No. 770,222. PATENTED SEPT. 13, 1904.

F. M. F. CAZIN.

MANUFACTURE OF ELECTRIC INCANDESCENT LAMPS.

APPLICATION FILED MAR. 16, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

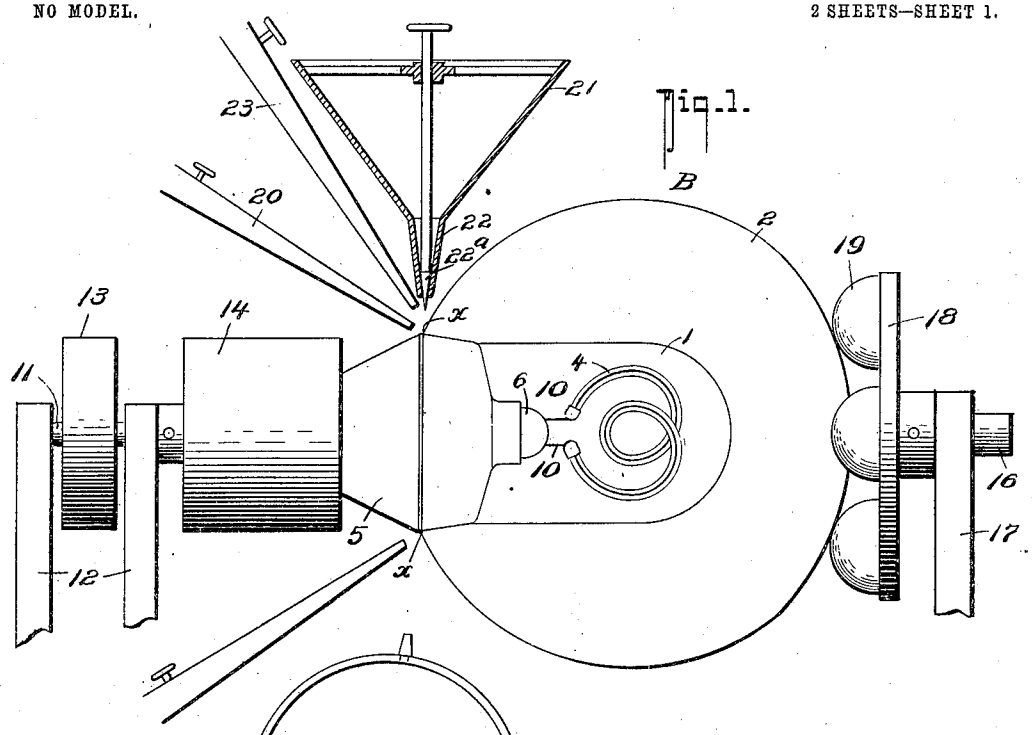
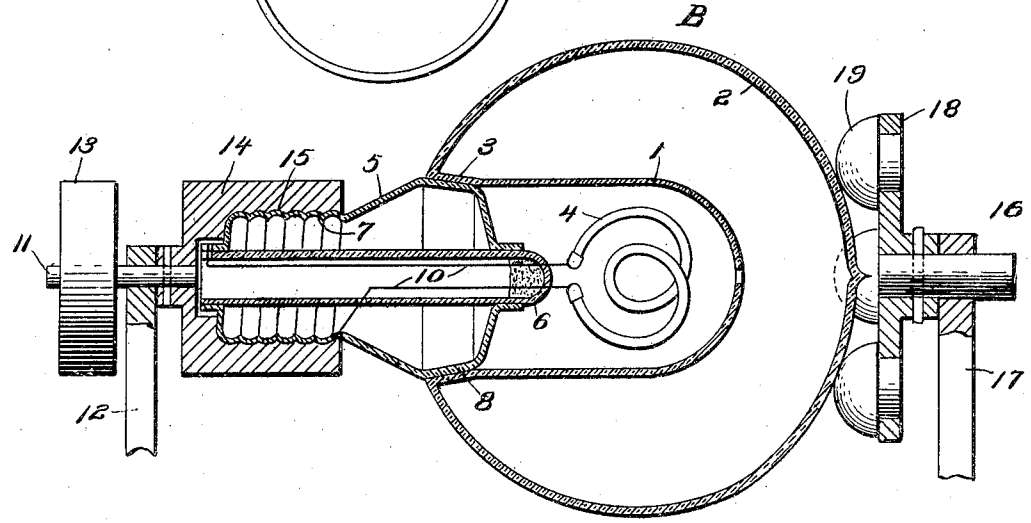



Fig. 2.




WITNESSES:

F. C. Gibson.

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INVENTOR

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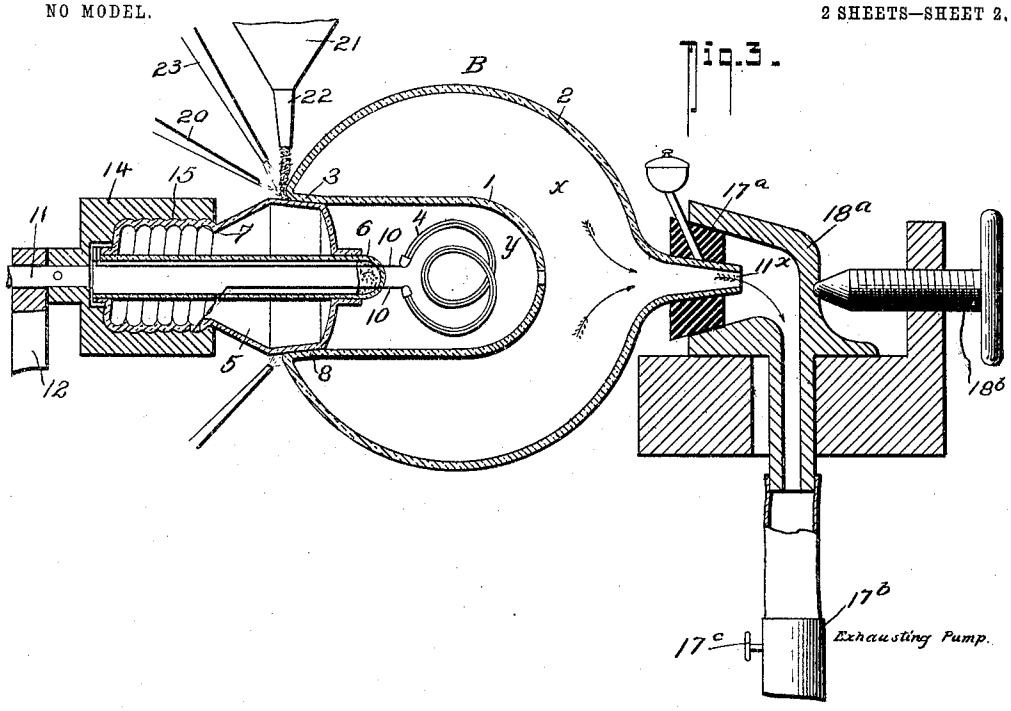
F. M. F. CAZIN.

MANUFACTURE OF ELECTRIC INCANDESCENT LAMPS.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.




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No. 770,222. Patented September 13, 1904.

# UNITED STATES PATENT OFFICE.

FRANCIS M. F. CAZIN, OF HOBOKEN, NEW JERSEY.

## MANUFACTURE OF ELECTRIC INCANDESCENT LAMPS.

SPECIFICATION forming part of Letters Patent No. 770,222, dated September 13, 1904.

Original application filed December 16, 1903, Serial No. 185,491. Divided and this application filed March 16, 1904. Serial No. 198,340. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS M. F. CAZIN, residing at Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in the Manufacture of Electric Incandescent Lamps, of which the following is a specification.

This invention, forming a division of my copending application, filed December 16, 1903, Serial No. 185,491, relates to certain new and useful improvements in the manufacture of electric-incandescent-lamp bulbs, and more particularly seeks to provide a simple and practicable method of joining the parts of the lamp that consist of glass or other vitreous matter—the method, namely, which was disclosed in the original specification of the application above referred to—viz., a method that in special also relates to those improved lamp-bulbs such as disclosed in my copending application, Serial No. 198,563, for electric-incandescent-lamp bulbs, filed on March 17, 1904.

Generically my present invention provides for holding the glass parts of an electric incandescent lamp to be hermetically or otherwise joined in proper correlative position while they are subjected to rotating motion and provides for applying heat simultaneously to the line of joint and provides for applying elastic pressure to the glass parts when in proper contact relation and provides for soldering or welding glass parts to one another and to do so on joints of a length which the present art of glass-blowing finds impracticable to so join.

The invention also includes improvements for applying a stream of soldering material, which may be either liquid at normal or increased temperature or liquefied, plastic, or granular glass, to the joints whenever it is found desirable to do so to the more permanently secure the parts together, the solder-glass as such being preferably colored or tinted and of lower temperature of fusion than the bulb-glass.

Again, my invention embodies certain peculiar manipulations, all of which will be first described in detail and then be specifically pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of the lamp parts assembled and held ready to have their joints sealed. Fig. 2 is a longitudinal section of the lamp parts placed in the soldering apparatus. Fig. 3 is a similar view of a slightly-modified form of apparatus designed to permit air exhaustion during the process of joining the parts.

To more clearly disclose my improved method of uniting parts, I will first describe it as applied in the art of electric-incandescent-lamp manufacture, and to this end I will first briefly describe the form of bulb which the present invention is more especially adapted to be applied to and also the apparatus used in carrying out my improved method.

The parts to be joined, in the present case, a lamp, bulb, and base, consist of a "bottle-shaped" bulb B, having an outer and inner envelop 2 and 1, respectively, and the base 5, having a shoulder 8 to seat in the seat 3 of the inner envelop, and the said base 5 also includes a threaded part 7 and a nipple 6, to which the inleading wires 10, carrying the filament 4, are sealed. The construction of the bulb and base *per se* forms no part of my present invention, as they form the subject-matter of my copending application filed on even date herewith.

The apparatus preferably used to carry out my method comprises generally one or more rotating shafts or shaft parts mounted in suitable bearings and provided with means for imparting rotating motion thereto, and it also includes means for holding the lamp parts in proper correlative position during the joining process. Again, my invention includes means for heating the solder-glass to partial or complete fusion, preferably Bunsen flames or blowpipes, and means for exhausting air from the part or parts to be joined or sealed, so as to suck the sealing, preferably tinted, vitreous substance into the joint to cause it to become securely welded, and means for creating air-pressure within parts to be joined.

As shown in the drawings, the apparatus used includes a shaft 11, mounted in suitable

bearings 12 to maintain it in proper position, which shaft 11 is provided with a drive-pulley 13 or other equivalent means for imparting a rotary motion to the shaft, and the said shaft is further provided with a chuck 14 or equivalent clamps for receiving and holding the base of the lamp to which the bulb is to be joined. The inner bore 15 of the chuck 14 is preferably so formed and shaped as to correspond with the shape of and closely fit the base end 7. To hold the bulb B on the base 5, I provide a tail-shaft 16, revoluble in the bearing 17 and carrying a tail-plate 18, to which elastic facings or buffers 19 are joined to frictionally engage the bulb.

21 designates a hopper for containing the sealing substance, which is preferably powdered and tinted glass, and the said hopper 21 has a mouth 22, with which coöperates the valve 22[a].

20 and 23 indicate the burners of the Bunsen type, so arranged that their flame will be mainly directed toward the joint to be sealed.

The parts being held in the usual mutual position they are to assume in the finished lamp by the apparatus just described, rotary motion is applied to the shaft 11 in any approved manner, and the flames, as illustrated by the burners 20 and 23, are directed against the joints X, Fig. 1, which causes the said joints to become heated to a temperature not sufficient to cause loss of form in the parts to be joined, but sufficient to cause interadhesion between their parts directly and by means of the fused glass solder. The hopper 21 having been previously filled with a sealing substance, preferably tinted glass in the form of powder, the said powder is then permitted to pass out of the hopper by adjusting the valve 22[a], which glass drops or is ejected toward the joints and made to attain the state of being heated, fused, or melted to a fillet by the burners 20 and 23 when in contact with the joint. One blowpipe-flame, as shown in the blowpipe 23, may be so directed as to strike the powdered glass after it leaves the hopper and on its way to the joint, and the said flame 20 is preferably so disposed, as shown in the accompanying drawings—that is to say, so directed toward the joint—that it not only heats the powdered glass, but also forcibly projects the same when in state of fusion against the parts to be united and between these parts to be joined, and to thus form an effective solder and a hermetical joint when cooled off. By rotating the parts as described—the bulb and base at their juncture—all parts of the said joint will be successively and evenly subjected to the influence of the heating-flames. By properly proportioning the heating powers of the flame the parts of the bulb and base adjacent to the joint can successively be brought to the proper temperature to permit them when the stream of fusing glass from the feeding-flames comes in contact therewith to unite with the latter, and to thereby form a hermetical or tight joint. The preheated or fused stream of glass from the hopper upon coming into contact with the heated parts at the joint will adhere thereto and under the impulse of the ejected flames directed thereto and owing to the inclination of the flame of the burners will be driven in part into the joint, the remaining part of the sealing material forming a bead around the point of juncture, whereby further means for forming a tight joint is obtained, and the color or tint of the glass solder permits the operator to closely observe and regulate the penetration of the solder into all parts of the circular joint.

Generally I prefer to preheat the base and bulb in a heating or annealing chamber before inserting them in the mechanism above described, whereby not only is the output of the machine increased, but the danger of cracking from local overheating is reduced to the minimum. It will be understood that after this general heating in the heating-chamber the burners 20 provide for local heating to a high temperature of those parts adjacent the joint. When the parts have been joined, as above described, the heated bulb may be further tempered in any approved manner.

Each of the blowpipes 20 and 23, as all others to be used, is provided with means for regulating the heat produced thereby, so that the several flames may have their temperatures individually adjusted to produce the best results. Thus the burners which play on those parts of the joint approaching the point where the sealing material is to be applied may produce gradually-increasing degrees of heat, while the burners playing on the parts immediately after the applications of the sealing may produce the high temperature necessary for the fusion of the soldering material and adhesion of parts, which temperature may be decreased in the succeeding burners.

Again, as shown in Fig. 3, I may while the parts are being sealed exhaust the bulb B, including both clambers X and Y, by any suitable exhausting-pump, (not shown,) the nozzle 17[b] of which, carrying the cut-off valve 17[c], is joined to the mouthpiece of a sliding holder 18[a], having a rubber-apertured bushing 17[a], in which the tube-stub of the bulb rotates, and the said bulb tube-stub where it engages the bushing 17[a] is suitably lubricated by any approved means to reduce the friction at the points of contact between the said tube-stub and the said bushing.

18[b] designates an adjusting-screw for regulating the tension and adjusting the member 18[a].

By exhausting the bulb during the process of sealing there will be a tendency to suck the molten sealing material in between the joints, and this may readily form a hermetical seal. At the same time heat is applied whereby to

weld the two parts together, and I may or may not use the liquid-glass sealing material as an auxiliary seal, as occasion may require. The glass being properly heated at the joint will join in interadhesion by the pressure thus applied and preferably aided by the simultaneous formation of a bead on the line of the joint.

I am aware that glass articles have heretofore been joined by using metallic solder; but I believe the use of glass solder exclusively to be new. When I use an all-glass solder for all-glass joints, I select a material having the same coefficient of expansion and contraction as that of the glass to be joined. With a metallic solder joining glass parts there are different coefficients of expansion and contraction as between solder and parts to be soldered, the former therefore being an improvement over the latter.

To have all glass parts—bulb, base, and solder—of the same coefficient of expansion is very essential, as is also an arrangement of parts whereby a wide opening is provided for the insertion or introduction of the filament to avoid breaking or cracking the same during the assembling of the parts. The providing of such enlarged opening will necessitate a much longer hermetical joint when the parts are assembled, a thing not feasible or practicable under the present methods now in common use in the art.

In all of the drawings that form a part of the present application a double bulb is shown as the one glass part to be joined to another, the base glass part, these parts in being assembled to a complete incandescent bulb-lamp requiring no other insulating material as between the two metal or pole caps to be attached thereto and avoiding the use of the two primary separate bulbs and of a separate and additional joint as between these two bulbs. Nevertheless I may use the apparatus herein disclosed and all of its essentials or functional parts and their combination for the purpose of sealing successively one single bulb after another to the base of the lamp or for sealing both to one another successively to the base, and bulbs and base may be of sundry other forms as long as the condition is present that it be desirable to join glass parts without changing or modifying their original form and that the joint be stable and be made with glass exclusively.

When I mention "blowpipes," I do not refer to the blowpipe of the metallurgist, that ejects air exclusively; but I refer to the Bunsen jet or its equivalent, ejecting both combustible gas and air or oxygen properly proportioned at the will of the operator to produce an oxidizing or reducing flame and properly regulated in total as to pressure and quantity to produce a high or low temperature. Again, I prefer to use a plurality of such blowpipe-flames suitably arranged mainly in a circular series and distributed around the axis-line of the apparatus and mainly in a radial relation to the said axial line, though at various angles thereto.

I prefer to arrange the position of the hopper 21 to the line of joint so that its spout will project the contents thereof when the line of joint is as well vertically below the aperture $22^a$ as forming the deepest part of the channel formed by the parts to be joined, though this may require the shafts 11 and 16 to be laid instead of in a horizontal position in an inclined one, so as to assist the blowpipe-burner flames in directing the molten fillet of glass into proper position with respect to the joint. While I have shown the hopper as adapted to contain powdered glass, yet I desire it understood that the hopper can be so constructed as to primarily contain molten, malleable, or fused glass, which may be ejected therefrom in such state and to maintain the contents of the hopper in such state desired. I may apply heat to the said hopper in any well-known manner. (Not shown.)

From the foregoing description, taken in connection with the accompanying drawings, it is thought the complete method of making joints and the advantages thereof will be readily understood by those skilled in the art to which it appertains, and I do not desire to limit myself to the exact method herein described, as slight changes therein may be made without departing from the scope of the invention.

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

1. The hereinbefore-described process of making joints between vitreous parts, consisting in heating the parts adjacent to the joint and in simultaneously applying to the joint preheated glass.

2. The hereinbefore-described method of making joints between vitreous parts, consisting of heating the parts adjacent the joint, in simultaneously applying a vitreous material to the said joint by means of a heated blast, and in simultaneously fusing the material to the joint.

3. The hereinbefore-described method of making joints between vitreous parts, consisting in heating the parts adjacent to the joint and applying a sealing material to one side thereof while maintaining a partial vacuum on the other side.

4. The hereinbefore-described process of making joints between vitreous parts, consisting in heating the parts adjacent the joints and in applying to one side of the joints a preheated plastic, vitreous material and maintaining a difference of pressure on the two sides.

5. The hereinbefore-described method of making joints between vitreous parts, one of

which is hollow, consisting in heating the parts adjacent the joint and exhausting the hollow part and applying a vitreous material to the exterior of the joint.

6. The hereinbefore-described method of sealing plugs in hollow vitreous articles, consisting in heating the parts adjacent the joint, and exhausting the hollow article and applying a vitreous, plastic material to the exterior of the joint between the plug and the article.

7. The method of sealing joints between hollow vitreous articles and plugs therefor, consisting in heating the parts adjacent to the joint, in exhausting the hollow article and in applying a plastic vitreous material to the exterior of the joints between the article and the plug.

8. The hereinbefore-described method of sealing joints between hollow vitreous articles and plugs therefor, consisting in heating the parts adjacent to the joint, and in applying a plastic vitreous material to the exterior of the joint and between the article and the plug and simultaneously exhausting the hollow article to suck the plastic material into the joint.

FRANCIS M. F. CAZIN.

Witnesses:
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R. B. HOOVER.