W. H. ADAMS.

ELECTRICAL CONNECTOR.

APPLICATION FILED MAY 1, 1915.

1,170,034. Patented Feb. 1, 1916.

Fig. 1.

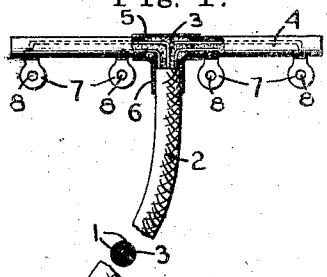


Fig. 2.

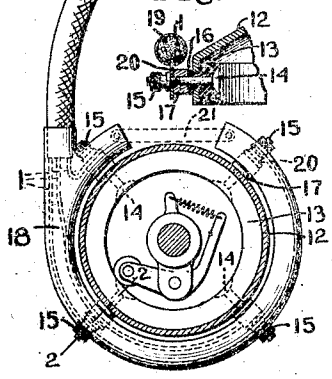


Fig. 3.

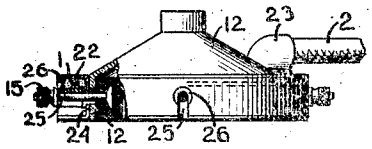


Fig. 4.

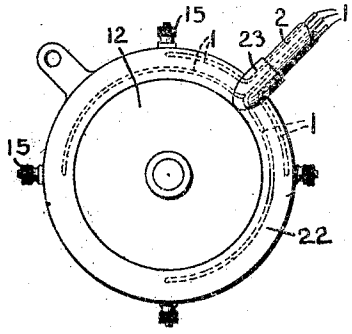
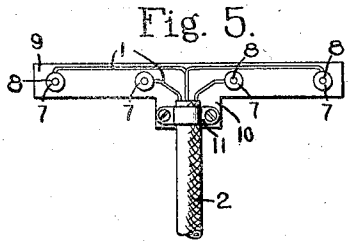


Fig. 5.



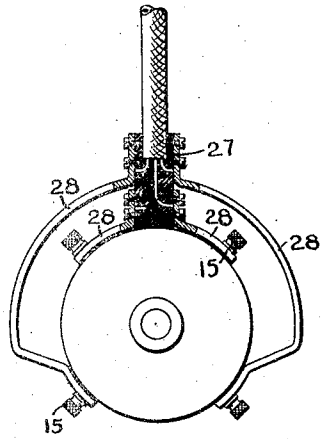


Fig. 6.

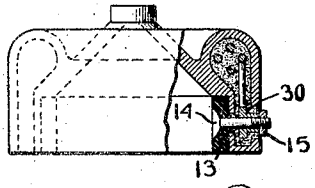
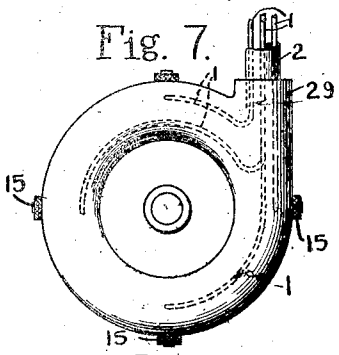


Fig. 7.



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ELECTRICAL CONNECTOR.

1,170,034. Specification of Letters Patent. **Patented Feb. 1, 1916.**

Application filed May 1, 1915. Serial No. 25,301.

To all whom it may concern:

Be it known that I, WILLIAM H. ADAMS, a citizen of the United States, residing at Kenyon, county of Washington, State of Rhode Island, have invented an Improvement in Electrical Connectors, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to improvements in electrical connectors and has particular reference to removing the strains of vibratory, or other tensioned stresses from the individual current-carrying media. Such strain results in parted conductors or in loosened imperfect contacts each entailing circuit interruption. It is common to convey one or more electrical conductors within an armored or otherwise protected sheath, conduit or cable. In such forms the contained wires or other conductors emerge from the cable at each end and are thereafter carried to the desired points, to a source of electrical energy and to a current utilization point. Resulting from such constructions, practice has demonstrated that the terminals of the individual strands or wires, thus isolated and frequently singly bearing the stress of the cable weight or of any force or motion imparted thereto, are broken under repeated bendings. Where the usual conducting wires terminate in metallic pins or tips the ordinary jars tend to pull and twist them out of contact. And, while the novel electrical connectors disclosed herein are adapted especially for use with the ignition systems of internal combustion engines, their multifarious adaptations to electrical circuits where flexibility and certain continuity of current conduction is desired, are obvious.

The selected embodiment of this invention, herein described and illustrated, is that of such an electrical connector as is designed to convey electrical energy from the usual spark coil to the commutator or timer of an internal combustion engine. Especially in motor vehicle service, with the constant swaying and jarring shocks and the frequent movement of the commutator to change its angular position consequent upon the advance or the retardation of the spark lever to meet the demands of varying loads, is such bending and torsional strain present. Furthermore, in such service these individual wires though properly insulated are directly and singly exposed constantly to high temperatures, to oil and to dirt by which means their insulation rapidly deteriorates and breaks occur which are difficult both of detection and of repair due to their restricted and ofttimes inaccessible locations.

The object of this invention is to provide a flexible electrical connector to which the terminals of the current-carrying means are rigidly secured.

Another object is to provide an electrical connection for the spark coil and timer parts of an internal combustion engine, the current-carrying media being incased in an insulated conduit—the timer and coil terminals of the respective media being rigidly attached to the cable.

Other objects of the invention will more fully appear from the following description and from the accompanying drawings and will be pointed out in the annexed claims.

An embodiment of this invention as adapted to the engine ignition parts of the well-known Ford automobiles has been illustrated. However, it is obvious that this device may be employed with an internal combustion engine having any number of cylinders or with other electrical apparatus having need of flexible connections, as but slight variations need be made so to adapt it.

Figure 1 is a view of the connector showing the spark coil and timer connections; Fig. 2 is a section on the line 2—2 of Fig. 1; Fig. 3 is a view partially in section showing a modified form of timer terminal connection; Fig. 4 is a plan of the form illustrated in Fig. 3; Fig. 5 is a view partially in section of a modified connection at spark coil and timer terminals; Fig. 6 is a view of another modified timer connection; Fig. 7 is a plan of the timer terminal shown in Fig. 6.

In the drawings, the connections shown are for four current-carrying elements as employed, for example, to convey electrical impulses between the spark coil and the commutator or timer. The wires 1, four in number as shown, are carried within a cable

or conduit 2. This conduit comprises the usually spirally taped, knitted or woven covering inclosing a flexible insulating medium 3 in which are embedded the wires 1, thus respectively insulated from each other. This conduit is rigidly secured at each end to the respective terminals shown. At one end is shown the spark coil connection. This consists, in the form shown in Fig. 1, of a tubular portion 4 of a material having insulating properties preferably of wood or fiber. A sleeve 5 which surrounds and retains therein the tubular portion has a cylindrical coupling 6 within which is received the conduit. The wires 1 are led to their respective terminals 7 which are insulated from each other. These terminals are formed of a conducting material and have apertures 8 to receive the usual binding posts of a spark coil. This tubular portion receives, when the wires are electrically attached to their respective terminals, an insulating substance 3 which enters therein in a viscous state and subsequently hardens.

In Fig. 5 is shown another form of spark coil connection. The wooden or fibrous portion 9 receives on its surface the wires 1 which are secured thereto and are thus led to their respective terminals 7 secured to the wood or fiber, preferably countersunk, and having apertures 8 to receive in electrical contact the spark coil binding posts. In this form the portion 9 has an integral projection 10 to which the conduit 2 is secured by the plate 11 screwed to the projection.

As at the spark coil end of the connector, so at the commutator or timer end, all stresses—longitudinal or transverse—are borne by the conduit and not, as at present, by the individual conductors.

Referring again to Fig. 1, the connection to the usual timer mechanism is shown. The timer casing 12 contains the usual fiber ring 13 having equidistantly embedded therein the four contact segments 14 each having its binding post 15. The usual roller contact, carried by the roller arm mounted upon the timer shaft and revoluble therewith, is shown. Each binding post 15 passes through the fiber ring and through the timer casing. The casing, opposite each binding post, has an opening in which is inserted, and suitably retained, the insulating collar 16. The washer 17 of non-conducting material is secured to the collar. The binding post extends through the collar and washer and has secured in adjustable threaded engagement thereon the usual thumb nut.

The cable or conduit 2 at this timer end is rigidly affixed to a substantially annular head 18 which is composed of inflexible or hardened insulating material 19 surrounded by the usual protective taped or woven covering. The wires 1 pass from the conduit to this timer head and are carried embedded in the material, being thereby respectively insulated. Each wire has secured thereto a metal conducting terminal 20 which projects from the under side of the head. The wires 1 in the head are of progressively increasing lengths so that each terminal may be positioned adjacent and may be detachably secured to one binding post. The terminals 20, apertured to receive the binding posts, are thus retentively held between the insulating washer 17 and the thumb nut. In dotted lines in Fig. 1 is shown a transverse brace 21 joining the two ends of the head—insuring greater rigidity should it be deemed necessary.

Another form of rigid timer connection is shown in Figs. 3 and 4 in which the head is composed of a channel iron or U-shaped member 22 having a coupling 23 affixed thereto in which the conduit 2 is received and rigidly retained. This member 22 which is preferably metallic is filled with a hardened insulation in which the wires 1 are embedded. The inner face 24 is positioned next to the timer casing 12. A plurality of binding post slots 25 are afforded by cutting away the lower flange and the inner face of this member. The wires are led through the head in parallel pairs from the conduit 2. The end of each wire is electrically connected to a conducting metal sleeve 26 which has a bottom longitudinal slot. This head is, therefore, adapted to be positioned about the timer casing from which the binding posts project by removing the thumb nuts from each and sliding the head thereupon. The binding posts 15 are received each within a slot 25 and make electrical connection with the slotted metal sleeve 26. The thumb screws are then adjustably tightened upon the binding post and sleeve and the head fixedly retained.

Fig. 5 shows another modification of a timer connection. In this structure the flexible conduit 2 is fixedly secured to and received within a wooden or fibrous block 27. Secured to this block are in this embodiment four rigid metallic conducting bars 28 each of which is screwed to the block at one end. The other ends of these conductors are each attached to a binding post, the bars and posts being suitably insulated from the timer casing. Each of the wires from the spark coil is electrically attached to a bar.

In Figs. 6 and 7 is shown another form of rigid timer connection. In this structure the timer casing is preferably of a pressed or molded electrically insulating material, the conductors being embedded and relatively insulated in the annular enlarged portion shown in section in Fig. 6 where the integral casing is shown partially broken away. This casing has an offset portion 29 into which the multi-strand conduit 2 is received and fixedly retained. Each strand

or wire 1 is led through the insulation to a collar 30 carried by and making electrical connection with one of the binding posts 15. There is thus produced an improved electrical connection having a main flexible wire carrying conduit whereby all strain is removed from the individual wires. It is efficient, simple and easy of attachment and liability of circuit interruption is reduced to a minimum.

It is understood that the embodiments of the invention as disclosed herein are illustrative and not restrictive and that the invention may be incorporated in other apparatus, and that it may be used for other purposes than in connection with timing mechanisms.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. An electrical connector comprising a flexible cable, members rigidly affixed to opposite ends of said cable and each having a plurality of relatively insulated terminals, a plurality of relatively insulated conductors carried by said cable, each oppositely disposed pair of said relatively insulated terminals being connected by one of said conductors, whereby relative movement of said members is compensated for by said cable and said members and strains upon said terminals and conductors are avoided.

2. An electrical connector comprising a flexible cable, inflexible members rigidly affixed to opposite ends of said cable, and forming therewith a substantially integral continuous structure, each of said inflexible members having a plurality of relatively insulated terminals, a plurality of relatively insulated conductors carried by said cable, each oppositely disposed pair of relatively insulated terminals being connected by one of said conductors, whereby relative movement of said members is compensated for by said cable and said members and strains upon said terminals and conductors are avoided.

3. In an electrical connector, a flexible insulating medium, a plurality of relatively insulated conductors carried by said medium, members rigidly affixed to opposite ends of said medium, each member having a plurality of relatively insulated terminals, a head substantially annular formed by one of said members and bearing therein the relatively insulated conductors of progressively increased length.

4. In an electrical connector, a flexible insulating medium, a series of relatively insulated conductors carried within said medium, means for connecting said conductors to electrical receiving and distributing elements including an inflexible head rigidly secured to said insulating medium said relatively insulated conductors extending into said head and each having a terminal, and a metallic reinforcing means surrounding said head.

5. In an electrical connection, a flexible insulating medium, a substantially annular head inflexibly attached to said medium, a series of relatively insulated conductors inclosed in said medium, and extending into said head in circumferential pairs of different lengths, a relatively insulated terminal for each of said conductors.

6. A flexible member carrying a plurality of respectively insulated flexible conductors, a group of fixed and relatively insulated terminals carried by said member, means for rigidly securing said member to each group, each of said conductors making a relatively insulated electrical connection between pairs of terminals.

7. In an electrical connector, a flexible insulating medium, a plurality of conductors separately embedded in said medium and carried thereby, rigid members inflexibly affixed to opposite ends of said medium and having a plurality of relatively insulated terminals, one of said members comprising a block of insulating material, rigid relatively insulated terminals secured thereto and extending therefrom, and means for connecting said conductors to said terminals.

8. A group of relatively immovable and relatively insulated terminals adapted to be severally attached to the binding posts of a multiple spark coil, a cable comprising mutually insulated and protected strands equal in number to said terminals, a rigidly connected but mutually insulated group of terminals connected to the opposite end of said cable and adapted to fit and be fastened upon the binding posts of a commutator.

9. An electrical connector for ignition systems of internal combustion engines, including a flexible medium, a series of relatively insulated conductors carried by said medium, a timer casing rigidly secured to said medium and forming therewith a substantially continuous structure, means for carrying said conductors relatively insulated in said casing and a series of relatively insulated terminals in said casing each connected to one of such conductors.

10. An electrical connector of the character described including a flexible medium, a series of relatively insulated conductors carried by said medium, a timer casing formed of electrical insulating material, means for rigidly securing said medium thereto whereby a substantially continuous structure is formed, a series of relatively insulated terminals in said casing, said conductors extending from said flexible medium into said insulating casing and electrically connected each to one of said terminals.

11. In an ignition device for internal combustion engines, a rigid member comprising

a series of relatively insulated terminals adapted each to be attached to a spark coil unit, a timer including a casing therefor, a flexible insulating medium rigidly secured to said member and to said timer casing, a series of conductors carried by said flexible medium and relatively insulated therein, an annular insulating and distributing chamber in said casing, said conductors extending into said chamber and each having a relatively insulated terminal adapted to make connection with a timer roller contact.

In testimony whereof, I have signed my name to this specification.

WILLIAM H. ADAMS.