

E. A. COLBY.
ELECTRICAL CONNECTING DEVICE.
APPLICATION FILED DEC. 14, 1905.

916,844.

Patented Mar. 30, 1909.
2 SHEETS—SHEET 1.

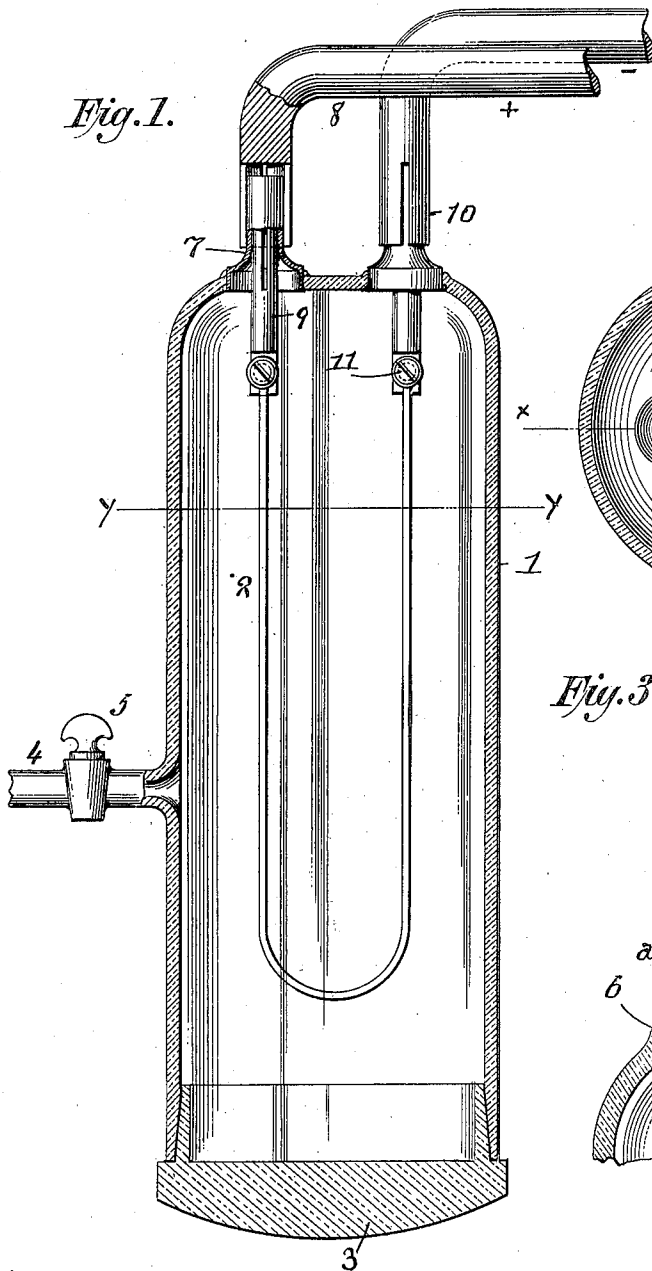


Fig. 2.

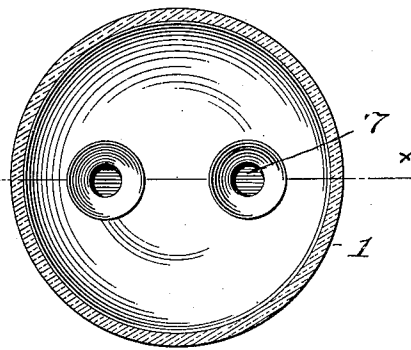
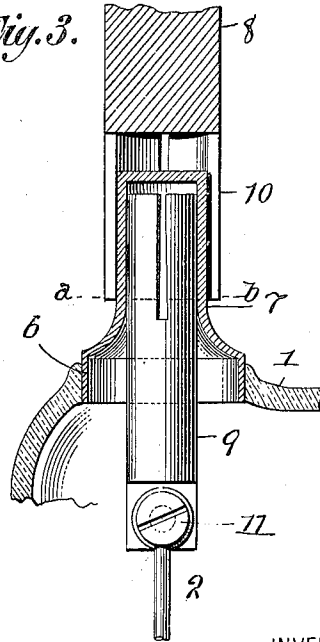


Fig. 3.



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Fig. 4.

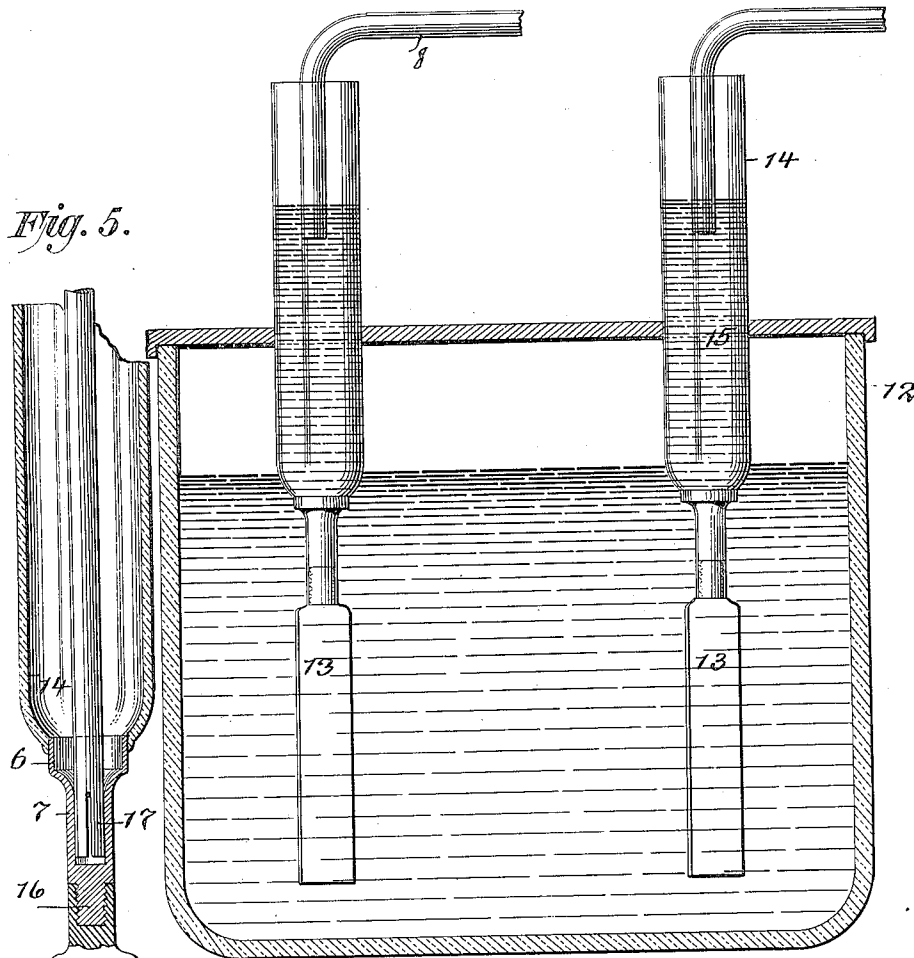


Fig. 5.

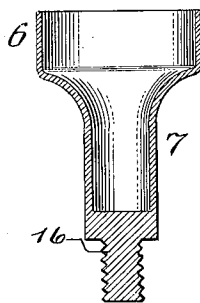
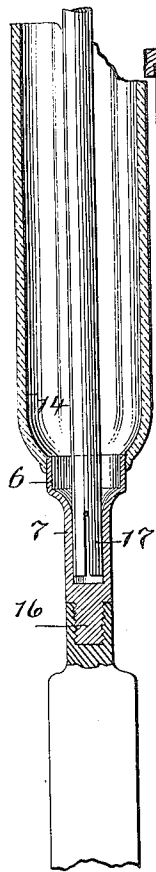


Fig. 6.

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EDWARD A. COLBY, OF NEWARK, NEW JERSEY.

ELECTRICAL CONNECTING DEVICE.

No. 916,844.

Specification of Letters Patent.

Patented March 30, 1909.

Application filed December 14, 1905. Serial No. 291,681.

To all whom it may concern:

Be it known that I, EDWARD A. COLBY, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Electrical Connecting Devices, of which the following is a specification.

Much difficulty has been found in sealing electric conductors in glass walls, especially where currents of strength exceeding five or six amperes are to be conveyed. The unequal expansion and contraction of the metal and the glass cause cracks at the joint thus destroying the vacuum if the glass wall be part of a vessel from which air is exhausted and in any event forming an imperfect union. Even when the metal, like platinum, has substantially the same rate of expansion per unit of bulk as glass, the unequal radiation of heat from the two bodies when the cross sectional area of the conductor is made large enough to carry currents of greater strengths than these above mentioned, results as before in a quicker contraction of the metal, and a like impairment of the joint. I have discovered that this difficulty can be completely obviated by constructing the connecting device for the circuit terminals in such a way as that when sealed in the glass all, or practically all, the current is diverted from the seal. Hence at the joint, even if currents very much greater in strength than six amperes are conveyed the difference in temperature between conductor and walls is not sufficient to produce any injurious effect upon the joint.

Inasmuch as there is practically no current passing directly at the joint, the cross sectional area of the metal may there be largely reduced and its surface extended so that the irregularity of radiation may be so far eliminated as to remove any injurious effects due thereto.

My invention consists in the connecting device and the combination therewith of circuit terminals set forth in the claims.

In the accompanying drawings—Figure 1 is a vertical section on the line *xx* of Fig. 2, of a glass vessel for the treatment of metals in a vacuum showing my connecting device applied thereto. Fig. 2 is a section of the same on the line *yy* of Fig. 1 the rods 9, 9, and wire 2 being removed. Fig. 3 is an enlarged section showing the mode of sealing my connecting device in the wall of the vessel. Fig. 4 is

a vertical section of an electrolytic cell, showing my device applied to the glass cups receiving mercury in which the exterior circuit terminals are immersed. Fig. 5 is a section showing my connecting device applied to a glass cup, as before, with the exterior circuit terminal mechanically connected. Fig. 6 shows separately, in section, the platinum thimble constructed as represented in Figs. 4 and 5.

Similar numbers of reference indicate like parts.

Referring first to Figs. 1 to 3 inclusive. 1 is a glass vessel designed to receive metals to be heated in a vacuum by means of the electrically heated wire 2. Said vessel is closed at its lower end by a stopper 3 ground to a tight fit, and is provided with a tube 4, having a stop cock 5, through which tube air may be exhausted from the vessel by any suitable means. In the wall of said vessel I form an opening and while the glass around said opening is kept in a plastic state by the blow pipe or any other suitable means, I insert therein the cylindrical end portion 6 of a thimble 7 which is preferably of platinum. The plastic glass is molded around the exterior of the thimble so as to form a tight seal. The thimble 7 is preferably produced by spinning a disk of platinum into substantially the shape shown; that is to say, with its wall made thinner at the open end than elsewhere. By reason of this reduction in thickness of the metal at the joint differences in rate of radiation of metal and glass are rendered inconsiderable in effect, and any impairment of the joint due to such differences is prevented.

The thimble 7 being attached to the wall in the manner described, I connect the circuit terminals of both the external current conveying conductors 8 and the internal current conveying conductors 9 to said thimble, so that the current proceeding, for example, from the external conductor 8 to the internal conductor 9 will pass through a portion of the wall of said thimble distant from the sealed joint; or, in other words, so that said current becomes diverted from the portion of the wall of said thimble at said joint. To this end, I make the diameter of the cylinder at its end cylindrical portion 6 (which cylindrical portion forms part of the joint) greater than at its body portion. The part of the internal current conveying conductor 9 which is directly connected to the thimble is

here a cylindrical rod, of suitable diameter to fit within the thimble. The end of the rod is split, so that when said end is inserted in the thimble the separated parts are pressed together and by their expansion hold the rod in place. Because the rod 9 is less in diameter than the cylindrical end 6 of the thimble it makes no contact with the metal of the thimble at the joint.

10 In order to connect the external conductor 8 with the thimble I provide at the end of said conductor a split tube 10 into which the thimble is inserted. The separated parts of the tube 10 are by the insertion of the thimble slightly forced apart so that by their spring action they grasp said thimble. By this construction, current, for example, from tube 10 passes through the wall of thimble 7 to rod 9 above the plane represented by *a, b*, Fig. 3, which bounds the area of contact between rod 9 and the inner surface of thimble 7. Hence, as no current gets to the joint, which is wholly outside of this plane, the contact area of thimble and conductors may be made large enough to conduct whatever current the conductors themselves are designed to convey. And, furthermore, because of the thinning of the metal at the joint, and the clearance thereat between the rod 9 and the thimble, and also because of the increased radiating area of the cylindrical end 6, the variation in dimension of said end will become negligibly small and not sufficient to impair the integrity of the seal.

In the vessel shown in Figs. 1 to 3, there are, of course, two thimbles receiving respectively the plus and minus conductors, and the two rods 9, which rods are connected by clamping screws 11, to the ends of the heating wire 2.

In Fig. 4, 12 is a cell containing an electrolyte, in which are immersed electrodes 13. The thimble 7, shown separately in Fig. 6, is sealed in the manner already described in the end of a glass cup 14 which contains a body of mercury 15 which fills the interior

of the thimble and partly fills the cup. The external circuit conductor 7 is immersed in the mercury. The thimble is provided with a threaded extension 16 which enters a similarly threaded opening in the electrode 13. In this case the proportion of current passing from the mercury to thimble, or vice versa, at the joint will be inconsiderably small as compared with the quantity diverted elsewhere.

In Fig. 5 the mercury is omitted and the external conductor terminates in a rod 17 split at its end, similar to rod 9, and in like manner fitting in the thimble. The conditions affecting the sealed joint are, therefore, here substantially the same as in Figs. 1, 2 and 3.

I claim:

1. A wall of non-conducting material, a tubular support of conducting material, having its end portion of thinner material than its body portion and having said end portion sealed in an opening in said wall, and separate circuit terminals respectively connected to the interior and exterior of said body portion of said support.

2. A wall of non-conducting material, a tubular support having an end portion of larger diameter and of thinner material than its body portion, and having said end portion sealed in an opening in said wall, and separate circuit terminals respectively connected to the interior and exterior of said body portion of said support.

3. In combination with a wall of non-conducting material, a thimble of metal formed with a closed end and having its open end sealed in an opening in said wall, the metal of said thimble being of reduced thickness at its open end.

In testimony whereof, I have affixed my signature in presence of two witnesses.

EDWARD A. COLBY.

Witnesses:

WM. H. SIEGMAN,
PARK BENJAMIN, Jr.