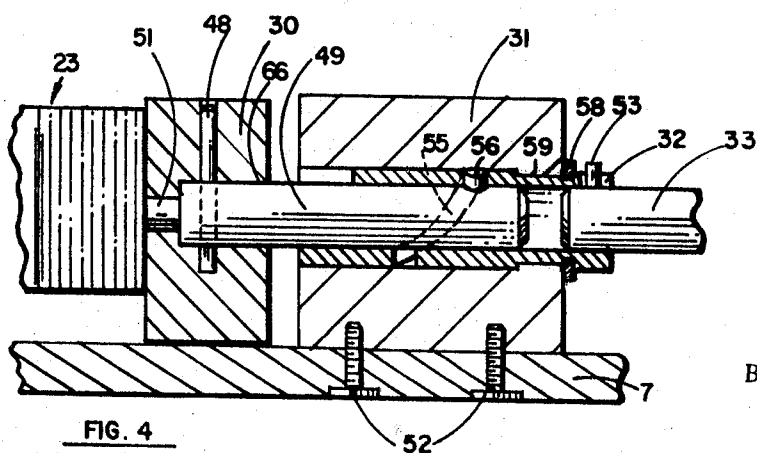
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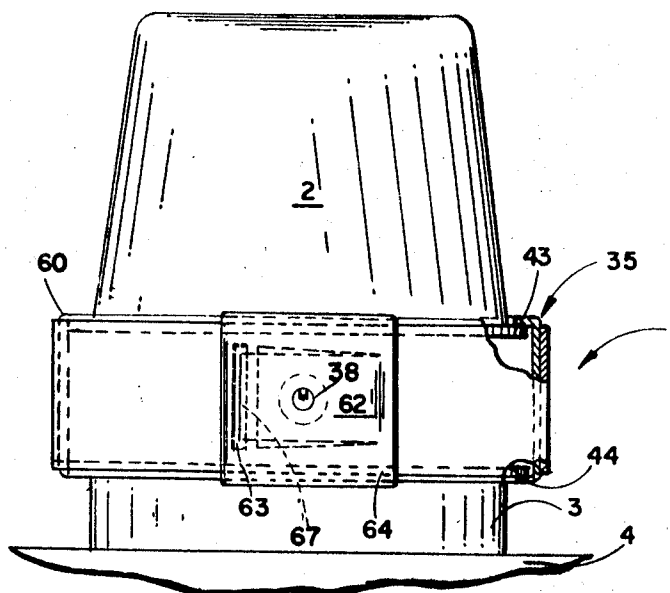


FIG. 6

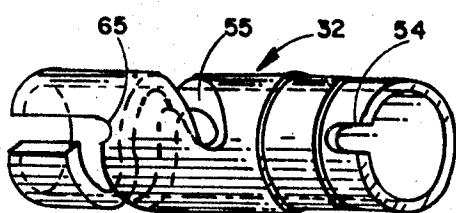


FIG. 8

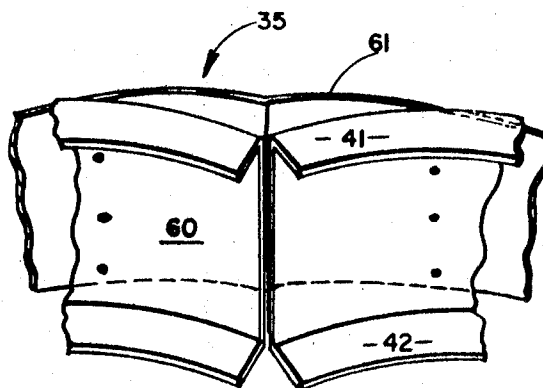


FIG. 7

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# LOCKABLE SWITCH FOR POWER METERS

## BACKGROUND OF THE INVENTION

### 1. Field of the Invention

The invention relates to switches for power meters and, more particularly, to such switches in which the contacts are engaged to connect power through the switch and the meter without the necessity for removing the meter from its base.

### 2. Description of Prior Art

The prior art is believed represented by U.S. Pat. No. 3,334,276 for a Meter Switch and Locking Device by J. R. Bateman et al., issued Aug. 1, 1967 (CL. 317-108). The patent teaches a switch including fingers 48 and 49 which are rotated into position to separate contacts 32, 34 and 33, 35 of disconnects 30 and 31 to disconnect power service. The disconnects use the force of the unnumbered prongs (see FIG. 10) to hold the contacts together after the fingers are rotated free. The unhinged ring 54 includes a split 55 for permitting it to be placed about the meter, switch, and socket combination. After it is in position, a locking mechanism 63 is inserted into slot 54. A regular-sized key 69 rotates locking bars 74 and 75 behind channel members 61 and 60 of the locking ring for securing the ring in place about the assembly and for permitting the power to be either connected or disconnected. Each time power is connect or disconnected, the locking mechanism 63 is disconnected from the slot 54.

A power meter switch is desired in which the contacts that complete the electrical circuit from the power inlet through the power meter into the metered facility are not constantly sprung apart when power is interrupted. Each time the contacts are sprung apart, there may be less engagement between the contacts. In addition, a switch is preferred which uses a hinged locking ring for reducing the possibilities of bending and breaking as well as reducing the efforts required to position the ring in place about the meter and socket flanges. A preferred switch also includes a relatively sturdy key for forcing the electrical controls into a firm engagement instead of a relatively thin key that is subjected to forces that could cause breakage of the key.

The present invention provides a power meter switch which has the desired characteristics. A summary of the invention is contained in the following paragraph.

## SUMMARY OF THE INVENTION

Briefly, the invention comprises a power meter switch connected between a socket and a power meter. The switch includes male prongs for inserting into the female clamps of the socket and female clamps for receiving the male prongs of the power meter. A hinged locking band, including an opening, overlaps the flanges of the power meter and the socket and encloses the switch for locking the power meter and socket together. One relatively sturdy key is inserted through the opening in the locking band to force the contacts of the switch to be firmly engaged. When the contacts are engaged, an electrical circuit is completed from the power inlets (connected to the socket) through the power meter into the metered facility connected to other terminals of the socket.

After the contacts have been engaged, the key is removed and a cover is placed over the opening. A second relatively smaller key is used to lock the cover in place. As a result, only authorized personnel having the proper keys can connect or disconnect power through the meter.

The switch includes two sets of contacts, one stationary and one movable. Both sets of contacts are slanted and, in the preferred embodiment, are shaped in the form of dual, inclined plates which mate together. When the first and relatively larger key is rotated, the movable set of plates slide into position adjacent to and in contact with the first set of plates for completing the electrical circuit. When the key is rotated in the opposite direction, the sliding contact is broken.

Therefore, it is an object of this invention to provide an improved power meter switch that enables power to be con-

nected and disconnected through a power meter into a facility without removing the meter from a socket.

Another object of the invention is to provide a power meter switch having a stationary set of slanted contacts and a moving set of slanted contacts which are actuated by a key mechanism for making a sliding engagement between the contacts when it is desired to complete an electrical circuit through the power meter.

A still further object of this invention is to provide a power meter switch including a hinge protective cover which is locked by a separate key after the switch contacts are closed.

Still another object of the invention is to provide a power meter switch having mating contacts which slide together to complete an electrical circuit from a power inlet through a power meter into a facility being metered.

Another object of the invention is to provide a power meter switch in which the electrical contacts are not repeatedly sprung when power is connected and disconnected.

Still another object of the invention is to provide a hinged locking band for an improved power-metering switch for overcoming the problems normally associated with positioning the band about the switch.

A further object of the invention is to provide a power-metering switch having one relatively large key for firmly engaging the electrical contacts of the switch and another relatively smaller key for locking the opening through which the relatively larger key was inserted so that access by unauthorized personnel is avoided.

A further object of the invention is to provide a power-metering switch using slidably engaged contacts for controlling the power into a facility being metered without the necessity of removing the power meter from its socket each time that it is required to disrupt the power service.

These and other objects of this invention will become more apparent when taken in connection with the description of the invention, a brief description of the drawings of which follows:

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded perspective view, partially sectioned and in partial elevation of the power meter switch, power meter, and socket.

FIG. 2 is a partial perspective view showing a portion of the electrical contacts in sliding engagement for completing an electrical circuit.

FIG. 3 is a top elevation view of the power meter switch showing the contacts disengaged from each other for interrupting the electrical circuit.

FIG. 4 is a cross-sectional view of the mechanism used to actuate the switch contacts.

FIG. 5 is a perspective view of the power switch showing the interconnection of the male power switch prongs with the female clamps of the socket.

FIG. 6 is a side elevation view of the complete assembly.

FIG. 7 is a partial view of the locking band showing the hinged portion.

FIG. 8 is a perspective view of the helical gear shown in FIG. 4 for controlling the movement of the switch contacts.

## DESCRIPTION OF PREFERRED EMBODIMENTS

FIG. 1 shows power meter switch 1 in its exploded position between power meter 2 (shown generally) and socket, or base, 3. The socket is ordinarily secured to the wall 4 of a facility to which power is being supplied.

The socket 3 includes female clamps 5 and 6 and an identical set of clamps concealed from view under the switch 1. Power is supplied, for example, to the clamp 5 (and the concealed, adjacent clamp) from the incoming electrical cables. The power passes through the switch, power meter 2, into the facility being metered via clamps 6 (and the concealed, adjacent clamp).

Switch 1 includes male prongs (not shown) under supporting base 7 which insert into the female clamps 5, 6, etc. Two of

the male prongs are illustrated in FIG. 5. The supporting base 7 may be fabricated from laminated wood or from another sturdy, insulating material. The base is circular since socket 3 and meter 2 are circular.

The switch 1 also includes female clamps 8, 9, 10 and 11 which engage the male prongs (not shown) of power meter 2. The clamps 8—11 include connecting base members 12, 13, 14 and 15.

The female clamps, as well as the other electrically conductive elements of the assembly shown in FIG. 1, are produced from an electrically conducting material such as iron, copper, etc. The clamps and other metal elements may be stamped, cut, molded, or produced by other means well known in the art.

The connecting base members 12 and 13 provide an electrical connection to slanted plate 16 and slanted plate 17, respectively, of stationary contacts 18 and 19. Oppositely slanted plates 20 and 21 complete the contacts. A male prong (not shown) is connected through the supporting base to each of the plates 20 and 21.

Electrically, plates 20 and 21 comprise terminals of the first set of contacts 18 and 19. Plates 16 and 17 comprise a second set of terminals for the contacts 18 and 19. A conducting path between the terminals is established when contacts 22 and 23 are engaged within contacts 18 and 19, shown by the dotted position of the contacts in FIG. 3.

Sliding contacts 22 and 23 include slanted plates 24, 25, and 26, 27, respectively. The plates slant inwardly toward each other for mating with the outwardly slanting plates 16, 20 and 21, 17 of contacts 18 and 19. Plates 16, 24, 26, and 21 are parallel as are plates 25, 20, 27 and 17. The contacts are in the shape of V's (with the tips removed) which mate together for completing an electrical circuit.

One electrical circuit includes clamp 8 to plate 16 through the plates 24 and 25 of contact 22 to plate 20 of contact 18. The circuit also includes the male prong (not shown) connected to plate 20. Another electrical circuit includes clamp 9 to plate 17 of contact 19 through plates 26, 27 of contact 23 to plate 21 of contact 19. The circuit also includes the male prong (not shown) connected to plate 21.

Contacts 18 and 19, as well as clamps 8 and 9, are secured to insulating layer 28 on supporting base 7. Clamps 10 and 11 are also secured to supporting base 7. Although adhesives, or brads may be used, screws 29 are shown in FIG. 1. Plates 20 and 21 are held in place (as shown in FIG. 5) by the layer 28. Clamps 10, 11, 8 and 9 are higher than contacts 22 and 23 so that when the meter is in place, the contacts 22 and 23 can slide freely in and out of engagement with contacts 18 and 19.

Contacts 22 and 23 are secured to insulative bar 30 by, for example, screws, as shown in FIG. 3. The openings in the bases of the contacts are relatively larger than the shaft of the securing screws so that the contacts 22 and 23 can rotate in a plane orthogonal to the longitudinal axes of contacts 18 and 19. As a result, if there is a slight misalignment between the moving and stationary contacts, the moving contacts can rotate into a mating engagement with the stationary contacts.

Bar 30 is part of the contact-actuating mechanism shown more clearly in subsequent figures. The mechanism also includes housing 31 which is attached to supporting base 7. Helical gear 32 is rotatably enclosed within housing 31. It is rotated by key 33 for forcing the contacts into engagement. Screw 48 screws bar 30 to a rod (not shown).

Plate 34, used for securing locking ring 35 about the switch 1, is positioned adjacent exterior bar 36 by spacer rods 37. The plate 34 is spring tensioned against spacer rods 37. The springs are secured within bar 36. The exterior bar 36 is slightly curved along its outer surface for fitting within the circular locking ring 35. Bar 36 is connected to supporting base 7.

Lock 38, a commercially available lock, except for the addition of cover plate 64, inserts through opening 68 in the locking ring 35 (see FIGS. 3 and 6). The bar 36 and plate 34 are dimensioned such that the lock 38 inserts through the

opening in ring 35 and into opening 39 of bar 36. Hook 40 of the lock 38 rotates behind plate 34 to secure the locking ring 35 in place about switch 1. If there is a slight misalignment, the spring-loaded plate 34 automatically adjusts to permit the hook to fit behind the plate.

Ring 35 includes rims 41 and 42 which project inwardly for overlapping flanges 43 of meter 2 and flange 44 of socket 3. The ring with its overlapping rim encloses switch 1 and interconnects the meter, socket, and switch. When the ring is locked in place about the switch, only authorized personnel with a key for lock 38 and a key 33 can change the position of the electrical contact.

For purposes of describing the operation of the switch 1, it is assumed that power is received on clamp 5 and its mating clamp (not shown). Key 45 of lock 38 is inserted in lock 38 and turned so that the lock is removed from within the switch. Key 33 is inserted through opening 39 into engagement with helical gear 32. The key 33 is rotated until contacts 22, 23 are firmly engaged within contacts 18 and 19. The key 33 is large and sturdy relative to key 45 so that added force can be applied to gear 32. As a result, the operating personnel are assured that the plates are in close contact and that a good electrical circuit is completed. Since the plates are slanted, rotation of key 33 forces the plates into a sliding engagement.

Afterwards, key 33 is removed and lock 38 reinserted for locking ring 35 in place. The relatively smaller key 45 can be used to secure lock 38 in the opening since less force is necessary. When lock 38 is locked in place, power into the facility being metered can only be interrupted by an authorized person with both keys.

Power passes from clamp 5 and its mating clamp through plates 20, 21 contacts 22, 23 through plates 16, 17 and into power meter 2 through clamps 8 and 9. The power is measured by the meter 2 and is supplied to the facility through clamps 10 and 11, via the meter prongs and through the prongs of switch 1 into clamps 6 and its associated clamp.

FIG. 2 illustrates contacts 18 and 22 in an engaged position. Key 33 is inserted in a slot (not shown) at the end of gear 32 for forcing the contact into engagement. Screw 46 passes through an opening in base 47 of contact 22 for securing the contact to bar 30. The opening is relatively large so that a loose fit exists. As a result, the contact 22 can rotate to correct any slight misalignment between contacts 18 and 22. The other contact 23 is similarly connected to bar 30.

Locking 58 slips over the end of gear 42 in a slot (see FIG. 4) for holding the gear within housing 31. The locking in combination with the ridge 59 inside the housing (see FIG. 4) prevents the gear from sliding in either direction inside the housing. Rod 49 moves through the housing 31 in response to the rotation of gear 32 by key 33. As the rod moves horizontally, bar 30 moves and the contacts are meshed together as shown.

FIG. 3 is a top view of the switch 1 showing screws 46 and 46' for contacts 22 and 23. Locking 58 is inserted over the end of gear 32. Screw 48 secures bar 30 to rod 49. Slot 54 in the end of gear 32 is also shown. The key 33 has a protruding tip which mates with the slot for changing the position of the contacts. Threaded screws 57 and 57' pass through openings in plate 34 into channels within spacer rods 37 for interconnecting spacer rods 37 with bar 36. Springs 50 and 50' are disposed around the threaded screws 57 and 57' inside bar 36. The springs are compressed for applying a force against plate 34.

In addition, springs 50 and 50' are shown enclosed within bar 30 for applying a spring force to plate 34. Lock 38 is shown in place within opening 39 for securing locking ring 35 about switch 1. Bar 30 is secured to the end of rod 49 by screw 31.

FIG. 4 is a cross-sectional view of a part of FIG. 3 including the helical gear 32 and bar 30. Key 33 is shown with its tip 53 engaged in slot 54 in the end of helical gear 32. Screws 52 are shown as securing housing 31 to the supporting base 7. Helical channel 55 within the helical gear 32 is shown for imparting

horizontal movement to rotate 49 if the key 33 is rotated. The rod includes a protruding tip 56 which inserts in the helical channel. If the key is rotated, the sides of the channel press against the protruding tip 56 to force the rod 49 to move in a horizontal direction. The rod 49 is secured to bar 30 by screw 48 which permits it to rotate relative to the bar. The end of rod 49 fits within base 66 of bar 30. Opening 51 may be used to rotatably secure rod or shaft 49 within bar 30 instead of screw 48.

FIG. 5 is a perspective view of a portion of the power switch 1 showing contacts 22 and 23 engaged within contacts 18 and 19. Male prongs 52 and 53 are shown as comprising an integral part of plates 21 and 20, respectively. Layer 28 is shown holding the plates and prongs in position on supporting base 7. Male prongs 52 and 53 are shown inserted into female clamps 5 and 6 of socket 3.

FIG. 6 is a side elevation view of the complete assembly including power meter 2 secured in place over power switch 1. Power switch 1 is secured between the power meter and socket 3 by locking ring 35. Flanges 43 and 44 of the power meter and the socket are respectively shown in dotted form.

The locking ring 35 is shown as comprising an inner ring 60 which is hinged or cut as shown in FIG. 7. The inner ring is hinged to permit the locking ring 35 to be easily attached to and removed from around the remainder of the switch 1. Both the inner ring and the outer ring 61 may be comprised of a flexible metal.

The inner ring 60 is shown in FIG. 7 as having rims 41 and 42 for overlapping the flanges 43 and 44 of the meter and socket, respectively. The outer ring 61 may be secured to the inner ring by welding, or by other means well known to persons skilled in the art.

Referring again to FIG. 6, it can be seen that the outer ring includes a flap 62 with a tab 67 at one end for mating with slot 63 of the adjacent edge of the locking ring. The flap and slot 63 are covered by cover 64 of the lock 38. The cover and lock are shown in position in FIG. 6. The flap and slot are shown in dotted form to illustrate the relative positions of the inner ring. The cover 64 has a configuration for mating with the external configuration of locking ring 35. As a result of using the flap 62 and slot 63, the ring can be temporarily locked into position while the contacts are being placed in a desired position. Afterwards, lock 38 including cover 64 is placed over the opening to secure the ring in place over the switch.

FIG. 8 is an illustration of the helical gear 32 showing slot 54 at one end and helical channel 55 about the circumference of the helical gear 32. Indent, or slot, 65 is shown at the termination of the helical channel 55 for securing tip 56 of rod 49 (see FIG. 4). In other words, the spring reaction force of the contacts when engaged holds the tip 56 in the indent 65 until sufficient force is exerted on the helical gear 32 by key 33.

I claim:

1. A power meter switch connected between a power meter and a base, said power meter switch comprising,
  - two pairs of relatively movable contacts actuated by first key means for sliding into engagement with each other, said contacts completing an electrical circuit into said power meter when said contacts are in sliding engagement with each other,
  - a band enclosing said contacts for securing said switch between said power meter and said base,

means for locking said band including second key means.

2. The switch recited in claim 1 wherein said pairs of contacts comprise slanted plates for meshing together.

3. A power meter switch connected between a power meter and a base for controlling the power supplied to a facility, said power meter switch comprising,

first and second key means,

a first pair of contacts having a first set of terminals for receiving power, and a second set of terminals insulated from the first set for conducting power to a power meter, a second pair of contacts, said pairs of contacts including mating plates,

one pair of said contacts being actuated by a first one of said key means for moving said plates in and out of engagement with each other for completing and interrupting an electrical circuit between said sets of terminals,

a locking ring enclosing said switch and securing said switch between said power meter and said base, said locking ring having an opening for accommodating said first key means,

lock means for securing said locking ring and for covering said opening, said locking means being removable by said second key means for permitting actuation of said contacts.

4. The switch recited in claim 3 wherein said second pair of contacts comprise inwardly slanting plates and said first pair of contacts comprise outwardly slanting plates whereby the plates of both pairs of contacts mate together.

5. The switch recited in claim 3 wherein said second pair of contacts are rotatable in a plane orthogonal to the longitudinal axis of said first pair of contacts for correcting slight misalignments between said contacts.

6. The switch recited in claim 4 wherein said locking ring is hinged for permitting relatively easy attachment and removal of the ring to said switch.

7. The locking ring recited in claim 6 wherein said locking ring comprises a flap having an inwardly pointed tab at one end of said flap, the adjacent edge of said locking ring having a slot for accommodating said tab whereby said ring can be temporarily locked into position about said switch,

said flap having an opening therethrough for permitting access by said first key, said opening being filled by said lock means when said contacts are in a required position relative to each other, said locking means including a cover mating with the external configuration of said locking ring for covering said opening and said slot.

8. The switch recited in claim 1 and further comprising spring-loaded plate means adjacent to the opening for said locking means, said plate being engageable by said locking means when said locking means secures the locking ring, said plate being spring loaded for being depressed in the direction of said second key means for correcting dimensional variations in the switch.

9. The switch recited in claim 3 wherein said first set of contacts are relatively higher than the second set of contacts for permitting the second set of contacts to slide freely in and out of engagement with the first set when the power meter is in place over the switch.

10. The switch recited in claim 9 further including a third set of terminals for conducting power from said meter into said facility through said base.