

United States Patent

[19]

Hesse

[11] 3,725,840

[45] Apr. 3, 1973

[54] **ELECTRICAL PLUG AND SOCKET COUPLING FOR CONNECTING ELECTRICAL LEADS**

[75] Inventor: **Kurt Hesse, Lemgo-Lippe, Germany**

[73] Assignee: **Staff & Schwarz G.m.b.H, Lemgo-Lippe, Germany**

[22] Filed: **Mar. 29, 1971**

[21] Appl. No.: **128,795**

[30] **Foreign Application Priority Data**

Mar. 31, 1970 Austria.....2942

[52] U.S. Cl.....339/14 R, 339/88 R, 339/189 R

[51] Int. Cl.H01r 3/06

[58] Field of Search...339/14, 88, 90, 181, 187, 188, 339/189, 190

[56] **References Cited**

UNITED STATES PATENTS

3,636,494 1/1972 Smith.....339/14 R
3,644,867 2/1972 Krause.....339/14 R
3,685,007 8/1972 Riley et al.....339/189 R
2,579,538 12/1951 Bierce.....339/14 R

FOREIGN PATENTS OR APPLICATIONS

1,178,366 12/1958 France.....339/188 C
171,330 5/1960 Sweden.....339/188 C

Primary Examiner—Marvin A. Champion

Assistant Examiner—Robert A. Hafer

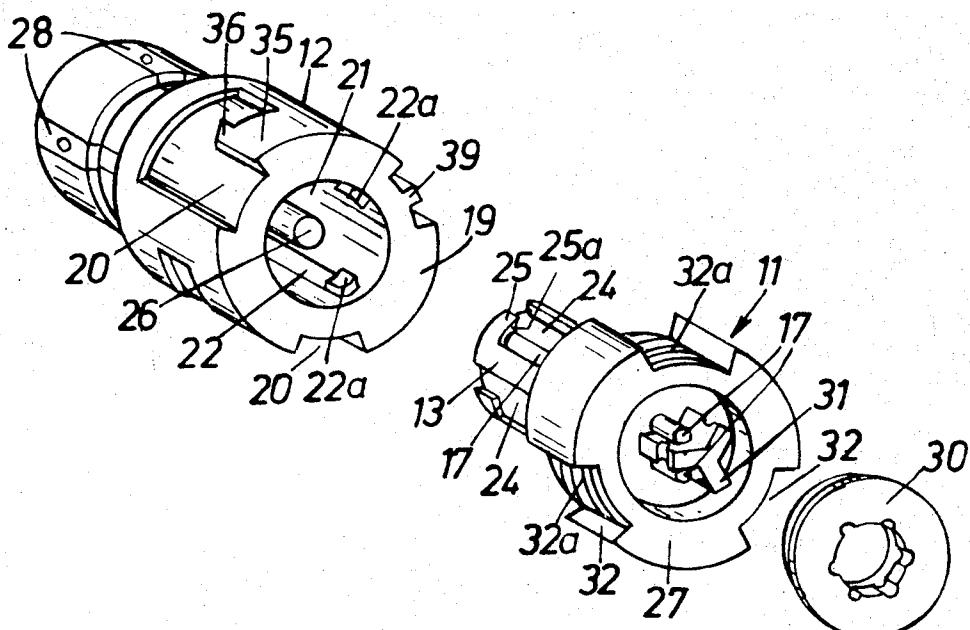
Attorney—Steinberg & Blake

[57]

ABSTRACT

An electrical coupling for connecting electrical leads containing two coupling halves, a socket and a plug having at least two current conducting contacts and at least one protective contact each, the protective contacts being capable of being connected together before the current conducting contact is made, wherein the socket at its coupling end has an annular space enclosing a core the outer wall of which is provided with radially projecting coupling members partially projecting into the annular space, and the inner wall of which, formed by the core, is provided with longitudinal electric contacts extending in the axial direction of the plug, and set back relatively to the front of the socket at the coupling end, together with a protective or earthing contact, the plug, at the coupling end, having a coupling ring engaging in the annular space of the socket and comprising external coupling members, the inner plug space enclosing the contact base of the socket comprising elongated electrical contacts extending in the axial direction of the plug and set back relatively to the face of the plug on the coupling end, together with a protective or earthing contact, so that the coupling members of the socket and plug form a bayonet connection disposed within the socket member and secured against unintentional detachment in the coupled position.

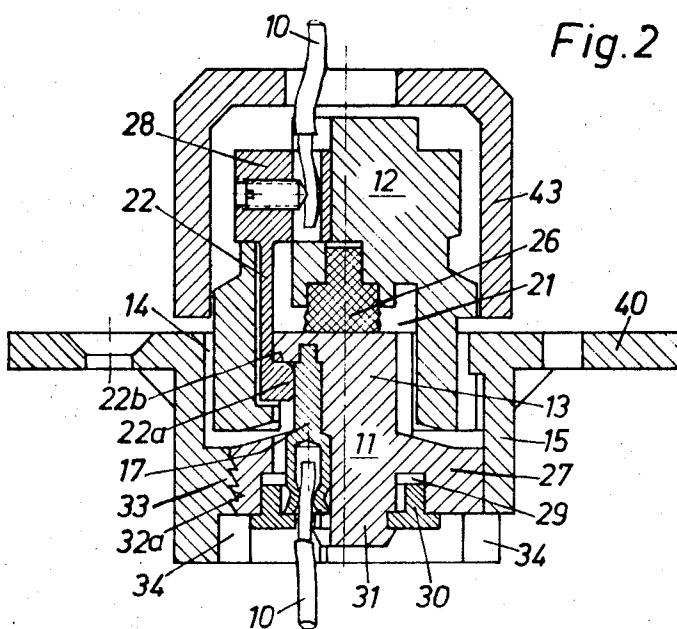
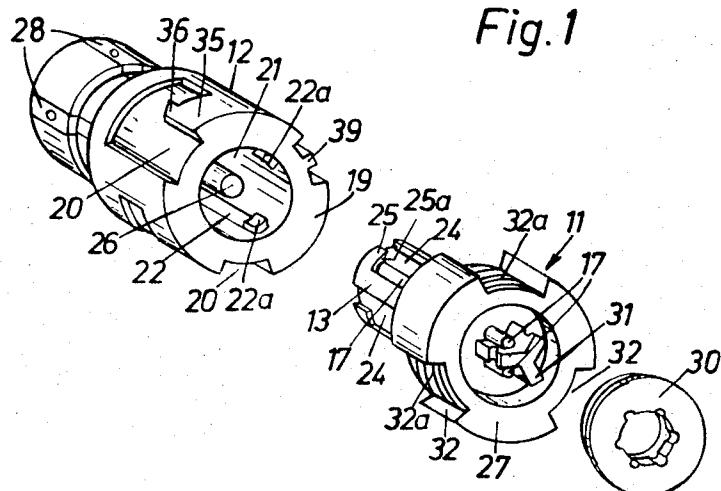
10 Claims, 19 Drawing Figures



PATENTED APR 3 1973

3,725,840

SHEET 1 OF 5



Inventor:

Kurt Hesse

by *Steinberg & Blaif*
Atlys

PATENTED APR 3 1973

3,725,840

SHEET 2 OF 5

Fig. 3

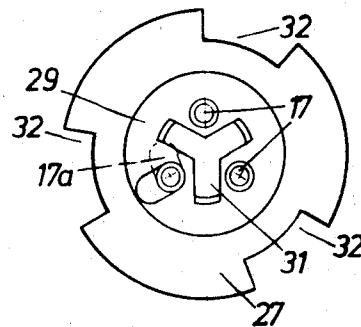


Fig. 6

I - I

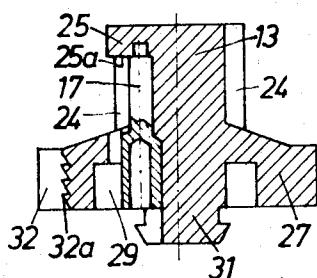


Fig. 4

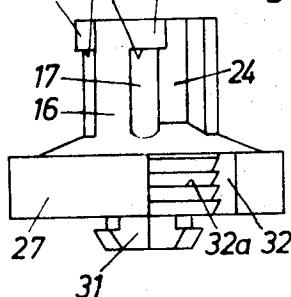


Fig. 7

II - II

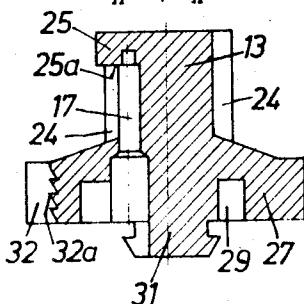
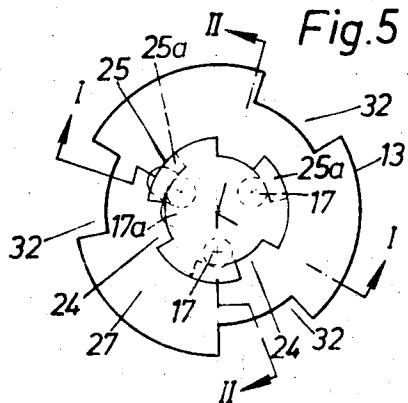


Fig. 5



Inventor:

Kurt Hesse

by *Steinberg & Blaue*
atty

PATENTED APR 3 1973

3,725,840

SHEET 3 OF 5

Fig. 11

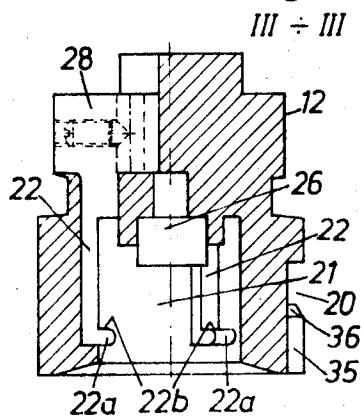


Fig. 8

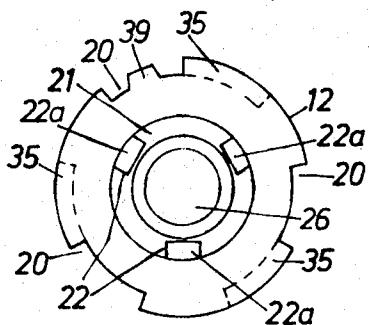


Fig. 12

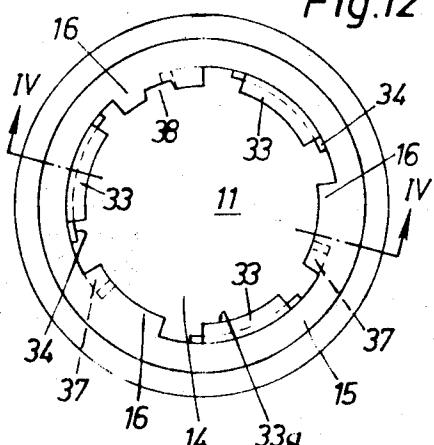


Fig. 9

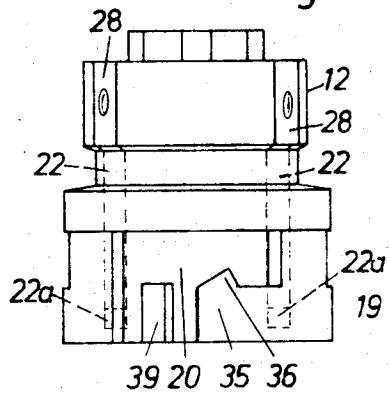
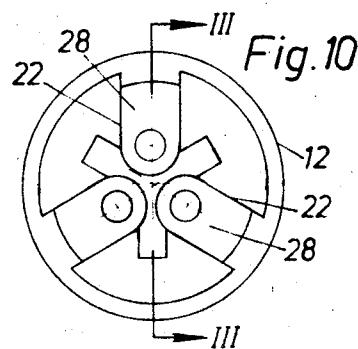
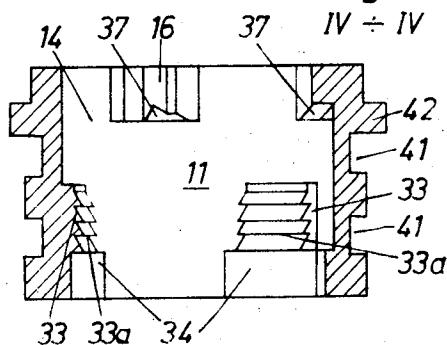


Fig. 13



Inventor:

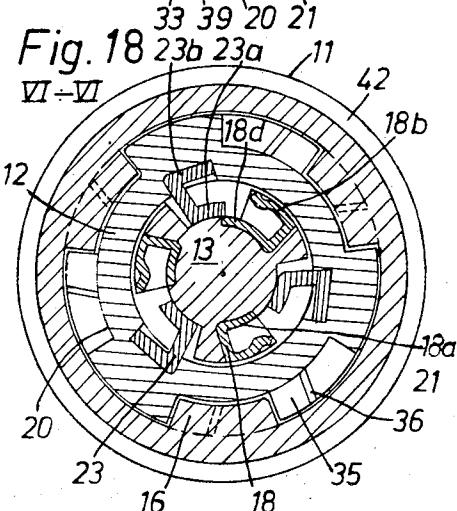
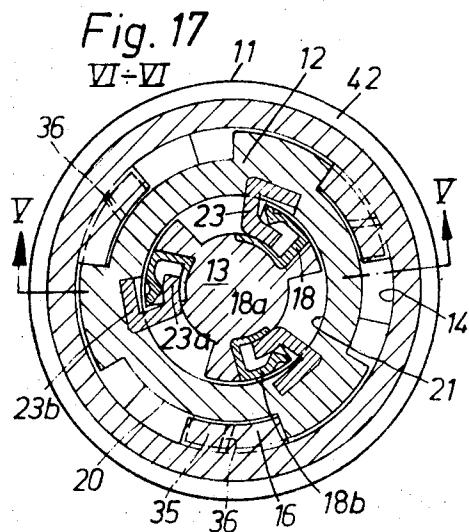
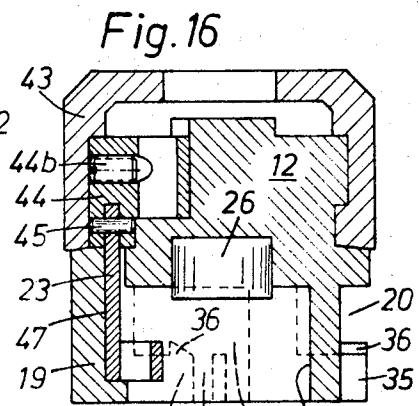
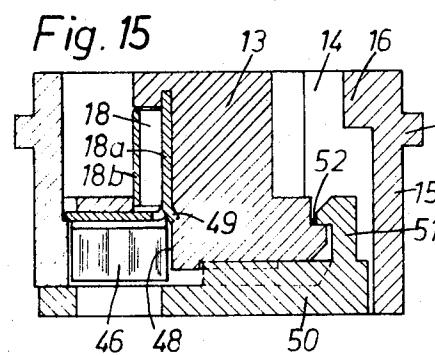
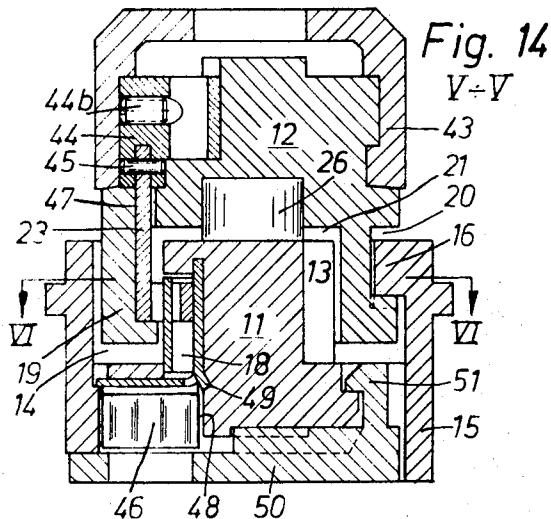
Kurt Hesse

by *Steinberg & Schaefer*
Gettg

PATENTED APR 3 1973

3,725,840

SHEET 4 OF 5

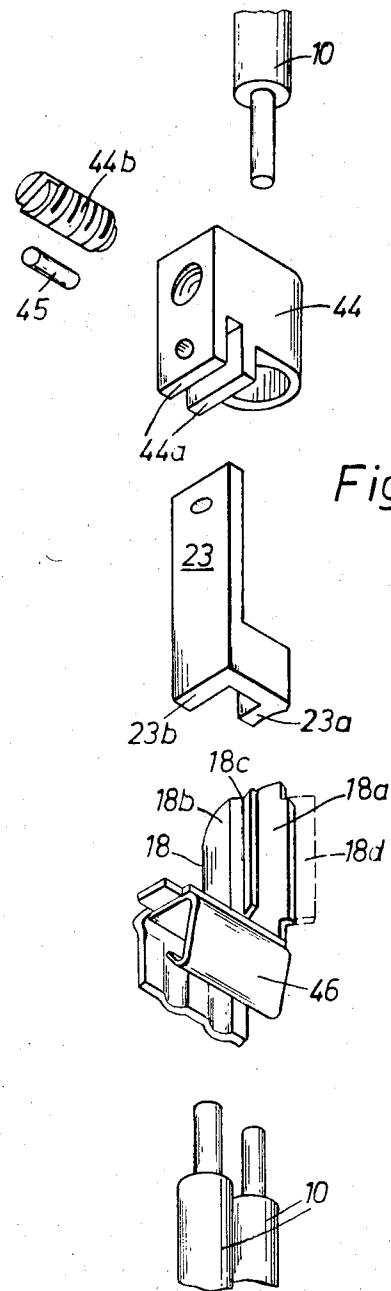


Inventor:
Kurt Hesse
by *Steinberg & Hesse*
Attys.

PATENTED APR 3 1973

3,725,840

SHEET 5 OF 5



Inventor:
Kurt Hesse
by Stanley Bloch
Altys

ELECTRICAL PLUG AND SOCKET COUPLING FOR CONNECTING ELECTRICAL LEADS

Prior Application: In Austria on Mar. 31, 1970 and numbered A 2942/70.

The present invention concerns an electrical plug and socket coupling for connecting electrical leads, said coupling having two halves comprising at least two current conducting contacts and at least one protective contact, wherein the protective contacts may be connected together before the current conducting contacts.

Conventional electrical couplings are constructed as a plug and plug box, in which two or more contact pins of the plug are insertable in contact sleeves of the plug box.

The protective (earthing) contacts of the plug are connected to the protective contacts in the plug box before current conducting contact is made. The disadvantage of these known couplings resides in their large dimensions and in that the plug is insufficiently secured against traction loading.

It is an object of the present invention to provide an improved electrical plug and socket coupling for the connection of electrical leads the plug of which, when inserted, cannot easily be withdrawn; this is combined with a high degree of electrical safety.

A further object of the invention is to provide a plug and socket coupling which is small and compact.

Furthermore, the connection between the two halves of the coupling is intended to be reliable and lasting and the electrical contacts to be secured so that they cannot readily be pulled apart.

According to the present invention there is provided an electrical coupling for connecting electrical leads containing two coupling halves, a socket and a plug, having at least two current conducting contacts and at least one protective contact each, the protective contacts being capable of being connected together before the current conducting contact is made, wherein the 40 socket at its coupling end has an annular space enclosing a core the outer wall of which is provided with radially projecting coupling members partially projecting into the annular space, and the inner wall of which, formed by the core, is provided with longitudinal electric contacts extending in the axial direction of the plug, and set back relatively to the front of the socket at the coupling end, together with a protective or earthing contact, the plug, at the coupling end, having a coupling ring engaging in the annular space of the 45 socket and comprising external coupling members, the inner plug space enclosing the contact base of the socket comprising elongated electrical contacts extending in the axial direction of the plug and set back relatively to the face of the plug on the coupling end, together with a protective or earthing contact so that the coupling members of the socket and plug form a bayonet connection disposed within the socket member and secured against unintentional detachment in the coupled position.

An advantage of the invention resides in the bayonet like connection which precludes accidental detachment of the connection even when one half of the coupling is subjected to traction stresses.

The connection of the two coupling halves for making an electrical contact is simple, rapid and reliable. Due to the construction and arrangement of the protec-

tive contacts, faulty coupling is impossible and in making the coupling the two protective contacts are always closed first, since the plug can be connected to the socket in only one position.

Due to the compact construction, the coupling of the present invention can be used as a plug and wall socket, occupying only a portion of the space required with conventional plugs and sockets.

10 The contacts are arranged so that they cannot be touched by hand and are therefore safe, particularly for children.

Embodiments of the invention are illustrated in the drawings in which:

15 FIG. 1 is a perspective view of an electrical plug and socket coupling comprising a contact socket, wall plug and a plug member to be connected thereto by a kind of bayonet connection, shown in the uncoupled condition and on a magnified scale.

20 FIG. 2 is a longitudinal section through the same coupling in the coupled condition, showing a socket mounted in a component housing of the socket member.

25 FIG. 3 is a view from below of the socket of the same electrical coupling.

FIG. 4 is a side view of the same contact socket.

FIG. 5 is a plan view of the same contact socket.

FIG. 6 is a longitudinal section through the same socket taken on the line I — I of FIG. 5.

30 FIG. 7 is a longitudinal section through the same socket taken on the line II — II of FIG. 5.

FIG. 8 is a view from below of the plug of the same electrical coupling.

FIG. 9 is a side view of the same plug member.

FIG. 10 is a plan view of the same plug member.

FIG. 11 is a longitudinal section through the same plug member, taken on the line III — III of FIG. 10.

FIG. 12 is a plan view of a housing for receiving the socket and for retaining the plug in the coupled condition.

FIG. 13 is a longitudinal section through the same socket housing taken on the line IV — IV of FIG. 12.

45 FIG. 14 is a longitudinal section through a further embodiment of an electrical coupling taken on the line V — V of FIG. 17, comprising a single-part socket and U-shaped inter-engaging contacts in the coupled condition.

FIG. 15 is a longitudinal section through the single 50 part socket of the coupling according to FIG. 14.

FIG. 16 is a longitudinal section through the plug of the coupling of FIG. 14.

FIG. 17 is a cross section through the coupling, taken on the line VI — VI of FIG. 14 in the coupled condition.

55 FIG. 18 is a cross section through the coupling taken on the line VI — VI of FIG. 14 in the uncoupled condition.

FIG. 19 is an exploded illustration of components shown in FIG. 14.

60 An electrical plug and socket coupling according to the present invention for the connection of electrical leads 10 has two coupling halves which are connectable together with a bayonet joint and are constructed as a socket 11 and a plug 12.

The socket 11 is provided at its coupling end with an annular space 14 enclosing a core 13, on the outer wall of which there are coupling members 16 enclosed by a

cylindrical socket housing 15 enclosing the contact socket 13, the members 16 extending partially into the annular space 14. On the inner wall formed by the core 13, there are electrical contacts.

A plug 12 is provided at its coupling end with a coupling ring 19 engaging in the annular space 14 of the socket 11 and provided with external coupling members 20, the inner surface 21 of the plug, enclosing the core 13 of the socket 11 being provided with electrical leads and protective (earthing) contacts 22.

The coupling members 16, 20 of the socket and plug 11, 12 form a bayonet connection located within the socket 11 and secured against unintentional disengagement of the insert plug.

In each half 11, 12 of the coupling three contacts 17, 22 and 18, 23 are provided uniformly distributed over the circumference of the socket and over the circumference of the inner space 21 of the plug, one of said contacts being used as a protective contact.

The connection of the two coupling halves 11, 12 is achieved by interengagement and twisting, the plug 12 engaging by its coupling ring 19 over a portion of the core 13, into the annular space 14 of the socket and thereafter turned through a certain angle relatively to the core 13. The contacts 17, 22; of the two coupling halves 11, 12 extend longitudinally parallel to the mounting and pivotal axis of the halves 11, 12 of the coupling and are located on the outside of the core 13 and, in the case of the plug 12, inside.

The contacts 17, 22 are arranged radially with respect to the mounting and pivotal axis of the core 13 and of the coupling ring 19, so that the contacts may be enclosed, and are at least partially exposed so that the interengageable halves 11, 12 of the coupling enable the engagement of parallel contacts 17 with 22 by longitudinally adjoining contacts 17, 22. The contacts 17 of the core 13, extending in their longitudinal direction parallel to the contacts 22 of the plug 12, are disposed within the contacts 22 arranged in a circle, and the inner surface of the contacts 22 engages with the outer surface of the contacts 17.

The contacts 17 of the core 13 are formed by tubular or bar-like terminals (earthing and phase terminals). Each contact 17 lies freely in a groove 24 with a portion of its surface exposed and the insertion end of the socket has a coupling bar 25 extending into the region of the groove 24, overlapping the front end of the contact 17 and keeping the front end of the groove 24 slightly open. The coupling bar 25 associated with each contact has a locking surface 25a which extends parallel to the front of the contact base and co-operates in the coupled position with a contact 22 of the plug 12.

The contacts 22 of the plug 12 are formed as sliding or knife contacts, and have a rectangular cross-section. The sliding contacts 22 partially project into the space 21 of the plug 12 and have a contact surface 22a at the open end which projects inwardly (towards the longitudinal axis of the space), and has a locking surface 22b co-operating with the locking surface 25a of the core.

The width of the groove 24, in the region of the coupling bar 25, corresponds to the width of the surface 22a of the contact 22, so that the plug 12 may be inserted to establish a bayonet connection with its contacts 22 into the grooves 24 when it is mounted on the core 13 by the groove on the bar; the grooves 24 en-

larging behind the coupling bar 25 allow of axial twisting of the plug ring 19 and the contact surfaces 22a.

The mounting and twisting of the plug 12 onto the core 13 forms a bayonet connection, whilst, after the twisting, the locking surfaces 22b of the contacts are disposed against the locking surfaces 25a of the coupling bars 25. The exposed contact surfaces of the two current conducting contacts 17 of the core 13 extends only in the region of its associated coupling bar 25, whilst the protective contact 17 is enlarged oppositely to the closing direction of rotation of the bayonet connection (17a). Due to this formation of the protective contact 17, a contact is made between the protective contact and a contact 22 of the plug 12 during the insertion of the coupling ring 19, which contact is maintained during the subsequent twisting of the coupling, but only after the plug 12 has been twisted is contact also made between the current conducting contacts 17, 22 of the two halves 11, 12 of the coupling.

An axial spring element 26, such as a rubber cushion, pressing against the front of the core 13 in the coupling position is secured in the space 21 of the cylindrical plug 12 and presses the contact surfaces 22b against the locking surfaces 25a with spring tension of the coupling bars 25 of the socket.

Instead of this spring element 26, an annular spring element such as a rubber cushion in contact with the mounting collar 27 of the core 13, may be arranged about the core 13. This spring element bears against the front of the socket in the coupling position and thus compresses the two locking surfaces 22b, 25a against each other.

The contacts 22 of the cylindrical plug member 12 each have a screw connection 28 at the rear end of the plug socket for detachably clamping electrical leads 10.

For securing the electrical leads 10 to their ends located in the fixing collar 27 the contacts 17 may be deformed to form a pinch connection, or the electrical leads 10 inserted at the rear in the tubular ends of the contacts 17 are connected by soldering or screwless spring pressure terminals to the contacts 17. In a recess 29 in the base a retaining cover 30 at least partially covering the ends of the contacts, is detachably inserted, which cover engages around a star-shaped separator 31 keeping the contacts 17 longitudinally spaced apart; it is secured thereto by a locking connection. The electrical leads 10 extend out of the annular retaining cover 30 and are secured thereby against traction.

The core 13 is secured in its position in the housing 15 of the bi-partite socket 11 and the ring 19 which may be coupled to the core 13 may be attached by a bayonet-type connection to the housing 15, so that, in the coupled condition of the two halves 11, 12 of the coupling a double bayonet connection is obtained.

The collar 27 of the core 13 is provided with three grooves 32 which are uniformly distributed around its periphery and in which inward projections 33 of the housing 15 engage in the mounted position of the core 13. The grooves 32 of the base 13 and the projections 33 of the housing 15 interengage by serrated surfaces 32a, 33a.

The sleeve-like housing 15 has three locking bars 16 on its coupling end which are uniformly distributed

over the circumference, and project into the receiving space 14 of the housing transversely to the longitudinal axis thereof to form parts of the bayonet connection between the housing 15 and the plug member 12.

The projections 33 spaced from these locking bars 16 in the axial direction of the housing are displaced relatively to the locking bars 16 by a certain angle and extend to the space 14 of the housing on the inside thereof, whilst a projection 33 (FIG. 12) extends between each two locking bars 16.

The grooves 32 of the fixing collar 27 of the base, the bars 16 and the projections 33 of the housing each have an identical basic shape so that, for securing the core 13 in the housing 15, the core 13 may be inserted by its grooves 32 in the housing 15 engaging round the bars 16, then the core 13 is twisted around the material of the projection 33 and can then be pressed by its grooves 32 onto the projection 33. In the fitted condition, the coupling end of the core 13 with the coupling end of the housing extends in one plane and the core 13 is supported on a bearing rib 34 provided in the vicinity of each projection 33.

The casing of the plug 12 is provided with angular grooves 20 used as coupling members, which receive 25 the locking bars 16 of the housing 15 and have a grooved portion extending in the insertion direction of the plug and a groove portion extending in the direction of rotation of the plug to form a front locking bar 35 extending in the direction of rotation transverse- 30 to the longitudinal axis of the plug.

Each locking bar 35 of the plug 12 is provided on its bar surface away from its coupling end with a locking catch 36 co-operating with a recess 37 formed on the 35 surface of the locking bars 16 opposed to the front of the housing and, in the coupled position, preventing unintentional detachment of the bayonet connection (See FIGS. 9 and 13).

In the inserted and twisted condition of the plug 12, engagement of the locking catches 36 in the recesses 37 is effected by the pressure of the spring element 26 on the plug 12 which ensures a locking effect. In order to release the bayonet connection, pressure of the plug member must therefore be effected against the spring element 26 along the longitudinal axis of the coupling so that the locking catch 36 is moved out of the recess 37, whereafter twisting of the plug member 12 is possible.

The plug 12 can be inserted in the socket member 11 only in one position; for this purpose the socket casing 15 is provided with a groove 38 in the region of a locking bar 16, and the plug member 12 is provided near part of an angular groove 20 extending in the longitudinal direction of the plug with a peripheral cam 39 so that, when the plug 12 is inserted in the housing 15, the plug with its cam 39 extends through the groove 38.

The earth conductor is applied to the protective contact 17 of the base 13, which has a larger contact surface (thickened portion 17a), and the core 13 can then be inserted in the housing 15 in any desired position (angle), since the protective contact 17 extends to the locking bar 16 with groove 38 in a certain position. When the earth conductor is applied to one of the contacts 22 of the plug 12, said earth conductor has to be applied to a contact 22 located relatively to the groove 38 corresponding to the position of the protective con-

tact 17 relatively to said groove 38 so that, when the halves 11, 12 of the coupling are connected together, the two protective contacts 17, 22 are able to make contact.

5 Due to the groove and tongue insertion of both halves 11, 12 correct polarity is maintained.

The housing 15 is provided with a securing flange 40 on the coupling end face, and resembles an insert box (See FIG. 2). The cylindrical housing 15 is provided with external grooves 41 or a collar 42 (See FIGS. 12, 13, 14 15); the housing 15 forms a coupling body.

10 The core 13 and the plug 12 are preferably made of synthetic material. The housing 15 may be made of metal or synthetic material. A detachable protective cap 43 engages over the rear end of the plug 12.

15 In addition the protective cap 43 and the housing 15 may be provided with a recess or thread for receiving a screw cap in order to transmit comparatively heavy 20 mechanical stresses to the coupling system (not shown).

In order to connect the two halves 11, 12 together, the plug 12 is inserted into the housing 15 in the longitudinal direction of the coupling by grooves 20 engaging round the locking bars 16 and at the same time it engages by its recess 21 over the core or base 13, the contacts 22 engaging in the grooves 24. During this insertion process contact between the protective contacts 17 and 22 is made immediately, whilst the current conducting contacts 17, 22 are out of contact with each other. After the insertion the plug 12 is turned by a certain amount and contact is made between the contacts 17 and 22 — the electrical connection is established.

30 Due to the spring element 26, the plug 12 received pressure in the longitudinal direction of the coupling against the direction of insertion, so that a secure connection of the two halves 11, 12 of the coupling results.

In order to detach the coupling, the plug member 12 40 is axially displaced oppositely to the direction of pressure of the spring element and is then turned for disengagement oppositely to the direction of rotation, so that the plug 12 can then be extracted from the housing 15 and withdrawn from the base 13.

45 The other embodiment of an electric coupling illustrated in FIGS. 14 – 19 corresponds in design and its mode of operation to the coupling shown in FIGS. 1 – 13. The difference in the embodiment resides in the design of the contacts 18, 23, in the arrangement thereof, and in the design of the socket 11. The socket 11 according to FIGS. 14 – 19 also has a housing 15 and a contact base or core arranged therein and forming an annular space 14 with the housing 15; the housing 15 and contact base 13 are constructed as a single 55 part. The socket and the plug members 11, 12 have U or C-shaped contacts 18, 23 which are open in opposite directions and, in the coupled condition, they make contact with each other by their U and C-shanks 18a, 18b; 23a, 23b.

60 At the same time, contacts 18 are partially embedded in the contact base 13 and the contacts 23 partially embedded in the coupling ring 19. Each contact 23 of the plug member 12 is located by a shank 23a in a coupling ring 19 and extends by its other shank 23b out of this coupling ring 19 and into the space 21 in the plug.

Each contact 18 of the socket member 11 is mounted by a shank 18a in the contact base 13 and extends by its other shank 18b, bent at an angle to form a terminal edge (contact edge 18c), into the annular space 14 of the socket member.

The contacts 23 are disposed with their shanks 23a between the shanks 18a and 18b and are connected together, giving a reliable contact, by the terminal edge 18c of the shanks. In order to be able to connect the two protective contacts 18, 23 together before making the current-conducting contact, the shank 18a of a socket contact 18 is provided with an extended portion 18d which establishes a contact between the protective contacts as soon as parts 11, 12 of the coupling are inserted one within the other.

Each plug contact 23 is connected to a screw contact 44 by its shank 23b extending beyond the shank 23a in the longitudinal direction thereof; at the same time this shank 23b engages in a U-shaped part 44a of the screw connection 44 and is maintained thereon by a pin 45. A screw 44b engages in the connection 44 and secures the inserted lead 10.

The contacts 18 each have a terminal member 46 extending at a right angle to the open side of the contact and at a right angle to the front side thereof, for forming a screwless connection with the electrical leads 10. Each contact 23, 18 is disposed in a recess of the part 12, 11 holding it; the contacts 23 are inserted by their extended shank 23b through a slot 47 of the plug 12 from the space 14 and are then secured in position by the connection 44. The contacts 18 are disposed in a recess 48 of the socket member 11 and are secured in position by a resilient member 49, such as a spring bent out in the area of transition between the contact 18 and terminal 46.

The open side of the housing of the socket 15 remote from the coupling side is detachably closed by a locked-on cover 50 connected to the housing 15 and enabling the leads 10 to extend outwardly, said cover engaging by locking hooks 51 behind retaining surfaces 52 in the area of the base.

By inserting the plug 12 in the annular space 14, the protective contact 23 of the plug is brought into engagement with the extended shank 18d of the protective contact 18 of the socket and, by the turning of the plug 12, the plug contacts 23 are inserted by their shanks 23a between the shanks 18a, 18b of the contacts 18 of the socket. At the same time the bayonet connection is obtained by way of the coupling members 16, 20.

The present invention is particularly suitable as a coupling for connecting two electrical leads, as a plug and socket, and also as a wall and ceiling fitting for lights. The use of several electrical couplings on strips or panels which may be used as ceiling or wall elements, is also within the scope of the present invention.

As is apparent from the above description and the drawings, the socket means 11 and the plug means 12 form when they are operatively connected to each other a pair of means having a common axis which is in fact illustrated in FIG. 2. A bayonet means 16, 20 is carried by the pair of means for releasably connecting them to each other in their operative position in response first to movement of the pair of means into engagement with each other along their common axis

and then to turning of one of the pair of means with respect to the other about their common axis in a given direction. Each of the pair of means has three elongated conductors extending parallel to and distributed about the common axis of the pair of means, with the three conductors of one of the pair of means electrically engaging the three conductors of the other of the pair of means when the latter pair of means are operatively connected to each other. The three conductors of each of the pair of means extend respectively through the corners of a triangle situated in a plane normal to the common axis of the pair of means. At least two of the conductors of one of the pair of means are positioned with respect to two conductors of the other of the pair of means so as to be situated beyond and respectively be out of engagement with each other when the pair of means are initially moved along their common axis prior to turning of one of the pair of means in said given direction, the latter two conductors of one of the pair of means engaging the corresponding two conductors of the other of the pair of means only after turning of one of the pair of means with respect to the other in said given direction to releasably connect the pair of means by said bayonet means. The third conductors of the pair of means, respectively, are adapted to form a ground connection by their electrical engagement with each other. One of the third conductors has an extension (17a in the embodiment of FIGS. 1-13 and 18d in the embodiment of FIGS. 14-19) for engaging the other of the third conductors, during turning of one of the pair of means with respect to the other in the above given direction, prior to electrical engagement between the remaining two conductors of the one pair of means and the remaining two conductors of the other of the pair of means, so that the ground connection is established prior to the electrical connections established by these remaining conductors.

40 The conductors of one of the pair of means terminate at their free ends in projections extending inwardly toward the common axis and overlapped by a portion of the other of the pair of means when the pair of means are operatively connected to each other to form in this way a second bayonet connection between the pair of means.

Furthermore, the axially extending groove 38 and tongue 39 of the pair of means form a positioning means for positioning the pair of means with respect to each other in only one position relative to each other, so that proper polarity at the conductors is assured.

We claim:

1. In a structure for releasably establishing an electrical connection, plug means and socket means forming a pair of means which have a common axis when they are operatively connected to each other, bayonet means carried by said pair of means for releasably connecting them operatively to each other in response first to movement of said pair of means one with respect to the other along said common axis thereof and then to turning of one of said pair of means with respect to each other in a given direction around their common axis, each of said pair of means having three conductors extending generally parallel to and distributed about said common axis with the three conductors of each pair of means respectively extending through the corners of a triangle situated in a plane normal to said

common axis, two of the conductors of one of said pair of means being angularly displaced beyond two of the conductors, respectively, of the other of said pair of means when the pair of means are moved axially one with respect to the other along their common axis, prior to turning of one of the pair of means in said given direction with respect to the other, and the latter two conductors of said one pair of means electrically engaging the latter two conductors of the other of the pair of means only after one of the pair of means is angularly turned in said given direction with respect to the other of the pair of means, the third conductors of the pair of means forming a ground connection, one of said third conductors having an extension situated closer to the other of the third conductors than the distance between the remaining two conductors of one of the pair of means with respect to the remaining two conductors of the other of the pair of means prior to turning of the one of the pair of means with respect to the other in said given direction for engaging said other third conductor prior to engagement between the remaining conductors for establishing a ground connection prior to electrical engagement of the remaining conductors with each other.

2. The combination of claim 1 and wherein said socket means has an outer housing provided with an inner surface carrying bayonet projections of said bayonet means, said plug means having an exterior surface formed with L-shaped grooves for respectively receiving said bayonet projections for releasably connecting the pair of means to each other in their operative position.

3. The combination of claim 2 and wherein said bayonet projections of said socket means are respectively formed with recesses and portions of said plug means which define said bayonet grooves are respectively formed with projections respectively received in said recesses, and spring means situated between said plug and socket means for urging said projections of said plug means into said recesses of said bayonet projections of said socket means, so that said pair of means must first be moved further along their common axis in opposition to said spring means prior to turning of one of the pair of means with respect to the other in a direction opposite to said given direction for disconnecting the pair of means.

4. The combination of claim 1 and wherein the conductors of one of the pair of means terminate in free ends respectively having electrically conductive projections extending inwardly toward said common axis with the other of the pair of means having portions extending over said electrically conductive projections of the

conductors of said one of said pair of means for providing a second bayonet connection between said pair of means.

5. The combination of claim 1 and wherein said pair of means carry a positioning means for angularly positioning said pair of means with respect to each other in only one operative position to assure a preselected polarity in the conductors.

6. The combination of claim 5 and wherein said positioning means includes a tongue carried by one of the pair of means and a groove formed in the other of the pair of means for receiving the tongue with the tongue and groove extending parallel to the common axis of the pair of means and cooperating to compel the pair of means to be initially displaced one with respect to the other along their common axis only when the pair of means have a predetermined angular position with respect to each other.

7. The combination of claim 1 and wherein said socket means includes an outer housing and an inner core carried by said outer housing, said core having a central portion adjacent said common axis and supporting said conductors of said socket means, said plug means having its conductors arranged more distant from said common axis than said conductors of said socket means with the conductors of said plug means situated in their entirety outwardly beyond said conductors of said socket means at a greater distance from said common axis than said conductors of said socket means.

8. The combination of claim 7 and wherein said housing and core of said socket means are separate elements having serrated surfaces respectively engaging each other for interconnecting said separate elements of said socket means.

9. The combination of claim 1 and wherein all of said conductors have elongated channel-shaped portions extending parallel to said common axis and having a substantially C-shaped cross section in a plane normal to said common axis, said socket means having at its conductors outer wall portions respectively received in the channel portions of the conductors of said plug means, and said plug means having at its conductors inner wall portions respectively received in the channel portions of the conductors of said socket means.

10. The combination of claim 9 and wherein said outer wall portions of said conductors of said socket means are respectively formed with inner elongated knife-edge portions extending parallel to said common axis and pressing against the inner wall portions of the conductors of said plug means for establishing an electrical connection therewith.

* * * * *