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F. C. INGOLD

METHOD AND APPARATUS FOR INSERTING SUPPORT WIRES

Filed July 21, 1921

FIG. 1.

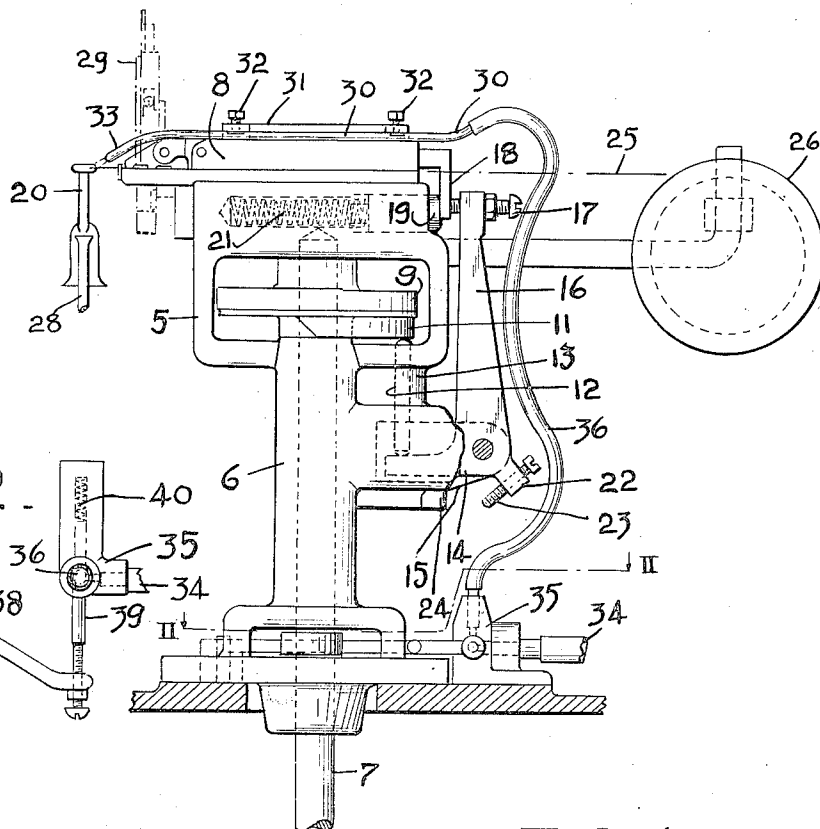


FIG. 2.

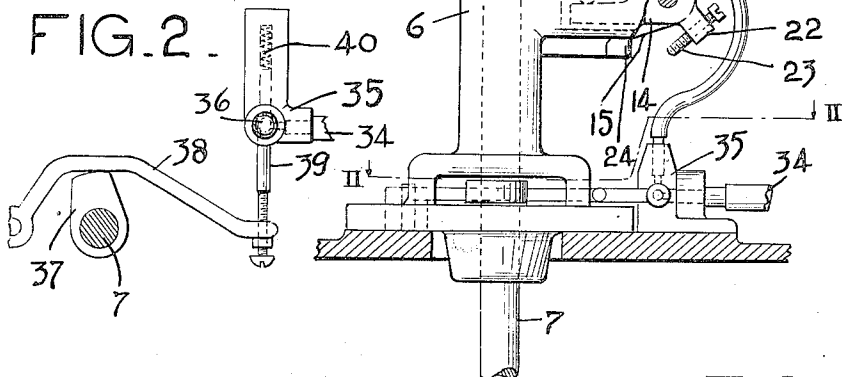


FIG. 4.

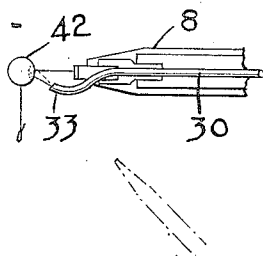
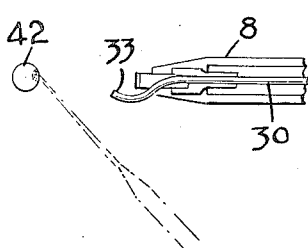


FIG. 3.



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METHOD AND APPARATUS FOR INSERTING SUPPORT WIRES.

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To all whom it may concern:

Be it known that I, FREDRICK CHARLES INGOLD, a citizen of the United States, and a resident of Bloomfield, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Methods and Apparatus for Inserting Support Wires, of which the following is a specification.

This invention relates to improvements in machines which operate to insert metal objects into plastic portions of given objects and it relates more particularly to machines for inserting wires into the buttons of incandescent-electric-lamp stems to constitute supports for the metallic filaments in such lamps.

An object of the invention is to provide means for directing the application of a cooling medium to a stem in such manner as to prevent the alternate heating and chilling of relatively large portions of the stem.

A further object of the invention is to confine the application of the cooling medium to that portion of the stem which is in a plastic condition.

A still further object is to provide a mechanism for controlling the application of the cooling medium and for directing it upon a predetermined portion of the stem.

Although my invention may be employed in many instances where it is desirable to insert an object into a substance which has been temporarily rendered plastic, it has been found particularly advantageous when practiced in connection with the well known type of filament-support-wire-inserting machine. These machines are generally constructed to vertically support, and to intermittently rotate, a lamp stem about its axis and, during each step or partial rotation of the stem, to apply heat locally to a given portion thereof. A wire-inserting member or ram carries the support wire toward and thrusts an end thereof into, the button on the arbor portion of the stem, a part of which has previously been rendered plastic by the usual heating means. Suitable mechanism then operates to cut the wire at a given point and other mechanism operates to form the exposed end into either a pig tail or an open hook, depending upon the type of support wire produced on a given machine. The ram then retreats, the stem is moved another step and the inserting and

forming operation is repeated; thus, upon a complete or partial rotation of a stem, a series of a given number of support wires will have been inserted into and about the arbor.

The insertion of the support wires requires an accurate co-ordination of machine elements, and one of the important features of an inserting machine resides in the provision of means for cooling the button immediately after each insertion, in order that the glass shall harden and contract to grip the wire.

The cooling of buttons has usually been accomplished through the agency of a nozzle connected to an air-pressure line and so positioned as to be clear of the moving parts of the machine. This comparatively remote location of the nozzle is prevalent in inserting machines for the reason that the cutting-off-and-forming mechanism thereon requires considerable operating space.

The necessarily removed position of the usual form of nozzle from the button causes the discharged air to be widely dispersed, which results in the cooling medium being applied to a greater area of the arbor than is desirable. The air impinging upon relatively large portions of the stem with each inserted wire, causes the alternate expansion and contraction of such portions, which produces opposing strains in the glass and thus renders it more or less brittle and subject to cracks which often appear either immediately or during further operations upon the stem.

This disadvantage is reduced by the employment of my improved nozzle which operates to confine the discharged cooling medium to the plastic area of the heated portion and thus maintain the application of the cooling medium approximately within the limits of a given region.

My invention will be more fully understood by reference to the accompanying drawings in which—

Fig. 1 is an elevational view of a portion of a wire-inserting machine;

Fig. 2 is a fragmentary detail view taken on line II—II in Fig. 1;

Fig. 3 is a fragmentary view and shows the inserting member and nozzle removed from the work during the application of heat, and

Fig. 4 is a view similar to Fig. 3 and

showing the inserting member and nozzle carried thereby in position for the application of a cooling medium to the work.

The present embodiment of the invention comprises a reciprocating member or ram which, with each forward movement, grips a length of wire and inserts the end thereof into a portion of a stem which has been rendered temporarily plastic. A conductor is carried upon the ram for the purpose of directing a cooling fluid upon that portion of the work in which the end of the wire has been embedded.

My improved inserting mechanism, as illustrated in the appended drawings, is applied to one of the heads of a support-wire-inserting machine of the usual type which includes a standard consisting of a bracket 5 and a vertical bearing 6 in which a shaft 7 is positioned and adapted to be rotated in a manner common to this class of machines. The shaft 7 is so associated with other parts as to effect the movement of an inserting member or ram 8 which is mounted on a track at the upper end of the bracket 5, and is reciprocable transversely to the shaft 7. This movable inserting member 8 is termed a ram and will be hereinafter so designated.

Movement of the ram may be accomplished in any desired manner and is, in the present construction, effected by the actuation of a plate 9 secured to the shaft 7. Upon the under side of the plate 9 is provided a cam face 11 adapted to move in contact with one end of a rod 12 movably positioned in an off-set portion 13 of the standard. The opposite end of the rod 12 is disposed in contact with one arm 14 of a bell-crank lever that is pivoted in a projection 15 integral with the standard. The end of the other arm 16 of the bell-crank lever is provided with a set screw 17 adapted to be moved into contact with a depending arm 18 integral with the ram 8.

Thus, movement of the cam face 11 operates to rock the arm 16 and move the ram forward. The return of the ram is caused by means of a spring-actuated plunger 19 slidable in a suitably positioned bore provided in the bracket 5. The plunger is so disposed as to compress a helical spring 21 located between one end of the plunger and the inner end of the bore. Thus, the spring 21 normally maintains the outer end of the plunger in contact with the arm 18 on the side opposite to that in contact with the set screw 17. When the cam face 11 moves to relieve the downward pressure upon the rod 12 the bell-crank lever is permitted to move under the action of the plunger 19 which also moves the arm 18 and thus returns the ram to its normal or inner position.

The expansion of the spring 21 which moves the plunger 19 also acts to rock the crank arm 16 when the cam face 11 is dis-

engaged from the rod 12. The movement of the crank arm is limited, however, by a stop, comprising a lug 22 provided with a set screw 23 which abuts against a rigid face 24, thus limiting the inward movement of the ram.

The ram is provided with any desirable form of gripping jaws to which a wire 25 is fed from a spool 26. The wire is gripped by the jaws of the ram during its forward movement and an end of the wire is thrust into the plastic portion of a suitably positioned stem 20. The stem 20 may be held by a holder of any well known type, the jaws of one such holder being indicated by the numeral 28. A limited portion of the button of the stem is rendered plastic by the usual form of pointed flame, as shown in dotted lines in Fig. 4, which is directed to heat a given portion of the button.

After the desired portion of the button has been rendered sufficiently plastic and the ram has moved forward and inserted a wire therein, the flame is removed and it is then necessary to direct a current of air upon the button to so cool the same as to cause the material to contract and grip the wire. The jaws of the ram then open to release the wire, and the ram retreats to permit a cutting and forming mechanism 29 (indicated in dotted lines in Fig. 1) to sever the wire and form the end thereof into a hook or a pig-tail shape.

In my improved construction, the fluid or cooling medium is conducted through a tubular member or fluid conductor 30 which may be rigidly secured to the ram 8 or adjustably secured thereto by means of a yoke 31 and set screws 32. The tubular member 30 may be of any malleable material whereby the nozzle 33 may be readily bent for the purpose of more accurately directing the discharged fluid upon a given portion of the work. It is therefore evident that the fluid may be controlled and confined to the plastic area which requires cooling.

By this means, a continually alternate heating and cooling of the entire button is avoided, since the cooling medium is applied in an approximately sufficient quantity to effect the cooling of the plastic region without being dispersed over the entire button, thus preventing the usual detrimental results.

Fluid is led to the conductor or tubular member 30 by means of its connection to any suitable pressure line 34 from which fluid is forced through a cut off 35 and through a flexible tube 36 which is connected to the tubular member 30. The fluid is discharged upon the plastic portion of the work for a predetermined interval of time, such interval being of any given duration and controlled by cooperating mechanism of the machine. One such mechanism is indicated

diagrammatically in Fig. 2 as comprising a cam 37 secured to the shaft 7 and adapted, when rotated by the shaft, to oscillate a lever 38 which, in turn, reciprocates a slide valve

39. A spring 40 acts to maintain the valve normally in position to cut off the passage of fluid between the tube 36 and the pressure line 34. A movement of the shaft, however, causes the valve 39 to slide inwardly to provide, in the usual manner, a passage way for the fluid from the pressure line to the fluid conductor 30. The cam which actuates the lever 38 may be so positioned and timed as to effect the discharge of the cooling medium for a given length of time in accordance with practical requirements.

It is possible, with my improved cooling device, to approach the ideal condition for cooling or contracting the material about a wire by concentrating the cooling medium upon the plastic portion when the fluid is discharged from a circular orifice, as, in the case of the usual form of discharge nozzle, it takes the form of a cone increasing in cross sectional area as it advances from the nozzle.

The present invention provides means for controlling the relative positions of the work and the discharged fluid, whereby a contact between the stream of fluid and the work may be had at a point in the stream at which its cross sectional area is approximately equal to the plastic area of the work. The impinging fluid may, therefore, be confined to a greater or lesser area of the work, in accordance with the relative position of the nozzle.

It will readily be understood that an efficient utilization of the cooling medium is possible in the present invention, inasmuch as a restriction of the fluid to the particular portion to be cooled avoids a wasteful distribution of the medium. Furthermore, since only a comparatively small area of the work need be cooled, it is possible to cause a contact of the fluid at a point near to the nozzle where the velocity of the fluid is highest and thereby gain the advantage of a high heat-transfer rate which results in rapid cooling of the material.

While I have illustrated a preferred means for practicing my invention, it will be understood that the invention resides, not in the particular form of mechanism, but in a means for conducting and directing a cooling medium upon that portion of the work which necessitates rapid cooling, without effecting the chilling of other parts of the work, and it is obvious that many structural changes may be effected in the illustrated embodiment of the invention within the scope of the appended claims.

What is claimed is:

1. A wire-inserting member having means associated therewith for directing a

fluid upon a predetermined portion of the work.

2. A wire-inserting member having a fluid conductor carried thereon said conductor having a discharge outlet.

3. A wire-inserting member having a fluid conductor carried thereon, said conductor being adapted to move with said member and direct a fluid upon the work.

4. A reciprocating wire-inserting member, a fluid conductor mounted upon said member and adapted to be moved therewith and a nozzle associated with said conductor to direct a fluid upon a predetermined portion of the work.

5. A member for inserting a wire into a blank, means for heating said blank and means movable with said member and adapted to direct a cooling medium upon said blank.

6. A member for inserting a wire into a blank, means for reciprocating said member, a fluid conductor disposed in adjustable association with said member and means whereby the relative positions of said conductor and said member may be varied.

7. A device for inserting a wire into a blank, means for reciprocating said device, means for applying heat to a blank, and cooling means movable with said device whereby a cooling medium is applied to said blank with each actuation of said device.

8. In combination, a reciprocable wire-inserting device, means for supporting a blank and a fluid conductor, adjustable in relation to, and movable with, said device for directing a fluid upon said blank.

9. In combination, a wire-inserting device having a fluid conductor carried thereon, means for reciprocating said device and conductor whereby fluid may be applied to the blank after a movement of said device and a nozzle for directing the fluid upon a predetermined area of the work.

10. In combination, a wire-inserting member, a work blank holder, means for heating portions of said blank, a fluid conductor and means for moving said member and said conductor simultaneously to cause a wire to be inserted in said blank and to subsequently effect the rapid cooling of said heated portion.

11. In a machine for inserting an object into a body, the combination of a reciprocable wire inserting member, a cooling medium conductor mounted on said member, means for applying heat to soften a given area of said body and means for causing a cooling medium to issue from said conductor and impinge upon said given area.

12. In combination, a wire-inserting member, a conductor for a cooling medium, a work blank carried by a holder, means for rendering plastic a given portion of said blank, means for operating said inserting

member to insert a wire into said plastic portion, means for actuating said conductor substantially simultaneously with said member, and means for discharging said cooling medium from said conductor.

13. In a machine for inserting an object into a body, means for heating a given region upon said body, means for causing an object to enter said region and means for rapidly cooling said region by applying a cooling agent substantially within the limits of said region.

14. In a machine for inserting an object into a body, means for heating a predetermined area of said body, means for thrusting an object within the limits of said area and means for rapidly cooling said area by causing a cooling medium to impinge upon, and substantially within the limits of, said area.

15. A machine for inserting an object into a body comprising means for heating a given area of said body, an inserting member adapted to thrust the end of a rod into the heated area of said body and means carried by said member for conducting a cooling medium to the said heated area.

16. A wire-inserting mechanism comprising a ram for embedding an end of a wire in a work blank, a fluid conductor carried by said ram whereby discharge fluid may be caused to impinge upon the work when disposed in near relation to said conductor.

17. In combination, a wire-inserting member, a work blank carried by a holder, means for heating a predetermined portion of said blank, means for operating said member to insert a wire into said heated portion when in a plastic condition, a fluid conductor mounted on said device, a nozzle associated with said conductor and means for discharging fluid from said nozzle upon said blank.

18. A wire-inserting mechanism compris-

ing a ram for embedding an end of a wire in a body, means for supporting the body, means for rendering plastic a portion of said body, and means carried upon said ram whereby a fluid may be directed to impinge upon said plastic portion subsequent to the insertion of the wire.

19. In a machine for inserting support wires into a lamp stem, the combination of means for supporting a stem, means for heating a portion of said stem, a reciprocable wire-inserting member, a nozzle connected with an air line and mounted upon said member, means for controlling the discharge of air from said nozzle, whereby the air is permitted to escape when the inserting member is in a given position.

20. The method of inserting an object into another body which consists in first heating, to render plastic, a limited region of said body, inserting an object into said heated region, so directing a current of fluid upon said plastic region that the fluid will impinge upon that portion of the body adjacent to the inserted object and substantially within said plastic region.

21. The method of securing a wire in a lamp stem, which consists in applying heat to said stem to render plastic a relatively small portion thereof, inserting the end of a wire into said portion, then applying a cooling medium by means of a nozzle adapted to discharge a cone shaped spray, confining the sprayed medium to the plastic portion by so positioning the nozzle that the medium will make contact with the plastic portion at a point in the cone where its cross sectional area is approximately equal to the area of the plastic portion.

In testimony whereof, I have hereunto subscribed my name this 20th day of July, 1921.

FREDRICK CHARLES INGOLD.