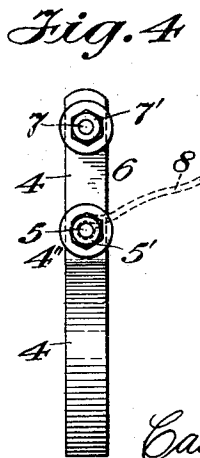
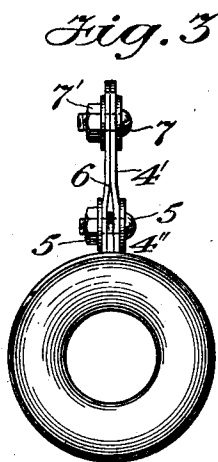
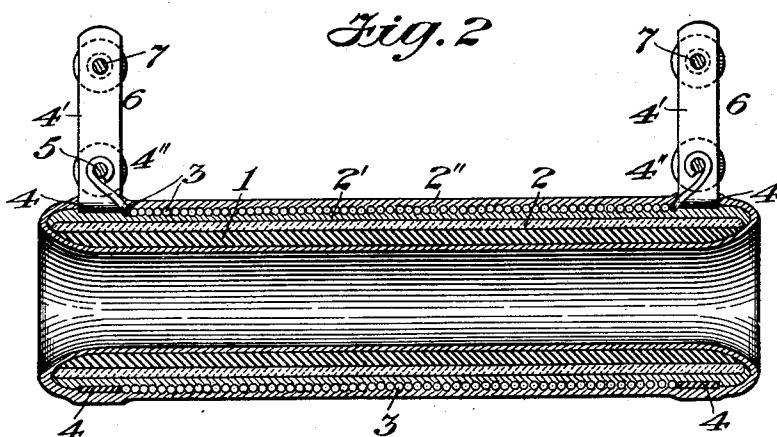
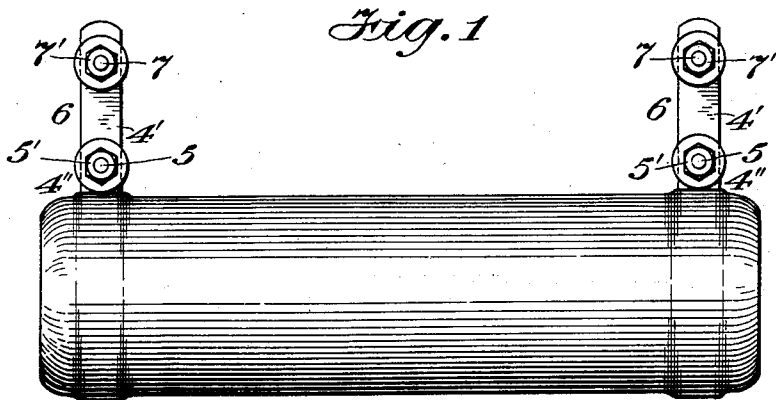


C. BLOOM.  
RESISTANCE TUBE.  
APPLICATION FILED MAR. 2, 1903.

NO MODEL.



Witnesses:  
Chas. J. Clagett,  
Chas. H. Davids.

Caspar Bloom,  
Inventor;  
By his Attorney, J. R. Little

# UNITED STATES PATENT OFFICE.

CASPAR BLOOM, OF BROOKLYN, NEW YORK.

## RESISTANCE-TUBE.

SPECIFICATION forming part of Letters Patent No. 736,677, dated August 18, 1903.

Application filed March 2, 1903. Serial No. 145,665. (No model.)

*To all whom it may concern:*

Be it known that I, CASPAR BLOOM, a subject of the Emperor of Germany, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Resistance-Tubes, of which the following is a specification.

My invention relates to devices for use in connection with electric conductors; and it consists of improved forms of "resistance-tubes," so called, or tubes which are longitudinally surrounded by the helices of a resistance-coil.

The objects of my invention are to provide as a part of such a device a metallic tube which shall be capable of resisting a breaking strain, such as might be due to the impact resulting from the falling of said tube upon an unyielding surface; to provide coats of insulating material which completely inclose said tube and also protect the latter from oxidation; to provide for the resistance-coil a perfect insulation by means of material of a relatively very high fusing temperature, and to provide improved means for connecting the ends of the resistance-coil with those of electric conductors.

I am aware that resistance-tubes have hitherto been made of vitrified clay and that resistance-coils have been inclosed within coats of soft enamel surrounding said tubes exteriorly. Such tubes are, however, more fragile than those of my invention, and the coil-inclosing enamel is fusible at a temperature which is several hundred degrees lower than that of porcelain or porcelain enamel, which are the materials used in my invention. Furthermore, exposed end parts of the coil-wire have been used for connecting other wires thereto, and these frequently were accidentally broken from the device at or near the surface of the insulating material, thus rendering the device entirely useless, the latter differing therein from my improved connections, each of which comprises a flexible metallic band which is suitably joined to an end of the coil, ends of said band forming a duplicate connection for a conducting-wire and the device therefore retaining its usefulness, even though parts of the band ends should be accidentally broken off. It should

be noted also that the band ends, because of their comparatively greater flexibility, are not so readily broken off as are projecting ends of wire.

In the drawings, Figure 1 is a side elevation of a complete resistance-tube which embodies a form of my invention. Fig. 2 is a central vertical longitudinal section thereof. Fig. 3 is an end elevation of the device; and Fig. 4 is a detail view of a band, a connecting-wire being shown in broken lines.

Corresponding parts in all the figures are denoted by the same reference characters.

Referring to the drawings, 1 designates a metallic tube, which may be inexpensively made of cast-iron and may be coated internally with any suitable protective material, such as a vitrified insulating substance, and preferably porcelain enamel. A coat 2, of porcelain, covers the exterior surfaces, including the ends, of the tube 1, and upon this is fused a coat 2', of porcelain enamel, upon which is coiled a resistance-wire 3. Flexible bands 4 4, of suitable sheet metal and preferably of copper, are respectively contacted with and preferably connected to the ends of the wire 3. The material of each band should be longer than is necessary to encircle the device as the latter is thus far formed, and the remaining parts 4' 4' of said material of each band may be joined together as closely to the tube 1 as possible, as at 4'', and in any suitable manner, a screw 5, passing through a perforation in each part 4' and secured by a nut 5', being shown herein as used for the purpose mentioned. The parts 4' extend radially near each end of the tube 1 a sufficient distance to form clamps 6, the members whereof are perforated near their outer ends. A screw 7 and a nut 7' may be used to close each clamp 6 upon a bent end of a conducting-wire 8, which is shown in broken lines in Fig. 4. An outer coat 2'', of fused porcelain enamel, surrounds the resistance-coil 3 and the bands 4 4 and is practically integral with the inner coat 2', thus inclosing the coil 3 in an impervious insulating material.

The porcelain enamel which I use in connection with my invention cannot be fused at a lower temperature than from 1,000° to 1,200° Fahrenheit, or at a temperature from 600° to 800° above that of the fusing-point of

the soft enamel heretofore used for the purpose.

The uses and advantages of my invention will be readily understood and appreciated 5 by those who are skilled in the art to which it appertains. The device as shown and described is simple and durable, provides perfect insulation for the resistance-coil, cannot easily be broken, and provides improved 10 means for its connection to electric conductors. It should be noted that the parts 4' are not of such a nature as to be easily broken from the resistance-tube; but should this occur at the most natural point of breakage— 15 namely, outwardly of the screw 5 and nut 5'—the latter members, together with the remainder of the projecting parts 4', will form a clamp which will be well adapted for use for the same purpose as that for which the clamp 6 20 is designed. The tube 1, which is simply used as a base member upon which to locate and secure the functionally-required members of the device, being completely inclosed within practically indestructible insulating 25 material, is perfectly protected from oxidation and also from electrolytic action.

I do not desire to be understood as limiting myself to the details of construction and arrangement as herein described and illustrated, 30 as it is manifest that variations and modifications may be made in the features of construction and arrangement in the adaptation of the device to various conditions of use without departing from the spirit and scope 35 of my invention and improvements. I therefore reserve the right to all such variation and modification as properly fall within the scope of my invention and the terms of the following claims.

40 Having thus described my invention, I claim and desire to secure by Letters Patent—

1. A resistance-tube, comprising a supporting-tube, a plurality of coatings of insulating 45 material inclosing said tube, a resistance-coil interposed between said coatings, metal strips encircling the supporting-tube between said coatings of insulating material and connect-

ed to the terminals of the resistance-coil, the ends of said bands projecting exteriorly of 50 said coatings and forming clamps for connecting the terminals of the coil with the terminals of a circuit, substantially as described.

2. A resistance-tube, comprising a metallic supporting-tube, a plurality of coatings of 55 insulating material inclosing said tube, a resistance-coil interposed between said coatings, metal strips encircling the supporting-tube between said coatings of insulating material and connected to the terminals of the resist- 60 ance-coil, the ends of said band projecting exteriorly of said coatings and forming clamps for connecting the terminals of the coil with the terminals of a circuit, substantially as described. 65

3. A resistance-tube, comprising a metallic supporting-tube, a plurality of coatings of porcelain enamel surrounding said tube exteriorly, a resistance-coil interposed between the coatings of porcelain enamel, and flexible 70 sheet-metal bands between said coatings of insulating material and connected to the terminals of the resistance-coil, the ends of said bands projecting exteriorly of coatings and forming clamps for connecting the terminals 75 of the coil with the terminals of a circuit, substantially as described.

4. A resistance-tube, comprising a supporting-tube, a plurality of coatings of insulating 80 material inclosing said tube, a resistance-coil interposed between said coatings, metal strips encircling the supporting-tube between said coatings of insulating material and connected to the terminals of the resistance-coil, the ends of said band projecting exteriorly of 85 said coatings, bolts projecting through said ends and nuts on the ends of said bolts, substantially as described.

In testimony whereof I have signed my name in the presence of the subscribing witnesses. 90

CASPAR BLOOM.

Witnesses:

CHAS. H. DAVIDS,  
J. C. PYBAS.