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L. J. GRUBMAN

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METHOD AND MEANS FOR ASSEMBLING THE PARTS OF ARTIFICIAL EYES

Original Filed Feb. 12, 1927 2 Sheets-Sheet 1

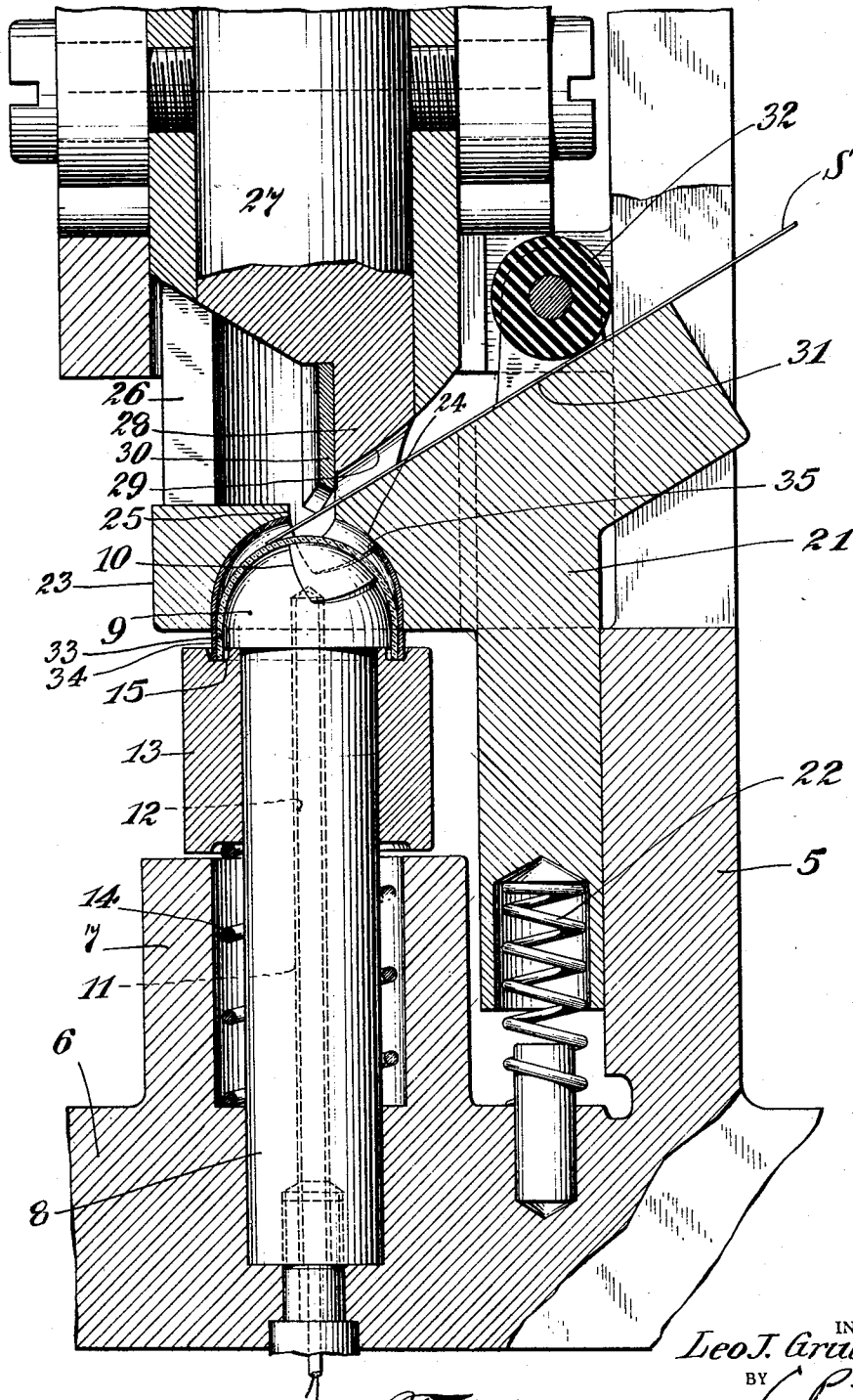


Fig. 1.

INVENTOR
Leo J. Grubman
BY
C. P. Goppel
his ATTORNEY

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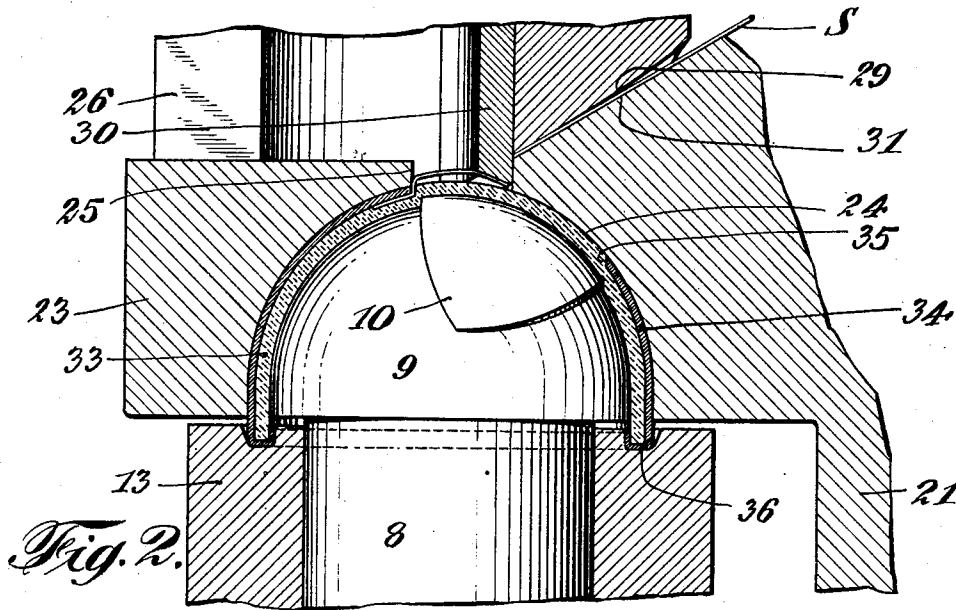


Fig. 2.

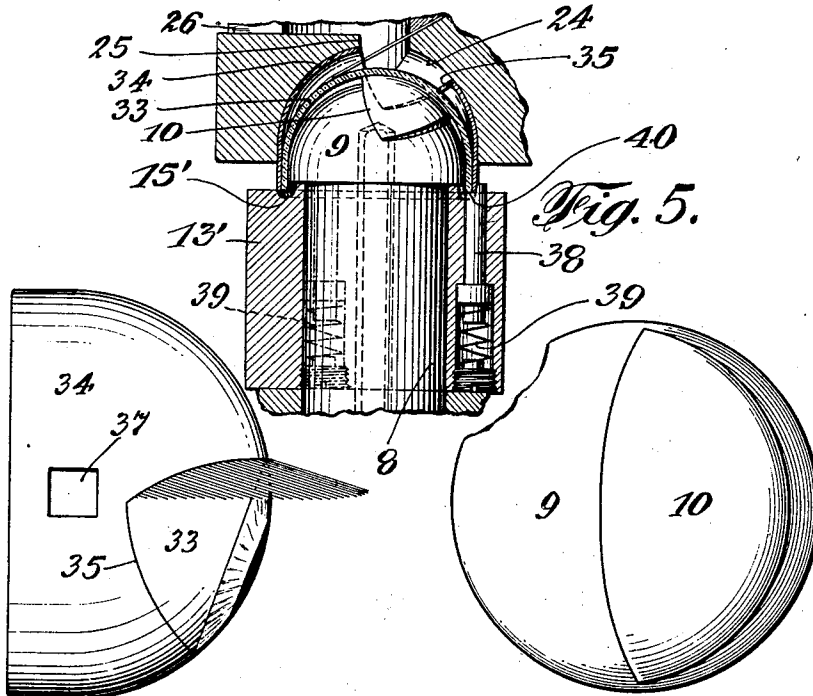


Fig. 3.

Fig. 4.

INVENTOR
Leo J. Grubman
BY *C. P. Goebel*
his ATTORNEY

UNITED STATES PATENT OFFICE

LEO J. GRUBMAN, OF BELLE HARBOR, LONG ISLAND, NEW YORK, ASSIGNOR TO
MARGON CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

METHOD AND MEANS FOR ASSEMBLING THE PARTS OF ARTIFICIAL EYES

Application filed February 12, 1927, Serial No. 167,634. Renewed February 12, 1930.

This invention relates to an improved method and means for assembling the parts of artificial eyes, and has for its general object and purpose to expedite the quantity production and reduce the manufacturing cost of such artificial eyes as are generally used in connection with dolls, manikins and similar figures.

It is one of the important objects of the present disclosure to provide a novel method characterized by the fact that inner and outer shells constituting the eye structure are assembled in nested relation to each other and parts of the walls of said shells simultaneously interlocked to fixedly secure the shells against relative movement. It is also another novel feature of the new method to permanently secure eyelash members in the operation of assembling the eye shells whereby the lash members will project outwardly from the outer surface of the eye at a definite angle with respect thereto and in appropriate relation to the eye pupil.

It is also a further object of the invention to provide novel means for quickly assembling an outer metallic eye shell having an eye-shaped opening in its wall and an inner shell of thermo-plastic material which includes means for moving said shells under pressure into nested relation and heating said inner shell whereby a part of its wall is angularly offset outwardly through said opening and the outer surface of said part positioned in the same circumferential plane as the outer surface of the outer shell.

It is also a further object of the invention to provide means for feeding eyelash strands into position between said inner and outer shells at one edge of the opening in the latter and adhesively incorporating the same in the structure of the inner shell as said shells are assembled and simultaneously cutting off said eyelash strands.

It is also an additional object of the invention to provide means automatically operating in the assemblage of the shell members to bend or turn the edge of one shell around or upon the edge of the other shell whereby said shells are permanently fixed or secured against relative movement.

With the above and other objects in view, the invention consists in the improved method and means for assembling the parts of artificial eyes, and in the several novel features of the assembling apparatus, as will be hereinafter more fully described, illustrated in the accompanying drawings, and subsequently incorporated in the subjoined claims.

In the drawings, wherein I have illustrated one simple and practical embodiment of the assembling apparatus, and in which similar reference characters designate corresponding parts throughout the several views,—

Figure 1 is a vertical sectional view showing the relative arrangement of the several parts of the eye structure with respect to the cooperating parts of the apparatus prior to the operation of the latter;

Fig. 2 is a fragmentary vertical section on an enlarged scale after the apparatus has been operated and showing the several parts of the eye structure as finally assembled;

Fig. 3 is a side elevation of the completed eye structure;

Fig. 4 is a top plan view of the male assembling die; and

Fig. 5 is a detail vertical sectional view showing a modified form of one part of the apparatus.

In the accompanying drawings, for purposes of illustration, I have shown the several essential parts of the apparatus mounted and arranged upon a suitable frame structure 5, said structure including the base 6 upon which an upstanding hollow boss 7 is formed. Positioned concentrically with respect to this boss a vertical post 8 is rigidly fixed at its lower end in any suitable manner in the base 6. This post extends above the boss 7 and is provided upon its upper end with a semi-spherical head 9 constituting a male die. This head, at the appropriate location on its surface is formed with a relief or raised portion 10 of substantially elliptical or eye-shaped form. The post 8 is provided with a longitudinal central bore 11 extending into the head 9 which is adapted to receive a suitable electrical resistance unit indicated at 12 whereby the die head 9 may be heated.

Above the boss 7 and below the head 9, a

collar 13 is loosely engaged upon the post 8 and is urged upwardly and yieldingly supported in a normal position against the head 9 by means of a coiled spring 14 arranged in the hollow boss 7 and surrounding said post. The upper surface of the collar 13 is provided with an annular groove 15 in spaced concentric relation to its inner edge. The purpose of this construction will be hereinafter explained in detail.

A female die member 21 is suitably mounted in the frame 5 for vertical movement and is urged upwardly to its normal position by a spring 22. This die member has a horizontally extending part 23 provided with a semi-spherical cavity 24 therein opening upon the lower side of said part 23, an opening 25 formed through said part communicating with the top of said cavity. The part 23 is provided with an upwardly extending tubular portion 26 constituting a guide for the vertically movable member 27. This member at its lower end and at one side of its center has a downwardly extending part 28 provided with an obliquely inclined lower end face 29. To the inner side of this part 28 the knife blade 30 is suitably fixed, the cutting edge of said blade being located below and in spaced relation to the inclined face 29. Any suitable means may be employed for imparting relative vertical movements to the female die 21 and the knife carrying member 27 in properly timed relation to each other.

The upper end of the member 21 is provided with a laterally extending part having an upper obliquely inclined surface 31 over which eyelash strands indicated at S are adapted to be fed from suitable spools (not shown) by means of the friction feed roller 32 rotatably supported upon the member 21. The lower end of this inclined surface 31 communicates with one side of the opening 25 and through said opening the ends of the eyelash strands are projected to position the same for attachment to the eye structure as the parts thereof are assembled in the manner which I shall now explain in detail.

The member 21 is normally urged upwardly by the spring 22 to a position wherein the arm 23 of said member is disposed above and in spaced relation to the head 9 of the post 8. In this normal position of said die member, the inner shell 33 of the eye structure which is formed from celluloid or other thermo-plastic material is arranged upon the head 9 of the post. This shell is of semi-spherical form and the edge thereof at the open side of the shell is engaged upon the base wall of the groove 15 and the collar 13. An outer shell 34 is then arranged over the shell 33, said outer shell preferably being formed from a thin metal sheet and being of somewhat greater depth than the inner shell 33. Therefore, when the outer shell is arranged in position with its edge also in con-

tact with the wall of the groove 15, the walls of said shells at their open ends are in snug contacting engagement with each other while the curved portions of the two shells are in spaced apart relation as clearly shown in Fig. 1 of the drawings.

Upon the outer surface of the inner shell 33 at the appropriate location which corresponds to the location of the eye shaped protuberance 10 on the post head 9, the representation of the human eye pupil is painted or otherwise delineated. At the corresponding location, the wall of the outer metal shell 34 is provided with an eye shaped opening 35 therethrough. The eyelash strands S are now fed downwardly through the opening 25 of the female die member so that their ends are projected beyond one side of said opening into tangential contacting engagement with the surface of the inner shell 33. It will of course, be understood that this feeding of the eyelashes to position is done either by hand or automatically after the members 21 and 27 have been moved downwardly from their uppermost positions to approximately the position shown in Fig. 1 of the drawings where the outer surface of the outer shell 34 is substantially in contacting engagement with the wall of the cavity 24 in the arm 23 of member 21. The downward movement of the parts 26 and 27 then continues so that while the inner shell 33 is retained in a stationary position upon the head 9 of the post 8, the outer shell 34 is forced downwardly under pressure. Initially, in this independent downward movement of the outer shell, the collar 13 is forced downwardly for a short distance against the action of spring 14 until it strikes upon the upper end of the boss 7, whereupon, the edge portion of the shell 34 yielding to the pressure of the female die member thereon is turned inwardly around the edge of the inner shell and upwardly upon the inner surface thereof substantially in the manner shown at 36 in Fig. 2 of the drawings, thus interlocking the edges of the inner and outer shells with each other. Simultaneously with this interlocking engagement of the shell edges, the curved section of the outer shell 34 is brought into concentric contacting engagement upon the outer surface of the inner shell. The head 9 of the post being more or less highly heated by the heating unit 12, the wall of the inner shell 33 is softened or reduced to a semi-plastic condition so that in the final downward movement of the female die member, the two shells are forced together under compression and a section of the wall of the inner shell corresponding in shape to the eye shaped protuberance 10 on the head 9 is projected outwardly through the opening 35 in the outer shell to position the outer surface of such projected section of the inner shell wall in substantially the same circumferential plane

as the outer surface of the outer shell 34. At the same time, the ends of the eyelash strands S interposed between the wall of the outer shell 34 at one edge of the opening therein and the wall of the inner shell are embedded under pressure in the softened structure of the inner shell wall so that they become adhesively united or incorporated therewith. Simultaneously with this final compressing action of the female die member, an independent downward movement is imparted to the knife blade 30 so that the eyelash strands are severed at the opposite edge of the opening 25 in said die member. In this manner, it will be seen that the two shells constituting the eye structure may be assembled in nested relation with each other and permanently secured against relative movement and the eyelash strands also securely attached in appropriate relation to the pupil bearing section of the eye structure in a single operation and without necessitating the employment of an adhesive or other additional mechanical fastening means for the several parts.

After the parts 26 and 27 of the apparatus are returned to their uppermost positions, the completed eye may be removed from the upper end of the post 8. Thereafter, the opposite sides of the eye are provided with perforations or openings of suitable size and shape therethrough as indicated at 37 for the purpose of receiving the shaft or axis of an eye mounting. Also, the outer surface of the wall of the outer shell 34 above the eyelashes may be appropriately colored to represent the upper eyelid.

In Fig. 5 of the drawings, I have illustrated a slightly modified form of a part of the apparatus, wherein the collar 13' may be mounted in fixed relation to the post 8, and said collar provided with a number of spaced vertically movable pins 38 the upper ends of which intersect the groove 15' in the upper face of said collar. These pins are yieldingly held in a normal position by means of suitable springs 39 with their upper ends projecting above the upper face of the collar, said ends of the pins being rabbeted to provide horizontal shoulders 40 above the base of the groove 15' upon which the edges of the inner and outer eye shells are adapted to be initially engaged. It will be evident that such an arrangement will operate to interlock the edges of the eye shells to each other in substantially the manner above explained. Thus, in the downward movement of the female die, the outer shell 34 will be forced downwardly relative to the inner shell, and the spring pressed pins 38 will therefore, also be forced downwardly in the collar 13' until the edge of said outer shell engages the wall of the groove 15' whereby under the continuing pressure of the female die member said edge of the outer shell is

turned inwardly and clinched upon the edge of the inner shell.

It will be understood from the foregoing that I have devised a method of assembling the elements of the eye structure together with the eyelashes which may be expeditiously executed by means of apparatus of comparatively simple form, thus greatly increasing quantity production and reducing the manufacturing cost of artificial eyes for use in dolls, manikins and similar figures. In the explanation of this new method, I have referred to certain apparatus which I have found to be quite satisfactory in practical use. Necessarily, I have also referred in some detail to the structural features of the eye itself. However, I am not herein claiming the novel features of the eye structure, as such subject matter is fully described and claimed in a separate application for patent filed February 24, 1927, Serial No. 170,446. It is accordingly to be understood that the illustrated apparatus is to be considered primarily with a view to enabling the several steps as involved in my new method of assembling the parts of the eye structure to be clearly understood, since it is possible that such method might be carried out by means of various other structural forms of the apparatus. However, the essential features of the apparatus which are particularly identified with my new method, are herein claimed, since in so far as I am aware, there is no known apparatus now employed in this art capable of utilization for the particular purpose in view. These characteristic features of the assembling apparatus may however, be exemplified in other mechanical forms than that herein shown, and it is accordingly to be understood that I reserve the privilege of resorting to all such legitimate changes in my present disclosure as may be fairly incorporated within the spirit and scope of the appended claims.

I claim:

1. In a method of assembling the parts of an artificial eye, first arranging two semi-spherical shell members one within the other and with their edges disposed in the same plane, then moving said members relative to each other to dispose the walls thereof in concentric contacting engagement and simultaneously turning the edge of the outer shell member inwardly and clinching the same upon the edge of the inner member.

2. In a method of assembling the parts of an artificial eye, first arranging two semi-spherical shell members one within the other, then relatively moving said shell members to dispose their walls in concentric contacting engagement and simultaneously bending the edge of one shell member and clinching the same upon the edge of the other member, and interlocking said shell walls with each other in spaced relation to the edges thereof.

3. A method of assembling the parts of artificial eyes which consists in arranging two semi-spherical shell members one within the other, the outer member having an eye-shaped opening through its wall, positioning eyelash strands between the walls of the inner and outer shells at one edge of the opening in the latter, and moving said shells relative to each other to dispose their walls in concentric contacting engagement and projecting a part of the wall of the inner shell through the opening in the wall of the outer shell to thereby secure the eyelash strands in attached relation to said shell members.
4. In a method of assembling the parts of an artificial eye, the step which consists in nesting inner and outer semispherical shell members with their walls in substantial contacting engagement, and simultaneously bending the edge of one shell member around and upon the edge of the other shell member and also interlocking a part of the latter shell member with the wall of the first named shell member to thereby secure said members against relative movement.
5. In a method of assembling the parts of an artificial eye, the step which consists in relatively moving an outer perforate shell member and an inner imperforate shell member into substantially concentric nested relation, and simultaneously projecting a part of the wall of the inner shell member from the plane thereof through the perforation in the wall of the outer shell member to interlock said shell members with each other.
6. In a method of assembling the parts of an artificial eye, the step which consists in relatively moving an outer perforate shell member and an inner imperforate shell member into substantially concentric nested relation, and simultaneously projecting a part of the wall of the inner shell member from the plane thereof through the perforation in the wall of the outer shell member and also bending the edge of the outer shell member around and upon the edge of the inner shell member to interlock said shell members with each other.
7. A method of assembling the parts of artificial eyes which consists in nesting an inner shell of thermoplastic material within an outer metal shell having an opening through its wall, heating the wall of said inner shell and moving said shells relative to each other under pressure to position their walls in substantially concentric contacting relation, and simultaneously projecting a part of the inner shell through the opening in the wall of the outer shell.
8. A method of assembling the parts of artificial eyes which consists in nesting an inner shell of thermoplastic material within an outer metal shell having an opening through its wall, heating the wall of said inner shell and moving said shells relative to each other under pressure to position their walls in substantially concentric contacting relation, simultaneously projecting a part of the inner shell through the opening in the wall of the outer shell, and simultaneously bending the edge of the wall of the outer shell inwardly around and upon the edge of the wall of the inner shell.
9. A method of assembling the parts of artificial eyes which consists in nesting an inner shell of thermoplastic material within an outer metal shell having an opening through its wall, heating the wall of said inner shell, positioning the ends of the eyelash strands between the walls of the inner and outer shells at one edge of the opening in the latter, and moving said shells relative to each other under pressure to position their walls in substantially concentric contacting relation, and projecting a part of the wall of the inner shell through the opening in the wall of the outer shell to adhesively incorporate the strand ends in the wall of said inner shell.
10. A method of assembling the parts of artificial eyes which consists in nesting an inner shell of thermoplastic material within an outer metal shell having an opening through its wall, heating the wall of said inner shell, positioning the ends of eyelash strands between the walls of the inner and outer shells at one edge of the opening in the latter, moving said shells relative to each other under pressure to position their walls in substantially concentric contacting relation, and projecting a part of the wall of the inner shell through the opening in the wall of the outer shell to adhesively incorporate the strand ends in the wall of said inner shell, and simultaneously bending the edge of the outer shell inwardly around and upon the edge of the inner shell.
11. A method of making artificial eyes which consists in applying a representation of an eye pupil on the outer surface of a semi-spherical eye shell of thermo-plastic material, then assembling said shell within an outer metallic shell having an eye shaped opening through its wall, heating the wall of the inner shell to render the same semi-plastic, and then moving the inner and outer shells relative to each other under pressure to project said portion of the wall of the inner shell having the eye pupil thereon through the opening in the wall of the outer shell and position the outer surfaces of said projected portion of the inner shell wall and of the wall of the outer shell in the same circumferential plane.
12. A method of making artificial eyes which consists in applying a representation of an eye pupil on the outer surface of a semi-spherical eye shell of thermo-plastic material, then assembling said shell within an outer metallic shell having an eye shaped

opening through its wall, heating the wall of the inner shell to render the same semi-plastic, positioning the ends of the eyelash strands between the walls of the inner and outer shells at one edge of the opening in the latter, and then moving the inner and outer shells relative to each other under pressure to project said portion of the wall of the inner shell having the eye pupil thereon through the opening in the wall of the outer shell and position the outer surfaces of said projected portion of the inner shell wall and of the wall of the outer shell in the same circumferential plane, and simultaneously adhesively incorporating the ends of the eyelash strands under pressure in the wall structure of the inner shell.

13. A method of making artificial eyes which consists in applying representation of an eye pupil on the outer surface of the semi-spherical eye shell of thermo-plastic material, then assembling said shell within an outer metallic shell having an eye shaped opening through its wall, heating the wall of the inner shell to render the same semi-plastic, positioning the ends of the eyelash strands between the walls of the inner and outer shells at one edge of the opening in the latter, then moving the inner and outer shells relative to each other under pressure to project said portion of the wall of the inner shell having the eye pupil thereon through the opening in the wall of the outer shell and position the outer surfaces of said projected portion of the inner shell wall and of the wall of the outer shell in the same circumferential plane and simultaneously adhesively incorporating the ends of the eyelash strands under pressure in the wall structure of the inner shell, and during such relative movement between the inner and outer shells bending the edge of the wall of the latter shell inwardly around and upon the edge of the inner shell wall to permanently secure the shells in nested relation.

14. Apparatus of the character described including means for supporting inner and outer eye shell members in nested relation for movement relative to each other, the outer shell member having an opening in its wall, means for feeding eyelash strands to position the ends thereof between the shell members at one edge of said opening, means for relatively moving the shells to permanently secure the strand ends between the shell walls in projecting relation to the edge of said opening and position said walls in substantially concentric contacting relation to each other, and additional means for interlocking parts of the shell walls with each other to secure said shells against relative movement.

15. Apparatus of the character described including means for supporting inner and outer eye shell members in nested relation for movement relative to each other, the outer

shell member having an opening in its wall, means for feeding eyelash strands to position the ends thereof between the shell members at one edge of said opening, means for relatively moving the shells to permanently secure the strand ends between the shell walls in projecting relation to the edge of said opening and position said walls in substantially concentric contacting relation to each other, and means automatically acting in the relative movement of said shells to bend the edge of the outer shell inwardly around and upon the edge of the inner shell and permanently secure said shells against relative movement.

16. Apparatus of the character described including a male die adapted to receive and support a semi-spherical shell member of thermo-plastic material, said male die having an eye shaped protuberance on its surface, a female die having a cavity to receive an outer metal shell positioned in enveloping relation to the shell on said male die, said outer shell having an eye shaped opening in its wall, one of said die members being movable relative to the other to force the shell walls under pressure into contacting engagement, and means for heating the male die whereby the part of the wall of the inner shell engaged by said protuberance is rendered semi-plastic and projected under pressure through the opening in the wall of the outer shell, and additional means for simultaneously interlocking parts of the shell walls with each other to permanently secure said shells in their final nested position.

17. Apparatus of the character described including a male die adapted to receive and support a semi-spherical shell member of thermo-plastic material, said male die having an eye shaped protuberance on its surface, a female die having a cavity to receive an outer metal shell positioned in enveloping relation to the shell on said male die, said outer shell having an eye shaped opening in its wall, means for feeding eyelash strands to position the ends thereof between the inner and outer shells at one edge of the opening in the latter, one of said die members being movable relative to the other to force the shell walls under pressure into contacting engagement, means for heating the male die whereby the part of the wall of the inner shell engaged by said protuberance is rendered semi-plastic and projected under pressure through the opening in the wall of the outer shell, and simultaneously embedding the ends of the eyelash strands in the wall of the inner shell, and additional means for simultaneously interlocking parts of the shell walls with each other to permanently secure said shells in their final nested position.

18. Apparatus of the character described including a male die adapted to receive and support a semi-spherical shell member of

thermo-plastic material, said male die having an eye shaped protuberance on its surface, a female die having a cavity to receive an outer metal shell positioned in enveloping relation to the shell on said male die, said
5 outer shell having an eye shaped opening in its wall, means for feeding eyelash strands to position the ends thereof between the inner and outer shells at one edge of the opening in the latter, one of said die members being
10 movable relative to the other to force the shell walls under pressure into contacting engagement, means for heating the male die whereby the part of the wall of the inner
15 shell engaged by said protuberance is rendered semi-plastic and projected under pressure through the opening in the wall of the outer shell, and simultaneously embedding
20 the ends of the eyelash strands in the wall of the inner shell, and means automatically acting during the relative movement between said shell members to bend the edge of the
25 outer shell member inwardly around and upon the edge of the inner shell member and thereby permanently secure said shell members against movement in their finally nested positions.

19. In a method of assembling the parts of an artificial eye, the step which consists in
30 nesting inner and outer semi-spherical shell members with their walls in substantial contacting engagement, and simultaneously bending the edge of one shell member around and upon the edge of the other shell member
35 to secure said members against relative movement.

In testimony that I claim the foregoing as my invention, I have signed my name hereto.

LEO J. GRUBMAN.

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