

Aug. 9, 1932.

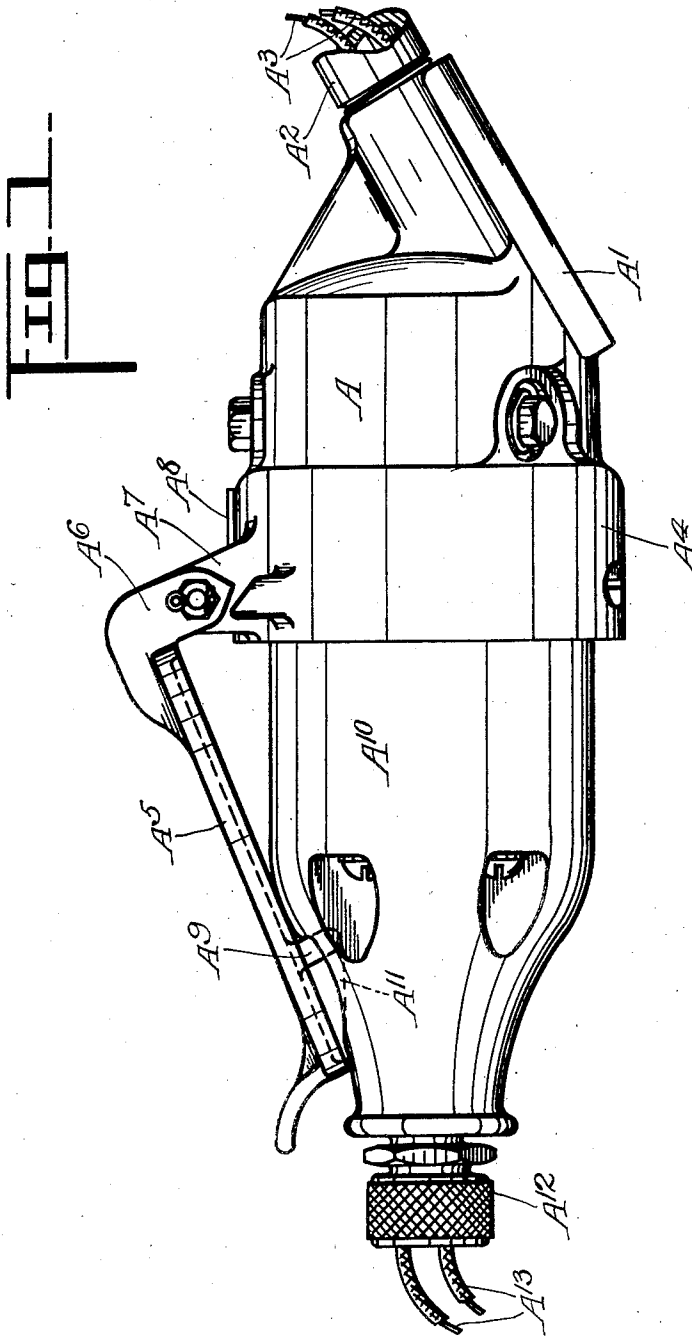
E. C. HELLWIG

1,870,625

ARCLESS RECEPTACLE AND PLUG CONNECTER

Filed Jan. 10, 1931.

4 Sheets-Sheet 1



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Aug. 9, 1932.

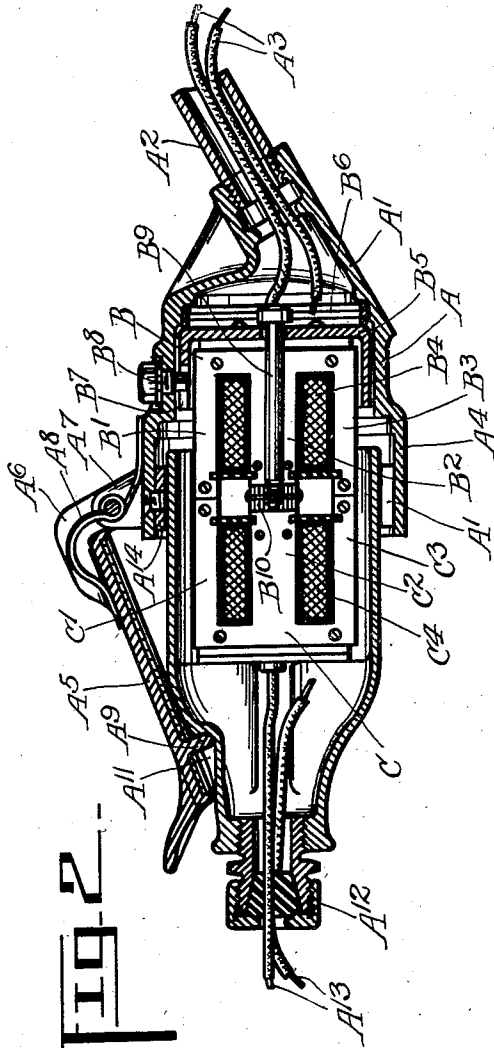
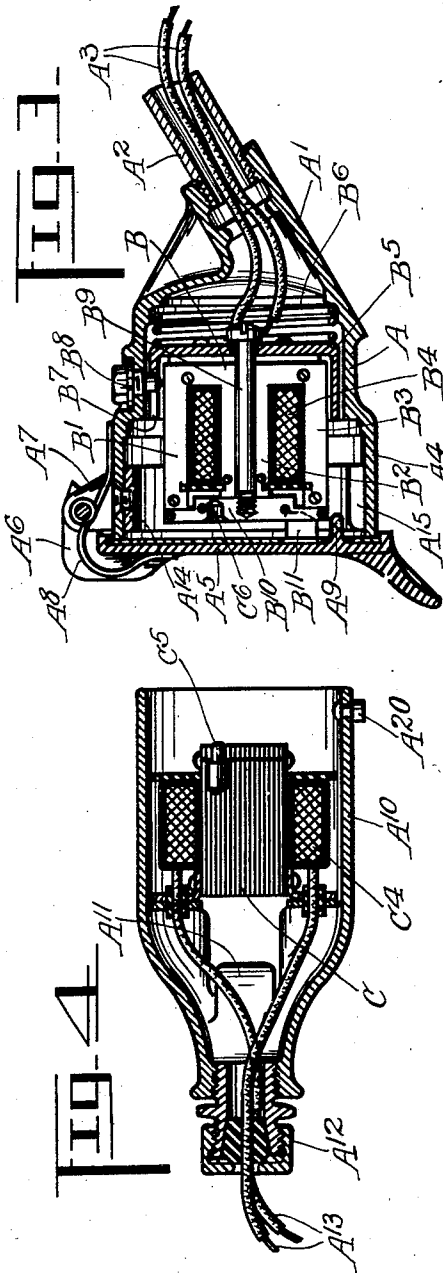
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ARCLESS RECEPTACLE AND PLUG CONNECTER

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4 Sheets-Sheet 2



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ARCLESS RECEPTACLE AND PLUG CONNECTER

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4 Sheets-Sheet 3

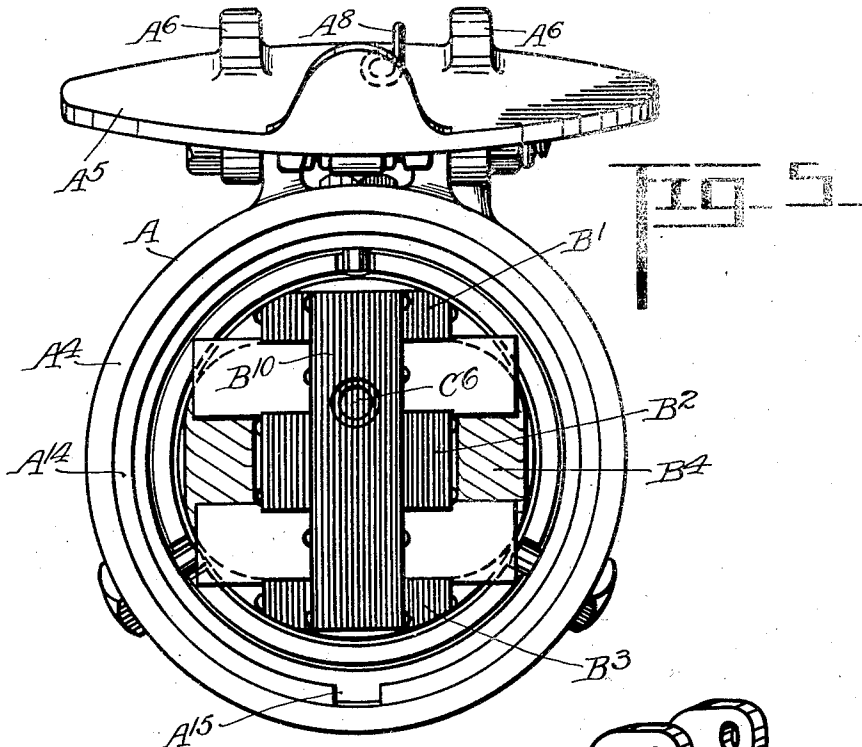


Fig. 6

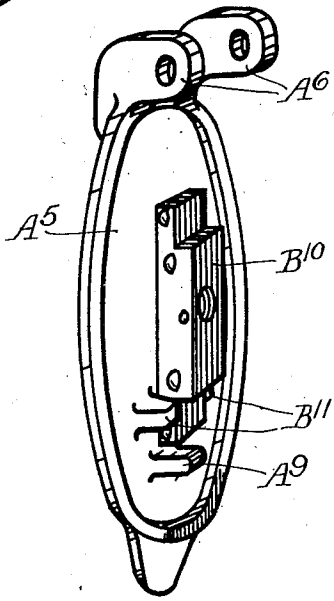
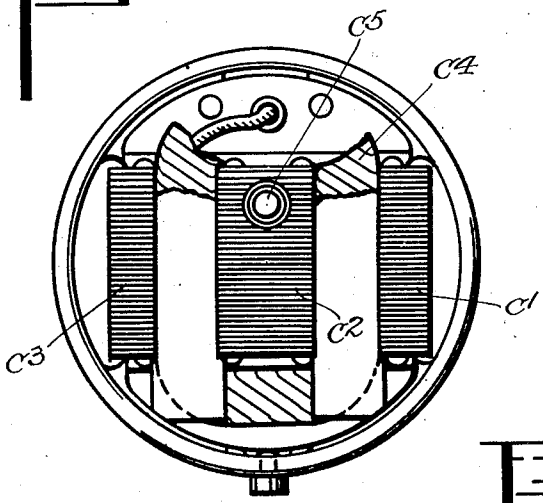


Fig. 9

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4 Sheets-Sheet 4

FIG-7

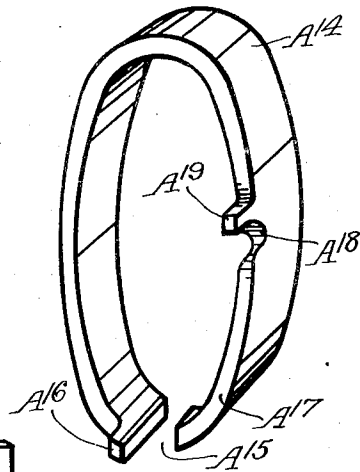
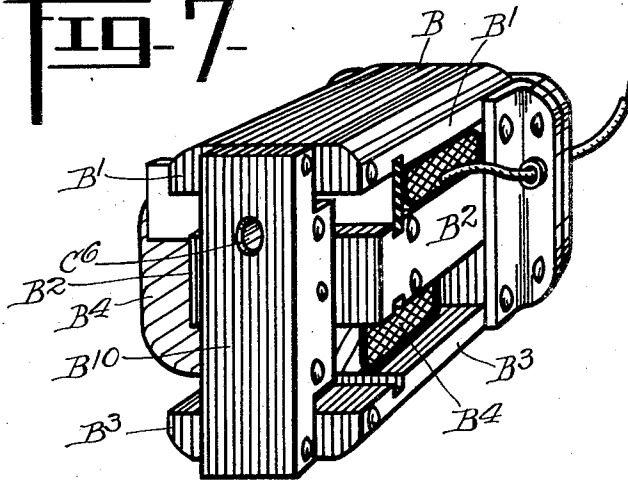


FIG-8

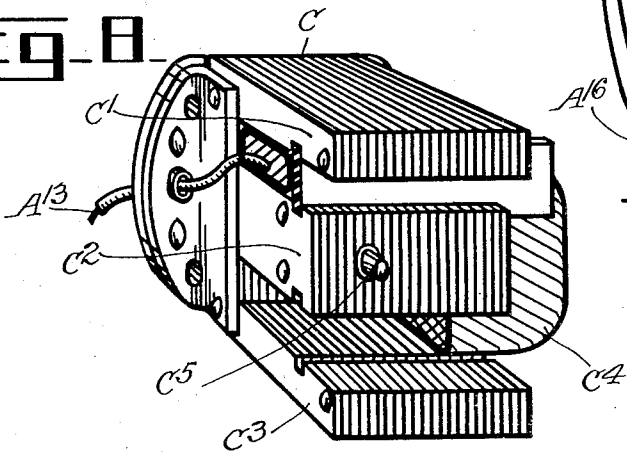


FIG-10

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UNITED STATES PATENT OFFICE

EMIL C. HELLWIG, OF AURORA, ILLINOIS, ASSIGNOR TO THE PYLE-NATIONAL COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY

ARCLESS RECEPTACLE AND PLUG CONNECTER

Application filed January 10, 1931. Serial No. 507,821.

My invention relates to improvements in arcless receptacles and plug connecters and has for one object to provide in connection with a terminal plug and receptacle, means whereby one electric circuit may be plugged into another electric circuit and accomplish the transmission of power without the closure of a continuous electric circuit. Another object is to provide an arrangement wherein the plug and socket will together form a transformer, one coil of which is excited from the power source, the other coil of which may be placed in circuit with the light or other suitable load for the purpose of transmitting power.

The present invention contemplates a connector for an electrical extension so made that no spark or arc is created on connecting or disconnecting the plug member. This makes it suitable for combustible atmosphere such as in powder plants, Duco paint plants, grain elevators, oil refineries and the like.

The connector is made with a transformer with a primary always in circuit with the line, consequently the extension is from the secondary with a reduced voltage of say 32 volts. The utilization of the 32 volt extension line is possible without changing the standard voltage of 110 of the main circuit and with which the connector is installed.

The low voltage in the extension makes it possible to use the same with safety. The low voltage extension circuit not being grounded makes it doubly safe from electrical shock should the installation of the extension be defective. Furthermore, there is less chance of an arc or spark through poor installation should any part of the extension circuit come in contact with some grounded object.

The primary is provided with a keeper which closes the magnetic circuit there-through thus preventing burning out of the core and the prevention of the creation of excessive heat. Once the plug member is inserted in the socket containing the primary and turned to lock the pipes together, such turning moves the keeper out of the path of the magnetic plug.

My invention is illustrated more or less dia-

grammatically in the accompanying drawings, wherein—

Figure 1 is a side elevation of the assembled plug and socket;

Figure 2 is a longitudinal section through the socket and plug assembled to form a transformer;

Figure 3 is a section through the socket showing the cover closed;

Figure 4 is a section through the plug at right angles to the section of Figure 2 showing the position it assumes as it is about to be engaged by the socket;

Figure 5 is a front elevation of the socket with the cover open before the plug has been inserted;

Figure 6 is a front elevation of the plug;

Figure 7 is a detail perspective of the receptacle core and coil assembly;

Figure 8 is a detail perspective of the plug core and coil assembly;

Figure 9 is a perspective of the socket cover showing diagrammatically its relation with the coil keeper;

Figure 10 is a perspective of the locking ring.

Like parts are indicated by like characters throughout the specification and drawings.

A is a socket having a supporting flange A¹ by which the socket may be mounted on any suitable support; a conduit A² leads from the socket and contains power conductors A³. The socket is bell mouthed as indicated at A⁴ and the mouth is closed by a cover A⁵ having hinge arms A⁶ pivoted on bracket arms A⁷ on the housing. A⁸ is a spring tending to hold the cover closed. A⁹ is a latch tongue on the cover adapted to cooperate with the plug to hold it in proper working position. A¹⁰ is the plug adapted to penetrate the bell mouth A⁴ of the socket A. This plug has a notch A¹¹ to receive the locking tongue A⁹ to assist in holding the socket and plug in working relation. A¹² is a packing gland through which the conductor wires A¹³ extend to any suitable lamp or motor or any other electric machine or device which is to be supplied with power from the socket through the plug.

The plug A¹⁰ itself is hollow and contains a coil and core which will subsequently be

described. The same thing is true of the socket. Contained within the bell mouth A⁴ of the socket is a locking ring A¹⁴. It is slotted as at A¹⁵. On one side of the slot is a stop A¹⁶, on the other side of the slot a cam surface A¹⁷ terminating in a notch A¹⁸, on the other side of which is a stop A¹⁹. The end of the socket has a lug A²⁰. When the two are to be assembled, the plug is thrust into the socket, the lug A²⁰ entering from the back toward the front, as viewed in Figure 10, of the holding ring through the slot A¹⁵. The plug is then rotated causing the lug A²⁰ to travel along the cam surface A¹⁷ until it engages the notch A¹⁸, further movement being prevented by the stop A¹⁹. Rotation of the plug in the wrong direction being prevented by the stop A¹⁶.

Referring now to the socket, it will be noted that it contains a core B. This core is made of laminated iron and has arms B¹ B² B³ joined by a central base and containing a primary coil B⁴ excited by the wires A³. This core is mounted in a carrier sleeve B⁵. A spring B⁶ is introduced between the sleeve B⁵ and the bottom of the socket and the sleeve is slotted at B⁷ and the slot is engaged by a guide pin B⁸ to prevent rotation of the carrier, limit its outward movement while leaving it free to be forced inwardly as the spring is compressed. The core and coil assembly is held in the carrier by the central screw B⁹, which screw extending through the core and rotatable in the core and carrier has on its end a rotatable keeper B¹⁰. In the position shown in Figures 3, 5 and 7 the keeper is in the plane of the members B¹ B² B³ and is in contact with all three of them, thereby closing the magnetic circuit through the core elements. The purpose of this is to reduce to a minimum the reluctance so as to prevent resistance to current flow in the primary coil when current is not being supplied to and through the plug. Referring to Figures 3 and 9, it will be noted that the cover A⁵ has a pair of inwardly projecting lugs B¹¹. These lugs straddle the keeper B¹⁰ and when the cover is down holds the keeper in the position shown in Figures 3, 5 and 7, there being a slight tendency of the magnetic field to cause rotation of the keeper. This is prevented by this engagement of the keeper with the lugs on the cover.

Referring now to the plug, it will be noted that the plug contains a core piece C comprising arms C¹ C² C³ joined by a central back piece as indicated and having associated with them a secondary coil C⁴ in communication with the wires A¹³. Projecting from the face of the core piece C² at a point removed from the center thereof is a pin C⁵. This pin is adapted to penetrate a hole C⁶ in the keeper B¹⁰. The device is put into operation by lifting up the cover, then inserting the plug. When the plug is inserted with the

lug A²⁰ in the slot A¹⁵ the pin C⁵ penetrates the hole C⁶, then when the plug is rotated through 90° to bring the lug A²⁰ into engagement with the notch A¹⁸ the eccentric pin C⁵ engaging the hole C⁶ causes the keeper to rotate into the position it is shown assuming in Figure 2. That is a position wherein the keeper is out of contact with members B¹ and B³ and in contact only with the pole piece B². I then have an arrangement of parts such as is shown in Figure 2 with the pole pieces B¹ C¹ B² C² and B³ C³ abutting one another, the keeper B¹⁰ forming for the time in this connection a part of the pole piece B². Under these circumstances the device operates just as any other transformer and transformed current passes through the wires A¹³ being generated by the exciting effect of the transformer field on the secondary coil. The cover engaging the notch in the plug furnishes an additional means for locking the plug against rotation and withdrawal.

It will be obvious that the relation between the primary and secondary coils may be anything desired, the transformer may be a step down or step up transformer as the case may be. It may be desirable to use it to increase or decrease the voltage or to give substantially the same voltage.

I claim:

1. In an electric plug and socket, core elements and coils mounted in each and means for locking them removably together to maintain the core elements and coils in working relation to form an electric transformer, and means associated with the primary coil and operative only when the plug and socket are not locked together for closing a magnetic circuit through the core elements associated with such coil.

2. In an electric plug and socket, core elements and coils mounted in each and means for locking them removably together to maintain the core elements and coils in working relation to form an electric transformer, means associated with the primary coil and operative only when the plug and socket are not locked together for closing a magnetic circuit through the core elements associated with such coil, said means comprising a keeper pivotally mounted on the core elements and adapted to be rotated into and out of magnetic circuit closing position.

3. In an electric plug and socket, core elements and coils mounted in each and means for locking them removably together to maintain the core elements and coils in working relation to form an electric transformer, means associated with the primary coil for closing a magnetic circuit through the core elements associated therewith, and means associated with the secondary coil and core elements for automatically displacing said first mentioned magnetic circuit closing

means when the plug and socket are in working relation.

4. In an electric plug and socket, a coil and a core element comprising a plurality of pole pieces joined at one end and projecting forwardly in general parallelism with the axis of plug and socket respectively, and means for removably locking the plug and socket in working relation with the pole pieces of one abutting and in line with the pole pieces of the other, and a keeper pivoted on one of the pole pieces associated with one of the coils and mounted for rotation into and out of engagement with another pole piece associated therewith.

5. In an electric plug and socket, a coil and a core element comprising a plurality of pole pieces joined at one end and projecting forwardly in general parallelism with the axis of plug and socket respectively and means for removably locking the plug and socket in working relation with the pole pieces of one abutting and in line with the pole pieces of the other, a keeper pivoted on one of the pole pieces associated with one of the coils and mounted for rotation into and out of engagement with another pole piece associated therewith, and means associated with the other coil for engaging such keeper and rotating it out of engagement when the pole pieces except the one upon which it is pivoted when the plug and socket are in working relation.

6. In an electric plug and socket, a coil and a core element comprising a plurality of pole pieces joined at one end and projecting forwardly in general parallelism with the axis of plug and socket respectively, means for removably locking the plug and socket in working relation with the pole pieces of one abutting and in line with the pole pieces of the other, a keeper pivoted on one of the pole pieces associated with one of the coils and mounted for rotation into and out of engagement with another pole piece associated therewith, and means associated with the other coil for engaging such keeper and rotating it out of engagement with the pole pieces except the one upon which it is pivoted when the plug and socket are in working relation, the means for locking the plug and socket in working relation comprising a cam and latch operative only upon relative rotation of plug and socket.

7. A transformer comprising a primary and a secondary coil, a core associated with each comprising a plurality of pole pieces joined together at one end only, means for removably locking the pole pieces together in abutting relation to complete the magnetic circuit associated with the two coils, the locking means comprising a lug associated with a cam and notch and a member carrying them and slotted to permit initial entry of the lug and to require rotation of the lug with re-

spect to the member before it engages with the notch in locked position.

8. A transformer comprising a primary coil and a secondary coil, a core associated with each comprising a plurality of pole pieces joined together at one end only, means for removably locking the pole pieces together in abutting relation to complete the magnetic circuit associated with the two coils, the locking means comprising a lug associated with a cam and notch and a member carrying them and slotted to permit initial entry of the lug and to require rotation of the lug with respect to the member before it engages with the notch in locked position, and a keeper mounted on one of the pole pieces adapted to be engaged by the other and rotated as the pole pieces come into locked working relation to move the keeper into inoperative position.

9. A transformer comprising a primary coil and a secondary coil, a core associated with each comprising a plurality of pole pieces joined together at one end only, means for removably locking the pole pieces together in abutting relation to complete the magnetic circuit associated with the two coils, the locking means comprising a lug associated with a cam and notch and a member carrying them and slotted to permit initial entry of the lug and to require rotation of the lug with respect to the member before it engages with the notch in locked position, the keeper being adapted to be rotated by relative rotation of the pole pieces into such position that it bridges the gap between the pole pieces when the two coils are separated.

10. A transformer connector including a plug member and a socket member, a primary winding in the socket member, a secondary winding in the plug member, means for removably locking together said plug and said socket, means associated with the primary winding for closing the magnetic circuit therethrough when the plug is disconnected, said means being rendered ineffective for closing the magnetic circuit through the primary when said plug is applied to said socket.

Signed at Chicago, county of Cook and State of Illinois, this 8th day of January, 1931.

EMIL C. HELLWIG.

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