May 22, 1956 E. G. JOHANSSON 2,747,049

PLUG-IN METER SOCKET WITH SHUNT SWITCH AND SIGNAL

Filed Feb. 1, 1954 2 Sheets-Sheet 1

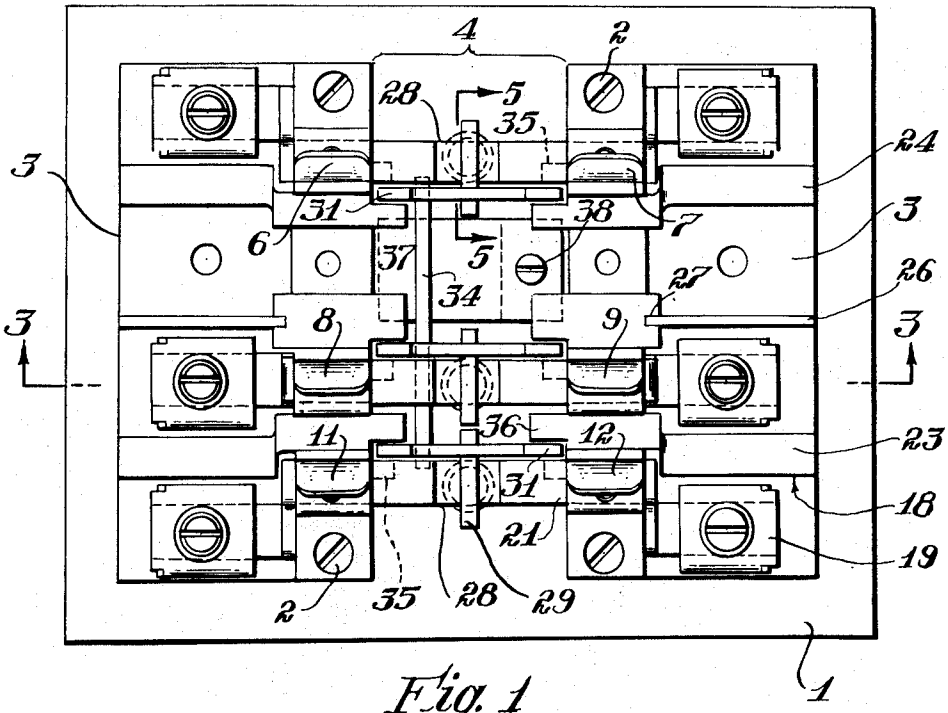


Fig. 1

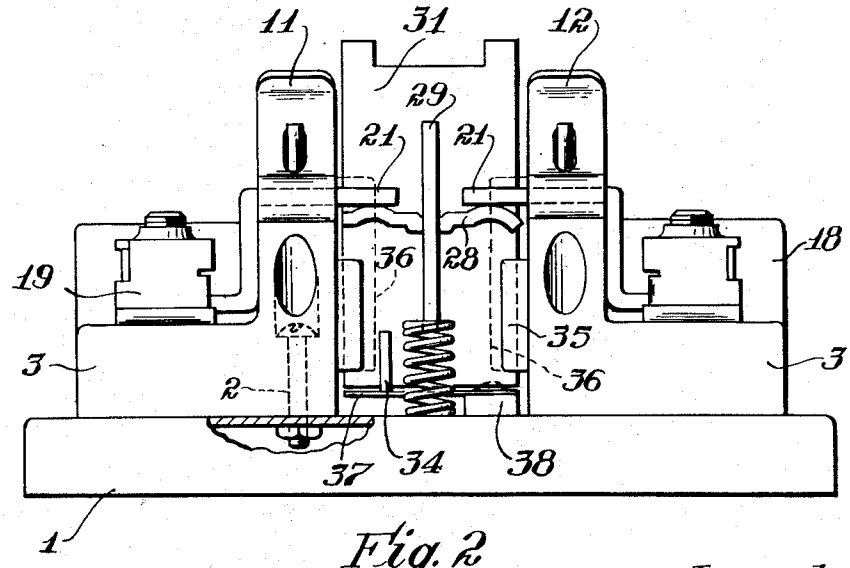


Fig. 2

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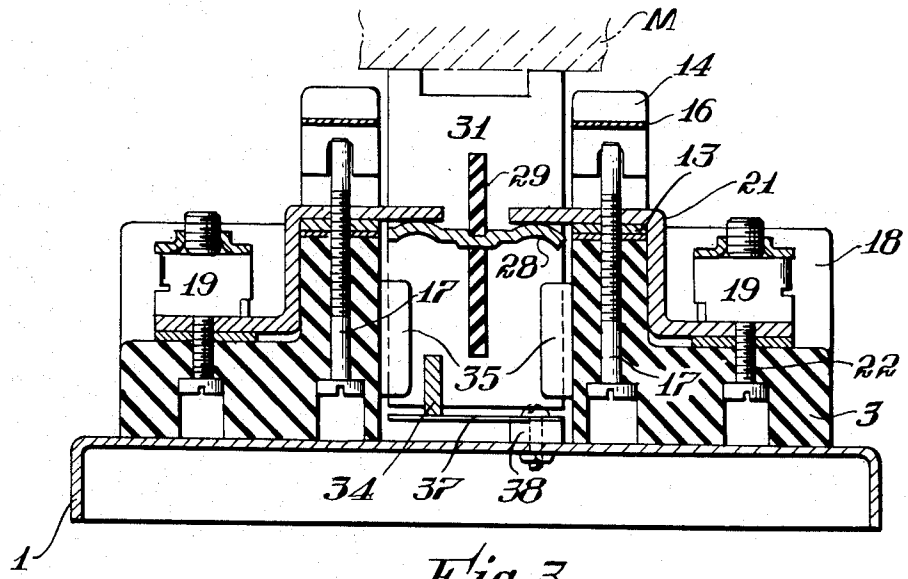


Fig. 3

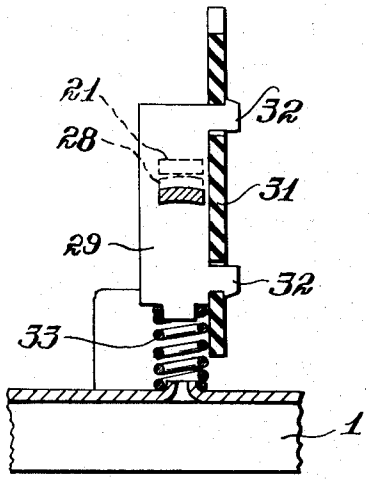


Fig. 5

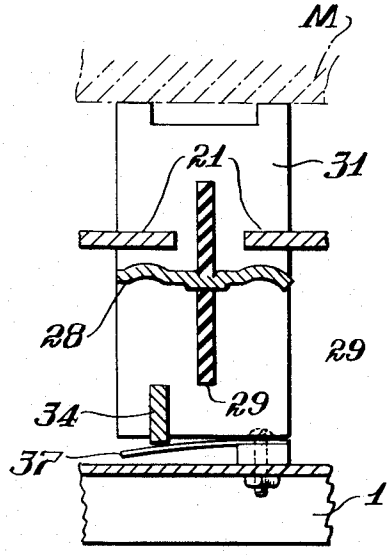


Fig. 4

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2,747,049

PLUG-IN METER SOCKET WITH SHUNT SWITCH AND SIGNAL

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Application February 1, 1954, Serial No. 407,535

14 Claims. (Cl. 200—51.1)

This invention relates to meter mounting boxes and other sockets of the kind disclosed in my pending application Ser. No. 370,775, filed July 28, 1953, namely sockets having switches which automatically close the gap between opposed terminals when the meter or other plug-in device is removed so that current will continue to pass through the circuit.

Objects of the present invention are to provide improved means which operate the switches more effectively, which produce an audible signal when the switches are opened, which will carry heavy current without danger of arcing, and which is durable and reliable in use.

According to the present invention the socket is provided with pairs of terminals for engagement with the electrodes of the plug-in device, each pair comprising two terminals spaced apart for connection to opposite sides of a gap in a circuit, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, together with a switch for bringing each of the gaps when the device is removed from the socket, an actuator extending lengthwise of the row in the aforesaid plane for actuating a signal when it is retracted, and means for retracting the actuator when the device is inserted in the socket. The actuator is preferably operated by means of one or more plungers extending in the direction in which the device moves when it is inserted in the socket. When using a plurality of plungers the actuator preferably comprises a part which extends lengthwise of the aforesaid row in the aforesaid plane and interconnects the plungers together.

In a more specific aspect the terminals of each pair have contacts extending toward each other part way across the gaps between the terminals and the switches engage the backs of the contacts when the switches are closed, and springs yieldingly urge the actuator forwardly to press the switches against the contacts. In the preferred embodiment each plunger comprises a plate of insulation extending transversely of the aforesaid plane between the contacts and the plungers have guides, also formed of insulation, which overlap the edges of the plates, so as to prevent arcing between adjacent contacts.

In a still more specific aspect the invention involves an audible signal operated by the switch actuating means. Thus, even though the operator cannot see the switches he knows when they are opened or closed.

For the purpose of illustration a typical embodiment is shown in the accompanying drawings in which:

Fig. 1 is a plan view;

Fig. 2 is a side elevation with a part broken away;

Fig. 3 is a section on line 3—3 of Fig. 1 showing the switches in closed position;

Fig. 4 is a similar view showing the switches in open position; and

Fig. 5 is a section on line 5—5 of Fig. 1.

The particular embodiment of the invention chosen for the purpose of illustration comprises a base 1 which is usually provided with a cover (not shown) having an opening shaped to fit around the periphery of the meter

or other device inserted in the socket. Mounted on the base 1 by means of screws 2 are blocks of insulation 3 which are separated by a space 4 (Fig. 1). Mounted on the forward faces of the blocks 3 adjacent the space 4 are pairs of terminals 6—7, 8—9 and 11—12, the terminals of each pair being aligned crosswise of the space 4 and the terminals on each side of the space being aligned in a row extending lengthwise of the space 4. These terminals are preferably constructed as disclosed and claimed in my copending application Ser. No. 371,281, filed July 30, 1953 (now Patent No. 2,709,794, dated May 31, 1955), each terminal comprising a U-shaped member having a base 13 and two forwardly projecting legs 14 and 16, the leg 14 being relatively straight and the leg 16 being curved so that its convex side is presented to the leg 14 (Fig. 3). Each terminal is secured to the block 3 by means of a screw 17 extending upwardly through the block of insulation and thence into juxtaposition to the outer concave side of the leg 16. Mounted in recesses 18 in the blocks 3 are connectors 19 for connection to the opposite sides of circuits. For use as a meter socket the connectors on one side are connected to the power lines and the connectors on the other side are connected to the load circuits. These connectors are preferably constructed as disclosed in my copending application, Ser. No. 400,957, filed December 29, 1953.

Each connector 19 is connected to its associated terminal through a Z-shaped bar 21 which is held in place by the aforesaid screw 17 and a screw 22 (Fig. 3). The danger of arcing between adjacent connectors is minimized by barriers 23 and 24 which are integral with the blocks 3 and by plates of insulation 26 which fit in grooves 27 in the block.

The aforesaid Z-bars 21 project into the space 4 and under each pair of projecting ends is a switch 28 which is preferably shaped like the switch 20 in my copending application Ser. No. 187,000, filed September 27, 1950, and now abandoned. Each switch 28 is mounted on a bar 29 as shown in Figs. 3, 4 and 5, the switch being inserted through a slot in the bar and the insulation material of the bar being sufficiently yielding to permit the insertion. The bar 29 in turn is mounted on a plunger 31, the bar having hooks 32 engaging through slots in the plunger and the insulation material of the parts being sufficiently resilient to permit the hooks to be snapped through the slots into the position shown in Fig. 5. Each bar 29 is pressed upwardly by a spring 33 yieldingly to hold the switch 28 against the rear faces of the contact ends of the Z-bars 21. The plungers 31 are interconnected by a bar 34 fitting in slots in the lower ends of the plungers (Figs. 1, 2 and 4). Projecting into the space 4 are guide flanges 35 and 36 to overlap opposite sides of each plunger, thereby forming guide grooves for the plungers. Thus the plungers are prevented from moving endwise of the space 4 in one direction by the projecting contacts 21 and in the other direction by the guides 36. The switches 28, bars 29, plungers 31 and bar 34 are free to move in and out as a unitary structure. They are normally held in their forward position shown in Figs. 2 and 3 by the springs 33 and they are pressed inwardly to the position shown in Fig. 4 when the meter M or other device is inserted in the socket, at least one of the plungers projecting forwardly far enough to be engaged by the meter when the meter is inserted as illustrated in Figs. 3 and 4. Inasmuch as each circuit is opened at two places the switches need not be moved so far.

Inasmuch as the operator cannot see whether the switches 28 are opened when the meter is inserted, because the meter is in the way, it is desirable to have an audible signal to indicate when the switches move out of circuit-closing position. For this purpose a snapper 37

is mounted on the base 1 at 38 with its free end projecting under the bar 34 so that when the switch assembly is retracted the free end of the snapper 37 is flexed rearwardly. This snapper may be of the ordinary warped metal type which produces an audible snap when flexed.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. For receiving a device such as a meter which has a plurality of pairs of electrodes for connection to opposite sides of a gap in a circuit, a socket having a plurality of pairs of terminals for engagement with said pairs of electrodes respectively, each pair comprising two terminals spaced apart for connection to said sides respectively, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, a switch for bridging each of said gaps when the device is removed from the socket, and a plunger carrying each of said switches, each plunger comprising a plate of insulation extending transversely of said plane between adjacent pairs of terminals to prevent arcing between adjacent pairs, the forward ends of the plungers projecting into the path of said device so that the switches are retracted when the device is inserted.

2. For receiving a device such as a meter which has pairs of electrodes for connection to opposite sides of a gap in a circuit, a socket having pairs of terminals for engagement with said electrodes respectively when the device is inserted in a predetermined direction, each pair comprising two terminals spaced apart for connection to said sides respectively, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, a switch for bridging each of said gaps when the device is removed from the socket, a plunger carrying each of said switches, each plunger comprising a plate of insulation extending transversely of said plane between adjacent pairs of terminals to prevent arcing between adjacent pairs, the forward ends of the plungers projecting into the path of said device on opposite sides of said plane so that the switches are retracted when the device is inserted, and a spring for each plunger to return it to advanced position when the device is removed.

3. For receiving a device such as a meter which has pairs of electrodes for connection to opposite sides of a gap in a circuit, a socket having pairs of terminals for engagement with said electrodes respectively when the device is inserted in a predetermined direction, each pair comprising two terminals spaced apart for connection to said sides respectively, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, a switch for bridging each of said gaps when the device is removed from the socket, plungers extending in said direction for engagement with the device when it is inserted in the socket, each plunger being connected to a switch to retract it, the terminals of each pair having contacts extending toward each other part way across said gap, and each plunger comprising a plate of insulation extending transversely of said plane between said contacts.

4. For receiving a device such as a meter which has pairs of electrodes for connection to opposite sides of a gap in a circuit, a socket having pairs of terminals for engagement with said electrodes respectively when the device is inserted in a predetermined direction, each pair comprising two terminals spaced apart for connection to said sides respectively, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, a switch for bridging each of said gaps when the device is removed from the socket, a plurality of plungers spaced along said row, each of the plungers carrying one of said switches projecting into the path of said device when it is inserted in the socket, the terminals of each pair having contacts extending toward each other part way across said gap, said plungers comprising plates of insulation extending transversely of said plane between said contacts, and guides for said plates, the guides being formed of insulation and overlapping the edges of the plates.

5. For receiving a device such as a meter which has pairs of electrodes for connection to opposite sides of a gap in a circuit, a socket having pairs of terminals for engagement with said electrodes respectively when the device is inserted in a predetermined direction, each pair comprising two terminals spaced apart for connection to said sides respectively, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, a switch for bridging each of said gaps when the device is removed from the socket, an actuator extending lengthwise of the row in said plane for actuating a signal when it is depressed, and plungers carrying said switches and extending in said direction for engagement with the device when it is inserted in the socket, said plungers engaging said actuator, the terminals of each pair having contacts extending toward each other part way across said gap, said switches engaging the backs of said contacts and moving away from both contacts when the actuator is retracted, springs yieldingly urging the plungers forwardly to press the switches against the contacts, each plunger comprising a plate of insulation extending transversely of said plane between said contacts, and guides for said plate, the guides being formed of insulation and overlapping the edges of the plate.

6. For receiving a device such as a meter which has pairs of electrodes for connection to opposite sides of a gap in a circuit, a socket having pairs of terminals for engagement with said electrodes respectively when the device is inserted in a predetermined direction, each pair comprising two terminals spaced apart for connection to said sides respectively, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, a switch for bridging each of said gaps when the device is removed from the socket, a plurality of plungers spaced along said row, at least one of the plungers projecting into the path of said device when it is inserted in the socket, the terminals of each pair having contacts extending toward each other part way across said gap, said switches engaging the backs of said contacts and moving away from both contacts when the actuator is retracted, springs yieldingly urging the plungers forwardly to press the switches against the contacts, said plungers comprising plates of insulation extending transversely of said plane between said contacts, and guides for said plates, the guides being formed of insulation and overlapping the edges of the plates.

7. For receiving a device such as a meter which has pairs of electrodes for connection to opposite sides of a gap in a circuit, a socket having pairs of terminals for engagement with said electrodes respectively, each pair comprising two terminals spaced apart for connection to said sides respectively, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, a switch for bridging each of said gaps when the device is removed from the socket, a plunger for actuating each switch, an actuator extending lengthwise of the row in said plane behind said plungers so as to be retracted when the device is inserted in the socket, and an audible signal operated by said actuator.

8. For receiving a device such as a meter which has pairs of electrodes for connection to opposite sides of a gap in a circuit, a socket having pairs of terminals for engagement with said electrodes respectively when the device is inserted in a predetermined direction, each pair comprising two terminals spaced apart for connection to said sides respectively, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, a switch for bridging each of said gaps when the device is re-

moved from the socket, means for operating the switches, and an audible signal operated by said means, the operating means comprising an actuator extending lengthwise of the row in said plane, and a plunger extending in said direction for engagement with the device when it is inserted in the socket, the plunger engaging said actuator to retract it.

9. For receiving a device such as a meter which has pairs of electrodes for connection to opposite sides of a gap in a circuit, a socket having pairs of terminals for engagement with said electrodes respectively when the device is inserted in a predetermined direction, each pair comprising two terminals spaced apart for connection to said sides respectively, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, a switch for bridging each of said gaps when the device is removed from the socket, means for operating the switches, and an audible signal operating by said means, the operating means comprising a plurality of plungers spaced along said row, at least one of the plungers projecting into the path of said device when it is inserted in the socket, and an actuator for actuating said signal, the actuator extending lengthwise of the row in said plane and interengaging said plungers.

10. For receiving a device such as a meter which has pairs of electrodes for connection to opposite sides of a gap in a circuit, a socket having pairs of terminals for engagement with said electrodes respectively, each pair comprising two terminals spaced apart for connection to said sides respectively, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, a switch for bridging each of said gaps when the device is removed from the socket, means for operating the switches, and an audible signal operated by said means, the operating means comprising an actuator extending lengthwise of the row in said plane, means for retracting the actuator when the device is inserted in the socket, the terminals of each pair having contacts extending toward each other part way across said gap, said switches engaging the backs of said contacts and moving away from both contacts when the actuator is retracted, and a spring yieldingly urging the actuator forwardly to press the switches against the contacts.

11. For receiving a device such as a meter which has pairs of electrodes for connection to opposite sides of a gap in a circuit, a socket having pairs of terminals for engagement with said electrodes respectively when the device is inserted in a predetermined direction, each pair comprising two terminals spaced apart for connection to said sides respectively, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, a switch for bridging each of said gaps when the device is removed from the socket, means for operating the switches, and an audible signal operated by said means, the operating means comprising an actuator extending lengthwise of the row in said plane, a plunger extending in said direction for engagement with the device when it is inserted in the socket, the plunger engaging said actuator to retract it, the terminals of each pair having contacts extending toward each other part way across said gap and said plunger comprising a plate of insulation extending transversely of said plane between said contacts.

12. For receiving a device such as a meter which has pairs of electrodes for connection to opposite sides of a gap in a circuit, a socket having pairs of terminals for engagement with said electrodes respectively when the device is inserted in a predetermined direction, each pair comprising two terminals spaced apart for connection to said sides respectively, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, a switch for bridging each of said gaps when the device is removed from the socket, means for operating the switches, and an audible signal operating by said means, the operating means comprising a plurality of plungers spaced along said row, the plungers projecting into the path of said device when it is inserted in the socket, an actuator extending lengthwise of the row in said plane and interengaging said plungers, the terminals of each pair having contacts extending toward each other part way across said gap, said plungers comprising plates of insulation extending transversely of said plane between said contacts, and guides for said plates, the guides being formed of insulation and overlapping the edges of the plates.

13. For receiving a device such as a meter which has pairs of electrodes for connection to opposite sides of a gap in a circuit, a socket having pairs of terminals for engagement with said electrodes respectively when the device is inserted in a predetermined direction, each pair comprising two terminals spaced apart for connection to said sides respectively, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, a switch for bridging each of said gaps when the device is removed from the socket, means for operating the switches, and an audible signal operated by said means, the operating means comprising an actuator extending lengthwise of the row in said plane, and a plunger extending in said direction for engagement with the device when it is inserted in the socket, the plunger engaging to said actuator, the terminals of each pair having contacts extending toward each other part way across said gap, said switches engaging the backs of said contacts and moving away from both contacts when the actuator is retracted, a spring yieldingly urging the actuator forwardly to press the switches against the contacts, said plunger comprising a plate of insulation extending transversely of said plane between said contacts, and guides for said plate, the guides being formed of insulation and overlapping the edges of the plate.

14. For receiving a device such as a meter which has pairs of electrodes for connection to opposite sides of a gap in a circuit, a socket having pairs of terminals for engagement with said electrodes respectively when the device is inserted in a predetermined direction, each pair comprising two terminals spaced apart for connection to said sides respectively, the pairs being arranged side by side in a row extending parallel to a plane disposed between the two terminals of each pair, a switch for bridging each of said gaps when the device is removed from the socket, means for operating the switches, and an audible signal operated by said means, the operating means comprising a plurality of plungers spaced along said row, at least one of the plungers projecting into the path of said device when it is inserted in the socket, an actuator extending lengthwise of the row in said plane and interengaging said plungers, the terminals of each pair having contacts extending toward each other part way across said gap, said switches engaging the backs of said contacts and moving away from both contacts when the actuator is retracted, a spring yieldingly urging the actuator forwardly to press the switches against the contacts, said plungers comprising plates of insulation extending transversely of said plane between said contacts, and guides for said plates, the guides being formed of insulation and overlapping the edges of the plates.

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