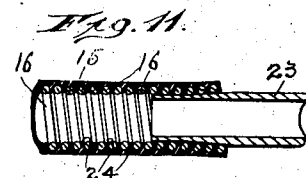
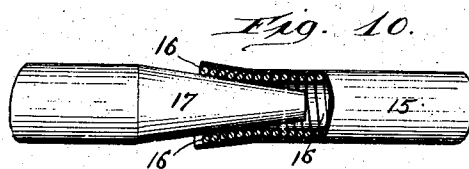
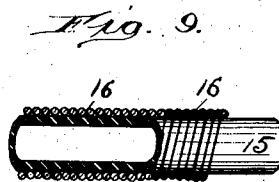
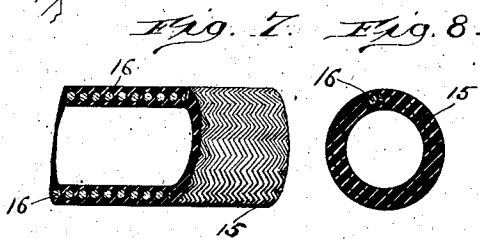
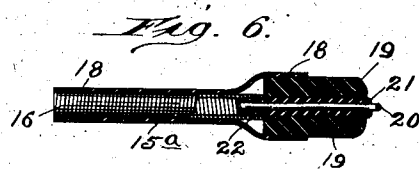
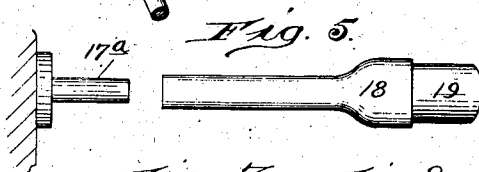
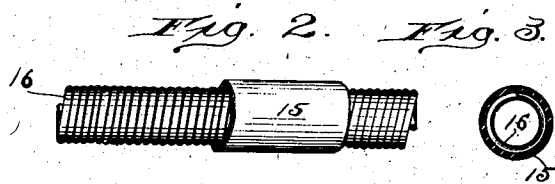
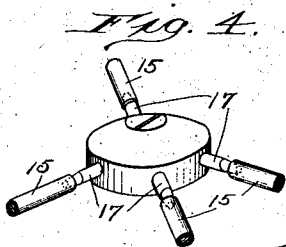
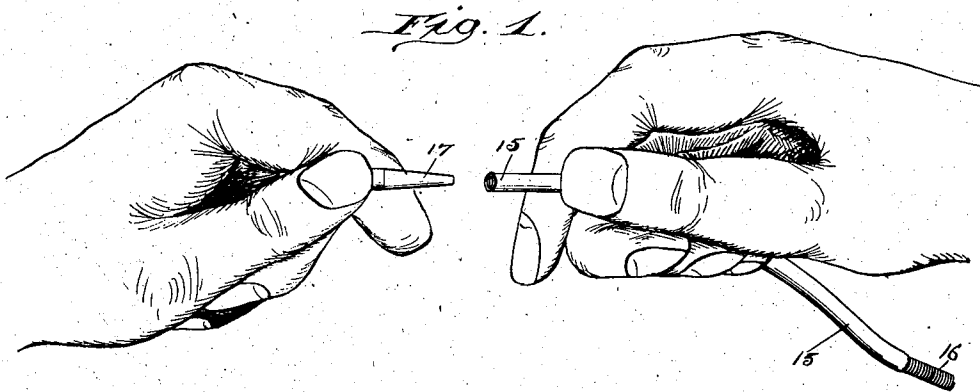


No. 839,260.

PATENTED DEC. 25, 1906.

A. BENSON.  
FLEXIBLE CONNECTION.  
APPLICATION FILED SEPT. 1, 1905.



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Inventor:  
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# UNITED STATES PATENT OFFICE.

ANDREW BENSON, OF CHICAGO, ILLINOIS.

## FLEXIBLE CONNECTION.

No. 839,260.

Specification of Letters Patent.

Patented Dec. 25, 1906.

Application filed September 1, 1905. Serial No. 276,687.

*To all whom it may concern:*

Be it known that I, ANDREW BENSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Flexible Connections, of which the following is a specification.

This invention relates to improvements in a flexible connecting device, and while it is more especially intended or designed to be used as a flexible electric conducting connection for electric terminals—such as those of batteries, motors, dynamos, telephones, and for electrical instruments, electrotherapeutical apparatus, and the like—yet it is applicable as a connection for or as a means of flexibly uniting various other parts; and it consists in certain peculiarities of the construction, novel arrangement, and operation of the various parts thereof, as will be hereinafter more fully set forth and specifically claimed.

The principal object of the invention is to provide a flexible connection of the above-named character which shall be simple and inexpensive in construction; strong, durable, and so made that it will not be affected by vibrations and that the operation of uniting two or more parts for the conduction of electricity or otherwise may be more quickly and efficiently performed and at less expense than by the means heretofore employed, and also to facilitate the act of detaching the parts. Another object is to provide simple and efficient means for insulating the conductor which forms a part of the connection in such a manner that the insulation and conducting material will cooperate with one another to render the device more durable and to more firmly or securely unite the parts to be connected.

Other objects and advantages of the invention will be disclosed in the subjoined description and explanation.

In order to enable others skilled in the art to which my invention pertains to make and use the same, I will now proceed to describe it, referring to the accompanying drawings, in which—

Figure 1 is a perspective view of a connection embodying one form of my invention, showing the parts held in the hands of the operator and in the act of being joined. Fig. 2

is a fragmental view in elevation of the flexible part of the connection. Fig. 3 is a cross-sectional view thereof. Fig. 4 is a perspective view of a terminal head provided with a number of projections or terminals, showing flexible connections secured thereto. Fig. 5 is a view in side elevation of a modification in the construction of the flexible portion of the connection, showing it detached from its plug or terminal. Fig. 6 is a view, partly in section and partly in elevation, of the modified form illustrated in Fig. 5. Fig. 7 is a fragmental sectional view of the flexible part of the connection, showing another modification in the construction. Fig. 8 is a cross-sectional view thereof. Fig. 9 is a view, partly in section and partly in elevation, of still another modified form of the flexible portion of the connection. Fig. 10 is an enlarged view, partly in elevation and partly in section, of a portion of the flexible part and a part of the plug shown in Fig. 1; and Fig. 11 is a longitudinal sectional view of portions of the flexible and inflexible parts of the connection, showing a further modification in its construction.

Like numerals of reference refer to corresponding parts throughout the different views of the drawings.

The reference-numeral 15 designates a tube of soft rubber in which is located and closely fitted a spirally-formed wire 16, which when the device is used for electrical purposes forms the electric conductor for the flexible portion of the connection, and whether used for electrical or other purposes serves as a gripping or clamping holder for the stiff plug or terminal 17, which is another part of the connection and which may be connected or secured at its end opposite to that which is located in the free end of the wire coil 16 to any suitable device and in any desired manner. The opposite end of the coil 16 from that which is connected to the plug or terminal 17 may be connected to any suitable part and in any desired manner.

As shown in Figs. 1, 4, and 10 of the drawings, the plugs or terminals 17, forming a part of the connection, are slightly tapered toward their free ends, so that they may be readily inserted within the free and open end of the wire coil 16, which it will be understood is entirely covered and closely pressed by the

rubber tube 15 surrounding the same. By inserting the plug 17 in the free open end of the coil 16 and slightly turning the latter in the direction of the progress of the spirals in its end adjacent to the plug it is apparent that the coil will be forced on the tapered portion of the plug, which operation will expand the coils, when by removing the pressure used for forcibly uniting the coil and plug it is apparent that the coils will contract, and as they lie spirally or diagonally around the plug that they will firmly grip or clamp it, thus providing a strong connection, the parts of which may be readily detached by again turning the coil in the above-named direction, which will again expand the coils so that the flexible portion consisting of the tube 15 and wire coil 16 may be removed from the plug.

In Figs. 5 and 6 of the drawings I have shown a modification in the construction of the connection, which consists in forming the plug or terminal 17<sup>a</sup> without the tapered free end, but of a size to fit snugly in the open end of the coil 16, which as in the construction just above described is covered by a rubber tube 15<sup>a</sup>, which has one of its ends enlarged, as at 18, to fit around a piece of insulation 19, through which is extended a conductor 20, which may be provided with a surrounding core 21 of the ordinary construction. In this modification of the connection that portion of the coil 16 within the enlarged portion 18 of the tube is located so as to surround the projecting end of the conductor 20 and is secured thereto by means of solder 22, thus providing by means of the coil 16 and the tube 15<sup>a</sup> a flexible connection to receive the plug 17<sup>a</sup>, which may be united thereto in the same manner as above described.

In some instances I may embed the coil 16 in the tube 15, as shown in Figs. 7 and 8, which will form a strong flexible connection and which may be used as a conductor of electricity or for other purposes. In this modification the manner of connecting the flexible portion to the plug or stiff portion is the same as that above set forth; except that the plug will not come in direct contact with the wire forming the coil 16 unless it is desired that said wire may be used as a conductor, when its ends may be exposed or suitably connected to the plug and electric wire.

In Fig 9 I have shown still another modification in which the tube 15 is located within the coil 16, and in using this construction it is apparent that the terminal may be hollow to receive the wire-coil 16, which in uniting the same to the hollow plug should be turned in the direction to contract the coils, so that when the force required to turn it is removed said coils will expand and engage the inner surface of the plug.

In Fig. 11 is shown another modification in which the wire coil 16 is located within the

tube 15 and is almost entirely embedded therein, but has the inner surface of each of its coils exposed to contact with a plug or terminal 23, which may be hollow and inserted in the coil 16 in the same manner as first above described in reference to the construction shown in Figs. 1 to 4, inclusive, and Fig. 10. This last-named construction is particularly applicable for connections used where it is desired to prevent leakage of air or water, such as in hose-couplings or air-brake couplings, for it is evident that the portions 24 of the rubber interposed between the coils of the wire 16 will prevent the passage of the fluids.

From the foregoing and by reference to the drawings it will be readily understood and clearly seen that in each and all of the constructions shown and described the tube which I have mentioned as being made of soft rubber, but which may be made of any other suitable material, will reinforce a spiral or coil and will yield therewith. A very important feature of my invention, and one that I wish distinctly understood, is that in each and all of the constructions the tube, whether made of rubber or other material, is permanently and integrally united to the coils of the spirally-formed wire, thus preventing the latter being pulled or removed from the tube and causing the two to coact in the expansion, contraction, or extension of the flexible part of the connection. In uniting the flexible part of the connection to the plug or terminal it should be understood that the pieces do not require to be screwed or turned several times upon one another, but that a very slight forward and lateral pressure or movement only is necessary, the said lateral movement being in the direction of the progress of the spirals or coils, which operation, as before stated, will expand the same, when by removing the pressure they will contract.

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

1. A flexible connection consisting of a spirally-formed wire, a rubber tube surrounding the same and having a portion projecting beyond one end of the spiral, an insulated conductor extending into said projecting portion and electrically connected to the adjacent portion of the spiral, and a plug or terminal adapted to be inserted in and to engage the other end of the spiral, substantially as described.

2. A flexible connection consisting of a spirally-formed wire reinforced by a flexible rubber tube vulcanized thereto, and a plug or terminal to engage the end of the spiral by the expansion and contraction of the latter.

3. A flexible connection consisting of a spirally - formed wire, a flexible tube surrounding the same and vulcanized thereto, and a tapered plug or terminal adapted to be

inserted in one end of the spiral and to engage the same.

5 4. A flexible connection consisting of a soft-rubber tube, a spirally-formed wire vulcanized therewith and having a portion exposed, and a tapered plug or terminal adapted to be inserted in one end of the spiral and

tube and to contact with the exposed portion of the former.

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