No. 770,221. PATENTED SEPT. 13, 1904.

F. M. F. CAZIN.

APPARATUS FOR USE IN UNITING VITREOUS ARTICLES.

APPLICATION FILED DEC. 17, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

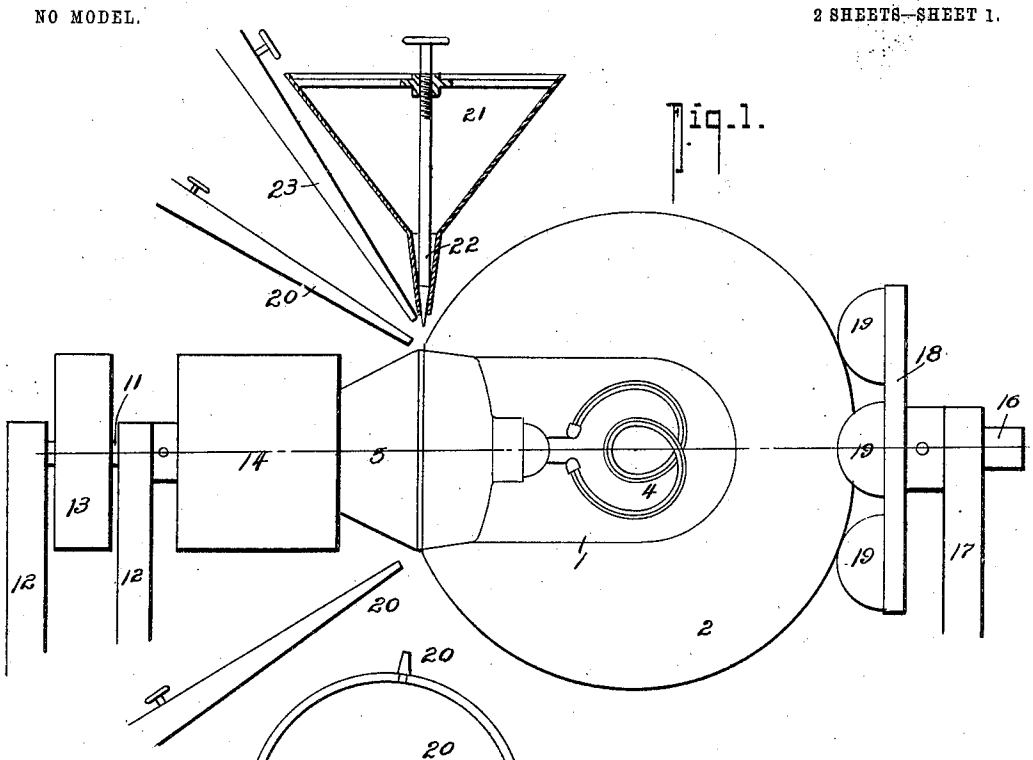
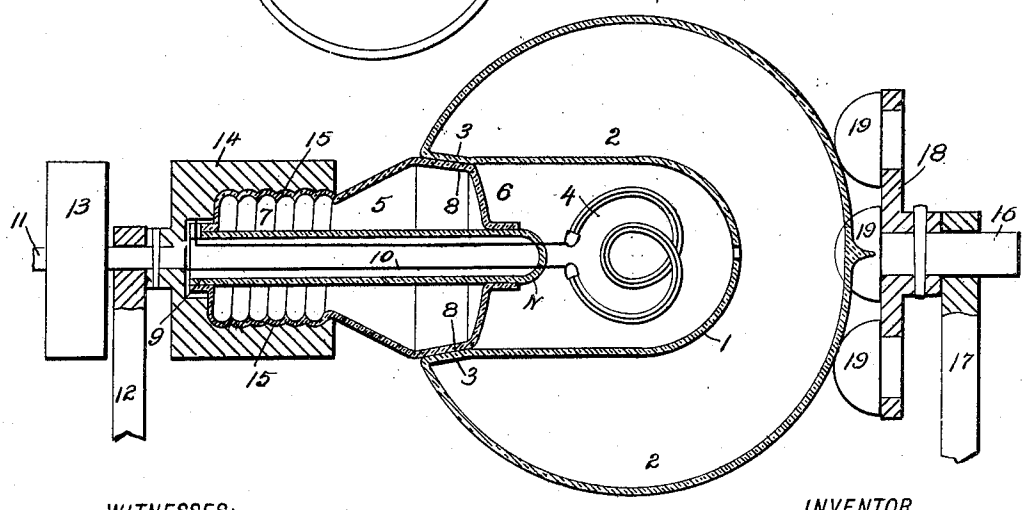


Fig. 2.



WITNESSES:

F. C. Gibson.

John T. Schmidt

INVENTOR

Francis M. F. Cazin

BY

Fred G. Dieterich & Co

ATTORNEYS

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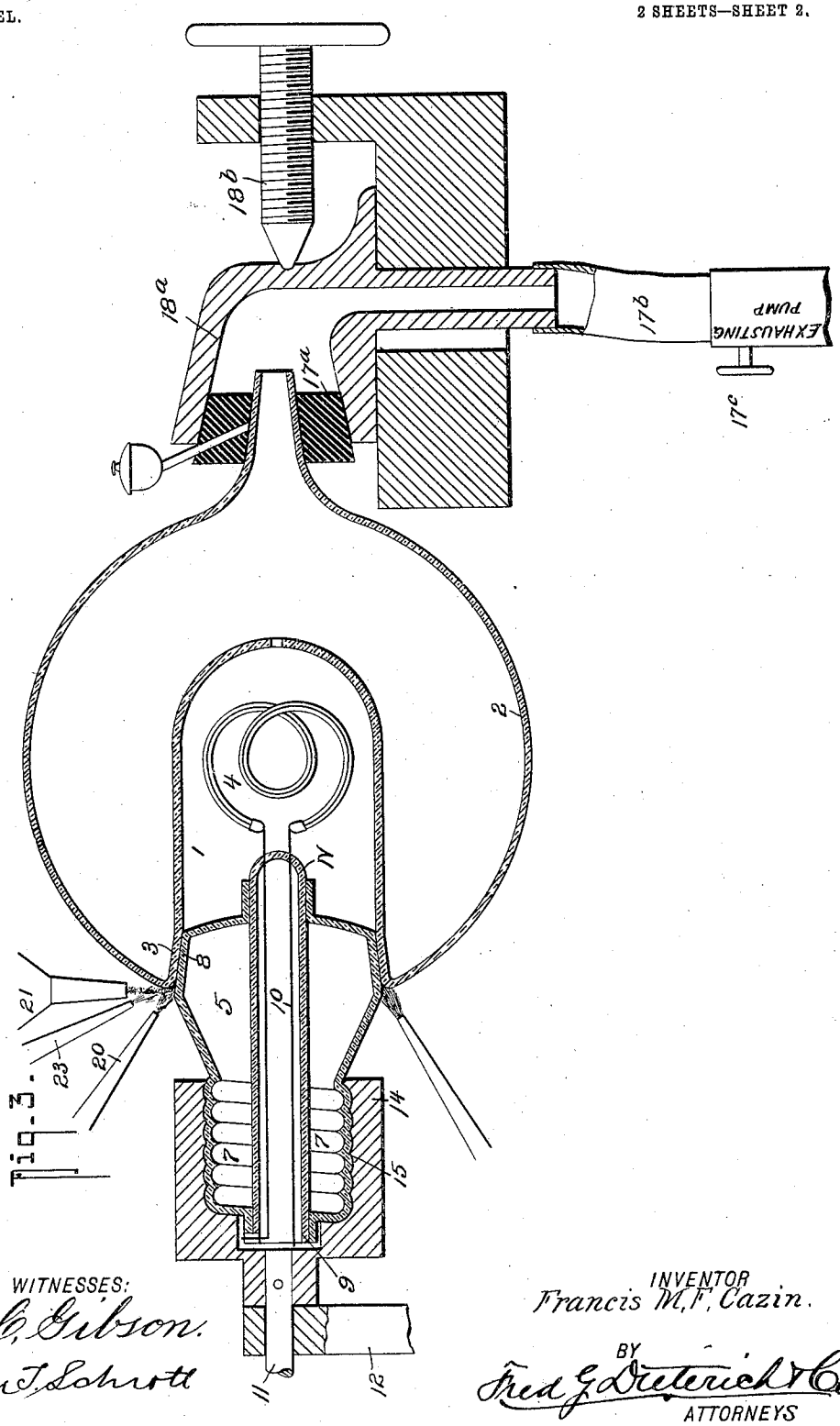


Fig. 3.

WITNESSES:

F. C. Gibson.

John T. Schrott

INVENTOR

Francis M. F. Cazin.

BY

Fred G. Dieterich & Co

ATTORNEYS

No. 770,221. Patented September 13, 1904.

UNITED STATES PATENT OFFICE.

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

APPARATUS FOR USE IN UNITING VITREOUS ARTICLES.

SPECIFICATION forming part of Letters Patent No. 770,221, dated September 13, 1904.

Application filed December 17, 1903. Serial No. 185,491. (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 Apparatus for Use in Uniting Vitreous Articles, of which the following is a specification.

My invention relates to certain new and improved apparatus for uniting vitreous articles such as is disclosed, and forms a part of my copending application filed on the 17th day of March, 1904, Serial No. 198,563, and as disclosed in my application filed on the 16th day of March, 1904, Serial No. 198,340.

In a prior application filed by me in the United States Patent Office on the 27th of June, 1899, Serial No. 725,283, I have shown an incandescent-electric-lamp bulb consisting of two envelops, the one fitting within the other and closing the aperture of the latter, while the aperture of the inner bulb is closed by a base. The apparatus is therefore adapted for use in connection with the method disclosed in my copending application Serial No. 198,340, before referred to, for securing the bulb of such an electric lamp to the base; but I prefer to form the two envelops of a single piece and to form them at the same time in any approved manner and to place around the aperture in the inner envelop a conical seat.

The apparatus for use in securing the base to the bulb in its essential feature consists in means for holding the two parts of the lamp in contact and for rotating them and of means for applying to the joint between the parts a stream of glass, either molten, plastic, or granular, and also means for heating the parts adjacent to the joint and the applied glass, so that the glass fed will be fused and become adhered to the parts to be united, whereby a tight joint will be secured.

My invention therefore in its detail nature consists in certain construction, arrangement, and combination of parts, as will be hereinafter more fully described in detail and specifically pointed out in the appended claims, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved apparatus, showing a lamp and bulb mounted thereon. Fig. 2 is a vertical section of the bulbs and the bulb holders or chucks shown in Fig. 1. Fig. 3 is a similar view of a slightly-modified form.

To more clearly understand the use of my invention, it will be necessary to briefly describe the parts to be joined and the method of joining the same. The bulb preferably consists of a single blown piece and comprises the inner envelop 1 and the outer envelop 2, the two envelops being united at the base of the bulb, whereby the inner bulb closes the aperture which would otherwise be formed in the outer bulb, a conical or flared seat 3 being formed at the mouth of the inner bulb, the bulb in this respect differing from that shown in my prior application, Serial No. 725,283, before referred to. In forming the outer and inner envelops of a single blown piece and in the conical seat at the aperture of the inner envelop it is obvious that the invention may be made of any desired shape. Within this inner envelop is mounted a luminant, which may be of the general character described in my said application first before referred to and may be carried on a base 5, which consists of a crown 6 and stem 7, which by preference is threaded to provide a convenient means for mounting it in a socket, the crown part being surrounded by a conical shoulder 8, adapted to snugly fit within the conical seat within the bulb. By preference the base is made of glass or other vitreous substance and has in the hollow stem thereof fused glass 9 and is provided with an archway N, by means of which the inleading wires 10 may pass to the filament, as more fully described in my application, Serial No. 620,640, of March 7, 1899.

Such being the construction of the parts themselves, I will now describe my improved apparatus and the method in which it is used in securing the base and bulb together and in doing so will describe it with reference to the parts shown and described, although it will be understood that my invention in respect thereto is not restricted to such parts or even uniting the parts of lamps; but it may be used in uniting other parts otherwise constructed.

Generally speaking, the apparatus invented by me comprises one or more rotating or

shaft parts having suitable bearings and means for imparting revolving motion to them and to the parts revolving with the same, also means for holding the parts and their edges in proper position to be joined. The means for heating and fusing glass in sealing preferably consists of Bunsen flames or blowpipes, and the invention also includes a supplemental heating means and means for modifying the air-pressure within the part or parts, preferably for exhausting air from the part or parts for which a joint or seal is being made. Thus this invention does not relate to the old art of glass-blowing, but mainly relates to a new art of glass-sucking.

In the preferred form of my invention shown in the accompanying drawings the shaft 11 is mounted in suitable bearings 12 to hold it in proper position with respect to its functional requirement, which position is not necessarily horizontal, but may be inclined as its function may demand, which shaft is provided with a pulley 13 or any other equivalent means for transferring rotary motion to the shaft or shaft parts and the other parts therewith connected. The shaft 11 is further provided with a chuck 14 for receiving and holding the base of the lamp-bulb which is to be hermetically joined or sealed to the bulb part thereof. When the base is threaded on the exterior face of its main body, the chuck may be correspondingly bored and threaded, as shown at 15 in the drawings.

For making a joint as stated the parts, such as the base and bulb of a bulb-lamp, must be primarily held in the very accurate mutual position with respect to one another that they are intended to occupy in the finished lamp. I have shown two ways of so holding these parts, the pressure used in either way being adapted to prevent breakage of glass parts by using elastic buffers, preferably of rubber, to take up all excessive pressure. I have shown two ways, for the reason that the air-exhausting contributive action to such joint or sealing may be dispensed with when the apparatus takes the form shown in Fig. 1, and when air exhaustion is used as an accessory the tail end of the apparatus may be modified, as shown in Fig. 3. In Fig. 1 the tail-shaft 16 runs in bearings 17 and carries a tail-plate 18 with elastic buffers 19 to frictionally engage the bulb or bulbs and to press them in proper mutual position against the base toward where they join in a conical shoulder and its counterpart. In Fig. 3 the tail-shaft is not a part of the apparatus, a substitute therefor being shown in the conical tube-stub of the bulb or bulbs and which revolves in the elastic rubber bushing 17^a, the latter serving as a bearing.

To reduce the friction between the conical tube-stub of the bulb and the elastic rubber bushing, I may provide any suitable lubricating device, as shown. The rubber bushing 17^a is held in proper position in a sliding mouthpiece of a suction-pipe of an air-exhausting apparatus, which then forms an accessory to my new and improved glass and soldering apparatus. The mouthpiece is connected with the exhausting-pump by an elastic joint 17^b, valve-controlled, as at 17^c, and the said mouthpiece 18^a is pressed against the bulb by the thumb-screw 18^b, as shown.

Heretofore in the art parts were joined by an expansion-joint process when the parts near a joint are at a temperature at which they are no longer form-retaining or are in the state of fusion, when one or both parts are made to expand, though in some cases very slightly, and to fuse the one with the other as means for joining them. However, in my method I join the form-retaining glass parts by means of a different or extra glass solder.

Heretofore glass has been soldered by using metallic solder, but not by using glass solder exclusively. The advantage of glass solder over the use of metallic solder consists in the all-glass joint having one coefficient of expansion or contraction, while metal solder and glass have been found unstable on account of the difference in their coefficients of expansion and contraction. The importance and almost necessity of this improvement in joining glass parts appears when glowers, luminants, or filaments are adapted for use which in view of other more important qualities secured must in part dispense with flexibility and which would receive life-shortening cracks by being passed through narrow necks, and consequently demand wide necks to their bulbs and much longer hermetical joints not feasible or practical under the methods of glass-blowing now in present use.

The means of providing for heating in my all-glass-soldering method and apparatus may be described as follows: First, it should be understood that when I mention "blowpipes" I do not refer to the blowpipe of the metallurgist, that ejects air exclusively; but I refer to an equivalent of the Bunsen jet ejecting simultaneously combustible gas and air or oxygen, or a mixture thereof, properly proportioned at the will of the operator to produce an oxidizing or reducing flame and having means whereby the total quantity of ejected combustible gas and air may be properly regulated to produce higher or lower temperature. In my apparatus I preferably use a plurality of such flames, regulating the function of each for a contributive purpose to obtain the final effect of making an all-glass solder-joint between glass parts that strictly retain their former shape and dimensions in the operation. These flames ejected in various directions are arranged and suitably distributed around the axial line of the apparatus and generally in radial relation thereto, although they may be disposed at various angles to the main axis. While this is charac-

teristic of the flames which directly effect the making of the glass-soldering joints, there are some not so characterized in direction which perform the function of fusing the glass powder dropping or ejected from a hopper into a malleable-glass fillet, which fillet then assumes the function as soldering material. I have shown as a means for producing this glass fillet a hopper 21, adapted to contain glass powder of such qualities of glass as shall hereinafter be explained. The glass powder either falls of its own gravitation through a regulatable aperture controlled by a valve 22 or is ejected by suitable air or steam pressure in the direction of the intended joint, of which the different parts are successively brought to the stable point where the glass fillet touches the line of joint.

My invention of all-glass soldering involves the use of the glass fillet or band ejected as powder or in liquid or malleable or fused state from a hopper that may maintain the solder-glass in such state of fusion as is directly suitable to its intended function. The heat for maintaining the molten state of the solder-glass in the hopper may be provided for in any suitable manner. It should be understood that when I use powdered glass primarily I preheat and fuse or melt or liquefy it before applying it to the line of juncture, and for this purpose I may employ a blowpipe 23, the flame of which is so directed as to intercept the path of the glass solder after it leaves the hopper, and preferably this flame is disposed as shown in the accompanying drawings—that is to say, directed toward the joint—so that not only does it preheat the glass, but it also forcibly projects the same against the parts to be united. The apparatus being organized as before described and put into motion, the lamp base and bulb will be slowly rotated between the hopper, and all portions thereof will be successively subjected to the influence of the heating-flames. By properly proportioning the heating of adjacent parts of the bulb and the base they can be brought to a proper temperature to permit them when the stream of glass from the glass-feeding means comes into contact therewith to unite with one another and with the latter, and thereby form a hermetical 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 burners directed thereto and owing to the inclination of the flame of the burners will be driven in part into the joint where the parts do not directly adhere to one another, the remaining part of the sealing material forming a bead around the point of junction, whereby a tight joint will be obtained.

In general I prefer to preheat the base and bulb in a proper 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 unequal heating is reduced. It will be understood that after this general heating in the heating-chamber the burners 20 provide for a local heating to a high temperature of those parts adjacent to the joint. When the parts have been joined as above described, the heated bulb may be tempered in any approved manner.

By preference I make the parts which are to be joined of a vitreous material which will retain its rigidity at a temperature higher than the materials to be used as the seal; but I further prefer that the temperature of fusion of the two materials shall be such that when the material of the seal is fused the material of the parts to be joined should be in a state to cause cohesion between them and between them and the sealing material.

I may by using borax in any or all of the glass parts, including the solder-glass, so fix their respective coefficients of expansion and contraction that they will be the same for all parts.

Preferably each of the blowpipes 20 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 joints 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 application of the seal may produce the higher temperature necessary for the fusion of the seal, which temperature may be decreased in the succeeding burners.

The complete method of joining the parts forms the subject-matter of my copending application, Serial No. 198,340, before referred to.

From the foregoing description, taken in connection with the accompanying drawings, it is thought the complete construction, advantages, and mode of operation of my improved apparatus will be readily understood by those skilled in the art to which it appertains, and I desire it understood that slight changes in the detail construction and arrangement of my invention may be made without departing from the scope of the invention and the appended claims.

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

1. In an apparatus for securing vitreous parts together, means for holding the parts, means for heating the joint between the parts, means for feeding powdered glass to the joint, means for fusing the glass so applied and driving it against the joint.

2. In an apparatus for securing vitreous parts together, a rotating chuck to hold the

parts to be secured, burners directed against the joint, a hopper for feeding glass to the joint, and a burner for directing heat against the glass fed from the hopper and for forcing it against the joint and fusing it.

3. In an apparatus for securing vitreous parts together, the combination with a revolving chuck for holding the parts to be united, a hopper for feeding glass solder to the joint between the parts, burners directed against the joint between the parts, and a burner directed against the stream of glass solder and projecting it against the joint, and means for sucking the solder into the joint.

4. In an apparatus for securing vitreous parts together, the combination with a revolving chuck for holding the parts to be united, a hopper for feeding glass to the joint between the parts, burners directed against the joint between the parts, and a burner directed against the stream of glass and projecting it against the joint, all being arranged substantially as shown and for the purposes described.

5. In an apparatus for securing vitreous parts together, the combination with a revolving chuck for holding the parts to be united, a hopper for feeding glass to the joint between the parts, burners directed against the joint between the parts, and a burner directed against the stream of glass and projecting it against the joint, and means for exhausting the parts to be joined.

6. In an apparatus for securing vitreous parts together, a revolving chuck including an internally-threaded base-holder for receiving the base part of the lamp, and a disk for engaging the bulb to hold it in position against the base of the lamp, pads secured to said disk between the face of the disk and the lamp-bulb, a spindle upon which said disk is mounted, a shaft upon which said base-chuck is mounted, a drive-pulley secured to said base-chuck shaft and bearings for said base-chuck shaft, and said disk-spindle substantially as shown and described.

7. In an apparatus for securing vitreous parts together, the combination with the revolving chuck for holding the parts to be united, a hopper for feeding glass to the joint between the parts, burners directed against the joint between the parts, burners directed against the stream of glass to project it against the joint, and means for maintaining a differential air-pressure between the inside of the parts to be joined and the outside thereof.

Hoboken, New Jersey, December 14, 1903.

FRANCIS M. F. CAZIN.

Witnesses:
ADELE CAZIN,
O. K. CAZIN.