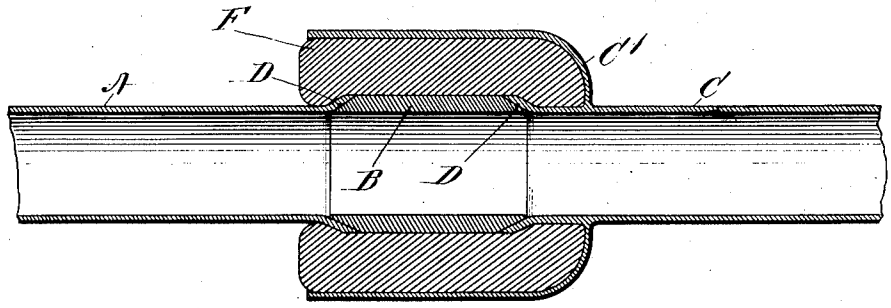
C. A. KRAUS.

JOINT.

APPLICATION FILED MAR. 2, 1910. RENEWED APR. 5, 1912.

1,046,416. Patented Dec. 3, 1912.



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CHARLES A. KRAUS, OF NEWTON HIGHLANDS, MASSACHUSETTS.

JOINT.

1,046,416. Specification of Letters Patent. Patented Dec. 3, 1912.

Original application filed August 27, 1909, Serial No. 514,859. Divided and this application filed March 2, 1910, Serial No. 546,958. Renewed April 5, 1912. Serial No. 688,788.

To all whom it may concern:

Be it known that I, CHARLES A. KRAUS, a citizen of the United States, and resident of Newton Highlands, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Joints, of which the following is a specification.

My invention relates to the construction of gas-tight joints between metallic members formed by means of a thermally and electrically insulating separator or intermediary, and the object of my invention is to produce effective joints of this type impervious to gases, capable of resisting the stresses due to mechanical shock and thermal changes, and also which shall possess in an effective degree the quality of electrical and thermal insulation.

My invention consists in an improved and special form of joints of this general character; other forms are described in an application for patent filed by me August 27, 1909, Serial No. 514,859, of which this application is a division.

The chief difficulties heretofore encountered in making such joints as are contemplated in connection with my invention, are lack of intimate union between the surfaces of metals and the refractory insulating separator or intermediary and the liability of the intermediary to fracture by reason largely of differences in co-efficient of thermal expansion and improper cooling.

By my invention herein to be described, thermally and electrically insulating joints between metallic members may be made which are adapted to the conditions alluded to.

The drawing hereto annexed illustrates sectionally a joint made according to my invention.

Tubular metal members, A and C, are joined to and connected by an intermediate sleeve B, of refractory insulating material, which fits the conical enlargements D, D, of the tubular members A and C. One of these tubular members, C, in the example shown, is provided with a cup-like extension C′, preferably welded or swaged to the tube C, and, after the joint is made between the tubes A and C and the sleeve B, the extension C′ is filled with fused vitreous flux material, which when the entire joint has cooled, protects the inclosed members.

In the construction of the joint, measures must be adopted to provide for an intimate union between the refractory intermediary and the metal surfaces in order that no leakage, however small, shall take place between the adjacent members. When oxidizable metals, such as iron or steel, are employed, a considerable amount of oxid appears on their surfaces or is formed before the insulating member can be applied; and moreover, gases are almost invariably present in the metal itself, and these are given off on heating the metal during the application of the insulating member. In order, therefore, to correct these conditions which are hostile to the obtainment of a satisfactory result, before the intermediary member B is introduced between the metal surfaces, both these metal surfaces are heated and coated with a relatively fusible vitreous material which with the metal is heated to such a temperature that the vitreous coating becomes sufficiently fluid to readily dissolve the oxid on the surface of the metal members.

The readiness of fusibility of such a vitreous flux is, of course, relative and variable, and is defined with reference to the physical and structural character of the metal members to which it is applied. Its fusibility should be such that it may be rendered fluid and dissolve the oxid at a temperature not so high as injuriously to affect the metal member itself. The process of solution of the oxid may be hastened by suitable mechanical manipulation of the flux. While the process of fusing the vitreous coating and the dissolving of the metal oxid is going on, gases are driven out of the walls of the metal and collect in bubbles under the vitreous coating, but since this coating is fluid these bubbles escape through the vitreous material and a layer of the vitreous flux free from bubbles is intimately fused on the metal. In general, it will be found preferable to coat the metal surfaces with a layer of vitreous material which is more readily fusible than is the intermediary member B, because in this way the necessary fluidity is obtained at a temperature sufficiently low to facilitate the application of the member B. This member may, to be sure, in some instances, be made of material as readily fusible as the vitreous flux or coating, or may be of the same

material, but it is preferable to employ a more refractory body for this separator or intermediary. One reason for this lies in the fact that the more readily fusible the intermediary the better as a rule will it conduct electricity. Then again, it is desirable that the insulating intermediary shall retain its form in the process of making the joints. Thus in making a joint like that shown in the drawing, the vitreous oxid-flux having been applied to the metal members, these members are united by pressure with the intermediary B between them. If this intermediary were readily fusible it would be liable in such process to be squeezed out of its proper place in the joint. Also it is desirable to reduce as far as possible the temperature at which permanent stresses begin to appear, and by employing relatively easily fusible material in combination with the metal members and a more refractory separator, this temperature is reduced to that at which the more fusible material becomes substantially rigid or solid.

While it will often be found convenient to make the insulating intermediary B of glass, it may be found desirable in some cases to employ other materials, not homogeneous, with the oxid-flux. Thus a semi-vitreous or fritted material, as, for example, porcelain, "lavite," magnesium oxid, etc., may be employed. If the material used is porous, it may be glazed so as to be impervious to gases.

For the manufacture of joints between iron or steel tubular members, I prefer to employ for the intermediary sleeve or member, marked B in the drawings, a material composed chiefly of magnesium silicate which is known by the term "lavite." Tips for gas jets are commonly made of this material. For the low melting glaze which it is often desirable to employ I recommend a vitreous composition containing 50 parts soda glass, 50 parts borax, and 12 parts iron oxid, by weight. A vitreous composition of this character and substantially as specified, forms the subject matter of an application for patent, Serial No. 514,858, filed by me August 27, 1909.

What I claim and desire to secure by Letters Patent is:

1. The combination of two metal members, an insulating intermediary joined thereto, the joint between the metal and the intermediary involving a low melting glaze in close adhesive association with the metal members and the intermediary, and an envelop of a material similar to the glaze, fused around and embracing the entire joint.

2. The combination of two tubular metal members, a refractory insulating intermediary joined thereto and connecting the metal members, a cup-like extension secured to one of the metal members and surrounding the intermediary, and an insulating vitreous filler in the extension, fused around and embracing the joint between the metal members.

Signed by me at Boston, Massachusetts, this twenty-fourth day of February, 1910.

CHARLES A. KRAUS.

Witnesses:
ROY D. MAILEY,
CHARLES D. WOODBERRY.