

Feb. 20, 1945.

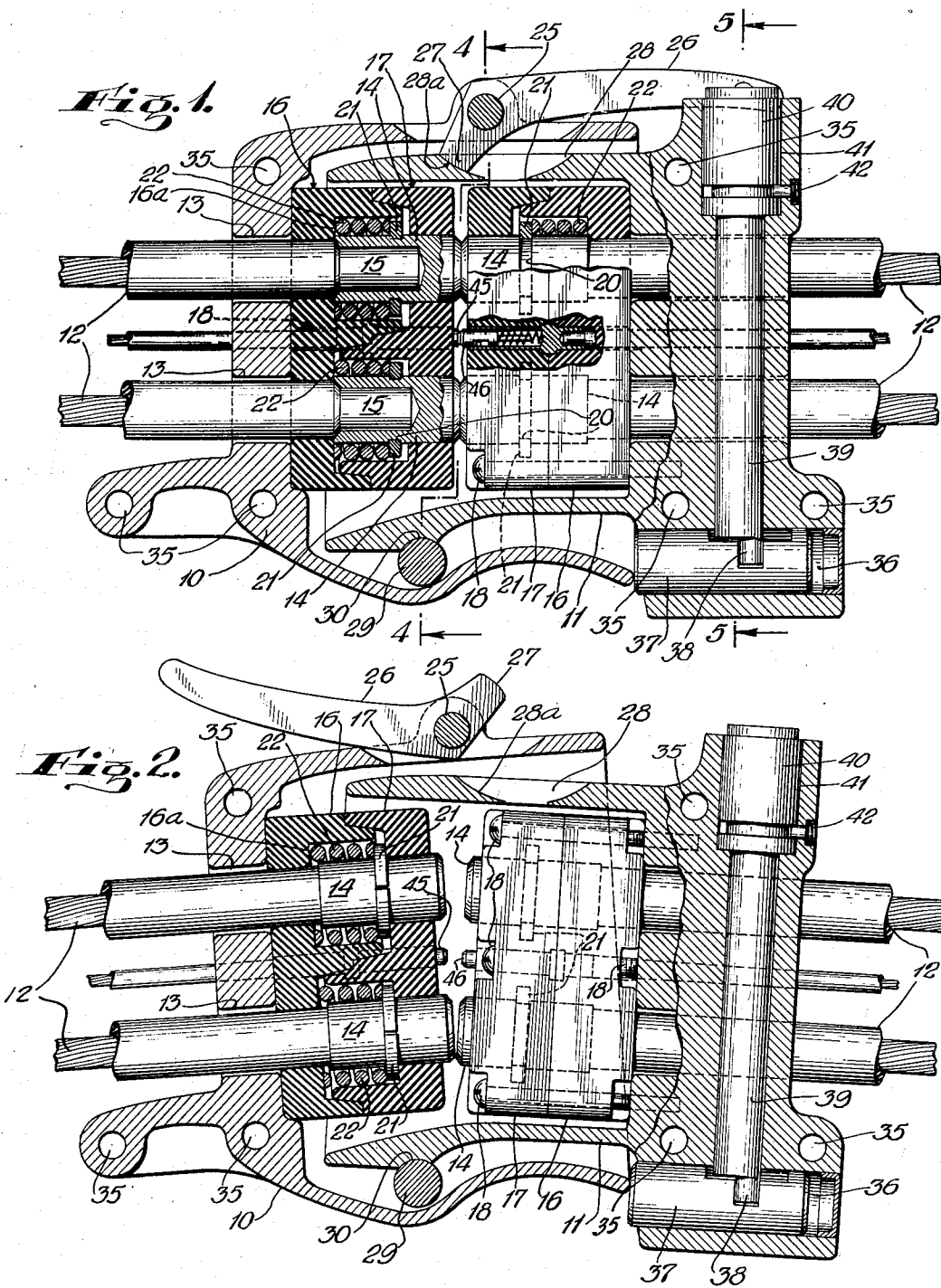
C. S. SCHROEDER

2,369,860

ELECTRIC CONNECTOR

Filed May 21, 1942

2 Sheets-Sheet 1



INVENTOR  
C.S. Schroeder  
BY *R.H. Solder*  
ATTORNEY

Feb. 20, 1945.

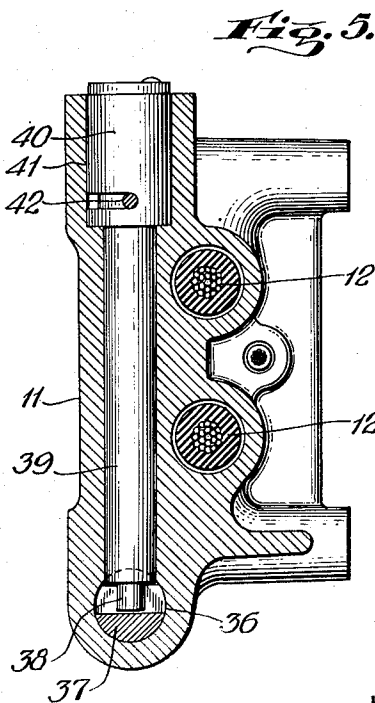
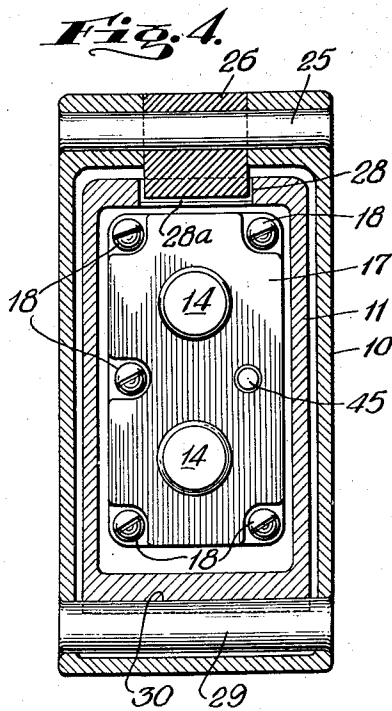
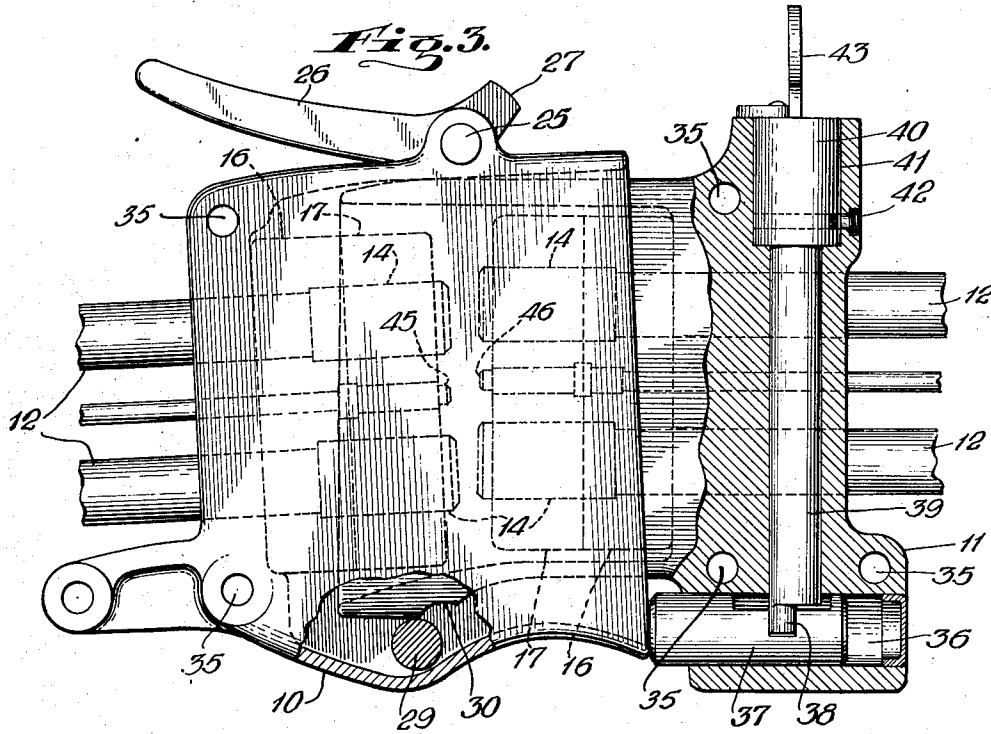
C. S. SCHROEDER

2,369,860

ELECTRIC CONNECTOR

Filed May 21, 1942

2 Sheets-Sheet 2



INVENTOR  
C. S. Schroeder  
BY *A. Golden*  
ATTORNEY

# UNITED STATES PATENT OFFICE

2,369,860

## ELECTRIC CONNECTOR

Charles S. Schroeder, Philadelphia, Pa., assignor  
to The Yale & Towne Manufacturing Company,  
Stamford, Conn., a corporation of Connecticut

Application May 21, 1942, Serial No. 443,879

3 Claims. (Cl. 173-328)

This invention relates to electric circuit connectors, and more particularly to electric circuit connectors to be used with electric industrial trucks.

The basic feature to which the novelty of my invention is directed, is the means whereby through a simple manual operation, an electric circuit connector may be actuated to break the electric circuit or circuits maintained closed thereby. This feature is of particular value in the electric truck field where it is frequently necessary to effect the immediate swift break of an electric circuit between the battery and the motor, or between the battery and the charging line, but it will readily be appreciated that the same feature may be useful in many fields other than that of the electric industrial truck.

A further feature of my invention resides in the manner in which the parts of my electric circuit connector are moved into assembled relation to one another by what I term a mechanical advantage means that may take the form of a toggle lever.

A further feature of my invention resides in the arrangement of the parts of my electrical connector so that the said parts may readily be moved manually into a predetermined intermediate position from which position they are then moved into final assembled relation to one another by means which preferably are in the form of mechanical advantage means, such as the toggle lever referred to. It is a feature of the invention that in the said intermediate position, the contacts of my electric connector are out of circuit closing position. As a still further feature, the movement of the parts of the connector into assembled relation is spring resisted, and preferably the springs resisting the said movement are springs which operate behind the contacts and that are compressed when the contacts are brought into engagement by the assembly of the parts.

A further important feature of my invention resides in the provision of means whereby the parts of my electric connector are moved into assembled relation at an angle relatively to one another somewhat displaced from the final angular alignment of the said parts, and thus preventing the bringing together of the several contacts until the parts approach final assembled relation. The means requiring this manner of assembly of the parts are preferably in the form of an obstruction. It is a further feature of my invention that the obstruction forms a pivot or fulcrum about which the parts of the

electric connector may move angularly relatively to one another into final assembled relation, it being a still further feature of my invention that the final movement about the obstruction as a fulcrum is effected by the mechanical advantage means or toggle lever.

Still a further feature of my invention resides in the particular construction of the parts of the electrical connector as will be fully appreciated after a reading of the specification which follows.

My invention contributes also the feature of a locking device for preventing the movement of the parts of the electric connector into final assembled alignment so as to prevent unauthorized connection of the several circuits controlled by the electrical connector.

I have thus alluded to the several more important features of my invention in order that the description thereof which follows will be more readily understood by those skilled in the art. It will be appreciated, however, that the basic conception on which the construction of my invention is based, may be embodied in many physical structures other than that which I shall herein describe. Therefore, I expect to obtain claims sufficiently broad to prevent the appropriation and use of my invention by those skilled in the art in such other forms as will readily suggest themselves.

Referring now to the drawings, Fig. 1 is a vertical section through the parts of my electric connector showing the said parts in final assembled relation. Fig. 2 is a section similar to Fig. 1 showing the parts in what may be termed an intermediate position from which they may be moved to the final position of Fig. 1 by the operation of a toggle. Fig. 3 is a vertical view of the parts of my electric connector showing their outer construction, with certain portions broken away. The parts of my connector are shown in Fig. 3 somewhat more separated than they are in Fig. 2. Figs. 4 and 5 are views respectively along lines 4-4 and 5-5 of Fig. 1.

Referring now more particularly to the drawings, the electric connector of my invention comprises what may be called an outer cup-shaped casting 10 and a nesting inner cup-shaped casting 11. A pair of cables 12 are shown traversing openings 13 in the casting 10, and copper contact members 14 are secured as by soldering or otherwise directly to the ends 15 of the wires of said cables. The ends of the contacts 14 may be supplied with silver surfaces if desired, for better service. The contacts 14 are housed within

bore formed in a pair of mating insulation blocks 16 and 17 that are identical in shape for economic manufacture, and are secured in the assembled position shown in Figs. 1 and 2 by five screws 18 best shown in Fig. 4, the said screws being adapted for entering into suitable threaded holes in the casing 10.

The casting 11 has assembled thereto similar cables 12 and contacts 14, as well as insulation blocks 16 and 17 held in position by screws 18, all in exactly the same manner as those elements are secured within the casting 10, as will be fully appreciated. In other words, the electric circuit connecting parts contained in the castings 10 and 11 are identical.

Each of the contacts 14 is grooved as at 20, and entered into each of the grooves 20 is a split steel ring 21. A spring 22 is positioned between each of the steel rings 21 and a surface 16a of the insulation blocks 16, so as to maintain the contacts 14 spring pressed outwardly into the position illustrated in Figs. 2 and 3.

Pivoted about the shaft 25 on the casting 10 is a toggle lever 26, the part 27 of the toggle lever being adapted for entry into a slot 28 of the casting 11, and for coaction with the surface 28a of the slot as will shortly be made apparent. Extending crosswise of the casting 10, as may best be seen in Figs. 2 and 4, is a rod 29 that may be secured in any manner that may be desired relatively to the said casting 10. The cupshaped inner casting 11 has the lower portion of its outer peripheral surface grooved at 30 as is best apparent from Figs. 3 and 4, for coaction with the shaft 29.

Having now described the more vital parts of my electric connector, it will be well to indicate just how those parts cooperate to yield the several desirable features to which I have already alluded. If it be now considered that the two castings 10 and 11 of my electric connector are separated one from the other, and it is desired to bring the several contacts 14 into the cooperating relationship illustrated in Fig. 1, it will be understood that it is first necessary to insert the inner cup shaped casting 11 into the outer cup shaped casting 10. This insertion of the casting 11 into the casting 10 is best illustrated in Fig. 3, where it will be noted that the casting 11, in order to avoid obstructing shaft 29, assumes an angular relation to the casting 10 with the contacts 14 out of axial alignment. This of course is the relation of the parts where my invention utilizes axially arranged spring pressed contacts of the type described, and it is herein emphasized that other types of contacts may be employed if desired.

Once the inner casting 11 is brought somewhat to the left of the position of Fig. 3, the groove 30 of the casting 11 will fit over the shaft 29 as best illustrated in Fig. 2. The lower pair of spring pressed contacts 14 will now preferably be in slight contact relation while the upper pair of contacts 14 will be completely separated and the circuits controlled by the connector will of course be open. Moreover, it is a particular preferred feature of my invention that the springs 22 be extremely heavy, so that it will be impossible for an operator to manually rotate the casting 11 about the fulcrum of shaft 29 relatively to the casting 10, so as to bring the upper contacts 14 into the relation illustrated in Fig. 1. For rotating the casting 11 about the fulcrum of the shaft 29 to bring the contacts 14 into the position of Fig. 1 against the resistance of the several springs

22, I utilize mechanical advantage means such as the toggle lever 26. This toggle lever is rotated from the position of Fig. 2 into the position of Fig. 1 and when so rotated its portion 27 first enters the slot 28 and then coacts with the surface 28a all as will be fully appreciated by those skilled in the art. This operation of the toggle lever not only moves the several contacts 14 into assembled relation, but also maintains the inner casting 11 aligned in assembled relation to the outer casting 10, with the circuits through the several contacts 14 maintained closed.

In the actual operation of my invention, one of the castings 10, 11 will preferably be secured to form a fixed part of the industrial truck or other machine with which it is to be used, while the other casting is movable, but it is entirely possible to make both castings 10 and 11 movable. Should it be desired to fix one of the castings 10, 11, I have provided the said castings with a series of bored openings designated by reference numeral 35 whereby either of the castings may be bolted to a fixed portion of a truck or other machine. It will now be appreciated that with one of the castings secured against movement, should an emergency arise requiring the immediate and quick breaking of the several circuits through the cables 12, a simple movement of the toggle lever 26 will allow the relatively powerful springs 22 to effect the immediate disengagement of the contacts 14 by moving the castings 10 and 11 into the position of Fig. 2 and possibly even into the position of Fig. 3.

It will be appreciated that this movement of the parts from the position of Fig. 1 to the position of Fig. 2 will be relatively swift under the impact of the springs 22 so as to effect a quick and immediate breaking of the electric circuit or circuits established through the electric connector.

In order to prevent unauthorized use of my electric connector, I employ a locking mechanism well illustrated in the several figures. There, it will be noted that the casting 11 is formed with a bore 36 in which slides a bolt 37 that is adapted to be moved by an eccentric pin 38 extending from a locking snail 39. The lock shaft 39 is controlled by a usual form of key plug forming part of a lock cylinder 40 mounted within a bore 41 of the casting 11, and held in place by a suitable screw stud 42. When the key to the lock, designated by reference numeral 43 in Fig. 3, is used to operate the lock and thereby rotate the shaft 39 whereby to throw the bolt 37 from the position of Figs. 1 and 2 into the position of Fig. 3, it will be readily apparent that it is impossible to obtain further movement of the inner casting 11 into cup shaped outer casting 10 from the position of Fig. 3. Therefore, it will be impossible to assemble the two castings of the electric connector to close the circuits as previously described.

Auxiliary circuit closing contacts 45 and 46 are shown in the several figures, one mounted in casting 10 while the other is mounted in casting 11, these auxiliary contacts moving into contact relation to close a metering or other circuit when the main contacts 14 move into cooperating relation. While the auxiliary contacts 45, 46 are shown and alluded to, they do not form a material part of my invention and further reference thereto need not be made herein. Since the operation and function of my invention is now quite apparent, no further description will be added.

I now claim:

1. In a combination of the class described, a pair of open end rimmed casings adapted for tele-

scoping nested relation with the open end of one casing entering the open end of the other casing, axially spring pressed contacts mounted within said casings to be protected by said rims and adapted for engagement when said casings are brought into a predetermined nested alignment corresponding to axial alignment of said contacts, said springs yieldingly maintaining said contacts in a position to oppose the movement of said casings into said predetermined nested alignment, means requiring that said casings approach said predetermined nested alignment angularly displaced from said predetermined alignment until they reach an intermediate position, and mechanical advantage means for moving said casings into said predetermined nested alignment from said intermediate position, against the pressure of said springs.

2. In a combination of the class described, a pair of open end rimmed casings adapted for telescoping nested relation with the open end of one casing entering the open end of the other casing, spring pressed contacts mounted within said

casings to be protected by said rims and adapted for engagement when said casings are brought into a predetermined nested alignment, mechanical advantage means for moving said casings into said predetermined nested alignment, and the springs of said contacts resisting the movement of said casings into said predetermined alignment by said mechanical advantage means.

3. In a combination of the class described, a pair of rimmed cup shaped casings, a pair of electric contacts in each of said casings mounted well inside the said rims to be protected thereby, the said pairs of contacts being adapted to make contact when said casings are secured in predetermined nested alignment to one another and with said rims in telescopic relation, springs pressing against said contacts whereby to maintain said contacts yieldingly in a position obstructing the movement of said casings into predetermined nested alignment, and a toggle means for moving said casings into said predetermined alignment against the pressure of said springs.

CHARLES S. SCHROEDER.