

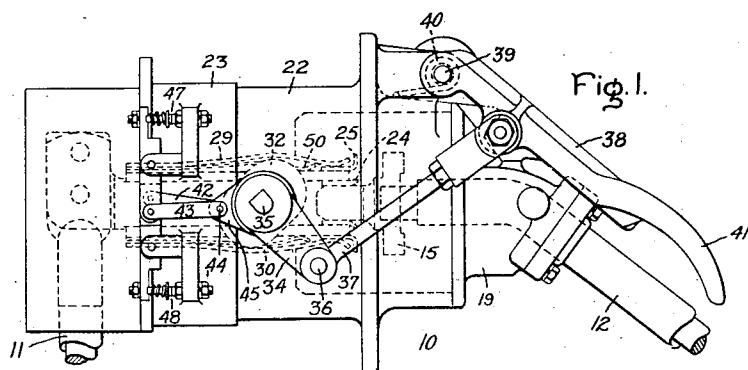
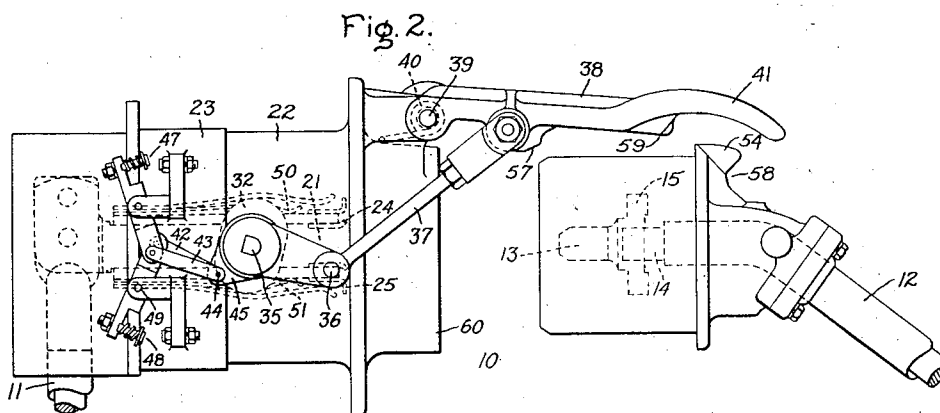
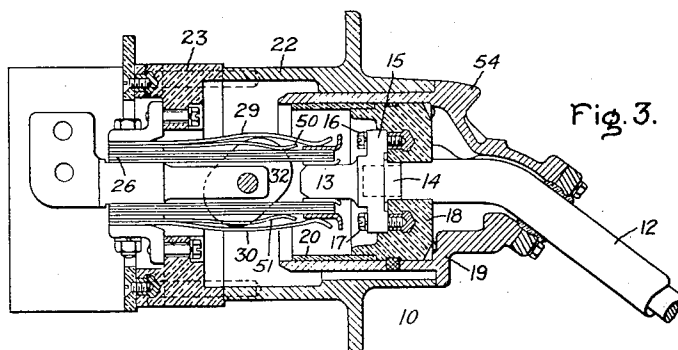
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ELECTRICAL COUPLER

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ELECTRICAL COUPLER

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My invention relates to electric cable couplers of the type commonly used on railway trains for establishing the power connections between cars, and has for its object the provision of a device of this character of simple and inexpensive construction which insures ease of operation.

Heretofore, it has been common practice to use a plug and socket coupling device. However, in designing heavy duty couplings it requires considerable manual effort to push the plug into place in the socket, and when the parts become roughened or marred in service it is often necessary to use additional mechanical force to engage or disengage the couplings. This mechanical force is ordinarily applied by whipping the connecting cables or by striking the cables with a switch bar, coupling pin, or other convenient implement. Any of these methods, of course, greatly shortens the life of the couplers and may result in serious delay in the operation of the cars or locomotives.

In carrying out my invention in one form thereof, I provide main contact springs in the socket portion of the coupler and arrange a cam in operative relation with the springs so that the bias normally applied by the springs on the current-carrying elements may be removed so as to permit the insertion of the plug member with minimum effort. More specifically, I include relatively strong springs and relatively weak springs so that the bias of the weaker springs causes a wiping or cleaning action between the plug and the socket. The cam is arranged to be operated by movement of a cover plate which is normally biased to the closed position by a coil spring. After the coupling plug is inserted in the socket the cam is operated to release the full tension of the springs thereby establishing an electrical connection having a minimum resistance between the plug and socket.

For a more complete understanding of my invention, reference should now be had to the drawing in which Fig. 1 shows a sectional elevation of my invention with the coupler plug in the current-carrying relation with respect to the coupler socket; Fig. 2 shows a sectional elevation of the device of Fig. 1 with the plug disengaged from the socket; and Fig. 3 is a section of Fig. 1.

Referring to the drawing, I have shown my invention in one form as applied to a coupler 10 arranged to complete a circuit between conductors 11 and 12, which conductors lead to the power connections in adjacent cars. The coupler plug 13 is soldered or welded to the end 14 of the cable 12. An outwardly extending flange 15 of the plug is provided with holes through which supporting

bolts 16 and 17 extend. These bolts are screwed into the insulating material 18 moulded into the plug casing 19 and serve to center the plug within the casing. A cylinder 20 of insulating material extends from the moulded insulation 18 to the open end of the casing 19.

The coupler socket 21 is similarly supported within the casing 22 by means of the moulded insulation 23. The current-carrying members 24 and 25 of the socket 21 are electrically connected to the cable 11, as indicated by the reference numeral 26. The current-carrying members are preferably made of copper because of its low resistivity. In order to provide a high contact pressure, the main contact springs 29 and 30 are arranged to bias the current carrying members 24 and 25 towards each other.

To secure the easy insertion of the plug 13 into the socket 21, a cam 32 is arranged between the main springs 29 and 30 so that the normal bias exerted by these springs on the contact members 24 and 25 is removed. The rotation of the cam 32 is accomplished by means of a crank arm 34 which is secured at one end 35 to the cam and at its other end 36 to a link 37 extending to and pivotally connected with a hinged cover 38 provided for the casing 22. The cover 38 is pivotally connected to the casing 22 by a pin 39 and is biased to its closed position by a coil spring 40. A handle 41 is provided by an extension of the cover 38.

Whenever the cover 38 is manually operated to the position shown in Fig. 2, it will be observed that the cam 32 removes the bias on the contact members 24 and 25. At the same time links 42 and 43 pivoted at one end 44 to an extension 45 formed on the cam are moved in a direction to open the interlock contacts 47 and 48. For example, the link 42 rotates the movable contact 48 about the pivot point 49 to interrupt its circuit. The contacts 47 and 48 are connected in circuit with the operating coil of the contactor (not shown) normally connected in series with conductor 11. Consequently the circuit including the conductor 11 is always deenergized when the cover 38 is operated to the position shown. If it were not for this provision injurious arcing might occur between the contact members 24 and 25 and the plug 13 when the plug 13 is removed from the socket 21 with possible injury to the operator.

Besides the bias produced by the main springs 29 and 30, the auxiliary springs 50 and 51 are arranged to produce a bias of predetermined magnitude on the contact members 24 and 25.

This magnitude is only sufficient to insure a cleaning action between the contact members 24 and 25 and the plug 13 when the plug is removed or inserted in socket 21. Assuming now that the cover 38 is in the position shown and the casing 19 and the plug 13 are moved to the left, it will be observed that the plug 13 enters the socket 21 in concentric relation with it. The auxiliary springs 50 and 51 perform their function by biasing the contact members so that any corrosion or dirt on the plug is cleaned away in readiness for the completion of an excellent electrical connection. The plug and casing are then moved to the left until a flange 54 formed on the casing 19 abuts against the casing 22. The handle 41 is then released and the spring 40 operates the cover 38 in a clockwise direction to the position shown in Fig. 1. The cam 32 is thereby rotated to apply the bias of the main springs 29 and 30 against the contact members 24 and 25 to complete the electrical connection and to provide full contact pressure between the contacts. At the same time the links 42 and 43 are operated to close the interlocking contacts 47 and 48 and a latching member 57 carried by the cover is rotated into locking engagement with a notch 58 formed in the plug casing 19. It will, therefore, be seen that the plug 13 is maintained in its operated position by the bias of the main springs and by the latch.

Whenever it is desired to disengage the plug from the socket it is only necessary to grasp the handle 41 and rotate it to the position shown in Fig. 2. The plug 13 may be readily withdrawn from the socket 21 and requires no force other than can be readily applied by the operator. As soon as the plug 13 is removed, the spring 40 rotates the cover 38 in a clockwise direction until the outer end 59 strikes the lower end 60 of the casing 22. Thus it will be seen that the casing 22 is closed by the cover 38 and provides additional safety to the trainmen in effectively preventing contact with the current-carrying members 24 and 25.

While I have shown a particular embodiment of my invention, it will be understood, of course, that I do not wish to be limited thereto since many modifications may be made, and I, therefore, contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. An electric coupler comprising a plug and a socket adapted to receive said plug, the said socket having a current-carrying member, means for biasing said member against said plug, a movable cover for said socket, and means associated with said cover for operating said biasing means to remove the bias from said member so as to permit the easy engagement and disengagement of said plug and said socket.

2. In an electric coupler, the combination of a plug and a plurality of current-carrying members arranged to form a socket for said plug, biasing means associated with each of said members for applying a pressure of predetermined magnitude on each of said members, a movable cover for said socket, and means responsive to movement of said cover for operating said biasing means to remove said pressures so as to permit the insertion of said plug within said socket, said means operating said biasing means to apply a predetermined contact pressure between said

members and said plug upon movement of said cover to a predetermined position.

3. In an electric coupler, the combination of a plug and a plurality of current-carrying members arranged to form a socket for said plug, biasing means associated with each of said members for applying pressures of predetermined magnitude on said members, a movable cover for said socket, means responsive to movement of said cover from a closed position to an open position for operating said biasing means to remove said pressure to permit the insertion of said plug within said socket, said means operating said biasing means to apply a predetermined contact pressure between said members and said plug upon movement of said cover towards closed position, and latching means on said cover for preventing the withdrawal of said plug.

4. An electric coupler comprising a plug and a socket formed by relatively movable current-carrying members for receiving said plug, main biasing means associated with each of said members for applying pressures of relatively high magnitude on said members in a direction to bias said members against said plug, and auxiliary biasing means associated with said members for applying relatively low pressures on said members to insure a cleaning action between said plug and members during movement of said plug into and out of said socket, and means for removing only the bias of said main biasing means to permit the movement of said plug into and out of said socket.

5. In an electric coupling device, the combination with a plug, a plurality of current-carrying members arranged in cooperative relation with each other to form a socket arranged to receive said plug, main biasing springs for applying a predetermined pressure between said members and said plug, a cam associated with said main contact springs for removing the pressure from said members, linkage means for operating said cam, and an auxiliary spring associated with each of said current-carrying members for applying a predetermined pressure between said members and said plug so as to insure a cleaning action between said plug and said members whenever said plug is inserted in said socket.

6. In an electric train coupler, the combination with a plug and a plurality of current-carrying members arranged to form a socket to receive said plug, of a casing surrounding said socket, said casing being provided with an opening through which said plug may be inserted, a cover member for said opening pivotally mounted on said casing so as to be movable between closed and open positions to respectively cover and uncover said opening, a spring operatively associated with each of said current-carrying members for applying a pressure against said members and a cam arranged for operation to release the pressure of said springs against said members, and linkage means extending between said cam and cover so as to operate said cam to release said pressure when said opening is uncovered and when said cover is moved toward said closed position operating said cam to apply said pressure to said members whereby said members are biased into engagement with said plug.

7. In an electric train coupler, the combination of a plug and a plurality of current-carrying members arranged to form a socket to receive said plug, of a casing surrounding said socket, said casing being provided with an opening through which said plug may be inserted, a cover

member for said opening pivotally mounted on said casing so as to be movable between two positions to respectively cover and uncover said opening, a spring operatively associated with each of said current-carrying members for applying a pressure against said members, a cam arranged to release the pressure of the springs against said members, linkage means extending between said cam and said cover for operating said cam to release said pressure whenever said cover is moved to uncover said opening, and when said cover is moved towards closed position to apply said pressure to said plug, and latching means carried by said cover for locking said plug within said socket.

8. In an electric train line coupling the combination with a fixed connecting member comprising a plurality of current-carrying members arranged to receive a movable connecting member, a casing surrounding said fixed member and being provided with an opening through which said movable member may be inserted, a cylindrical casing for said movable member arranged to engage said casing to center said movable member with respect to said fixed member, a closure member for said opening pivotally secured to said casing so as to be movable between a covering position and an uncovering position, biasing means for producing a predetermined bias on each of said current-carrying members in a direction to produce a predetermined contact pressure between fixed member and said movable member, a rotatable cam associated with said biasing means for removing said bias, linkage means extending between said closure member and said cam for rotating said cam to release said pressure whenever said closure is moved from said covering position to said uncovering position, a notch formed on said cylindrical casing and a latching member carried by said cover, said member and said notch forming a latch for locking said plug within said socket whenever said closure is moved a predetermined distance towards said covering position, said movement also operating said cam to release said biasing means to establish said contact pressure between said fixed member and said movable member.

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