

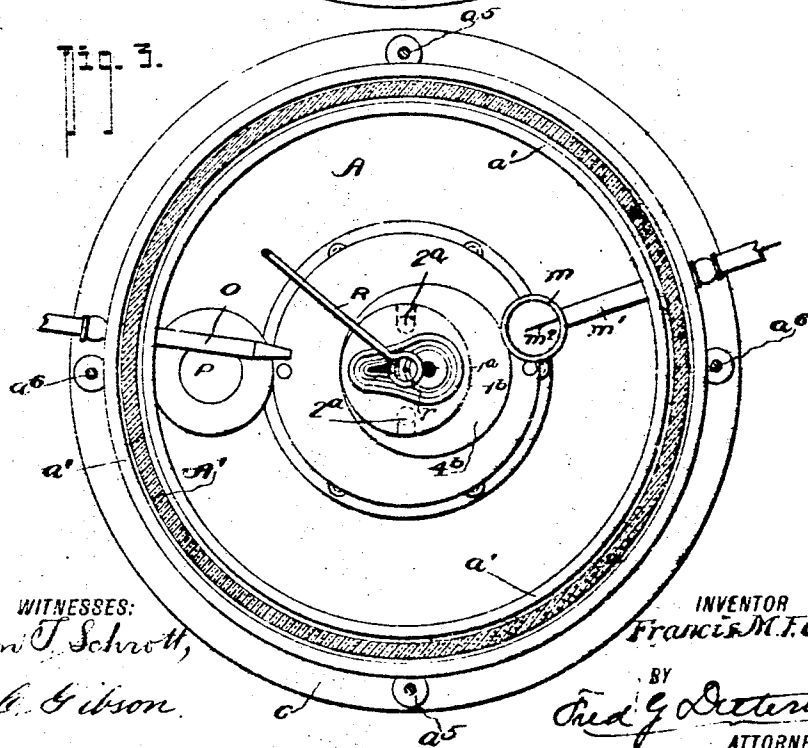
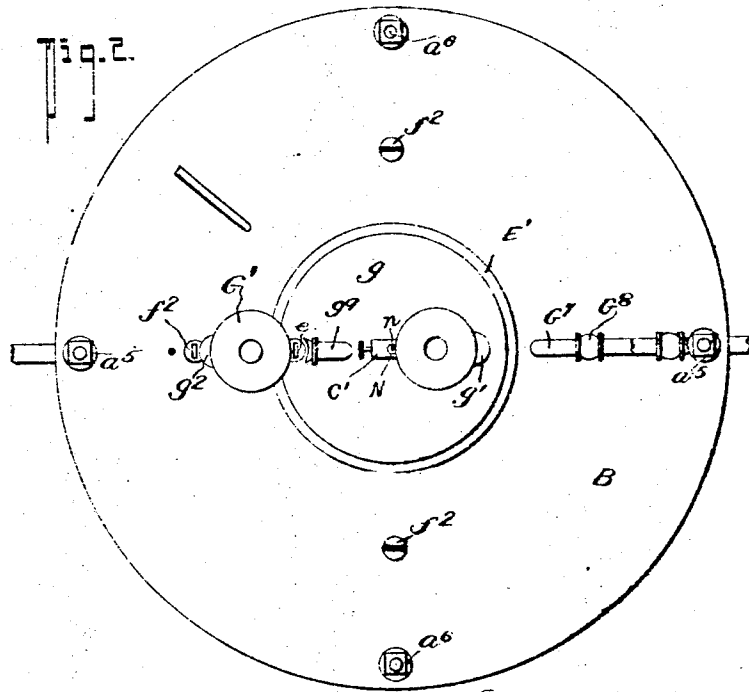
No. 874,938.

PATENTED DEC. 31, 1907.

F. M. F. CAZIN.
MACHINE AND APPARATUS FOR MANUFACTURING FILAMENTS FOR
ELECTRIC INCANDESCENT LAMPS.

APPLICATION FILED AUG. 27, 1903.

3 SHEETS—SHEET 2.



WITNESSES:
John T. Schrott,
T. C. Gibson.

INVENTOR
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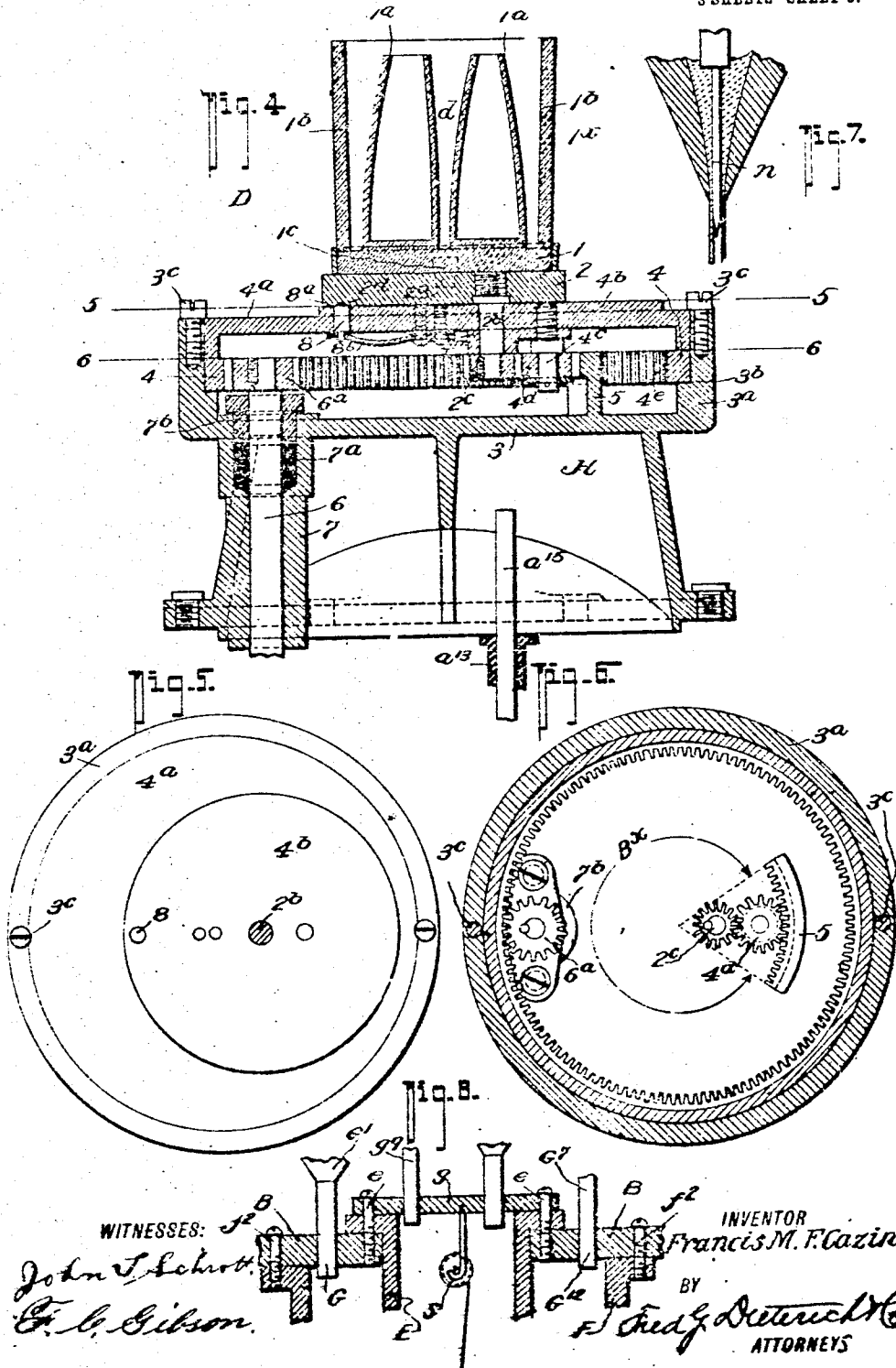
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UNITED STATES PATENT OFFICE.

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

MACHINE AND APPARATUS FOR MANUFACTURING FILAMENTS FOR ELECTRIC INCANDESCENT LAMPS.

No. 874,938.

Specification of Letters Patent.

Patented Dec. 31, 1907.

Application filed August 27, 1903. Serial No. 170,940.

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 Machines and Apparatus for Manufacturing Filaments for Electric Incandescent Lamps, of which the following is a specification.

My present invention relates to an improved apparatus for forming or producing filaments for electric incandescent lamps and it more particularly seeks to provide means for simultaneously squirting a plurality of preferably a fillet consisting of concentrically arranged strata composed of a plurality of materials.

My invention also seeks to provide means for rapidly drying the squirted fillet and simultaneously winding or coiling the same preferably in the shape or form that the finished luminant body is intended to have.

Another object of my invention is to provide means for passing an electric current through the fillet as it passes from the squirting receptacles which contain the different materials, to the receptacles connected with the coiling mechanism, by means of which current the fillet may be tested to give warning of any interception in the fillet and for any other observations useful in conducting the progress of the process and the action of the apparatus. And I desire it to be understood that I use any suitable means for the said passing of said current.

My invention also includes means for calibrating the section of the issue apertures, of the receptacle for squirting either a tubular or a solid single or concentric fillet of any desired cross section into the air evacuated bell jar and into the therein moving coiler.

Again, my invention includes means for guiding the squirted fillet in its progress to the coiler and also means for intercepting the squirted fillet for taking samples thereof while the apparatus is in operation.

This invention is particularly adapted for carrying out the process disclosed in my application filed February 2, 1903, #145,871, and patented April 4, 1905.

With other objects in view which will be hereinafter fully apparent, the invention also includes certain novel construction and arrangement of parts, all of which will be first described in detail and then specific-

ally pointed out in the appended claims, reference being had to the accompanying drawings in which:—

Figure 1, is a vertical longitudinal section of my invention. Fig. 2, is a top plan view thereof. Fig. 3, is a horizontal section on the line 3—3 of Fig. 1. Fig. 4, is an enlarged detail vertical section of the coiling apparatus. Fig. 5, is a horizontal section on the line 5—5 of Fig. 4. Fig. 6, is a similar view on the line 6—6 of Fig. 4. Fig. 7, is a detail vertical longitudinal section of a slightly modified form of my invention showing the arrangement of parts when the wire core is used in connection with the squirted material. Fig. 8, is a detail view hereinafter specifically referred to.

Referring now to the accompanying drawings in which like numerals and letters of reference indicate like parts in all of the figures, A designates the bell jar of an air exhausting apparatus which includes the top B, the bottom C and the intermediate transparent section A'. The top, bottom and intermediate members B, C and A' are held together by the bolts a^0 which are insulated from the top and bottom by the insulating bushing a^1 as clearly shown in Fig. 1. To insure an hermetical joint between parts B and C and the transparent section A', I provide the cup shaped portions a^2 in which the packing rings a^3 are held.

The top B is apertured as at b^1 to receive the inner receptacle E which has an annular flange E' by means of which it is secured to the top B. Fastened to the top B by screws f^2 or otherwise, is a second receptacle F which surrounds and is preferably arranged concentrically with the receptacle E, which receptacles E and F have their outlet apertures or mouths in the same vertical alignment for a purpose presently understood.

K designates a calibrating mouth piece fitted over one or both of the receptacles E and F (on the drawings it is shown only over the mouth of receptacle F) to which it is secured by the split ring K' and the springs K² which take in the depressions f of the receptacle F.

G designates an inlet pipe having a valve g^2 for admitting the material to the receptacle F and this pipe G is provided with a funnel shaped receptacle G' for a purpose readily understood. G² designates a pipe

communicating with the receptacle F, controlled by a cut-off valve G⁸ for the admission of either compressed air or steam for driving the semi-liquid material out of the receptacle F during the process of squirting the fillet as will be hereinafter more fully explained.

The receptacle E is closed by a top or cap plate *g* which is secured thereto by the screws *e*, which screws also serve to connect the receptacle E to the top B. An inlet pipe *g*¹² having the cut-off valve *g*⁷ communicates with the receptacle E through an aperture in the plate *g* and by means of which the material is fed to the receptacle E.

*g*⁹ designates a pipe communicating with the receptacle E and controlled by a cut-off valve *g*¹⁰ by means of which compressed air or steam is admitted to receptacle E to force its contents out during the process of squirting the fillet.

Passing through an insulating gland *n*² in the cap plate *g* is the tubular rod N through which the needle rod *n* passes. A terminal *c*¹ is connected to the rod N as shown in Fig. 1, by means of which any suitable source of electric current supply may be brought into electrical connection therewith.

The top B is apertured to receive the pipe connection *a* from any suitable air exhausting or rarefying apparatus, not shown, and the communication with such apparatus is regulated by the valve *a*³ in the pipe *a*.

*b*² designates an incandescent lamp held within the bell jar A for lighting up the interior thereof and this lamp connects with any suitable outside source of current supply in the usual manner.

M represents a fillet interceptor and sampler consisting of the receiver *m*, the connecting tube and holder *m*¹, the hook *m*² which passes through the tube *m*¹ and has its outer end provided with a stopper inserted into a mouth piece *m*³ for hermetically closing the tube *m*¹. The tube *m*¹ passes hermetically through the insulating stuffing box *m*⁴ to the inside of the bell jar A. By means of this sampler M which is movable toward and from the fillet, samples of the squirted fillet may be taken at various times and withdrawn from the apparatus for testing or other purposes.

O represents an ejector or other dust sprinkler for ejecting into the bell-jar interior at a suitable elevation graphite or other functionally similar dust for coating and drying the squirted fillet, which effect it should be understood, is aided by the exhausting of the bell jar, which exhausting action also aids the dust to reach the fillet L as it is squirted, so that it may settle thereon and coat the same.

The mouth of the pipe which connects with the air exhausting apparatus may be covered with a cloth diaphragm *a*⁴ to prevent

the dust from entering the pipe *a* and eventually reaching the pump. The excess of dust in the bell jar is collected by the dust collector P diagrammatically shown in Fig. 1.

*a*¹⁷ indicates an air admitting pipe communicating with the bell jar A and which is controlled by a valve *a*¹⁸, as clearly shown in Fig. 1.

R represents a guide for the fillet core or filament, which has a loop *r* for surrounding the fillet between the mouth K of the receptacles and the coiler apparatus hereinafter again referred to. The guide R is preferably bent upwardly and hermetically passed into the apertures in the plate B and is movable both vertically and laterally.

H represents a metallic vessel located inside the bell jar A and hermetically closed with respect to the same. This vessel, as shown in the drawings, forms a part of the supporting base of the coiler mechanism hereinafter more fully explained and this vessel H has for its object to receive steam therein through the pipe *a*¹⁵ which passes through the insulating bushing *a*¹³ of the bottom C and the steam supply to the vessel H is regulated by the valve *a*¹⁴ as shown. This vessel H serves as a heater to radiate heat into the space into which the fillet is being squirted. While I have shown this heater as a steam heater, yet I desire it understood that the same may be used to burn charcoal therein, for the production of the heat.

While I have shown the vessel H as a part of the base of the coiler mechanism, yet I desire it understood that the heat-producing vessel may be an independent vessel and located anywhere within the bell-jar, without departing from my invention.

The mouth piece K before referred to is so designed as to give the fillet the desired cross sectional area and is made up of essentially two parts, the mouth piece member and a split ring K¹ and individual narrow springs K² with projections for entering the indentations of the receptacles. It should be understood however, that I do not limit myself to the exact method of attaching these calibrating mouth pieces as any suitable means may be used, which will perform the desired function and I also desire it understood that one or more of the vessels may be provided with these calibrating mouth pieces depending upon the condition of the fillet. I also desire it understood that I do not limit myself to the use of the exact form of calibrating mouth pieces, as any other suitable calibrating devices such for instance, as the smaller ends of the tentacles of the lobster, may be used.

The bell jar A may be of any desired shape either circular in horizontal section as shown or of any other shape in horizontal section which may be found desirable. By providing the bell jar with a transparent portion, I

obtain two very essential advantages, namely, 1st. the fillet L as it is taken up by the moving receptacle of the coiler mechanism D can be readily observed and manipulated at will by the guide R, and secondly that, by making the part between and joining top and bottom of vitreous material electrical insulation is provided between these top- and bottom-parts.

10 C² designates a terminal connected to the bottom C by means of which the positive connection with any suitable source of current supply may be made it being understood that the coiler mechanism is in electrical connection with the bottom of the bell jar, so that an electric current can be passed serially through the fillet as it is being formed for the purposes hereinbefore referred to, and for the additional purposes of producing moderate heat in the said fillet for the purpose of drying and hardening the same as well as causing the required chemical reaction favorable to obtaining the desired product.

25 Both the top and bottom plates B—C may be made of metal or graphite so long as they are insulated from each other. Each of the portions B—C may be made of one piece or cast with parts of the up-right side of the bell jar A, although if desired, they may be made in separate pieces so long as the joints are made hermetical.

As my present invention primarily seeks to produce a fillet consisting essentially of concentrically arranged layers of various materials, each of which is designed to serve a special contributive function in the completed filament or luminant for electric incandescent lamps, such as I have described herebefore in patents issued to me and in pending applications, it being well understood, that instead of coating a core or original fillet in an electrolytic plating apparatus, I may also produce the same luminant by concentric squirting in and by the apparatus herein described and claimed. And such squirting may include any core, be it conductive or non-conductive and any other concentric stratum thereto, be such stratum intended as a chemical insulating stratum or as a conducting stratum, or as a surface stratum of any other description, such as by me made in any of prior applications for protecting my improved luminants in electric incandescent lamps.

Referring now more particularly to Figs. 1, 4, 5 and 6, the construction and operation of the coiler mechanism D will be more readily understood. The coiler mechanism shown in the drawings consists essentially of a fillet receiving member 1^a upon which are mounted the core members 1^a—1^a which are so cooperatively arranged as to give the fillet when wound the desired shape or form. These core members may be surrounded by

a transparent jacket 1^b which is detachably held on the base portion 1 as clearly shown in Figs. 1 and 4. The parts 1^a—1^b serve as the fillet receptacle and the base portion 1 thereof is provided with slotted portions 1^c on its under face to receive the lugs 2^a—2^a carried by the foot plate 2 as shown. The base portion 3 of the coiler mechanism D which is supported by and forms the top of the vessel H is in the nature of a circular plate having an annular rim 3^a provided with a seat 3^b to receive the internal gear housing 4 which housing 4 includes the top 4^a, having a surface 4^b upon which the foot plate 2 rests and turns.

4^m designates an apertured hub on the top plate 4^a through which the stub shaft 2^b joined with the foot plate 2 passes and this stub shaft is arranged eccentrically with respect to said foot plate 2.

2^c designates a pinion carried by the stub shaft 2^b and held within the internal gear housing 4.

4^e designates a stud secured to the top plate 4^a, in the internal gear housing 4, upon which is loosely mounted an intermediate gear 4^d which meshes with the pinion 2^c and also with the rack section 5 projected from and formed with the base 3.

4^e designates an internal gear rim in the internal gear housing with which the pinion 6^a carried by the drive shaft 6 which passes through the bearing 7 and the stuffing box 7^a, closed by the gland 7^b, meshes.

3^c—3^c designates guide screws carried by the member 3^a for maintaining the internal gear housing in position on the base.

8 designates a locking pin which passes through an aperture in the top plate 4^a and has a conical end 8^a for seating or engaging the conical depression 2^d in the foot plate 2 against which foot plate 2 it is held by the spring 8^b secured to the top plate 4^a and within the internal gear housing, see Fig. 4. This locking pin 8 is designed to hold the foot plate 2 in position with its center in the same vertical alinement as the center of the internal gear 4^e when the gear 4^d is not in engagement with the rack portion 5 so as to form the elongated portion of the fillet coil in the manner presently more fully explained.

The internal gear housing 4 serves as a turn table on which the revolving foot plate 2 rests. When power is applied the shaft 6 will cause the gear 6^a to turn the turn table 4^a. The gear 4^e is provided with 112 teeth, pitch 16, with which the pinion 6^a having 18 teeth 16 pitch meshes. The rack portion 5 is arranged in opposition to the primary drive device and has 16 teeth of concentric pitch in each and comes into operation when the gear 4^d on the stud 4^e comes into connection therewith during the revolutions of the turn table 4^a to transmit motion to the stub shaft 2^b which in turn

moves the foot plate 2 on a vertical axis through the said stub shaft 2^b which is concentric to the said plate 2.

From the foregoing it will be seen that the axial center of the stub shaft 2^b does not coincide with the center of the gear 4^c and therefore when the internal gear housing is revolving the center of the shaft 2^b will also describe a circle. As the local position of the centers of the pinions or gears 2^c—4^d with respect to each other are constant the gears will commence revolving as soon as the gear 4^d comes into contact with the rack portion 5 and rolls on it.

Supposing the number of teeth in the gear 2^c to be equal to the number of teeth in the rack section 5, the gear 2^c and coiling vessel 7 will make one full revolution around the axial line of the stub shaft 2^b thereby forming the small circular loop in the filament around the conically shaped members 1^a. Continuing the rotation of the gear 4^c over the arc or angle B^x (see Fig. 6) the gear 2^c will be then without motion and the coiling vessel will rotate around its center V, Fig. 4, thereby forming the oval shape part of the filament over the other core member 1^a of the receptacle. During this period of coiling the foot plate 2 and the coiling vessel 1 are held in proper position with respect to the housing 4^a by the locking stud or lug 8 spring pressed to its locking position. To diminish the friction in the gears and other parts, the whole space between the housing 4^a and the base 3 is filled with any suitable lubricating material.

When a small receptacle rotatable on a central vertical axis without the coiler mechanism, is used, it is only necessary to manipulate the fillet by means of the guide R.

While I have shown the coiler mechanism as any automatically operating mechanism yet a simple rotary receptacle may be used particularly when it is desired to merely form a circular or hemispherical fillet or one of a spiral form or any other mechanisms devisable in mechanical art may be used for similarly moving the coiler. The receptacle or coiler it will be noticed is provided with a groove or grooves *d* into which the issuing fillet *L* is caused to drop. The coiler mechanism is so formed and regulated as to move only with sufficient speed to take up the fillet as it is squirted into the receptacle 1, the speed at which the fillet is squirted being regulated by regulating the pressure in the receptacles E and F for forcing the materials therein contained out through the mouth of the said receptacles.

By reference to the drawings it will be noticed that the mouth of the groove *d* is wider or funnel shape to compensate for discrepancies in the mutual positions and speeds of operation of the said parts. The coiling mechanism performs the function 1st. by pro-

viding means for receiving the squirted filament at the same rate of length per stated time as it is ejected from the mouth of the receptacle, such rate of ejection being regulated either by regulating the pressure of the air before the materials in the receptacles or by regulating the revolving speed or motion of the coiler mechanism. 2nd. The coiler mechanism serves to form the fillet into the individual shape desired.

From the foregoing it is apparent that for different forms or shapes of glowers not only different fillet receptacles are required but the position of the receptacles can be varied with respect to the supporting parts being either eccentric or concentric, depending on the shape or form of filament desired.

One result obtained by the coiler mechanism is to hold both of the coils and the uniformly cut parts thereof, while the same are being treated,—hardened or eventually carbonized, until they are ready to be assembled in the complete lamp. To permit of ready access to the coiler fillet the envelop 1^b may be made removable and is preferably composed of glass to permit inspection of the coiled material during the operation of the apparatus and I may omit to use this envelop 1^b if desired when the coiling action is such that it can be dispensed with. Again when this envelop 1^b is not used, the coiled fillet is under the drying influence of rarefied air as before referred to and may be dust-coated by means of the dust ejector O.

When the envelop 1^b is used I may fill the groove *d* with any suitable liquid which will preserve or serve a useful function with respect to the fillet, provision being made for the over-flow of such liquid in the hollow core members 1^a—1^a.

I may construct the coiler of any suitable mechanism now known in the art to allow for passing current through the filament.

While I have shown one of the receptacles E as located within the other receptacle F, I do not desire it understood that such is the only position they may assume as both receptacles may be held entirely without the bell jar H so long as their exit ends are within the bell jar and so long as their exit ends are practically in the same alinement so that the two fillets issuing simultaneously may be twirled or twisted to form a single cord, thread or fillet and as such be guided into the coiler mechanism receptacle. Again while I have shown but two receptacles yet I desire it understood there may be more or less, depending on the number of strata of which it is desired to construct luminants.

In Fig. 7, I have shown a modified form of my invention in which I suspend a bobbin S upon which is wound a fine metallic wire the end of which, passing through the squirting mouths, is secured to the receptacle so that in the formation of the fillet the same will be

provided with a metallic continuous core, if a filament or luminant is to be produced having a continuous metallic core.

When it is desired to squirt a fillet of tubular shape I project the needle *n* into the mouths of the receptacles so that the fillet as it issues from the mouths of the outer receptacle will be of tubular shape, as clearly illustrated in Fig. 7. As materials that I may use in the squirting of the luminants of my lamps I mention carbon, or plumbago, powdered metals of the ruthenium-osmium class and of others, rare metal oxids, graphite, kaolin, or other materials, made into a paste or syrup or varnish.

Experience has shown that with finely divided solid matter, be it divided by mechanical means or be it divided by being chemically precipitated from a solution, plastic, semi-liquid, and liquid paste, syrup or varnish may be prepared by admixing therefor be it collodion or volatile or drying oil as the precise state needed for their squirting as core or as cover.

While the pipes G^2-g^0 are primarily designed for the admission of the cocks or valves G^3-g^{10} for regulating the quantity admitted of compressed air or gas it should be understood that they may form a connection to a source of steam supply and that one of them can be used for the admission of steam and the other for the admission of compressed air, the pressure being regulated differently or uniformly in the two receptacles to produce the desired result. Whenever steam pressure is used a surface cover of a liquid which has a higher boiling point than water is used over the squirttable material. The heat of the steam may be employed for rendering the matter which at lower temperature is either solid or plastic, syrupy or semi-liquid so that it may readily squirt from the aperture, care being taken that the condensed water does not have a detrimental effect on or mix with the material to be squirted.

The spool is in the form shown in Fig. 8 and may contain silk, cotton, wool or other threads instead of wire, when a core of discardable material is desired, the same is passed out of the mouth of the squirter or squirters to the fillet receptacles of the coiling apparatus to which the end is secured so that when pressure is applied on top of the semi-plastic liquid, it also serves to carry with it a thread of the wire as an integral part and thereby prevents breaks in the continuity of the cover which would otherwise result from its lack of cohesiveness.

Having thus described the construction of my apparatus, I will now summarize the operation thereof. The mouths of the squirting receptacles having been provided with suitable calibrating caps and the semi-plastic or semi-liquid material having been filled into the receptacles with all connections pri-

marily closed, the needle *n* closing the mouth of the squirters, air or steam pressure is put on by opening the valves G^3-g^{10} . The needle *n* is then raised to give the squirter mouth the properly regulated dimensions or cross sections. The sampler *M* may be primarily used to with-draw samples of the fillet to examine it as to its proper size. When a satisfactory sample is obtained, the sampler is with-drawn and the coiler mechanism set in operation. The vessel *H* is then heated and the air exhausting apparatus is set in operation to receive the bell jar *A*. The fillet is then made to coil into the desired shape by the coiler apparatus. Instead of using compressed air or gas for forcing the materials from the squirter, any suitable substance may be used although I prefer to use pneumatic pressure on the material such as compressed air or gas. Gas pressure may be generated within a separate vessel by creating gas pressure say with carbon di-oxid from lime rock when under the action of sulfuric acid or say by heating carbonate of ammonia or by any other physical or chemical means for obtaining gas pressure. Again the materials to be used may be such as to cause one or more porous strata. In addition to the materials hereinbefore mentioned I may form the core or primarily conducted member of amalgam in view of the subsequent evaporation of the mercury or by forming the same of a mixture of carbon paste with metallic powder in view of the two substances entering into a compound such as carbureted metal.

From the foregoing it will be seen that the fillet so produced can be readily prepared or treated for further electrolytic deposition after it has been formed by my present apparatus.

From the foregoing description taken in connection with the accompanying drawings it is thought the complete operation, construction and many advantages of my invention 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 parts may be made without departing from the scope of the invention or the appended claims and by the use of my improved apparatus such lamps may be manufactured as are disclosed in my copending applications filed July 27, 1889, #725283 and October 2, '99, #732399 and my application filed October 31, 1899, #735438.

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

1. In an apparatus of the character stated, an exhaustible receptacle, means for squirting a prospective fillet or glower into said receptacle for the purposes specified and means for air exhausting said receptacle.

2. In an apparatus of the character stated, an exhaustible receptacle, a plurality of fillet squirters arranged to squirt a prospective fillet or glower into said receptacles, and means for air exhausting said receptacle.

3. An apparatus of the character stated, an exhaustible receptacle, means for squirting a prospective fillet or glower into said receptacle and means for simultaneously forming said fillet into its final shape substantially as shown and described.

4. An apparatus of the character stated comprising a chamber, means for simultaneously squirting a core and cover therefor into said chamber and means for forming such squirted parts into their final shape, and means for simultaneously exhausting said chamber.

5. In an apparatus of the character stated, an exhaustible vessel, a plurality of receptacles having concentrically arranged squirting mouths, said receptacles adapted to receive semi-plastic material, means for maintaining such material in the semi-plastic liquid condition and for forcing such material out of the squirting mouths in the receptacles, said receptacles having their squirting mouths arranged to discharge into said exhaustible vessel and means for simultaneously forming such squirted fillet into the final shape desired.

6. In an apparatus of the character stated, an exhaustible vessel, a plurality of receptacles having concentrically arranged squirting mouths, said receptacles adapted to receive semi-plastic material, means for maintaining such material in the semi-plastic liquid condition and for forcing such material out of the squirting mouths of the receptacles, said receptacles having their squirting mouths arranged to discharge into said exhaustible vessel and means for simultaneously receiving and forming such squirted fillet into the final shape desired, and means for heating said forming receptacle.

7. In an apparatus of the character stated, an exhaustible vessel, a plurality of receptacles having concentrically arranged squirting mouths, said receptacles adapted to receive semi-plastic material, means for maintaining such material in the semi-plastic liquid condition and for forcing such material out of the squirting mouths of the receptacles, said receptacles having their squirting mouths arranged to discharge into said exhaustible vessel and means for simultaneously receiving and forming such squirted fillet into the final shape desired, means for heating said forming receptacle, means for guiding said squirted fillet into said receptacle.

8. In an apparatus of the character stated, an exhaustible vessel, a plurality of receptacles having concentrically arranged

squirting mouths, said receptacles adapted to receive semi-plastic material, means for maintaining such material in the semi-plastic liquid condition and for forcing such material out of the squirting mouths of the receptacles, said receptacles having their squirting mouths arranged to discharge into said exhaustible vessel and means for simultaneously forming said squirted fillet into the final shape desired, means for heating said forming means, means for guiding said squirted fillet into said forming means, means for injecting dust into said exhaustible vessel to coat the squirted fillet.

9. In an apparatus of the character stated, an exhaustible vessel, a plurality of receptacles having concentrically arranged squirting mouths, said receptacles adapted to receive semi-plastic material, means for maintaining such material in the semi-plastic liquid condition and for forcing such material out of the squirting mouths of the receptacles, said receptacles having their squirting mouths arranged to discharge into said exhaustible vessel and means for simultaneously forming such squirted fillet into the final shape desired, means for heating said forming means, means for guiding said squirted fillet into said forming means, means for injecting dust into said exhaustible vessel to coat the squirted fillet, means for collecting the excess dust.

10. In an apparatus of the character stated, an exhaustible vessel, a plurality of receptacles having concentrically arranged squirting mouths, said receptacles adapted to receive semi-plastic material, means for maintaining said material in the semi-plastic liquid condition and for forcing such material out of the squirting mouths of the receptacles, said receptacles having their squirting mouths arranged to discharge into said exhaustible receptacle and means for simultaneously forming such squirted fillet into the final shape desired, means for heating said forming means, means for guiding said squirted fillet into said forming means, means for injecting dust into said exhaustible vessel to coat the squirted fillet, means for collecting the excess dust, and means for removing samples of said squirted fillet during the operation of the apparatus.

11. In an apparatus of the character described, means for simultaneously squirting a hollow core and a cover therefor.

12. In an apparatus of the character described, means for simultaneously squirting a hollow core and a cover therefor, means for simultaneously filling said hollow core with a continuous thread.

13. In an apparatus of the character described, means for simultaneously squirting a hollow core and a cover therefor, and means for simultaneously filling said hollow core with a metallic thread.

14. In an apparatus of the character described, means for simultaneously squirting a hollow core and a cover therefor, and means for simultaneously filling said hollow core with a metallic thread and means for passing an electric current through the squirting fillet during its formation.

15. In an apparatus of the character stated, a bell jar including an opaque top and bottom and a transparent intermediate partition, a receptacle secured to said top within said bell jar, said receptacle having a discharge mouth, means for calibrating said discharge mouth.

16. In an apparatus of the character stated, a bell jar including an opaque top and bottom and a transparent intermediate partition, a receptacle secured to said top within said bell jar, said receptacle having a discharge mouth, means for calibrating said discharge mouth, means for applying pneumatic pressure to the contents of said receptacle to force the same into the bell jar.

17. In an apparatus of the character stated, a bell jar having an apertured top, a receptacle secured to said top, a second receptacle passing through said top aperture and projecting into said first receptacle, said receptacle having concentrically arranged discharge apertures, pneumatic means for independently forcing the contents of each receptacle out of their discharge apertures, means for regulating such discharge, and means within the second receptacle for causing the discharge material thereof to assume a tubular form.

18. In an apparatus of the character stated, an exhaustible vessel, fillet squirting and coiling devices within said vessel and means for lighting up the interior of said vessel.

19. In an apparatus of the character stated, an exhaustible vessel, fillet squirting and

coiling devices within said vessel and means for lighting up the interior of said vessel, means for exhausting said vessel and means for radiating heat within said vessel.

20. A fillet squirting machine comprising in combination with an air exhauster, squirter members and a fillet coiler, of an electric lamp held within the bell jar of said exhauster, said exhauster bell jar having transparent walls, and said electric lamp serving to illuminate the interior of said bell jar to permit observation of the operating parts within the bell jar.

21. In a fillet squirting machine, an air exhauster including a bell jar, squirting mechanism for squirting the fillet into the inside of the bell jar, a fillet receiver, and a fillet sampler held within the bell jar.

22. In a fillet squirting machine, an air exhausting squirter, a bell jar, squirting mechanism for squirting the fillet into the inside of the bell jar, a fillet receiver and a fillet sampler held within the bell jar, and a dust sprinkler for injecting dust into the bell jar for the purposes specified.

23. In an apparatus of the character stated, comprising in combination with a bell jar and fillet squirting receptacles, of a fillet receiver and coiling mechanism mounted within the bell jar comprising a rotatable platform, an eccentrically mounted foot plate carried by said platform and a receiver mounted on said foot plate, means for rotating said platform and means for rotating said foot plate on its eccentric axis at predetermined times means for exhausting said bell jar for the purposes specified.

FRANCIS M. F. CAZIN.

Witnesses:

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V. BLOOM.