

No. 640,479.

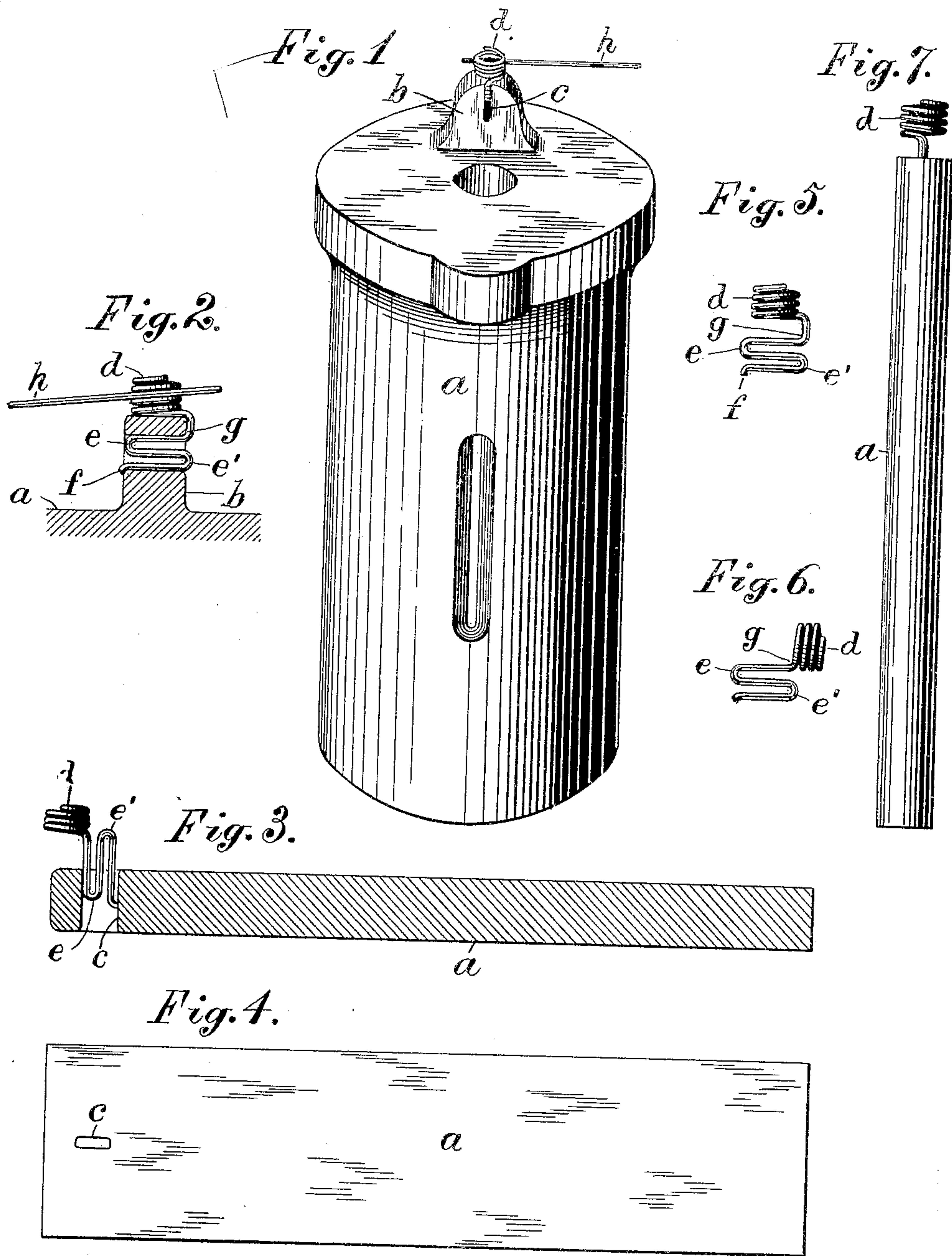
Patented Jan. 2, 1900.

W. MILLS.

CONNECTOR FOR BATTERY ELECTRODES, FUSES, &c

(Application filed Mar. 16, 1899.)

(No Model.)



Attest:
L. Lee.
Edw. F. Winery

Inventor
William Mills, per
Thomas S. Crane, Atty.

UNITED STATES PATENT OFFICE.

WILLIAM MILLS, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO THE EASTERN CARBON WORKS, OF RAHWAY, NEW JERSEY.

CONNECTOR FOR BATTERY-ELECTRODES, FUSES, &c.

SPECIFICATION forming part of Letters Patent No. 640,479, dated January 2, 1900.

Application filed March 16, 1899. Serial No. 709,243. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MILLS, a citizen of the United States, residing at Elizabeth, county of Union, State of New Jersey, have invented certain new and useful Improvements in Connectors for Battery-Electrodes, Fuses, &c., fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of the present invention is to facilitate the connection of a conducting wire or strip to a battery-electrode; and this object is accomplished partly by providing the electrode with a connector having a spring-clip in which the conducting wire or strip may be readily crowded, so as to make an effective contact without the use of screws or pliers. The object is, further, accomplished by making the clip detachable from the electrode and providing it with spring-arms adapted for attachment to the electrode by a frictional engagement. The spring-arms may be readily made in one piece with the spring-clip by bending a piece of wire to form a series of adjacent coils to constitute the clip and the remainder of the wire into a couple of parallel loops to form arms adapted for insertion in a slot or hole upon the electrode. The wire loops spring elastically apart in a sufficient degree to crowd within the slot upon the electrode, and thus form normally-extended arms which press against the sides of the slot and maintain their connection with the electrode by a frictional engagement. The terminal of the wire forming one of the spring-arms may be slightly hooked at the end and the slot formed in a lug upon the electrode, so that the hook may project beyond the farther side of the lug and hold the connector securely in the slot without preventing its removal when desired. A shoulder is formed upon the wire at one end of the arms to regulate their penetration within the slot, and with such construction the connector may be instantly secured to the electrode by merely pressing the arms within the slot as far as the shoulder will permit. The attachment of the connector to the wire conductor and to the electrode by a frictional engagement saves the expense of the screw attachments which are commonly used for such purpose, and thus very greatly

reduces the cost of the connector, while the frictional engagement with both the conductor and the electrode produces a more perfect electrical connection, as it induces friction between the parts when they are connected together, and thus cleans the contiguous surfaces and brings them into closer contact.

The invention will be understood by reference to the annexed drawings, in which—

Figure 1 is a perspective view of a cylindrical carbon electrode provided with the connector, and Fig. 2 is a cross-section of the lug upon the cylinder with the connector in place thereon. Fig. 3 is a cross-section of the electrode with the connector inserted partly in place; and Fig. 4 is an elevation of a flat carbon electrode, showing the slot prepared for the conductor. Fig. 5 shows the connector with the series of coils at one side of the spring-arms, and Fig. 6 shows the connector with the series of coils at one end of the spring-arms. Fig. 7 shows a zinc electrode with the connector secured permanently on one end. Fig. 1 is drawn upon a smaller scale than the other figures.

In Fig. 1, *a* designates the electrode, and *b* a lug upon the top of the same, having slots *c* to receive the arms of the connector. *d* designates the coils of the spring-clip, *e* and *e'* the parallel loops or arms to fit within the slot, and *f* the hook upon the terminal of the arm *e'*. An abrupt bend is formed in the wire at the opposite end of the arms from the hook *f* to produce a shoulder *g*, which is arranged to strike the face of the lug *b* when the arms are pressed therein, and the hook *f* is projected slightly through the lug, so as to engage its farther side. The coils *d* are bent at right angles to the shoulder portion *g* and arranged to set upon the top of the lug *b* in a convenient position to slip the connecting-wire *h* between the coils, as shown in Fig. 2, which thus forms a spring-clip to elastically grip the wire. The pushing of the arms into the slot *c* cleans off the contacting surfaces of the wire, and thus secures a perfect electrical connection with the carbon *a*, while the crowding of the wire *h* between the coils *d* serves to clean the contiguous surfaces of the wire and coils, and thus afford them a perfect connection.

a' designates the flat carbon electrode shown

in Figs. 3 and 4, in which the connector is shown inserted half-way through the slot and the coils bent parallel with the shoulder portion *g*, so as to lie upon the face of the electrode.

The two forms of the connector just described are shown in Figs. 5 and 6.

The spring-clip may be used to make electrical connections with fuses, switches, and in various other situations, and the slot or aperture to receive the spring-arms may be formed upon any suitable part of the object to which the connector is to be applied.

The detachable character of the connector is of great value upon carbons, as it may be applied instantly to the slot or aperture and makes a much better electrical contact than the screw-stud which is commonly used. Such studs consume much time in their application, as they require the removal of two nuts and the insertion of the stud through the lug *b* and the tight clamping of the nuts upon the lug to prevent their loss in transportation. The slot for the spring-arms is most readily formed on the carbon where the latter is provided with a flat lug or portion through which the slot can be extended.

The wire connector may be made and sold as a separate article of manufacture for application to electrodes, and it is also sold in combination with the electrodes and considerably reduces the cost of furnishing an electrode with a connector by its cheapness in manufacture and the great saving in time in applying it to the electrode.

A spiral spring has been used between two collars upon a binding-post of smaller diameter than the interior of the spring; but in such construction the wire is coiled around the binding-post between the successive coils of the spring. My invention is much more simple, as it involves spiral coils only and differs materially in its operation, as the clip is formed wholly of the elastic coils *d* and en-

tirely obviates the winding of the conducting-wire *h*, which is inserted in the connector by pressing it laterally between the coils and across the diameter of the same, as is clearly shown in Figs. 1 and 2.

Having thus set forth the nature of the invention, what is claimed herein is—

1. The combination, with a carbon electrode having a flat portion or lug with slot extended wholly through the same, of a connector comprising a piece of spring-wire bent to form a series of adjacent coils and provided with normally-extended spring-arms fitted elastically within such slot.

2. As a new article of manufacture, a connector having a spring-clip formed of a series of coils to elastically grip a conductor, and provided with spring-arms to fit elastically in a battery-electrode.

3. As a new article of manufacture, a connector having a series of spring-coils to elastically grip a conductor, and provided with normally-extended spring-arms to engage within a slot in a battery-electrode.

4. As a new article of manufacture, a connector comprising a piece of spring-wire bent to form a series of coils, elastic arms to engage a slot in the conductor and a shoulder at one end of such arms to regulate their penetration into the slot, substantially as herein set forth.

5. As a new article of manufacture, the battery-electrode connector consisting of a single piece of wire bent to form the elastic coils *d*, the shoulder *g*, and the double loops *e*, *e'*, with hook *f* at the terminal of the loop *e*, as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM MILLS.

Witnesses:

L. LEE,
THOMAS S. CRANE.