

S. FERGUSON.
 FILAMENT APPARATUS.
 APPLICATION FILED FEB. 3, 1908.

Patented Apr. 16, 1912.

1,023,305.

Fig. 1.

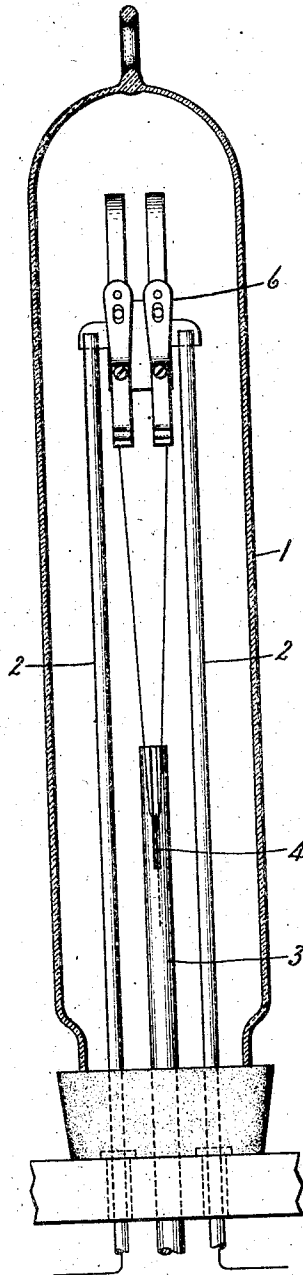


Fig. 2.

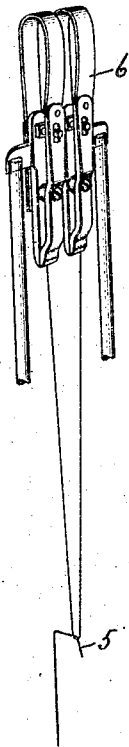
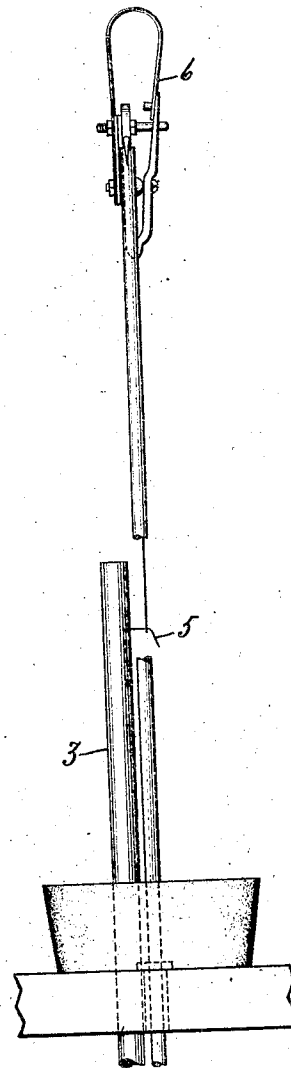


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

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FILAMENT APPARATUS.

1,023,305.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, SAMUEL FERGUSON, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Filament Apparatus, of which the following is a specification.

This invention relates to the production of a symmetrical form in a metallic incandescent filament.

When as a final step in the manufacture of refractory filaments, the filaments are heated to a high temperature in a vacuum or a suitable atmosphere, in order to consolidate or sinter the same, there occurs a contraction or shortening of the filaments. This shortening of the filament is apt to be accompanied by distortion of shape which is undesirable, as it results in an unsightly filament, and may even give rise to short-circuiting in the same. The difficulty may be overcome by suspending a weight on its lower end and again bringing it to incandescence. The filament will then be drawn down when in a softened condition and will be made symmetrical. According to some processes of manufacturing refractory metal filaments, the filament is very fragile before being sintered together at a high temperature, and hence if a weight were placed upon the same while in this condition the hazard of breaking the filament would be increased. In this case the filament must first be consolidated by sintering and afterward "pointed" by hanging a weight upon it and again raising it to a high temperature. It is obvious that this double treatment is not only troublesome but expensive.

My invention comprises a device and a method whereby the filament is given a symmetrical shape and operates by allowing the looped end of the filament to engage with a weight as it is drawn up during the sintering process. The filament thus engages with the weight after it has gained sufficient strength to bear the same. This method of pointing the filament possesses the additional advantage that a separate handling of the weight in each case is not required.

The novel features of my invention will be pointed out in the appended claims.

The following description taken in connection with the accompanying drawing will serve to more fully explain my invention.

Figure 1 shows a treating bottle and a front view of the clamping device; Fig. 2 shows the clamp and the filament with the suspended weight in perspective; and Fig. 3 illustrates more fully how the weight is picked up by the filament.

In order that my invention may be more readily understood, I will explain it in connection with the treating or finishing of refractory conductors of tungsten.

According to one method of making tungsten filaments a vaporizable alloy composed of cadmium 42%, mercury 53% and bismuth 5%, is impregnated with a refractory material, as tungsten. The tungsten may be added to the extent of 30 to 40 per cent. by weight of the final mixture. The mass is then squirted into filaments. These receive a preliminary baking which vaporizes part of the metallic binder. The partially finished filaments, which are quite fragile, are thereupon suspended in a vacuum or in an inert atmosphere and an electric current is passed through the same so as to heat the same and vaporize the remainder of the binder and the filaments are then raised to a still higher temperature to sinter or consolidate the particles of refractory metal. The heating in vacuum here described is known as "treating." It is during this "treating" process that distortion of shape is liable to occur in the filament.

In carrying out my invention I place in the treating chamber 1, between the supporting rods 2, a tube 3 which has a slot 4, extending down a part of its length. In this slot a weight or rider 5 is hung. The slotted tube serves as a guide so that the rider will always be in the desired position. The filament while suspended from the clamp 6, its lower end being below the weight 5, is raised to incandescence by the passage of a current. As it sinters together and shrinks in length, it engages the rider as the curved or looped end is drawn upward. As shown in the drawing, the contraction of the filament has already taken place, and its lower end has come into engagement with the weight 5. The metallic filament being in a softened condition, this weight draws or "points" it into the regular shape as shown in the drawing.

It is obvious that my invention will be found useful in any process of producing

metallic filaments in which, as a final step in the process, the filament is sintered together at a high temperature; I, therefore, do not wish to be limited in its application to the particular process described in connection therewith.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. The method which consists in passing current through a suspended filamentary body to vaporize out a binder contained in it and consolidate the refractory residue, causing the filament to contract freely during the vaporization and initial consolidation and then causing a load to be imposed on the filament after removal of the binder.

2. The method which consists in passing current through a suspended metallic filament whereby it is heated and causing it first to contract freely and then to assume a load when further contracting under the influence of high temperature.

3. The combination of an envelop, means for supporting a metallic filament, means for passing current therethrough, means for suspending a weight or rider in the path of said filament to engage therewith when the filament shrinks.

4. The combination of a treating envelop, means for suspending a filament in the same, means for passing current therethrough, a tube and a rider suspended in said tube above the looped end of the filament.

5. The method which consists in passing current through a suspended metallic filament to heat and consolidate it, causing it to contract freely during its initial consolidation and then causing it to assume a gravitational load tending to give it a symmetrical form after it has consolidated sufficiently to bear such load.

6. The process of treating a fragile filament which consists in incandescing said filament to partially consolidate the same permitting said filament to contract freely under said partial consolidation and then applying a straightening force to said filament and continuing the consolidation by a progressive increase of temperature while said straightening force remains applied.

7. The process of sintering a refractory metallic filament which consists in heating said filament by passage of current to consolidate and shrink the same permitting the filament initially to shrink freely and without restraint and then placing said filament under slight tension while still hot and in a

softened condition and continuing the shrinkage by a further increase of temperature.

8. The combination of filament supporting means, means for heating a filament suspended therefrom, and a weight placed in the path along which the filament moves in shrinking in length under the influence of a high temperature, said weight being initially out of engagement with said filament and engaging said filament only after a predetermined shrinkage thereof.

9. The combination of means for supporting a filament loop for treatment and means in the path of the bight thereof initially out of engagement with the filament but engaging with the bight when the bight has traveled a predetermined distance upon shrinkage of the filament, for giving the loop a symmetrical shape.

10. The method which consists in subjecting a filamentary body to continuous heat treatment the first part of which involves sintering while the body is free to contract and change its shape and the latter part of which involves continuing sintering and causing force tending to give it a desired shape to be brought into action upon it during the latter part of such treatment.

11. The method which consists in subjecting a filamentary body to continuous heat treatment during which it shrinks, leaving it free to contract and to change its shape during the first part of the treatment and causing a force acting to shape it to be brought into action upon it during the latter part of the treatment in consequence of such shrinkage.

12. The method which consists in subjecting a filamentary body to continuous treatment during which it is very weak and subsequently shrinks and becomes stronger, leaving it free to contract and to change its shape during the first part of the treatment and thereafter causing a force tending to give it a desired shape to be brought into action upon it, while it is under treatment in consequence of shrinkage corresponding to the possession of strength adequate to sustain such force.

In witness whereof, I have hereunto set my hand this 21st day of January, 1908.

SAMUEL FERGUSON.

Witnesses:

HELEN ORFORD,
BENJAMIN B. HULL.