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CHARGING RECEPTACLE FOR ELECTRIC STORAGE BATTERY LOCOMOTIVES

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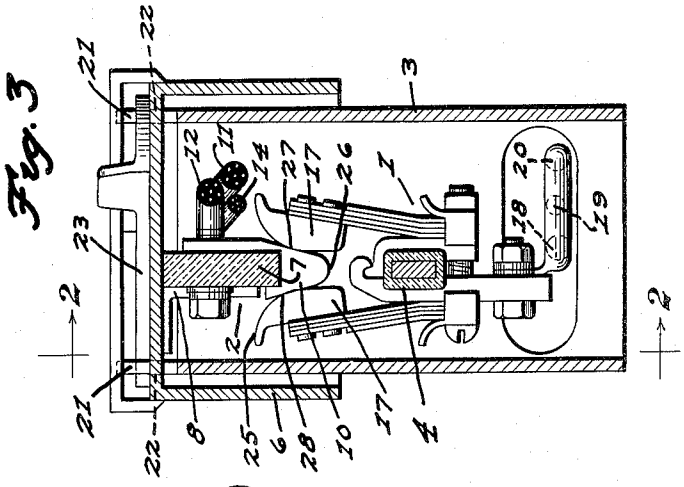


Fig. 3

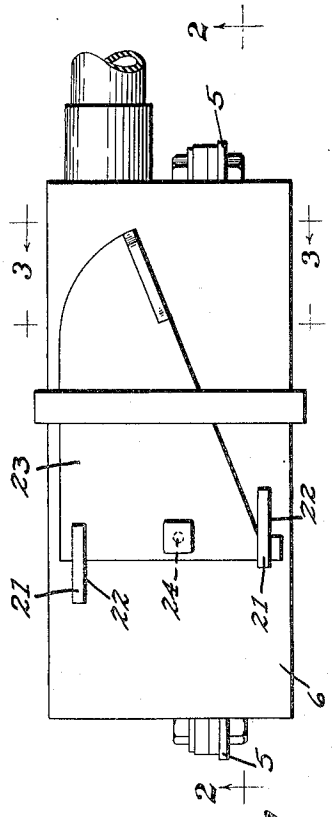


Fig. 1

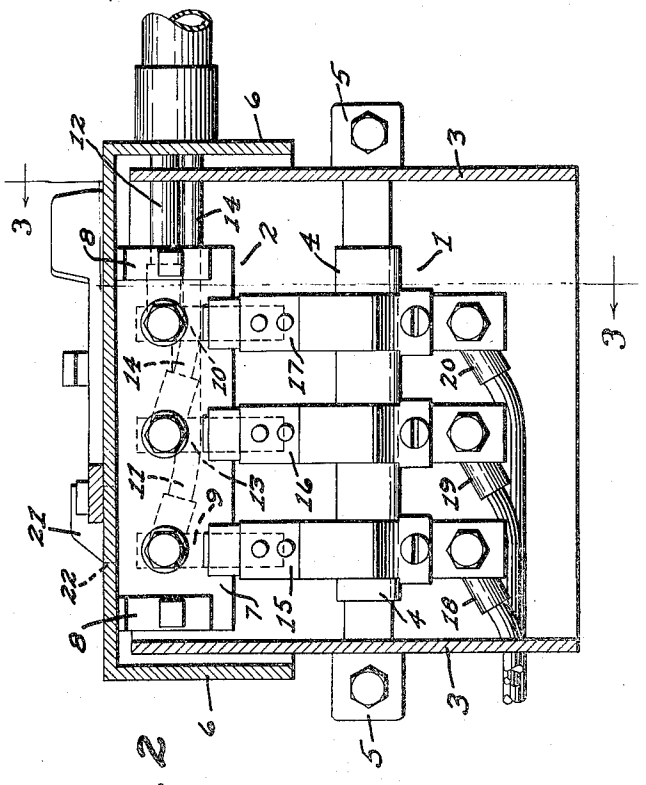


Fig. 2

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This invention relates to improvements in electrical connection receptacles, and particularly to those used in connection with electric storage battery locomotives.

Principal objects of my invention are as follows:

To provide an electrical connection receptacle, which does not require that its mating parts have exact alignment for full snug fitting, and which does not require that its mating parts be closely machined nor maintained in perfect condition.

To provide such a device in which the individual mating contacts automatically adjust and tighten themselves and wipe their contact surfaces clean when the mating assembly is pushed home by the operator, and one in which it is practically impossible to place the mating assemblies in an incorrect position.

To provide such a device in which the mating contacts are readily accessible; in which dirt, water and foreign matter does not accumulate and pack in the housing, but automatically falls out; and one which can be washed with a water hose or be blown out with an air jet without damaging or fouling the mating contacts.

To provide such a device in which the mating contacts are readily accessible for inspection and repair; which can be dismantled and reassembled without the use of special tools; and in which damaged parts can be readily replaced to enable the receptacle to function as well as a new unit.

A charging or electrical connection receptacle in an electric storage battery locomotive is the electrical switch by which connections are made, first from the source of the direct current to the storage battery, to charge the storage battery, and, then, from the charged storage battery to the locomotive, to operate the locomotive. One part of the switch is permanently and rigidly connected to the storage battery; one part of the switch is permanently connected, by a flexible connection, to the source of direct current; and one part of the switch is permanently connected, also by a flexible connection, to the locomotive. The part of the switch which is permanently and rigidly connected to the storage battery, is a common connection to the other two parts, and, in turn, mates with each one; at one time, it mates with the part which is connected to the source of direct current, to make electrical contact for charging the storage battery; and at another time, it mates with the part which is connected to the locomotive, to

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make electrical contact for operating the locomotive.

Another important object of this invention is to provide a convenient, rugged, positive, dependable way to make these necessary electrical contacts, first with the source of the direct current, to charge the storage battery, and, after the storage battery has been charged and disconnected from the source of direct current, to the locomotive, so that the locomotive can be driven by the electrical energy stored in the battery.

In the accompanying drawing, which illustrates a presently preferred embodiment of the invention:

Fig. 1 represents a top plan view of the receptacle with cover latched in place;

Fig. 2, a longitudinal vertical section taken on the line 2—2 of Figs. 1 and 3; and

Fig. 3, a transverse vertical section taken on the line 3—3 of Figs. 1 and 2.

Refering to the accompanying drawing, wherein my invention is illustrated as adapted especially for use with electric storage battery locomotives: a contact assembly 1 is securely but detachably mounted in a sleeve housing 3. Two mating-contact assemblies, such as that illustrated at 2, are alternately used in conjunction with 1 for charging the storage battery and operating the locomotive, respectively. The contact group itself, indicated at 4, is made up of standard parts and materials, and rigidly mounted on support lugs 5 bolted to housing 3.

A loosely-fitting cover 6 for the open top of the sleeve housing 3 has a mating-contact group 7 mounted on lugs 8, as shown. Mating-contact assembly 2, as shown on the drawing, is of the type which is permanently connected to the source of the direct current. It therefore contains contact elements, of which 9 and 10, are connected to conductors 11 and 12 in the main circuit, while the third, 13, completes, through conductor 14, the connection between the ampere-hour meter and a switch in the line supplying the direct current for charging the storage battery, whereby the charging current is interrupted when the ampere-hour meter on the storage-battery-assembly registers full charge.

The other type of mating-contact assembly 2, which is connected to the driving motor of the locomotive, carries only the two contact elements 9 and 10. Contact assembly 1, being a double purpose unit used both in charging the storage battery and in operating the locomotive, contains three contact elements 15, 16, and 17,

connected to conductors 18, 19, and 20, all of which, or 15 and 17 only, are engaged, depending on whether the storage batteries are being charged or the locomotive is being operated. Locking lugs 21 of housing 3 project up through slots 22 of housing 6 and are engaged by latch 23.

When cover 6 is pressed down over housing 3, no difficulty is encountered, as the clearance is ample between the two, a close fit being unnecessary to align the mating contact surfaces. As the mating-contact elements 9, 11, and 13 and contact group 7 are pressed into engagement with the flexibly and resiliently mounted fingers 15, 16, and 17 respectively of contact group 4, the contact surfaces rub and tighten against each other and thereby secure a positive electrical contact The cover 6 is held in place by latch 23, which catches under the two lugs 21 when moved about its pivot 24. The resilience of the leaf-spring mounts for contact fingers 15, 16 and 17 insures a snug electrical contact at all times, and prevents opening of the electrical circuit during any vibration or jarring of the switch.

It will be noted that both contact groups are mounted so that all of their elements are clearly visible and readily accessible for inspection and repair. When the charging receptacle is in use, either when charging the battery or when operating the locomotive, the working parts of the charging receptacles are protected from above by the cover 6. If dirt, water or foreign matter should enter when housing 6 is not in place, the absence of a bottom in housing 3 permits it to drop without accumulating.

The simplicity of the device is evident from the drawings, and the contact assemblies include no parts or materials which are not standard and which are not easily obtainable.

The arrangement of the locking lugs 21 and the slots 22, as guides, makes it impossible to engage the contact groups in any but the correct position. The housing, mounting lugs, locking device, and contact elements are all of substantial construction and securely assembled. The resilient pincer-action of contact elements 15, 16, and 17 insures perfect contact with their mating elements 9, 13 and 10, respectively. At the same time, the latch 23 secures against accidental disengagement of the electrical surfaces.

In the event that the contact elements are disengaged by the operator before the current is interrupted, any arcing that may occur, takes place at the tips 25 and 26 of the contact elements and not at their contact surfaces 27 and 28. This prevents roughening, pitting or burning of these vital surfaces by arcing, so that an electrical contact is insured at all times. Since the component parts of the charging receptacles are not molded in place in a mass of insulating material, but are in all cases retained in position by accessible bolts and screws which are removable with ordinary tools, it is evident that dismantling, assembling and replacement of worn or damaged parts are readily accomplished.

In locomotive service, the charging-receptacles are exposed to very severe operating conditions such as dirt, moisture, vibration, heavy electrical currents and careless manipulation, all of which, to avoid wear, damage and electrical short-circuits, necessitate that all parts of the charging receptacles be unusually rugged, simple, self cleaning and easily accessible. Receptacles now commonly used do not meet these requirements, and have apparently been designed with a view to conditions involving explosion hazards, or to novelty, or for extreme compactness, or for convenience of manufacture, all at the expense of dependability in operation and easy access for repair. My invention is intended to overcome these difficulties.

What I claim is:

1. An electrical connection receptacle, comprising an open-topped housing; an electrically insulated mounting bar extending through said housing substantially from one wall to an opposing wall thereof in spaced relation to the other housing walls; a plurality of mutually spaced, laterally-resilient electrical contact sockets mounted within said housing in fixed positions which are spaced apart from the walls thereof, each of said electrical contact sockets being made up of two opposing, resilient contact elements detachably secured to said mounting bar at opposite sides thereof; a cover for said housing, said cover having mounted at its underside, in fixed positions corresponding to those of said contact sockets, a plurality of mutually spaced male contact elements of downwardly tapered formation adapted to mate with and laterally expand said electrical contact sockets in good, sliding, electrical contact therewith when the cover is in place upon said housing; and means for securing said cover in place upon said housing.

2. An electrical connection receptacle, comprising an open-topped housing; a plurality of mutually spaced, laterally-resilient electrical contact sockets mounted within said housing in fixed positions which are spaced apart from the walls thereof; a loose-fitting cover for said housing, said cover having mounted at its underside, in fixed positions corresponding to those of said contact sockets, a plurality of mutually spaced male contact elements of downwardly tapered formation adapted to mate with and laterally expand said electrical contact sockets in good, sliding, electrical contact therewith when the cover is in place upon said housing; and means for securing said cover in place upon said housing, said means comprising positioning-lugs fixed to the housing and formed as catches, registering slots in the cover through which such lugs are adapted to extend when the cover is in place upon the housing, and a manually-operable latch fixed to the cover and adapted to engage said lugs as catches.

3. The combination recited in claim 1, wherein a mounting bar of electrical insulation depends from the underside of the cover in substantial registry with the mounting bar of the housing, and wherein the male contact elements are detachably secured to said cover mounting bar in mutually spaced relationship along the length thereof.

4. The combination recited in claim 2, wherein the housing has an open bottom.

5. In an electric storage battery locomotive, an electrical connection and charging receptacle assembly for the storage battery of said locomotive, said receptacle assembly comprising a sleeve housing secured substantially vertically to said locomotive, so that its open bottom is substantially free as a dirt-discharge opening; a set of mutually spaced electrical contacts mounted within said housing in fixed positions spaced from the housing walls so as to provide substantially free passage for dirt downwardly through the housing, said electrical contacts being directed

to the open top of said sleeve housing; means electrically connecting said electrical contacts with respective terminals of the locomotive storage battery; a cover for the open top of said housing, said cover having a set of electrical contacts arranged at its underside for mating with the said housing contacts; and means electrically connecting the said cover contacts with the driving motor of said locomotive.

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