Aug. 28, 1962 R. SCHUSTER 3,051,800

PLUG SOCKET WITH PLUG

Filed Aug. 20, 1959 2 Sheets-Sheet 1

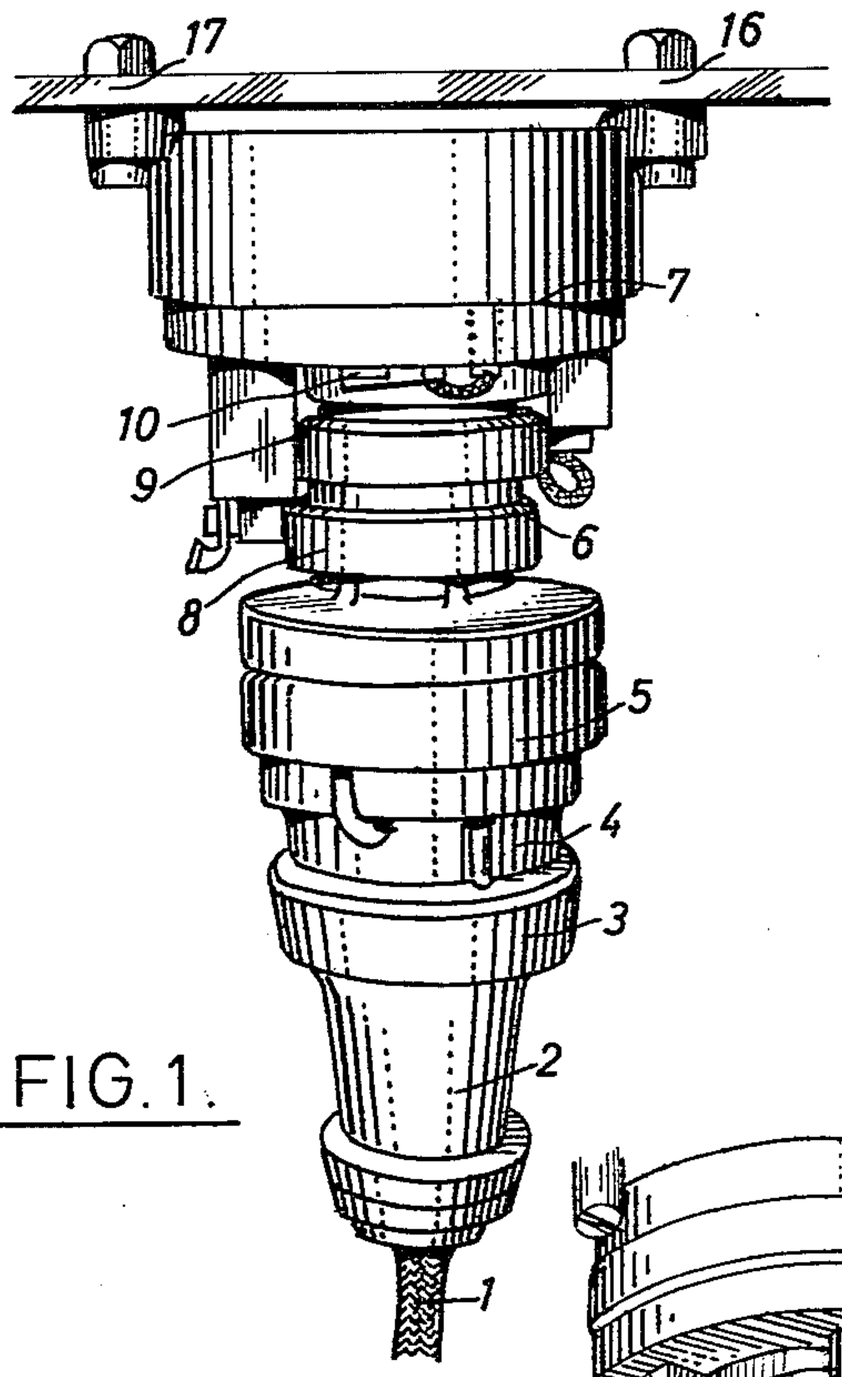

FIG. 1.

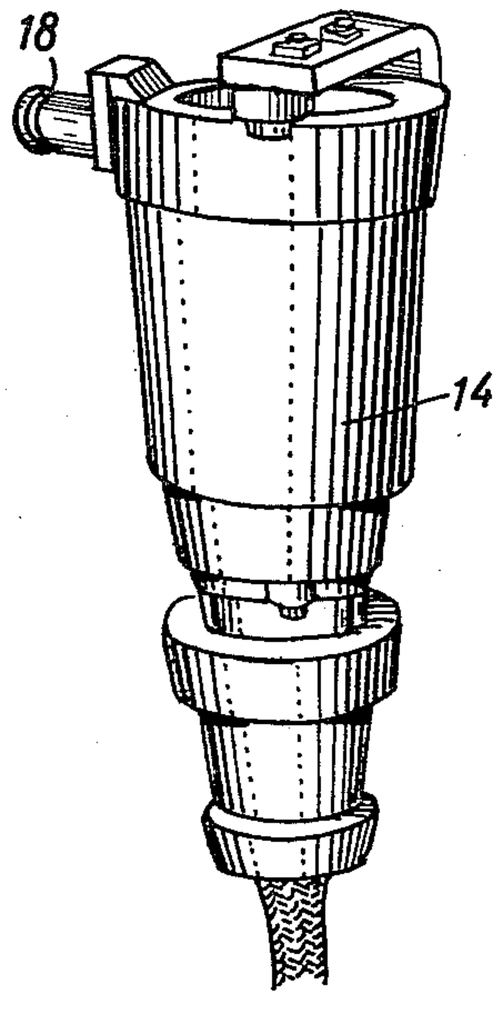

FIG. 2.

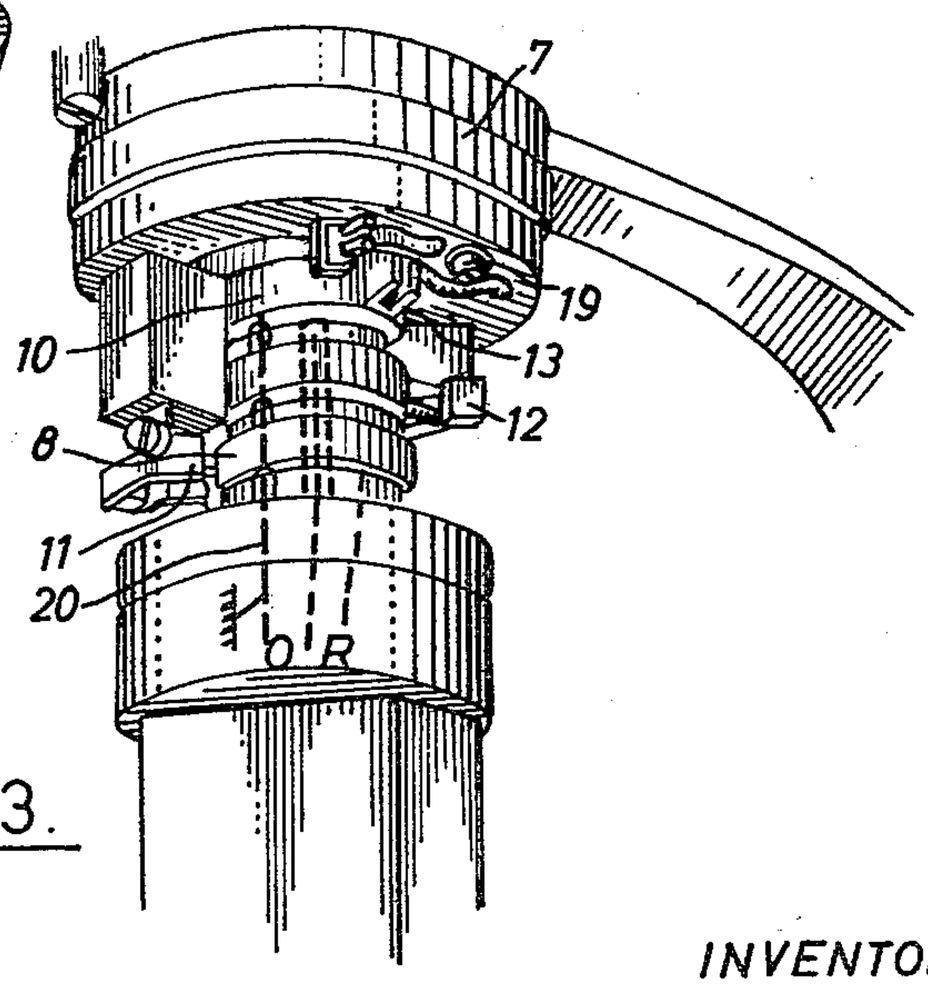

FIG. 3.

INVENTOR:
ROMAN SCHUSTER

BY Toulmin & Toulmin

Attorneys

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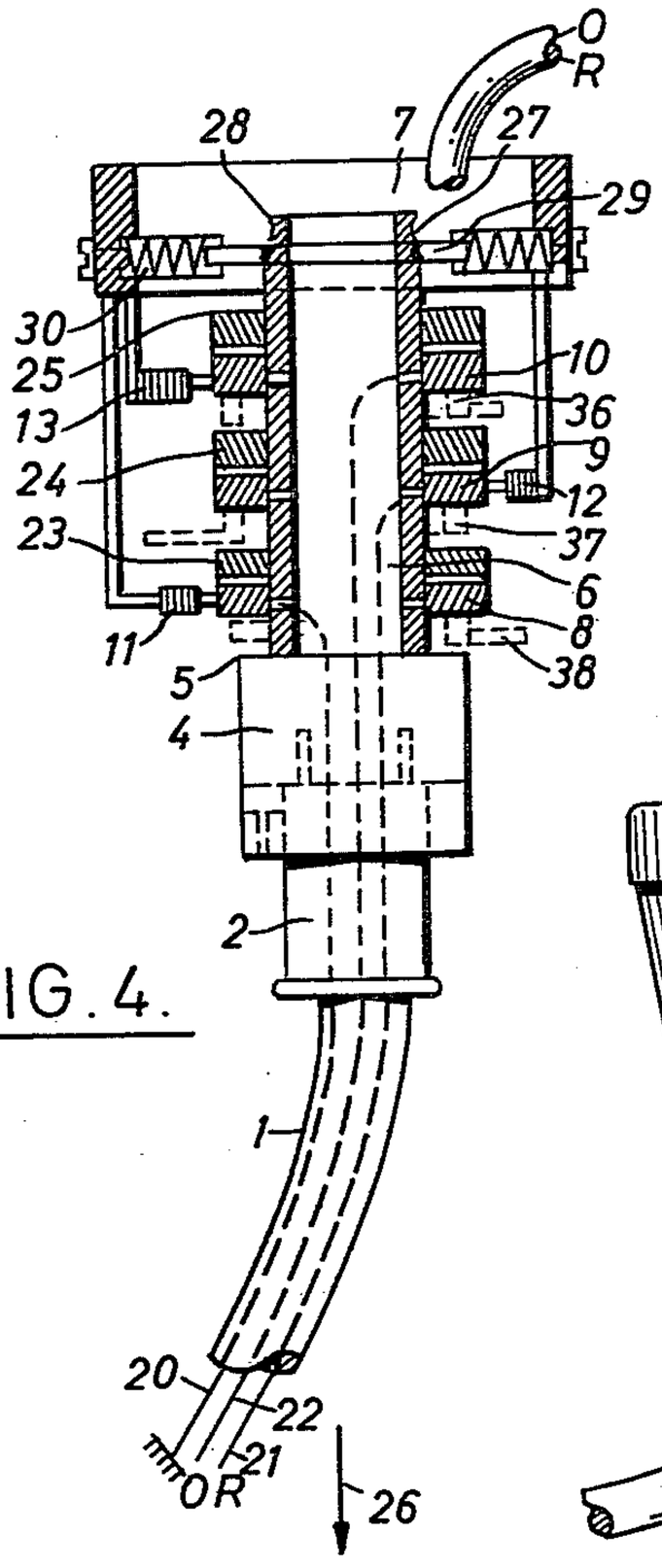

FIG. 4.

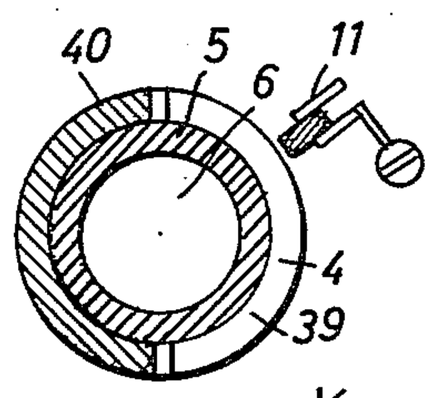

FIG. 5.

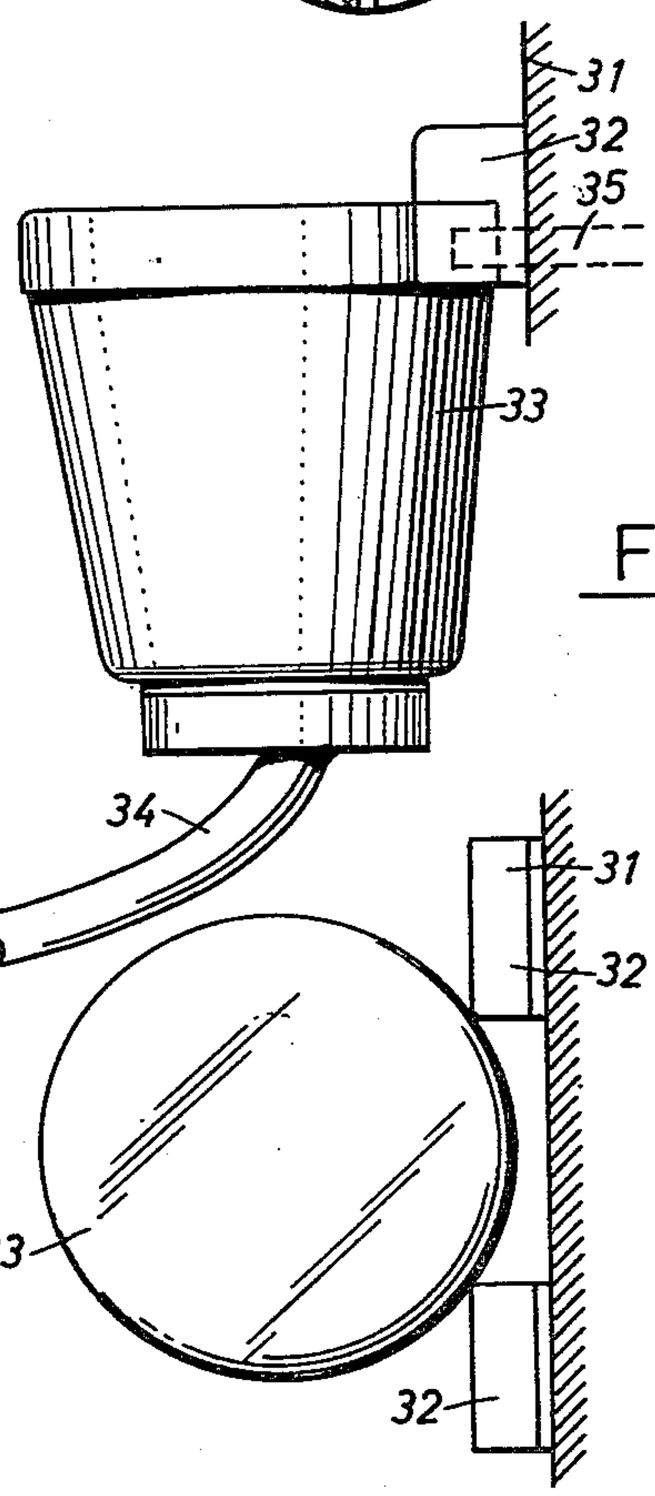

FIG. 6.

FIG. 7.

INVENTOR:
ROMAN SCHUSTER

By Toulmin & Toulmin
Attorneys

United States Patent Office

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3,051,800

PLUG SOCKET WITH PLUG

Roman Schuster, 14 Funkweg, Senden (Iller), Germany

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4 Claims. (Cl. 200—51)

The invention concerns a plug socket with plug for the connection of flexible leads which are subjected to torsional and tensile stresses by the devices connected thereto.

It is an object of the invention for the flexible leads to be so connected to the plug socket by means of the plug that the flexible leads are prevented from becoming twisted and hence in the course of time damaged, and moreover so that tensile stress does not cause the plug to become detached from the plug socket, as for example in the case of a plug socket which is situated on the ceiling, where the danger of the plug being pulled out of the socket is particularly great.

It is a further object of the invention to prevent the cable from damage when using hand surface milling cutters, since in this connection cables are subjected to torsional stress up to breakage point, because when milling off glued-on sheets or projecting veneers, for example, from the top of a table, with a hand surface milling cutter it is necessary to move all round the whole table top. Moreover, when using such hand surface milling cutters there is a danger that the cables may come into contact with the tools being used and may then be ripped or cut off by the sharp milling cutters.

It is the object of the invention to obviate the use of special flexes and to render sufficient the use of one type of plug socket to prevent the leads from being twisted; i.e. it is possible for any apparatus to be connected to this plug socket and the leads are always safely prevented from becoming twisted, so that knots cannot be formed, the leads cannot be damaged, and no obstruction of the work can occur.

The solution of the problem according to the invention consists in the fact that the plug socket is mounted in a rotatable housing, current being supplied by means of collecting rings known per se from the fixed plug socket mount to the rotatable housing carrying the plug socket.

According to this feature, any possible twisting stresses will be compensated for by the fact that the plug socket and plug are together rotatable. It is thus not necessary now for leads to be provided with additional steel wires, as if the plug socket is mounted so as to turn easily, it will rotate with the slightest torsional stress.

In this connection it is important that, in sequence, the plug socket mount, the rotatable housing and the plug socket should be of decreasing diameter, the slip-ring brushes being mounted offset on the plug socket mount, while the rotary shaft carrying the collecting rings is rotatably mounted in a thrust ball bearing provided in the plug socket mount.

Due to the diameter being reduced downwardly, if the plug socket is mounted on the ceiling, it is possible for a housing to be fitted over the collecting rings, such housing being removable in a downward direction even when the plug is left in the plug socket. Thus, when any faults arise, inspection is readily possible. The easy accessibility of the collecting rings also makes it possible for meters, e.g. ammeters, to be interconnected to check the amperage.

In order to conform with safety regulations, it is important for one of the slip-ring brushes adjacent to the plug socket mount to be firmly connected with a protective earth, which is also connected to the plug socket mount.

Since the whole arrangement is preferably made of metallic materials (whereby the use of plastics materials is of course not excluded) the whole plug socket is connected with protective earth in that the earth wire is simultaneously firmly connected with the plug socket mount. Hence the firm continuous connection to the slip-ring brush of the protective earth is simultaneously effected, thus eliminating any fear of too high a contact voltage occurring.

A futher possible arrangement consists in the fact that the plug may be firmly connected with the plug socket by means of a screwed cap ring, and an annular groove on the rotary shaft may be located by plungers in the plug socket mount which, when a considerable tensile stress is applied by the connecting lead, allow the rotary shaft to snap into another groove, whereby the slip-ring brushes make contact with dead collecting rings.

Since by this means it is possible to separate the brushes from the collecting rings, this possibility can be used as it were to obtain an emergency cut-out switch, as might become necessary when there is a risk of an accident occurring. A strong pull on the lead thus suffices for switching off. This safety measure is necessary for the reason that a screwed cap ring would not allow the plug to be pulled out of the socket.

A further possibility consists in the fact that the collecting rings may be circumferentially divided into two parts each having a separate connection, so that when the plug socket is rotated the direction of rotation of a motor connected thereto changes due to phase reversal.

It is thus possible, according to this feature, to bring about change of direction of rotation without a separate reversal control by purely mechanical means, by transmitting a rotary movement to the plug socket. This may thus concern woodworking or other machines wherein a reciprocating movement is to be produced, or any other arrangements are conceivable as long as it is ensured that, possibly by other means known per se, the reciprocating movement is transmitted to the lead by way of a reciprocating rotary movement, thereby causing the reversal of the direction of rotation by purely mechanical means, independently of distance of travel.

A constructionally alternative design consists in the fact that the collecting ring brushes may contact the collecting rings from below, thus simultaneously forming the thrust bearings for the rotary shaft.

When the plug socket is mounted above, then the weight of the rotary shaft with housing, plug socket, and plug is so great that the slip-ring brushes, which are located in semi-circular or quadrant-shaped bearings, establish a good contact if a corresponding counterspring is provided, while at the same time the thrust bearing is saved.

An example of the invention is shown in the drawings, thus further features of the invention become evident from the drawings and the description thereof.

FIG. 1 shows the use of a two-pole earth contact plug socket with the cover removed;

FIG. 2 is a side elevation corresponding to FIG. 1 with the cover fitted in position;

FIG. 3 shows on an enlarged scale the slip-rings and slip-ring brushes corresponding to FIG. 1;

FIG. 4 shows diagrammatically the possibility of causing an emergency cut-out by pulling on the lead;

FIG. 5 shows diagrammatically the possibility of designing the slip-rings for a reversal control;

FIG. 6 shows a front elevation of a rotatably mounted plug socket mounted on the wall;

FIG. 7 is a plan view corresponding to FIG. 6.

In FIG. 1 a flexible lead **1** is inserted in a plug **2**.

The plug concerned is an earth contact plug. It is of course also possible for a plug to be provided for a three phase connection with the corresponding lead. A screwed ring **3** then secures the plug in an earth con-

tact socket **4**. This earth contact socket in turn is firmly connected with the rotatable housing **5**. The rotatable housing is mounted in the plug socket mount **7** so as to be readily rotatable via a rotary shaft **6** and a thrust ball bearing, not shown. Mounted on the rotary shaft are slip-rings **8**, **9**, **10**. The corresponding slip-ring brushes **11**, **12**, **13** are particularly evident in FIG. 3. A protective cover **14** seals the slip-rings and slip-ring brushes against accidental external contact. The mounting, by means of bolts **16**, **17** is effected at any points, either on the ceiling or on the wall. The leads are accommodated in a guide **18**. It can be seen from FIG. 3 that an earth terminal **19**, which inter-connects all metal parts, is provided in the plug socket mount **7**, and the uppermost slip-ring brush **13** transmits the earth protection to the slip-ring and thence to the protective earth lead **20** into the apparatus. The leads **21**, **22** which are shown in broken lines supply current for the apparatus connected thereto. They are passed through insulating tubes from the slip-rings themselves up to the plug socket.

The same parts in FIG. 4 bear the same numerals. There are, however, also provided additional slip-rings **23**, **24**, **25**. The slip-ring brushes **11**, **12**, **13** arrive at these dead slip-rings when by pulling the flexible lead **1** in the direction of the arrow **26**, the rotary shaft snaps out of the groove **27** into the groove **28**. The engagement may be effected by means of spring-loaded plungers **29**, whereby these plungers simultaneously form the thrust bearing. It is however equally possible for these formers to be substituted by balls, whereby it will then be necessary for the springs **30** to be of correspondingly strong design.

This figure also indicates in broken lines an alternative possibility, in that the slip-ring brushes **36**, **37**, **38** fitted from below replace the thrust ball bearing. Such an arrangement will be particularly convenient in the case of plug sockets which are fitted on the ceiling. The slip-ring brushes are so arranged as to allow the rotary shaft to be readily inserted from above.

FIG. 5 shows diagrammatically an alternative possibility. Herein circumferentially divided slip-rings **39**, **40**, are provided whereby, by means of phase reversal of the direction of rotation is achieved. One of the corresponding slip-ring brushes is designated by **11**. The slip-rings and slip-ring brushes disposed therebelow are of similar design.

The wall in FIG. 6 is designated by **31**, on which the rotatable plug socket **33** is mounted by means of a bracket **32**. The outgoing cable **34** is connected to the incoming cable **35**.

It is of course also possible for the rotatably mounted plug socket to be connected between two leads in the form of a coupling, so as to render it applicable to any type of plug.

Suitable fields of application for the invention are all

cases wherein the plug socket needs to be mounted so as to be rotatable, or wherein the socket is used as an emergency switch by means of pulling the plug socket out of a groove, or wherein the plug socket is to be used as reversing gear by means of the existence of slip-rings and slip-ring brushes. It is also possible for lamps to be fitted, which may be in rotating engagement therewith, depending upon the position of the apparatus, since it is possible to effect a more or less solid mechanical transmission between the movements of the connected apparatus and the plug socket.

I claim:

1. A rotatable electrical connecting device comprising a plug socket mount firmly attached to a surface, a protective cover surrounding said plug socket mount, slip ring brushes being carried offset at the outer end of said plug socket mount, a housing rotatably journalled in said plug socket mount, and a shaft at one end of said housing, said shaft carrying slip rings and being in rotatable engagement with said plug socket mount, whereby said slip rings and said slip ring brushes are in contacting engagement, and a standard plug socket provided in said rotatable housing, said plug socket being in electrical connection with said slip ring brushes.

2. A rotatable electrical connecting device as claimed in claim 1, wherein said slip ring brushes form a thrust bearing for said shaft.

3. A rotatable electrical connecting device as claimed in claim 1, wherein said slip rings are composed of groups of one conducting and one dead slip ring each, and wherein the rotary shaft is adapted to be pulled into engagement with said dead rings, thereby rendering the connecting device disconnectable by pull.

4. A rotatable electrical connecting device comprising a plug socket mount firmly attached to a surface, a protective cover surrounding said plug socket mount, a housing rotatably journalled in said plug socket mount, electrical slip ring and brush connecting means having a plurality of brushes in said rotatable electrical connecting device, the slip rings of said electrical slip ring and brush connecting means being circumferentially divided into two parts, one of which having a reversed phase connection so that upon rotation of said housing a phase reversal of the current is attained, and a standard plug socket provided in said rotatable housing, said plug socket being in electrical connection with said electrical slip ring and brush connecting means.

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