D. McF. MOORE.

MECHANICAL JOINT FOR VACUUM TUBES.

APPLICATION FILED APR. 16, 1908.

995,025.

Patented June 13, 1911.

Fig. 1.

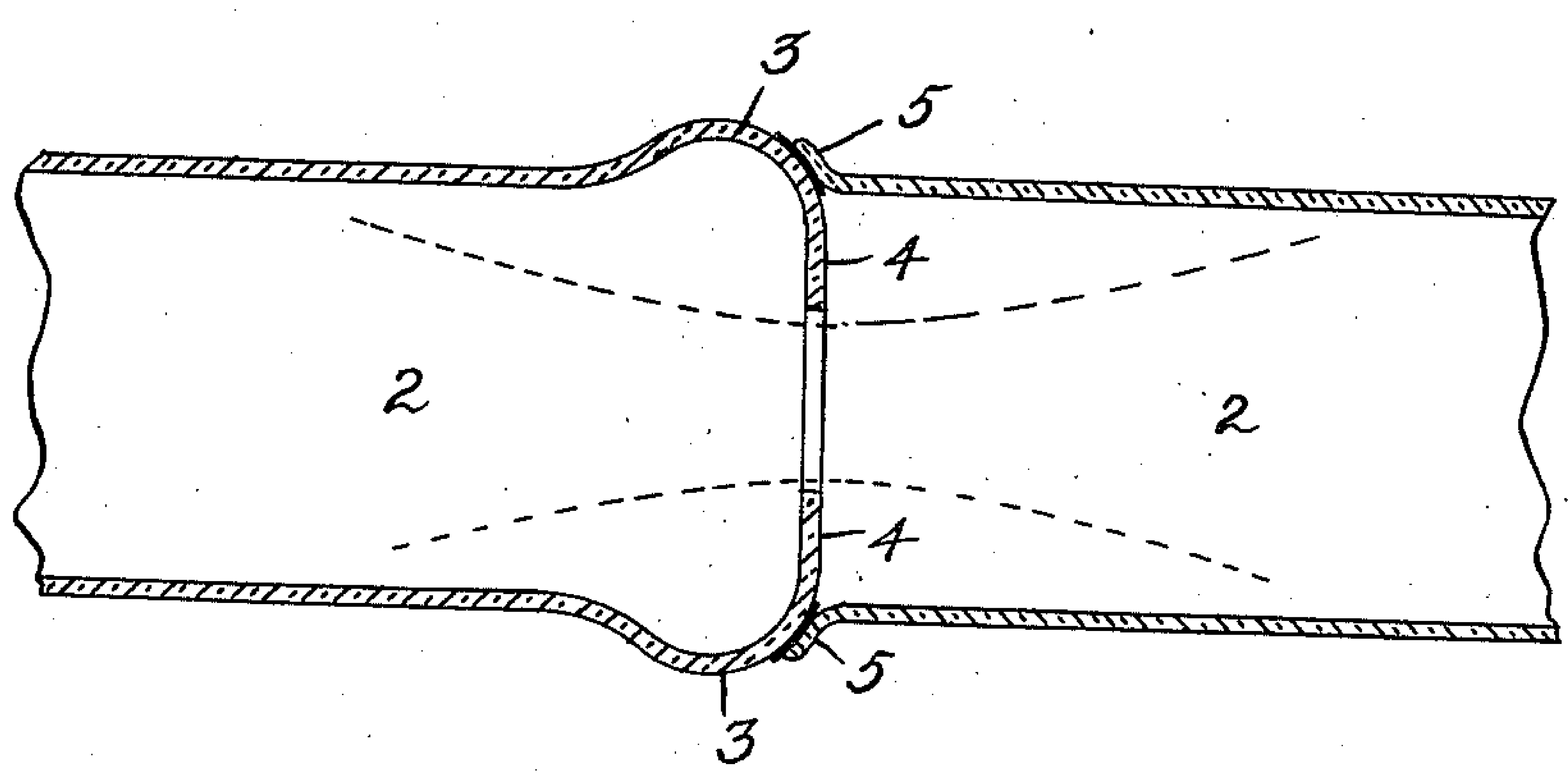
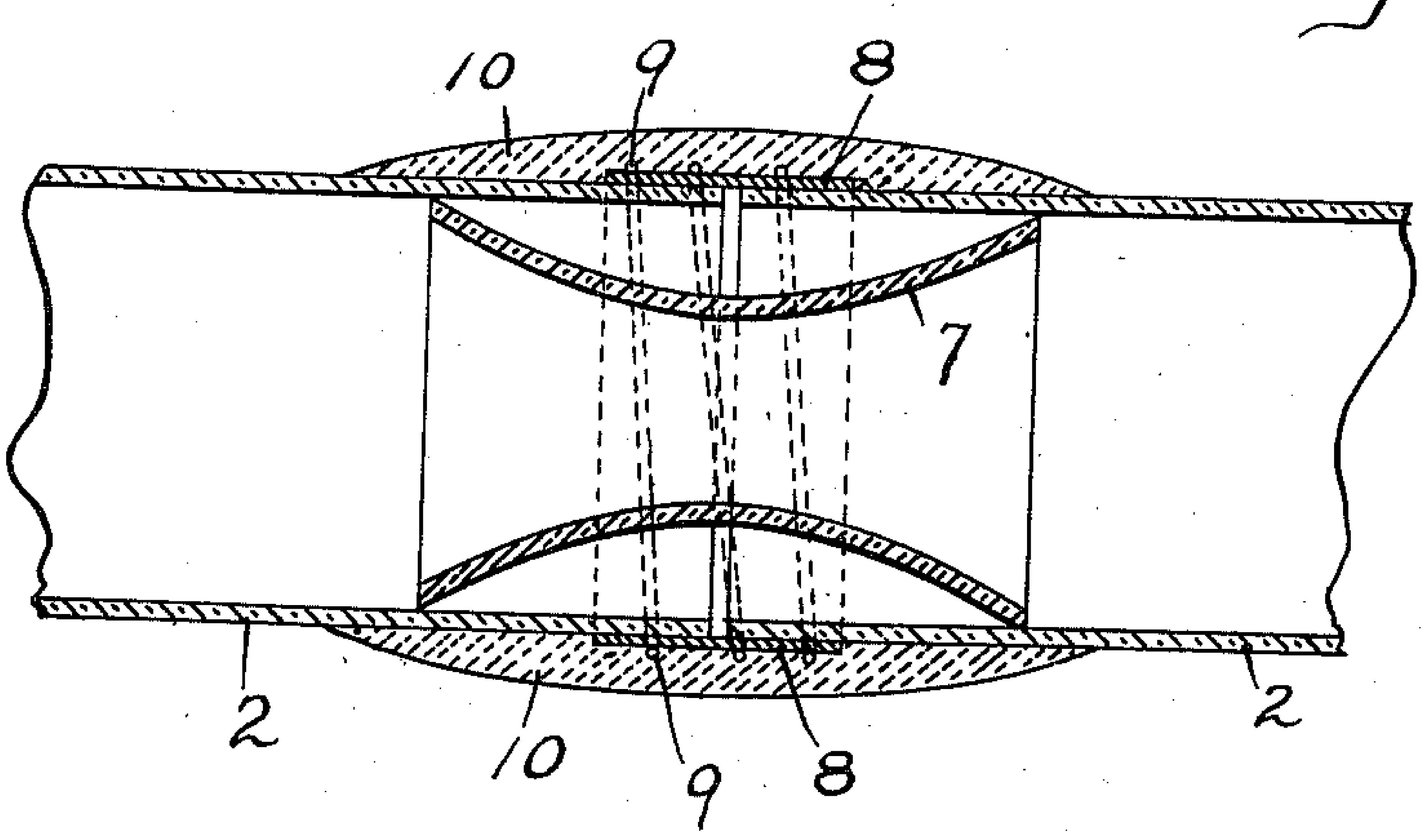


Fig. 2.



WITNESSES:

[signatures]

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UNITED STATES PATENT OFFICE.

DANIEL McFARLAN MOORE, OF NEWARK, NEW JERSEY, ASSIGNOR TO MOORE ELECTRICAL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

MECHANICAL JOINT FOR VACUUM-TUBES.

995,025. Specification of Letters Patent. **Patented June 13, 1911.**

Application filed April 16, 1908. Serial No. 427,367.

To all whom it may concern:

Be it known that I, DANIEL MCFARLAN MOORE, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Mechanical Joints for Vacuum-Tubes, of which the following is a specification.

My invention relates to gas-tight joints or seals for vacuum tubes, and is designed, primarily, to avoid certain difficulties incident to the use of a material that will readily fuse, melt or disintegrate under the action of heat, although the invention is likewise useful for joints of vacuum tubes which are liable to damage by expansion and contraction arising from the heating effect of the electric discharge passing through the tube, and the subsequent contraction of the joint when the discharge ceases.

Another part of my invention consists of an improvement in the mechanical structure of the joint and has for its object to provide a joint of very simple construction and with a minimum of parts.

Briefly stated, my invention consists in providing the tube at the joints with means for contracting the electric discharge so as to direct it away from the joint at the wall of the tube and thereby prevent, as far as possible, the heating of the joint with the damaging or deteriorating effects above mentioned.

My invention consists further in the special constructions or forms given to the tube ends at the joint and to the special construction of joint itself, as hereinafter more particularly described and then specified in the claims.

In the accompanying drawings, Figure 1 is a longitudinal section through the end portions of two tube sections at the joint and shows one of the constructions embodying my invention. Fig. 2 is a similar section through a modified form of the invention.

The two sections of tubing to be joined are indicated at 2. One of them has its end expanded slightly as at 3 and then inturned, as at 4, so as to produce a contraction in the bore or passage through which the electric discharge passes. The general path of the discharge through this contraction, so that said discharge will be directed away from the junction of the tube section, is indicated by the dotted line and, as shown, passes through the contracted mouth of one of the tube sections. The end or mouth of the other tube section is expanded or out-turned as indicated at 5, and said out-turned portion or mouth receives the inturned end of the opposite tube section, the two parts being fitted, if desired, as a ground joint. If desired, a plastic sealing material or cement as indicated by the heavy black lines may be used between the abutting surfaces or said sealed joint may be formed in any other desired way, and by the use of any other desired materials.

As will be seen, the electric discharge being obliged to pass through the contracted mouth or end of the tube, is directed away from the joint, so that the latter will not become heated to nearly as great an extent as it would if the discharge were permitted to pass through the tube at the joint without any contraction of bore of the completed tube.

Instead of forming a contraction in the tube itself, a separate connecting tube 7 may be located at the joint, as shown in Fig. 2, said tube practically filling the bore of the tube sections at its ends, but being contracted between its ends under the main portion of the joint so as to contract the discharge and thereby lessening the heating of the joint by such discharge. In this figure, a modification of the joint itself is shown. 8 is a sleeve of thin metal or other suitable material encircling and fitting closely upon the meeting ends of the tube sections and spanning the line between them. A binding wire, cord or tape of metal or other material, indicated at 9, binds the said sleeve closely upon the tubes and over all is applied a mass of some cementing or sealing material 10, preferably one which will harden and which will thereby anchor the tubes and the other portions of the sealing joints. For this sealing material or cement, I use sealing wax, but have employed other materials or substances and as will be evident to those skilled in the art many other materials would be suitable for the purpose.

What I claim as my invention is:—

1. An electrically operated vacuum tube built up in sections joined together having a contraction for the electric discharge at its joints.

2. An electrically operated vacuum tube

made up in sections sealed at the joint by the aid of a material liable to fusion or disintegration by heat combined with means for directing the electrical discharge away from the joint.

3. An electrically operated vacuum tube built up in sections joined together end to end, one of the sections having an inturned end adapted to contract the electric discharge.

4. A section of vacuum tube having an expanded and inturned end adapted to produce a contraction in the bore of the tubing combined with an adjacent section having an expanded or out-turned end, as and for the purpose described.

5. An electric vacuum tube made in sections joined together and means for contracting the electric discharge at the joints between sections.

Signed at New York in the county of New York and State of New York this 14th day of April A. D. 1908.

DANIEL McFARLAN MOORE.

Witnesses:
C. F. TISCHNER, Jr.,
LILLIAN BLOND.