

April 7, 1953

J. J. ROBINSON, JR., ET AL
REVERSING CONNECTOR PLUG AND ADAPTER
FOR THREE-PHASE MOTORS

2,634,344

Filed Jan. 10, 1951

2 SHEETS—SHEET 1

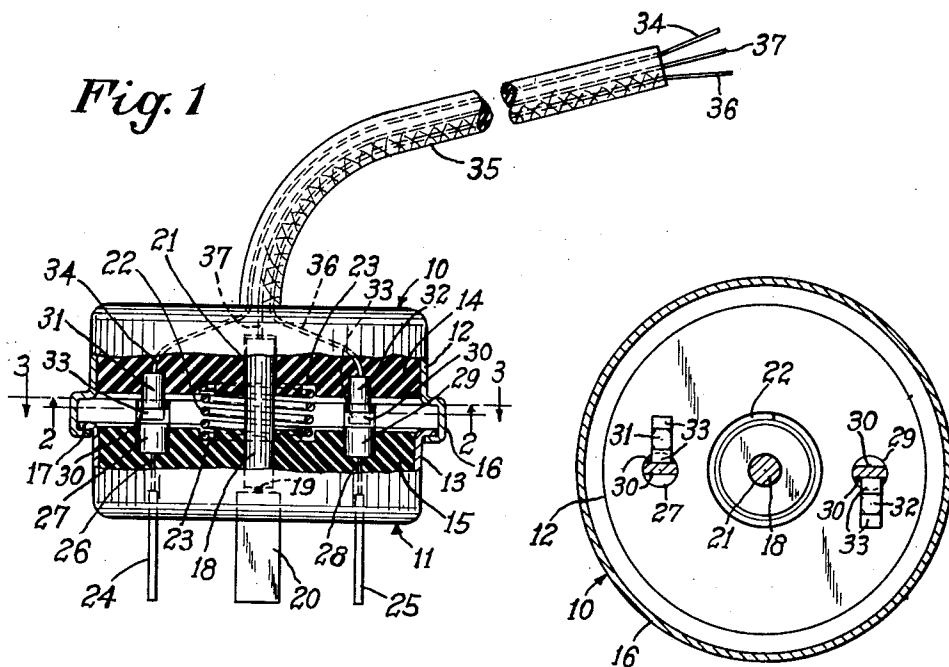


Fig. 2

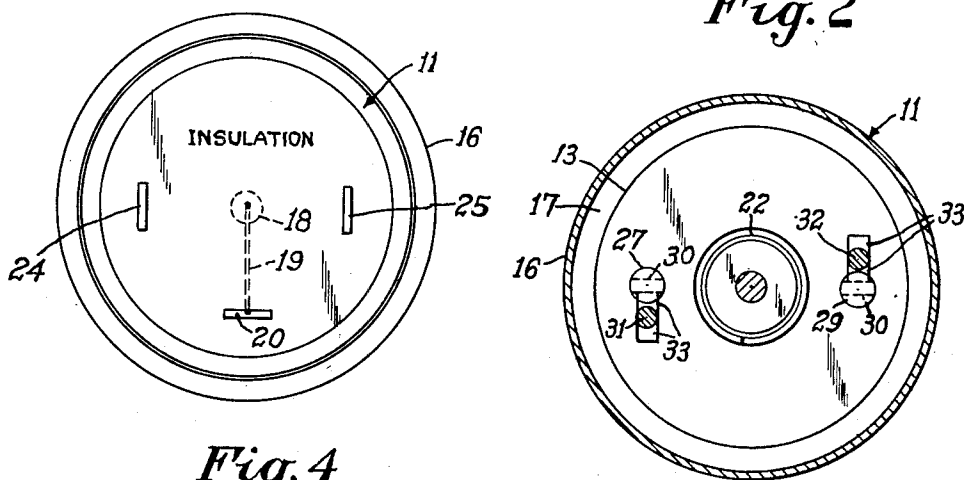


Fig. 3

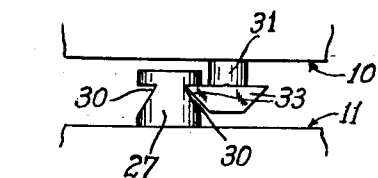


Fig. 4



Fig. 5

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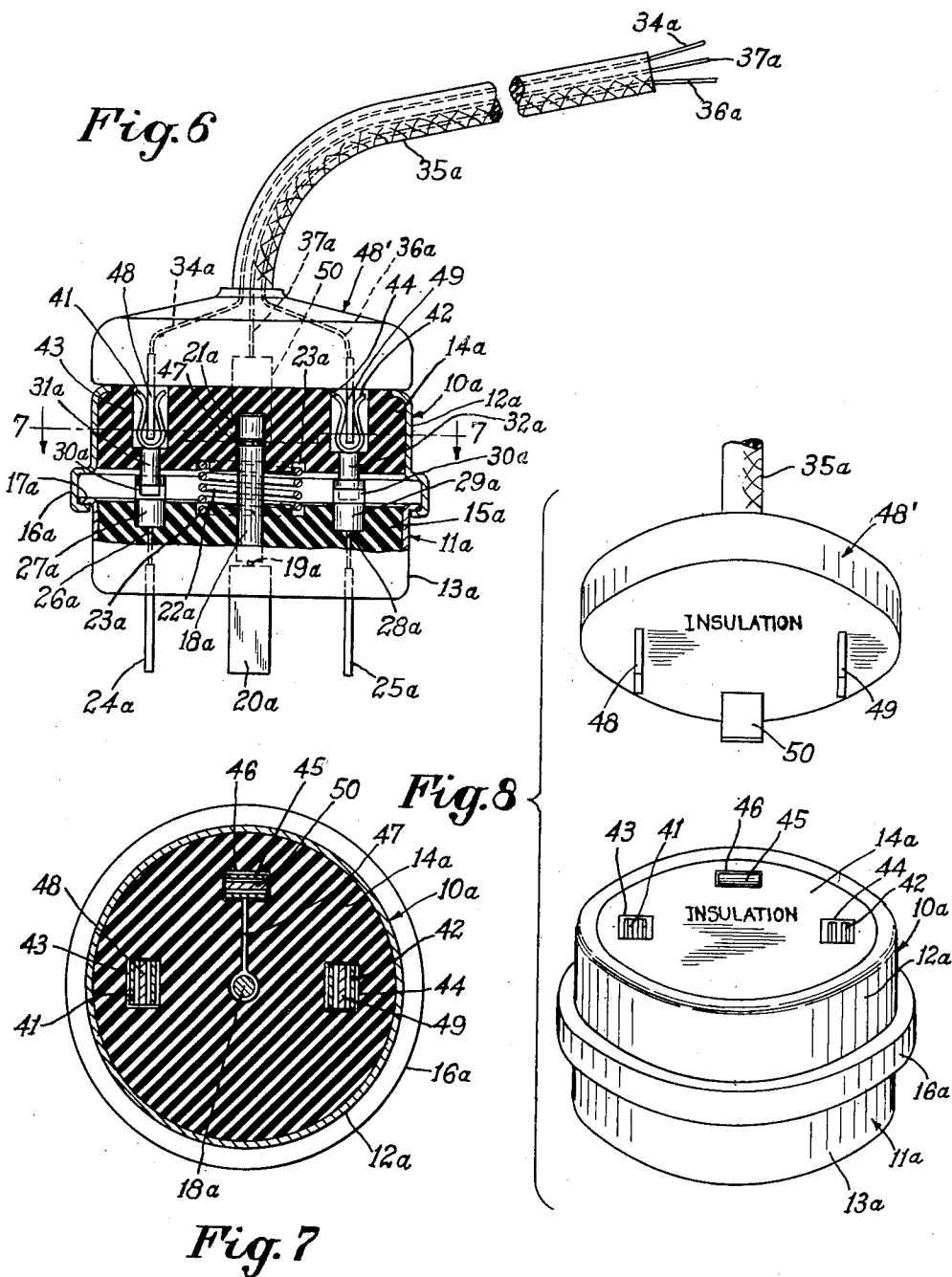
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2 SHEETS—SHEET 2



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UNITED STATES PATENT OFFICE

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REVERSING CONNECTOR PLUG AND
ADAPTER FOR THREE-PHASE MOTORSJoseph J. Robinson, Jr., Dover, and Howard M.
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The invention relates generally to electrical connecting devices or connector plugs for use with flexible electric cords, adapted for insertion into electrical receptacles or sockets, and more particularly to a device of this character in the form of a reversible, connector plug or adapter, especially designed for connecting a three-phase motor.

Such terminals or connector plugs for use in a three-phase line are provided with three prongs, or plug-in points, arranged for insertion, in one position only, into a conventional three-phase receptacle or socket.

In shops or factories where three-phase motors are used, it is customary practice for employees, of the shop or factory, to do the wiring of the motors themselves, connecting the three wires from the motor to the cord terminal or connector plug, and it frequently happens that after the wiring has been completed, it is found that the wires are connected to the wrong prongs or plug-in points of the cord terminal or connector plug, causing the motor to run in reverse. This requires that the terminal or connector plug be taken apart and the connections of the wires changed.

The present invention contemplates the provision of a connector plug or adapter comprising two members rotatably connected together, one member carrying the prongs, or plug-in points, for insertion into a conventional three-phase receptacle or socket, and the other member being connected to the wires leading to the motor.

Another object of the invention is to provide such a three-phase reversing plug or adapter wherein the two members thereof are rotatably connected together by a central conductor which is connected to one of the wires leading to the motor and to one of the prongs or plug-in points.

A further object is to provide a three-phase connector plug or adapter of this type in which the other two prongs or plug-in points are connected to contacts carried by one member of the plug, and the other two wires are connected to contacts carried by the other member of the plug, whereby a half-rotation of one member relative to the other will reverse the engagement of the contacts.

A still further object of the invention is to provide a connector plug or adapter of this character having spring means for normally urging the two members of the plug away from each other so as to cause the contacts of the two members to tightly engage each other.

Another object is to provide a novel construc-

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tion of interengaging contacts upon the two members of the plug or adapter.

The above objects together with others which will be apparent from the drawing and following description, or which may be later referred to, may be attained by constructing the improved connector plug or adapter in the manner hereinafter described in detail and illustrated in the accompanying drawing, in which;

Figure 1 is a side elevation of a three-phase reversing plug embodying the invention, with parts broken away for the purpose of illustration;

Fig. 2 a transverse section through the connector plug, taken as on the line 2—2, Fig. 1;

Fig. 3 a transverse section through the connector plug, taken as on the line 3—3, Fig. 1;

Fig. 4 a bottom plan view of the improved connector plug, showing the arrangement of the prongs, or plug-in points, for insertion into a conventional three-phase receptacle or socket;

Fig. 5 an enlarged, fragmentary, detail elevation showing the novel construction of the contacts upon the two members of the plug;

Fig. 6 a side elevation, partly in section, showing the invention in the form of an adapter, with a conventional three-phase connector plug detachably connected thereto;

Fig. 7 a transverse, sectional view of the adapter, taken as on the line 7—7, Fig. 6; and

Fig. 8 an exploded, perspective view of the adapter shown in Figs. 6 and 7, and the conventional, three-phase connector plug detached therefrom.

The improved connector plug, as shown in Figs. 1 to 5 inclusive, comprises the upper and lower members indicated generally at 10 and 11 respectively. Each member of the connector plug may be of any conventional construction, and for the purpose of illustration the two members are shown as comprising metal shells 12 and 13 respectively, filled with any suitable insulation material, as indicated at 14 and 15 respectively.

The upper member 10 of the connector plug may have an annular channel portion 16 formed upon the lower edge of the metal shell 12 to receive the annular flange 17 formed at the upper edge of the metal shell 13 of the lower member 11, so as to connect the two members of the plug together in such manner that they are rotatable relative to each other.

A central conductor, in the form of a rod 18 of copper, bronze or other suitable conductor material, may be fixed within the center of the insulation material 15 of the lower member 11 of the connector plug and connected as indicated at 19 to the prong or plug-in point 20, which is

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carried by said lower member 11 and projects downwardly or outwardly therefrom. The upper portion of the conductor 18 is rotatably received within a suitable opening 21 in the insulation 14 of the upper member 10 of the plug.

A coil spring 22 surrounds the conductor 18, in spaced relation thereto, and opposite ends thereof are received in the annular grooves 23 formed in the opposed faces of the insulation 14 and 15 of the two members of the plug. This spring urges the members 10 and 11 apart, the flange 17 and channel 16 of the shells of the two members limiting the separating movement thereof.

Prongs 24 and 25 are also embedded in the insulation of the lower member 11 of the plug and extend through the bottom thereof, as best shown in Figs. 1 and 4. The prong 24 is connected, as at 26, to a contact 27 and the prong 25 is connected, as at 28, to a similar contact 29.

The contacts 27 and 29 are embedded in the insulation 15 of the lower member of the connector plug and project through the top thereof. Each of these contacts 27 and 29 has notches 30 on opposite sides thereof, said notches being preferably substantially V-shape as shown in Fig. 5.

Contacts 31 and 32 are embedded in the insulation of the upper member 10 of the connector plug and projected down through the bottom thereof. Each of the contacts 31 and 32 has V-shape projections 33, on opposite sides, for engagement with either of the notches 30 of the contacts 27 and 29.

The contact 31 is connected to one wire 34 of the flexible cord 35 which leads to the motor, the contact 32 is connected with another wire 36 of said flexible cord and the upper end of the central conductor 18 is connected to the third wire 37.

With the parts in the position shown in the drawing, the wire 37 is connected to the prong 20, the wire 34 is connected through the contacts 31 and 27 to the prong 24 and the wire 36 is connected through the contacts 32 and 29 to the prong 25.

The prongs 20, 24 and 25 of the connector plug may be inserted into a conventional three-phase receptacle or socket, with the parts in the position shown in the drawings. If it is found necessary to reverse the wiring, in order to reverse the direction of the motor, it is only necessary that the upper member 10 of the connector plug be given a one-half turn, relative to the lower member 11, withdrawing the contact 31 from the contact 27 and moving it into engagement with the contact 29 of the lower member, while at the same time the contact 32 of the upper member is withdrawn from said contact 29 of the lower member and moved into engagement with the contact 27 of the lower member, thus reversing the connection of the wires 34 and 36 relative to the prongs 24 and 25 so as to reverse the motor.

It will be evident that with the contacts of the upper and lower members in either engaged position, the coil spring 22, urging the members 10 and 11 apart, will urge the contacts of the upper and lower members into tight engagement with each other so as to make good electrical connections therebetween.

With this construction of the connector plug, it will be seen that it is immaterial how the wires may be connected as it is only necessary to give the members of the connector plug a half-revolution relative to each other in order to reverse the connection.

Referring now more particularly to Figs. 6, 7

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and 8, in which the invention is illustrated as embodied in an adapter plug arranged to be plugged into a conventional three-phase receptacle or socket, and to have a conventional three-phase connector plug attached thereto, the device is shown as comprising the upper and lower members indicated generally at 10a and 11a.

The two members are shown as comprising metal shells 12a and 13a, filled with insulation material, as indicated at 14a and 15a. The upper member 10a, of the adapter, is shown provided with an annular channel portion 16a formed upon the lower edge of the metal shell 12a to receive the annular flange 17a, formed at the upper edge of the metal shell 13a of the lower member 11a, so as to connect the two members of the adapter together in such manner that they are rotatable relative to each other.

A central conductor, in the form of a rod 18a of copper, bronze or other suitable conductor material, may be fixed within the center of the insulation material 15a, of the lower member 11a, and connected, as indicated at 19a, to the prong or plug-in point 20a carried by the lower member 11a and projecting downwardly and outwardly therefrom.

The upper portion of the conductor rod 18a is rotatably received within a suitable opening 21a, formed in the insulation 14a of the upper member 10a of the adapter.

A coil spring 22a surrounds the contact rod 18a, in spaced relation thereto, and opposite ends thereof are received in the annular groove 23a formed in the opposed faces of the insulation 14a and 15a of the two members of the adapter.

Prongs 24a and 25a are also embedded in the insulation 15a, of the lower member 11a, and extend through the bottom thereof as shown in Fig. 6. The prong 24a is connected as at 26a to a contact 27a and the prong 25a is connected, as at 28a, to a similar contact 29a.

The contacts 27a and 29a are embedded in the insulation 15a, of the lower member 11a, and project through the top thereof. Each of these contacts has notches 30a on opposite sides thereof and identical with the notches 30 shown in Figs. 1 and 2.

Contacts 31a and 32a are embedded in the insulation 14a, of the upper member 10a of the adapter, and project down through the bottom thereof, each of these contacts having V-shape projections similar to the projections 33 in Figs. 1, 2 and 3, for engagement with either of the notches 30a of the contacts 27a and 29a.

The contact 31a is connected to a pair of spring contact jaws 41, and the contact 32a is connected to a similar pair of spring contact jaws 42, these jaws being located in slots 43 and 44 respectively, opening through the top of the insulation 14a of the upper member 10a.

A similar pair of spring contact jaws 45 is located in a slot 46 in the insulation 14a, and is rotatably connected to the center post 18a as by a conductor 47.

A conventional three-phase connector plug 48' may be detachably connected to this adapter. This connector plug has three prongs projecting from its lower side, and designated by the numerals 48, 49 and 50. The prong 48 is connected to one wire 34a of the flexible cord 35a, which may lead to a motor or the like, the prong 49 is connected to the wire 36a of said cord, and the prong 50 is connected to the wire 37a of said cord.

The prongs 20a, 24a and 25a, of the adapter, may be plugged into a conventional three-phase

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receptacle, and the prongs 48, 49 and 50 of the conventional three-phase connector plug may be plugged into the contact jaws 41, 42 and 45 respectively of the adapter.

With the parts in the position shown in Fig. 6 of the drawings, the wire 37a is connected through the prong 50, contact jaws 45, conductor 47, center post 12a and conductor 19a to the prong 20a, the wire 34a is connected through the prong 48, contact jaws 41, contacts 31a and 27a and conductor 26a to the prong 24a, and the wire 36a is connected through the prong 49, contact jaws 42, contacts 32a and 29a, and conductor 28a to the prong 25a.

If it is found necessary to reverse the wiring, in order to reverse the direction of the motor, it is only necessary that the upper member 10a of the adapter be given a one-half turn, relative to the lower member, withdrawing the contact 31a from the contact 27a and moving it into engagement with the contact 29a of the lower member, while at the same time the contact 32a of the upper member is withdrawn from said contact 29a of the lower member and moved into engagement with the contact 27a of the lower member, thus reversing the connection of the wires 34a and 36a relative to the prongs 24a and 25a so as to reverse the motor.

We claim

1. A reversing adapter plug for a three-phase line, comprising a pair of members, annular channel and flange means connecting the members together for relative rotation, three spaced plug-in prongs carried by one member, a multi-conductor cable having three conductors therein, one of said conductors being connected to one prong, said one conductor forming a pivot around which the members rotate a diametrically spaced pair of contacts in said one member, means connecting each of the other two prongs to one of said contacts and a diametrically spaced pair of contacts in the other member for engagement with the first named contacts, each of the second named contacts being connected to one of the other two conductors, one pair of said contacts having notches in opposite sides, the other pair of contacts having projections on opposite sides for engagement in said notches.

2. A reversing adapter plug for a three-phase line, comprising a pair of members, annular channel and flange means connecting the members together for relative rotation, three spaced plug-in prongs carried by one member, a multi-conductor cable having three conductors therein, one of said conductors being connected to one prong, said one conductor forming a pivot around which the members rotate a diametrically spaced pair of contacts in said one member, means connecting each of the other two prongs to one of said contacts and a diametrically spaced pair of contacts in the other member for engagement with the first named contacts, each of the second named contacts being connected to one of the other two conductors, one pair of said contacts having notches in opposite sides, the other pair of contacts having projections on opposite sides for engagement in said notches, and spring means urging the members apart, whereby said projections will be tightly engaged in said notches.

3. A reversing adapter plug for a three-phase line, comprising a pair of members, annular channel and flange means connecting the members together for relative rotation, three spaced plug-in prongs carried by one member, a cen-

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trally located conductor rod pivotally connecting the members together, means connecting said rod to one of said prongs, a multi-conductor cable having three conductors therein, one of said conductors being connected to said rod, a diametrically spaced pair of contacts in said one member, means connecting each of the other two prongs to one of said contacts and a diametrically spaced pair of contacts in the other member for engagement with the first named contacts, each of the second named contacts being connected to one of the other two conductors, one pair of said contacts having notches in opposite sides, the other pair of contacts having projections on opposite sides for engagement in said notches.

4. A reversing adapter plug for a three-phase line, comprising a pair of members, annular channel and flange means connecting the members together for relative rotation, three spaced plug-in prongs carried by one member, a centrally located conductor rod pivotally connecting the members together, means connecting said rod to one of said prongs, a multi-conductor cable having three conductors therein, one of said conductors being connected to said rod, a diametrically spaced pair of contacts in said one member, means connecting each of the other two prongs to one of said contacts and a diametrically spaced pair of contacts in the other member for engagement with the first named contacts, each of the second named contacts being connected to one of the other two conductors, one pair of said contacts having notches in opposite sides, the other pair of contacts having projections on opposite sides for engagement in said notches, and spring means urging the members apart, whereby said projections will be tightly engaged in said notches.

5. A reversing adapter plug for a three-phase line, comprising a pair of members, annular channel and flange means connecting the members together for relative rotation, three spaced plug-in prongs carried by one member, a multi-conductor cable having three conductors therein, one of said conductors being connected to one prong, said one conductor forming a pivot around which the members rotate a diametrically spaced pair of contacts in said one member, means connecting each of the other two prongs to one of said contacts and a diametrically spaced pair of contacts in the other member for engagement with the first named contacts, each of the second named contacts being connected to one of the other two conductors, one pair of said contacts having V-shape notches in opposite sides, the other pair of contacts having V-shape projections on opposite sides for engagement in said notches.

6. A reversing adapter plug for a three-phase line, comprising a pair of members, annular channel and flange means connecting the members together for relative rotation, three spaced plug-in prongs carried by one member, a centrally located conductor rod pivotally connecting the members together, means connecting said rod to one of said prongs, a diametrically spaced pair of contacts in said one member, means connecting each of the other two prongs to one of said contacts, a diametrically spaced pair of contacts in the other member for engagement with the first named contacts, spring contact jaws connected to each of the contacts in said other member, one pair of said contacts having notches in opposite sides, the other pair of contacts hav-

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ing projections on opposite sides for engagement in said notches, a third pair of spring contact jaws in said other member and means rotatably connecting said third pair of spring contact jaws with said centrally located conductor rod.

7. A reversing adapter plug for a three-phase line, comprising a pair of members, annular channel and flange means connecting the members together for relative rotation, three spaced plug-in prongs carried by one member, a centrally located conductor rod pivotally connecting the members together, means connecting said rod to one of said prongs, a diametrically spaced pair of contacts in said one member, means connecting each of the other two prongs to one of said contacts, a diametrically spaced pair of contacts in the other member for engagement with the first named contacts, spring contact jaws connected to each of the contacts in said other member, one pair of said contacts having notches in opposite sides, the other pair of contacts having projections on opposite sides for engagement in said notches and spring means urging the members apart whereby said projections will be tightly engaged in said notches, a third pair of spring contact jaws in said other member and means rotatably connecting said third pair of spring contact jaws with said centrally located conductor rod.

8. A reversing adapter plug for a three-phase line, comprising a pair of members, annular channel and flange means connecting the members together for relative rotation, three spaced plug-in prongs carried by one member, a centrally located conductor rod pivotally connecting the members together, means connecting said rod to one of said prongs, a diametrically spaced pair of contacts in said one member, means connecting each of the other two prongs to one of said contacts, a diametrically spaced pair of contacts in the other member for engagement with the first named contacts, spring contact jaws connected to each of the contacts in said other member, one pair of said contacts having V-shape notches in opposite sides, the other pair of said contacts having V-shape projections on op-

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posite sides for engagement in said notches; a third pair of spring contact jaws in said other member and means rotatably connecting said third pair of spring contact jaws with said centrally located conductor rod.

9. A reversing adapter plug for a three-phase line, comprising a pair of members, annular channel and flange means connecting the members together for relative rotation, three spaced plug-in prongs carried by one member, a centrally located conductor rod pivotally connecting the members together, means connecting said rod to one of said prongs, a diametrically spaced pair of contacts in said one member, means connecting each of the other two prongs to one of said contacts, a diametrically spaced pair of contacts in the other member for engagement with the first named contacts, spring contact jaws connected to each of the contacts in said other member, one pair of said contacts having V-shape notches in opposite sides, the other pair of said contacts having V-shape projections on opposite sides for engagement in said notches, and spring means urging the members apart whereby said projections will be tightly engaged in said notches, a third pair of spring contact jaws in said other member and means rotatably connecting said third pair of spring contact jaws with said centrally located conductor rod.

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