July 28, 1925. 1,547,393

J. J. HIGGINS

UNIVERSAL STEM HEAD

Filed Feb. 24, 1921 2 Sheets-Sheet 1

FIG. 1.

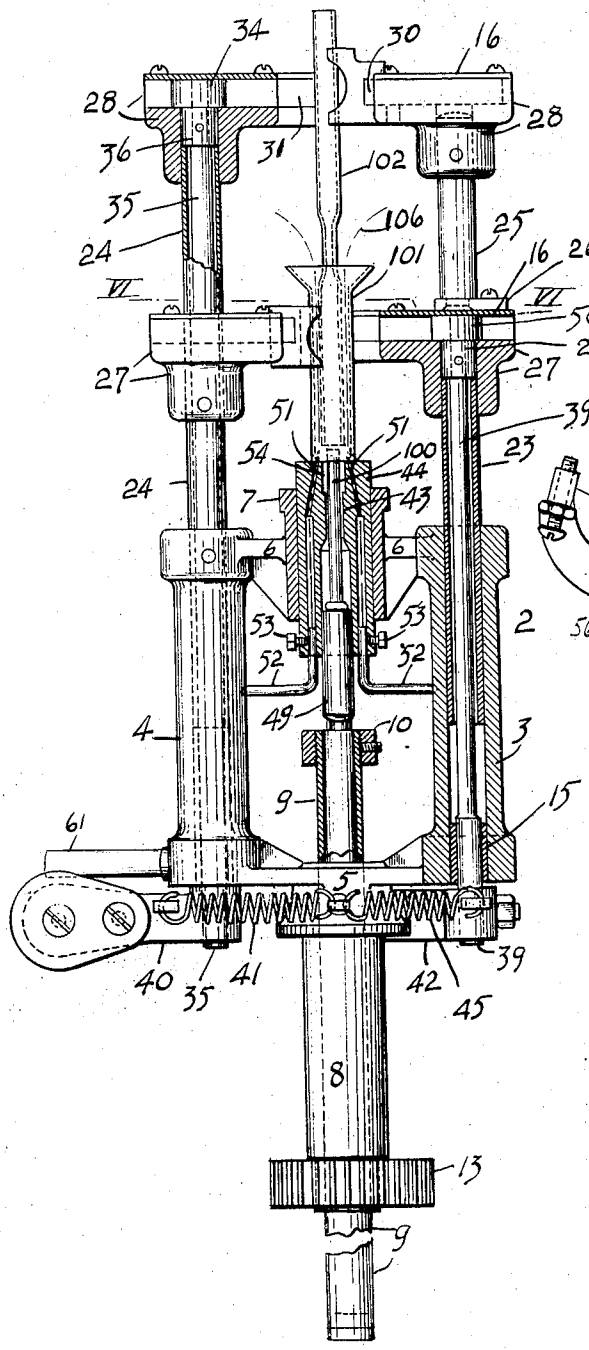
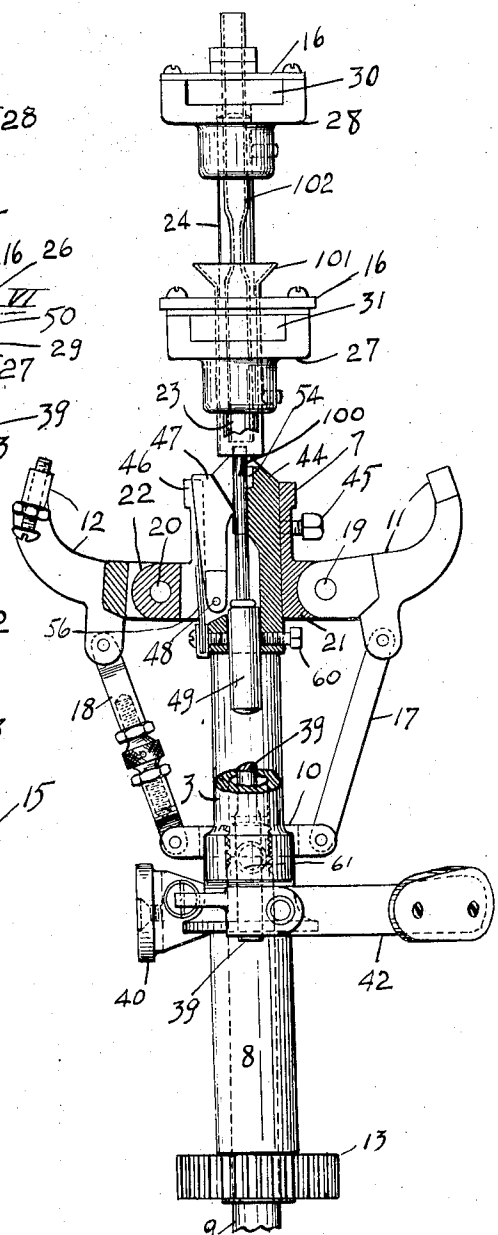



FIG. 2.




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FIG. 5. FIG. 6.

FIG. 4.

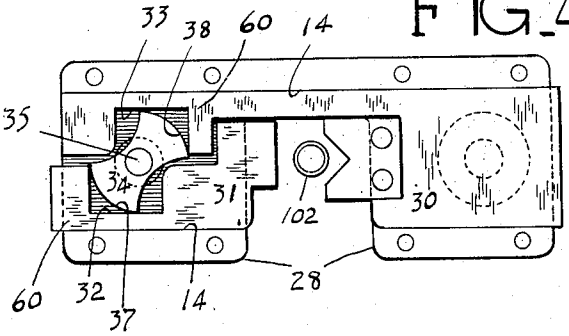
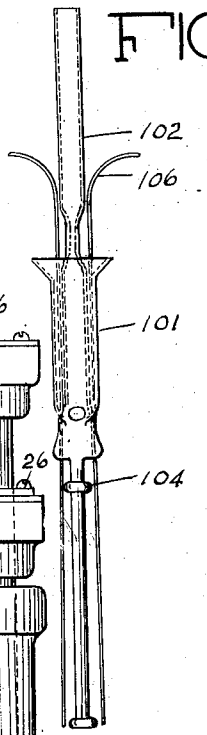



FIG. 7.



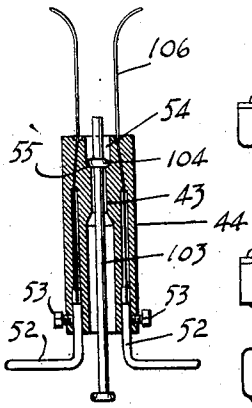




FIG. 3.




FIG. 8

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# UNITED STATES PATENT OFFICE.

JOHN JOSEPH HIGGINS, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO WESTINGHOUSE LAMP COMPANY, A CORPORATION OF PENNSYLVANIA.

## UNIVERSAL STEM HEAD.

Application filed February 24, 1921. Serial No. 447,604.

*To all whom it may concern:*

Be it known that I, JOHN JOSEPH HIGGINS, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Universal Stem Heads, of which the following is a specification.

This invention relates to improvements in machines for the manufacture of incandescent lamp stems and more particularly to that portion of the machine comprising the work-holding devices which are termed stem heads.

Stem heads are commonly constructed to support, in a given relation, several glass work blanks including an arbor, a flare tube and an exhaust tube; also several lead-in wires disposed in the proper relation to the blanks. Heat is applied locally to the assembled blanks until a portion thereof is rendered plastic when a mechanism is actuated to compress the plastic portion, thereby consolidating the parts; the product being a stem adapted for use in connection with the manufacture of tipless incandescent lamps.

The above mentioned blanks are substantially of cylindrical shape and inherently possess manufacturing variations, such as difference of wall thickness, diameter, etc. Because of these variations, particularly with respect to the diameters, great difficulty has been encountered in the alignment of the blanks in their proper relative positions on a common axis. The heads of stem-forming machines, as heretofore constructed, did not afford means whereby the work-holding jaws would accommodate work blanks of varying diameters and did not automatically centralize them upon a common axial line.

Among the objects of the present invention is the provision of a machine element or stem head in which several work blanks may be vertically supported in the necessary accurate relation, one with another, on a common axial line; and in the provision of other connected elements which will function in such a manner that the supporting means will be automatically adjustable to receive and center blanks of different diameters.

Other objects of the invention have to do with various features of construction and arrangement of parts which will manifest themselves upon a reading of the following description and appended claims.

In the accompanying drawings, Fig. 1 is a front elevation, partly in section, of my stem forming mechanism; Fig. 2 is a side elevation of Fig. 1, a portion thereof being broken away to more clearly show a sectional view of the arbor support; Fig. 3 is a sectional view of an arbor support, showing an arbor supported therein; Fig. 4 is a plan view of the upper jaws and their carriers, showing the cover plate removed and the jaws in an open position; Fig. 5 is a view, similar to Fig. 4, with the jaws closed upon a tube; Fig. 6 is a transverse section taken on line VI—VI of Fig. 1 showing the cover plate of the carrier removed; Fig. 7 is an elevation of a complete lamp stem; Fig. 8 is an elevation of a portion of a stem head for making stems in which no exhaust tube is employed and in which the arbor is supported by a pair of jaws, a portion of the arbor pocket being shown broken away.

Like numerals refer to like parts throughout the several views.

A machine of the type to which the present invention relates may comprise in the main, a central hub suitably mounted upon a base and provided with a circular plate, or carriage, rigidly secured to the hub and having several bearings disposed near its periphery in which are mounted a corresponding number of work-holding heads.

Means are provided for effecting the independent rotation of the carriage and the heads, the carriage being usually rotated intermittently and being indexed to move a given distance at each step. The heads are adapted to rotate on their own axes at a given number of steps or stages during a cycle of the carriage and are held in the path of a suitably disposed flame designed to make the glass parts plastic; press-forming jaws are then actuated to consolidate the plastic parts.

Subsequent to the consolidation of the work parts and during the application of heat thereto, a current of air, under pressure, is directed down the exhaust tube, and a puncture of the plastic wall of the tube is effected to provide a communication for

exhaust purposes. This puncture or aperture is necessary for evacuating the bulb during subsequent steps in the manufacture of the lamp which form no part of the present invention.

Most of the apparatus just described is not of my invention, and, consequently, is not illustrated or described in detail, as my invention resides in the improvement of the work-holding jaws mentioned above, whereby the several work parts which are formed into a stem may be accurately positioned and supported in vertical alignment when inserted between the said jaws.

Referring to the drawings; my improved head consists essentially of a standard or frame 2, which may be of any desirable construction and is illustrated in the form of a casting comprising two laterally positioned vertical bearings 3 and 4 connected at their lower ends by a cross piece 5 and at their upper ends by a cross piece 6. Integral with the cross-piece 6 is a hub 7, centrally disposed between the bearings 3 and 4 with its axial line coincident with the axial line upon which the work blanks are assembled.

Extending downwardly from, and connected to, the cross piece 5, is a hollow shaft 8 having a pinion 13 fixed to its lower end. Within the shaft 8 is disposed a vertically reciprocating plunger 9 provided, at its upper end, with a cross head 10 having pivotally connected thereto, by means of links 17 and 18, a pair of arms terminating in jaws 11 and 12. The arms and jaws 11 and 12 are arranged to rock on pins 19 and 20 carried in bearings of projections 21 and 22 integral with, and disposed at opposite sides of, the cross piece 6. A movement of the plunger 9 effects an actuation of the jaws 11 and 12 which, when closed, compress certain portions of the work previously rendered plastic by the application of the heat supplied by suitably disposed flames. The jaws 11 and 12 are common to this class of machines and are known as press-forming jaws and will be hereinafter so termed.

Fixed within each of the bearings 3 and 4 are tubular members 23 and 24, respectively, which, in cooperation with another member, support jaw carriers 27 and 28. The carrier 27 is equipped with flare-tube-supporting clamp, and the carrier 28 is equipped with an exhaust-tube-supporting clamp. The said clamps consist of a pair of jaws slidably mounted in each of the carriers and their operation will be more fully described below. Directly above the member 23 and positioned on the axial line thereof is a post 25 having an integral foot or step 26 securely fastened to a cover plate 16 of the carrier 27.

The upper carrier 28 is fastened to the upper ends of member 24 and the post 25; the lower carrier 27 is secured, at one side, to the member 24, which passes there-through, and, at its opposite side, to the upper end of the member 23.

Each of the carriers 27 and 28 is constructed to furnish guides 14 (see Figs. 4, 5 and 6) for a pair of slidable jaws 30 and 31. The jaws of each pair are provided with extensions or shanks 60 and are adapted for actuation in opposite directions and toward the axial line of the work. The jaws are preferably formed of sheet metal and the shanks thereof are provided with rectangular notches 32 and 33 in which are disposed the ends of cam plates 34 and 50 having surfaces 37 and 38 so disposed as to contact with the sides of the notches to effect a movement of each pair of the jaws to open or close the same. The cam plate 34 is secured at the upper end of a spindle 35 movable in the tubular member 24 and retained from a downward movement by means of attached collar 36 which bears upon the upper end of the member 24. An actuating lever 40 is pinned, or otherwise secured, to the lower end of the spindle 35 to provide a means for manually oscillating the cam plate 34, and the normal position of the lever is maintained by means of a helical spring 41 connected thereto and to the cross piece 5. The jaws for supporting the flare tube and the means for actuating the same are similar to the exhaust tube supporting jaws and their operating means. The cam 50 which moves the flare tube-holding jaws is secured at the upper end of a spindle 39 rotatably located in the tubular member 23 and the bearing 3 in which is provided a bushing 15, to retain the spindle in a central position within the member 23. A collar 29, similar to collar 36, serves as a bearing upon which the spindle 39 is carried. The lower end of the spindle 39 is provided with an actuating lever 42 having a helical spring 45, to maintain it in a normal position, connected to the lever and to the cross piece 5.

Means for supporting the arbor is afforded by the provision of a cylindrical member 44 arranged securely in the bearing 7 and having a centrally located recess or aperture 43 adapted to accommodate an arbor 100. A vertical slot 46 is milled, or otherwise formed, in the wall of the member 44, and the self-acting finger 47 is disposed within the slot and adapted to swing on the pivot 48. The finger is, by means of a spring 56, tensionally moved toward the vertical axis of the member 44 and is provided with a chamfered surface upon its exposed end to facilitate the entrance of the arbor which is forcibly inserted in place and retained in position by the contacting finger 47.

The seat for the arbor is adjustable and consists of a short cylinder 49 arranged to be moved vertically in the lower end of the

ers, arranged to be secured by means of set screws 53. The rods are bent outwardly at right angles to afford a means of manual adjustment.

In cases where the arbor is provided with a bead 104, as shown in Figs. 3 and 7, the cylinder 49 may be omitted, a suitable counter bore 54 being provided at the upper end of the aperture 43 for the purpose of affording a ledge 55 upon which the bead 104 may rest to support the arbor.

As shown in Fig. 8, the jaws 30 and 31 may be employed to secure an arbor in heads for the manufacture of stems for lamps which are exhausted from the tip and no exhaust tube is used.

Any desirable number of stem heads may be rotatably mounted in the hubs of a revolving table or carriage, and the shafts 8, which project below the table, are provided with pinions 13 so disposed as to engage with a suitable driving gear, at one or more of the stationary periods or stages during a rotation of the table, thereby effecting the rotation of the heads at given stages, at which points heat may be applied locally to the work, and suitable mechanism may actuate the plunger 9 to close the press-forming jaws to consolidate the work parts and thereby form a stem.

In practice, the several work blanks are inserted in the head at the first stage or first stationary position of the table at which point no driving mechanism is provided to rotate the head, the same being free to be rotated by the operator, who first inserts an arbor 100 into the recess, thereby causing it to be instantly retained in position by means of the self-acting finger 47. The actuating lever 42 is then manipulated to oscillate the spindle 39 which causes a movement of the cam plate 50 and an opening of the flare-tube-holding jaws. A flare tube is then inserted over the exposed end of the arbor, and the lever 42 is released to permit the jaws to move toward their normal position and secure the inserted tube. The arbor and flare tube being thus properly supported, the actuating lever 40 is moved, causing the exhaust tube-holding jaws to open, an exhaust tent motion to a plurality of positions at one or more of which heat is locally applied to a portion of the assembled parts to render them plastic, and the press-forming jaws are duly actuated by any suitable well known mechanism to compress or consolidate the heated parts to produce a stem. It will also be understood that heat may be applied during one or more stages, subsequent to the press-forming operation, for the purpose of effecting a gradual cooling or annealing of the fused parts.

My improved stem-head-forming machine performs the necessary functions essential to rapid and efficient production with a minimum amount of working parts which, in a device of this character, is of great advantage for the reason that the maintenance cost is lowered and many superfluous movements on the part of the operator are eliminated.

While I have illustrated a preferred embodiment of my invention, it is evident that many structural changes may be made therein and it is to be understood that my invention is to be limited only by the scope of the appended claims.

What is claimed is:

1. A holder for incandescent electric lamp stem parts comprising upper and lower jaw-carriers, pairs of slidable jaws in said carriers, vertical members for supporting both carriers and means within said members for actuating said jaws.

2. A holder for incandescent electric lamp stem parts comprising an upper pair of jaws and a lower pair of jaws, each of said pairs of jaws including two slidable members adapted to be moved to engage a lamp part, spindles associated with each pair of jaws and arms upon said spindles adapted to engage and actuate the jaws to secure a lamp part.

3. A holder for incandescent electric lamp stem parts comprising jaw-carriers, movable jaws in said carriers, vertical members for supporting said carriers, spindles in said members having ends thereof projecting into said carriers and means associating said spindles with said jaws.

4. A stem head comprising an upper and a lower pair of jaws, a vertical spindle for actuating each pair of jaws, lever arms on said spindles, notches in each of the jaws of each pair to receive opposite ends of a lever arm on a spindle to open and close the jaws of each pair when the respective spindle is oscillated.

5. A stem head comprising an arbor holder, said arbor holder comprising a member having a tubular recess and means for tensionally retaining an arbor therein, an exhaust-tube-supporting clamp, a flare-tube-supporting clamp, said clamps consisting of slidable jaws mounted in carriers and adapted to secure work blanks of varying diameters in concentric relation, and means for consolidating the blanks by compressing, after portions thereof have been rendered plastic.

6. A stem head comprising an outer tube clamp, an inner tube clamp and a glass rod holder, each of said clamps comprising a pair of slidable jaws adapted to accommodate tubes of varying diameters, means for actuating said clamps to secure said tubes in concentric relation, means for tensionally retaining the said rod in the holder, a member having well-pockets to receive the ends of lead-in wires, means for varying the depths of said well-pockets, and means for consolidating said tubes, rod and lead-in wires by the formation of a press when said tubes and rod have been rendered plastic.

7. A stem head comprising a pair of slidable outer tube-supporting jaws, a pair of slidable inner tube-supporting jaws, a member having a recess for receiving an arbor, means for varying the depth of said recess, means for tensionally retaining an arbor in said recess in a given relation to tubes secured by said jaws and means for consolidating said tubes and arbor when portions thereof have been rendered plastic.

8. A stem head comprising a plurality of pairs of jaws mounted in carriers, supporting members, spindles rotatably mounted within the said members, cam plates secured to the upper ends of said spindles and in operative contact with said jaws, and actuating levers secured to the opposite ends of the spindles whereby the same may be oscillated to effect a movement of the jaws.

9. A stem head comprising an upper and a lower work-holding clamp, each of said clamps comprising a pair of slidable jaws, a cam plate associated with each pair of jaws whereby a movement of a given cam plate effects the opening or closing of a pair of jaws controlled thereby, a tubular member having a recess therein to receive an arbor, means for tensionally holding an arbor in said recess, said tubular member having well-pockets to receive the ends of lead-in wires when disposed in proper relation to other work parts, means for varying the depths of said well-pockets, and means for compressing the work parts when heated.

10. A stem head comprising an upper carrier and a lower carrier, each carrier having a pair of tube-holding jaws mounted slidably therein, individual actuating cam plates disposed in operative relation to said jaws, means for oscillating the said plates to open and close said pairs of jaws, a member having well-pockets to receive the ends of lead-in wires, means for varying the depth of said well pockets, and means for consolidating tubes secured by said jaws and lead-in wires when said tubes have been rendered plastic.

11. A stem head comprising an exhaust-tube-supporting clamp, a flare-tube-supporting clamp, means for supporting an arbor, each of the said clamps comprising a pair of slidable jaws, a cam plate so associated with each pair of jaws as to cause the jaws to open and close when the cam plate is oscillated, means for actuating said cam plates, and means for consolidating the tubes and arbor when portions thereof have been rendered plastic.

12. A stem head comprising upper and lower work-holding clamps, each of the said clamps comprising a pair of slidable jaws, a cam plate associated with each pair of jaws whereby a movement of a given cam plate effects the opening or closing of a pair of jaws controlled thereby, means for sequentially actuating said cam plates, and means for compressing a portion of the positioned parts when said portion is rendered plastic by heating.

13. In apparatus for manufacturing incandescent lamp parts, the combination of a plurality of work-holding clamps, each of the said clamps comprising a pair of slidable jaws, a cam plate provided with two cam surfaces disposed in notches in the shanks of said jaws to effect the movement of a pair of jaws when a given cam plate is moved, spindles associated with said cam plates and actuating levers secured to the lower ends of said spindles for the purpose of permitting manual actuation of the cam plates.

14. A stem head comprising a plurality of work-holding clamps, each of the said clamps comprising a pair of jaws slidably mounted in a carrier and provided with oppositely disposed notches, a cam plate having two effective cam surfaces positioned in the said notches of each pair of jaws, a spindle associated with each cam plate, said spindles being mounted in tubular supporting members and adapted to be oscillated to effect an opening and closing of said jaws.

15. A stem head comprising a plurality of work-holding clamps, each of said clamps consisting of a pair of jaws slidably

mounted in carriers, a cam positioned in operative relation to each pair of said jaws, a spindle secured to each cam plate, tubular supporting members for the spindles, a tubular member having a recess therein to receive work, means for tensionally supporting the work in said recess, means for manually oscillating the said spindles to open said jaws, and means for automatically closing the jaws.

16. A stem head comprising a plurality of work-holding clamps, each of said clamps comprising a pair of jaws slidably mounted in a carrier, a cam plate disposed in operative relation to each of said jaws, spindles connected to said cam plates, tubular supporting members for said spindles, a work-holding member having a recess disposed on the axial line thereof and provided with a tension finger adapted to hold a work part within the recess, actuating levers secured to the ends of said spindles for manually opening the jaws, and means for automatically closing the jaws when the levers are released.

17. A stem head comprising a plurality of work-holding clamps, each of said clamps comprising a pair of jaws slidably mounted in a carrier, a cam plate disposed in operative relation to each of said jaws, spindles connected to said cam plates, tubular supporting members for said spindles, a work-holding member having a recess disposed on the axial line thereof and provided with a tension finger adapted to hold a work part within the recess, said work holding member having well pockets disposed at opposite sides of said recess, means for varying the depth of said pockets, and actuating levers secured to the ends of the said spindles for operating the jaws.

18. A device for supporting cylindrical objects of different diameters comprising a pair of slidable jaws adapted to move in opposite directions, a spindle for each pair of jaws and an oscillatory member movable with each spindle to directly engage with and open and close said jaws when said spindles are rotated about their longitudinal axis.

19. A device for supporting a tubular body comprising a carrier having a pair of jaws slidably mounted therein and provided with oppositely disposed notches, a cam plate positioned within the said notches, and means for actuating the said cams to effect a movement of said jaws.

20. A device for supporting tubular bodies comprising a plurality of work-holding clamps, each of said clamps consisting of a pair of slidable jaws mounted in carriers, a cam plate disposed in operative relation to each pair of jaws, spindles connected to said cam-plates, tubular supporting members for said spindles, said cams being adapted for oscillation by means of actuating levers secured to the ends of said spindles.

21. A device for supporting a tubular body comprising a carrier having gripping jaws slidably mounted in guides therein and provided with oppositely disposed notches upon the shanks thereof, a cam plate positioned within each pair of said notches and in operative relation with the sides thereof, spindles fastened to said cam plates, and actuating levers fastened to said spindles to permit the manual actuation of the cam plates.

In testimony whereof, I have hereunto subscribed my name this 23d day of February, 1921.

JOHN JOSEPH HIGGINS.