

(No Model.)

R. S. WARING.

REPAIRING DEFECTS IN THE CONDUCTORS OF LEAD CABLES.

No. 294,549.

Patented Mar. 4, 1884.

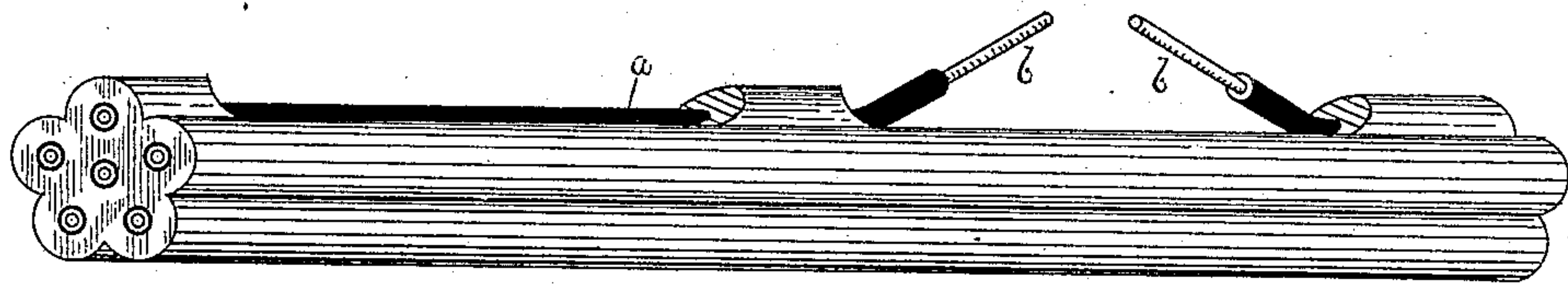


FIG. 1.



FIG. 2.

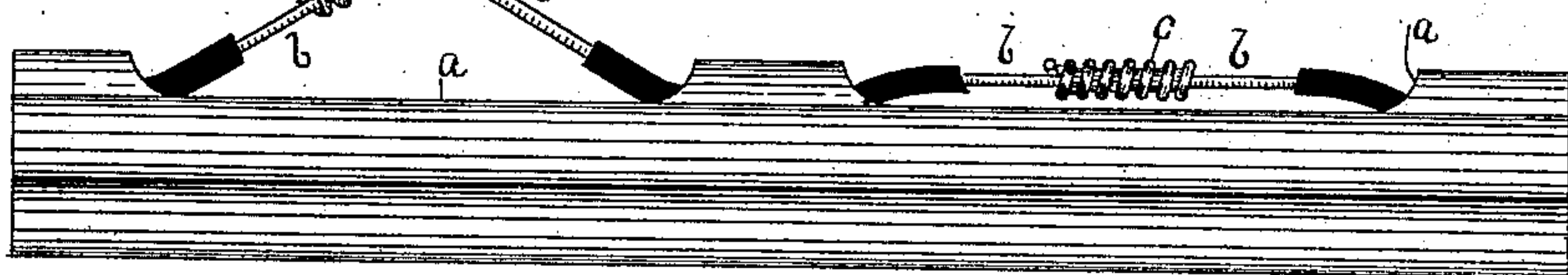


FIG. 3.



FIG. 4.

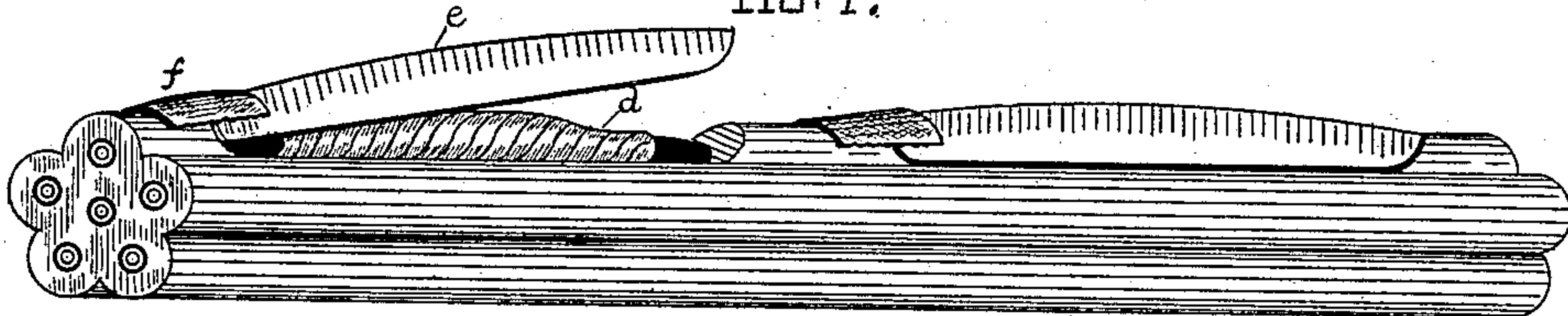


FIG. 5.

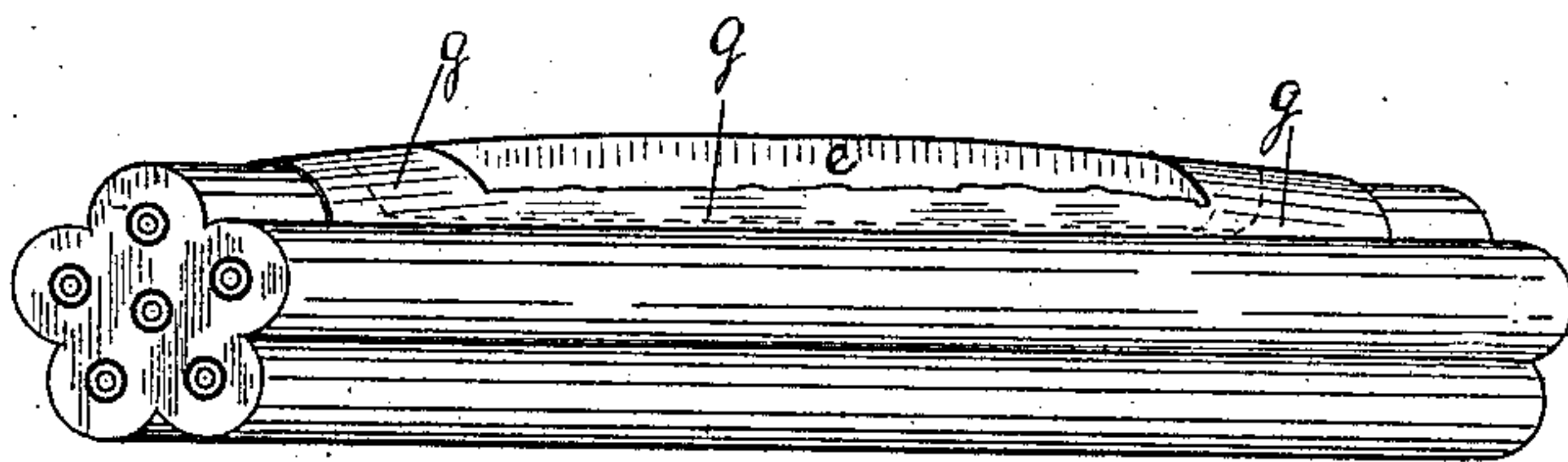


FIG. 6.



FIG. 7.

Witnesses
Samuel S. Wolcott
R. H. Whittelsey

Inventor
Richard S. Waring
By George H. Christy
Attorney

UNITED STATES PATENT OFFICE.

RICHARD S. WARING, OF PITTSBURG, PENNSYLVANIA.

REPAIRING DEFECTS IN THE CONDUCTORS OF LEAD CABLES.

SPECIFICATION forming part of Letters Patent No. 294,549, dated March 4, 1884.

Application filed October 24, 1883. (No model.)

To all whom it may concern:

Be it known that I, RICHARD S. WARING, a citizen of the United States, residing at Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Repairing Defects in the Conductors of Lead Cables; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figure 1 is a side elevation of one form of my ribbed cable, showing at the left one of the ribs cut away to expose one of the insulated conductors, and at the right the exposed conductor as severed, the severed ends bent up and partially denuded of their insulating-covering. Fig. 2 is a side elevation of my coupling-spiral. Fig. 3 is a view similar to Fig. 1, showing at the left one of the denuded and turned-up ends provided with the spiral coupling, and at the right both of the denuded ends of the conductor as bent down and slipped into the spiral coupling. Fig. 4 shows the joint formed at the right of Fig. 3 thoroughly coated with solder. Fig. 5 shows at the left the joint as formed in Figs. 3 and 4 covered with insulating material, and the lead covering-flap secured at one end over the cut-away portion of the cable, and at the right the flap is shown as soldered down in place, covering the joint between the ends of the conductor. Fig. 6 shows the edges of the flap as thoroughly covered and secured by a wipe-joint. Fig. 7 is a perspective view of a flap.

My invention is designed to provide for access to the various wires composing a cable formed by passing the electrical conductors through separate passages formed in a lead bar or rod in the process of manufacturing it, and for repairing or correcting any breaks or faults which may occur in any of the said conductors; and, in general terms, my invention consists in the method and construction all as more fully hereinafter described and claimed.

Usually heretofore in laying underground conductors it has been customary to arrange the conductors in passages formed in a box or frame, which at every three or four hundred feet is interrupted or opens into what is termed a "testing-box," and it has been necessary, in

order to repair any breaks or faults occurring between any two testing-boxes, to draw out the conductor between said boxes until the fault or break is found, and after repairing said fault or break to replace the conductor. This method of repairing conductors not only consumes a great deal of time, but requires the frequent interposition of testing-boxes, which is very expensive. In repairing cables such as are used for ocean and other cables it is usually necessary to entirely sever or cut out a piece of the cable, and then either join the several ends or splice in a piece of cable, and during this operation all the conductors in said cable are rendered useless, although the break or fault may occur in only one of them. The above and other objections, however, are obviated in the use of my cable, and any faults or breaks can be repaired without either withdrawing any part of the injured conductor from its shield or covering or interrupting the use of the other conductors while the injured conductor is being repaired.

I will now describe the manner in which I propose to repair any one or more conductors of my improved cable in which a fault or break has occurred. The position of the fault or break in any one of the conductors having been located by any of the well-known means, the lead wall or covering of that conductor is cut away at the point of break, as shown at *a*, Fig. 1, thus exposing the conductor at that point. The conductor is then severed, and, if necessary, the injured part of the conductor is then cut out, and the insulation of the protruding ends of the conductor is then removed for some distance back along the conductor, as shown at *b*, Fig. 1. After the exposed ends of the conductor have been cleaned to obtain a bright surface, they are slipped into the coupling *c*, Fig. 2, which is formed of a piece of coiled wire; but any other suitable coupling may be used. The coupling and the ends of the conductor therein are then firmly united together by solder, as shown at the right of Fig. 3, and the whole joint thoroughly coated with solder, as shown at Fig. 4. After the joint has been thoroughly coated with solder, as above stated, it is wrapped with some insulating material, as shown at *d*, Fig. 5, the insulating material covering not only the joint, but the ends of the conductor which were previously exposed.

The joint having been carefully formed and all the exposed parts completely covered, all as above stated, a flap or cover, *e*, is secured at one end of the recess *a* by a piece of metal, *f*, as shown at the left of Fig. 5. The flap *e* is then bent down to its place, and is soldered to the edges of the recess *a*, as shown at the right of Fig. 5. After being so secured the joints between the flap and the edges of the recess are "wiped" over with solder, as at *g* in Fig. 6.

It will be seen that the whole of the above operation of opening the cable and repairing one of the wires can be effected without disturbing or interrupting the use of the other wires comprising the cable.

It frequently happens that the location of the fault or break cannot be exactly found, and that the conductor will have to be uncovered and severed in order to make another test to more nearly locate the break or fault, and I consider it within the spirit of my invention to perform the steps hereinbefore described for the purpose of making additional tests to locate breaks or faults.

What I claim herein as my invention is—

1. The method herein described, which consists in uncovering one of the conductors of a lead-covered electric cable having two or more conductors inclosed in separate passages in the lead covering, severing the conductor, electrically uniting the severed ends, covering said union with insulating material, and re-covering the union with lead, substantially as set forth.

2. The method herein described of repairing the conductors of a lead-covered electric cable having two or more conductors inclosed

in separate passages in the lead covering, which consists in uncovering one of said conductors, removing the defective part of said conductor, electrically uniting the severed ends of said conductor, covering said union with insulating material, and re-covering the union and exposed parts of the conductor with lead, substantially as set forth.

3. The method herein described of repairing the conductors of a lead-covered electric cable having two or more conductors inclosed in separate passages in the lead covering, which consists in removing the lead covering from around one of said conductors, removing the defective part of the conductor, electrically uniting the severed ends by any suitable coupling, covering said coupling and exposed parts of the conductor with insulating material, re-covering the insulated coupling and conductor with a piece of lead, and soldering said piece of lead to the body of the cable, substantially as set forth.

4. In a lead-covered electric cable having two or more conductors inclosed in separate passages in the lead covering, one of whose conductors is so severed that the several ends will not meet, the combination of the spiral coupling *c*, in which the severed ends of the conductor are soldered, the insulating-covering *d*, and the flap *e*, securely soldered over the coupling, substantially as set forth.

In testimony whereof I have hereunto set my hand.

RICHARD S. WARING.

Witnesses:

DARWIN S. WOLCOTT,
R. H. WHITTLESEY.