No. 843,750.

PATENTED FEB. 12, 1907.

J. W. HOWELL & W. R. BURROWS.

MACHINE FOR MAKING STEMS OF INCANDESCENT LAMPS.

APPLICATION FILED JULY 11, 1902.

4 SHEETS—SHEET 1.

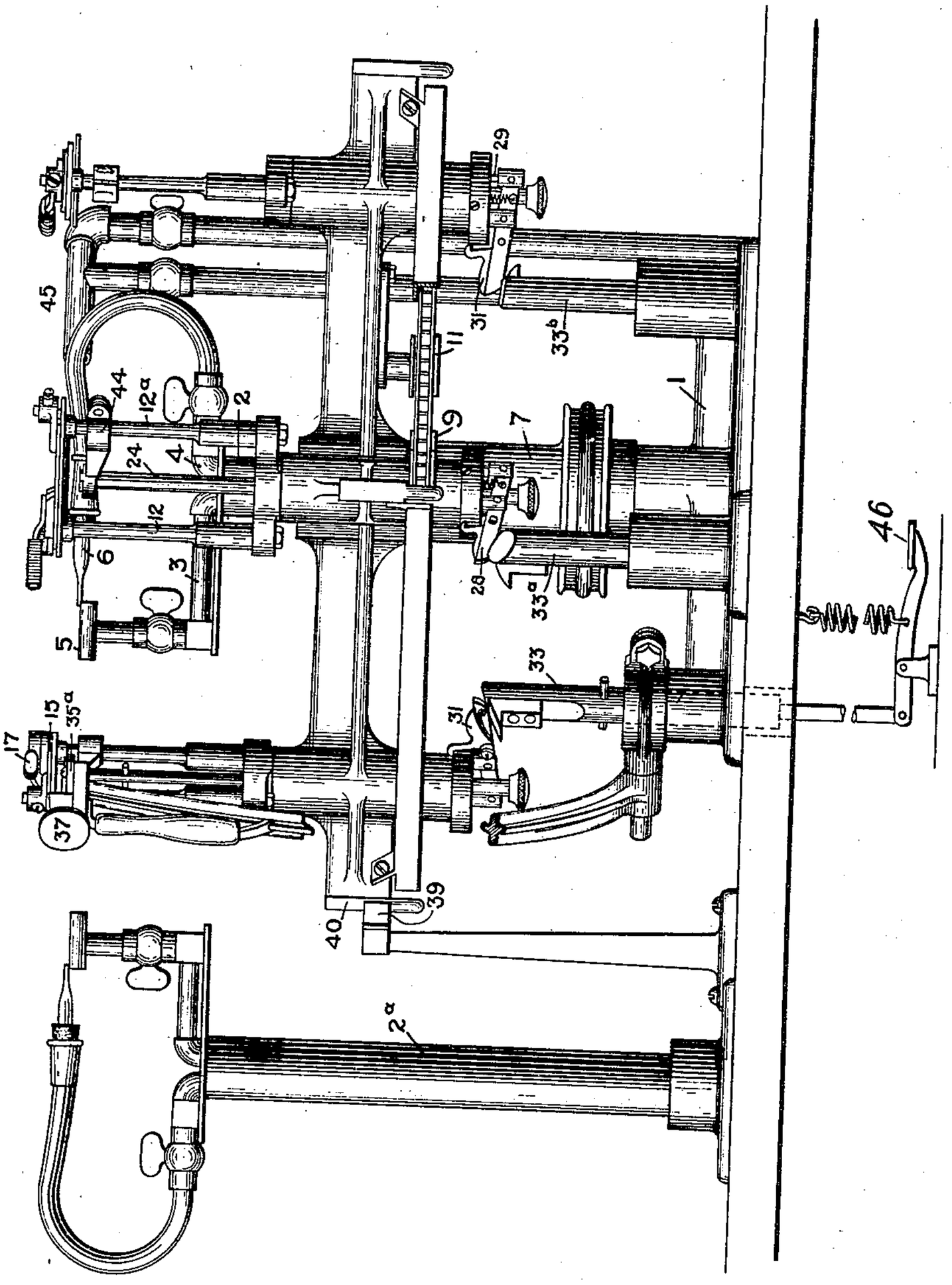

Fig. 1.

Witnesses.
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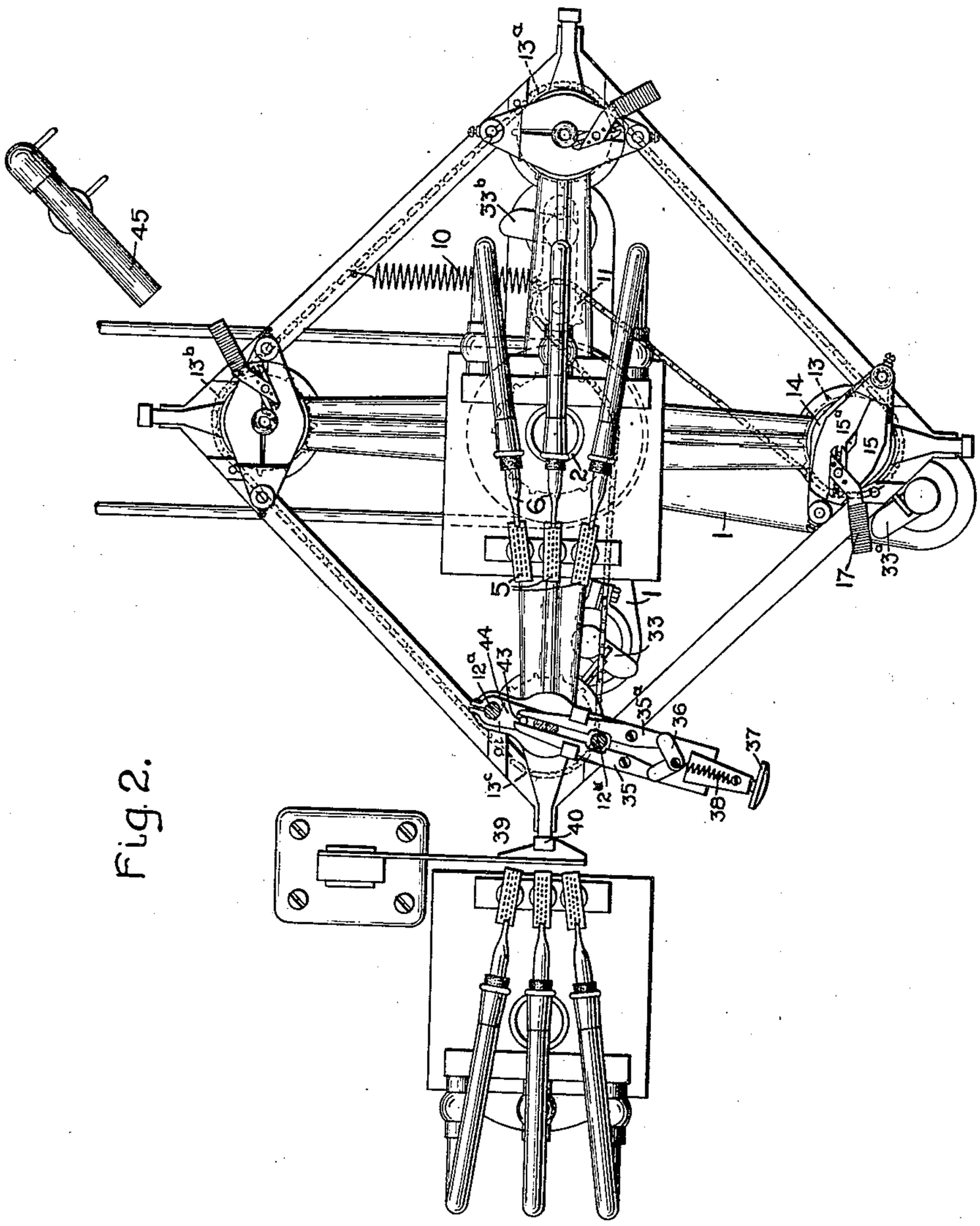

Fig. 2.

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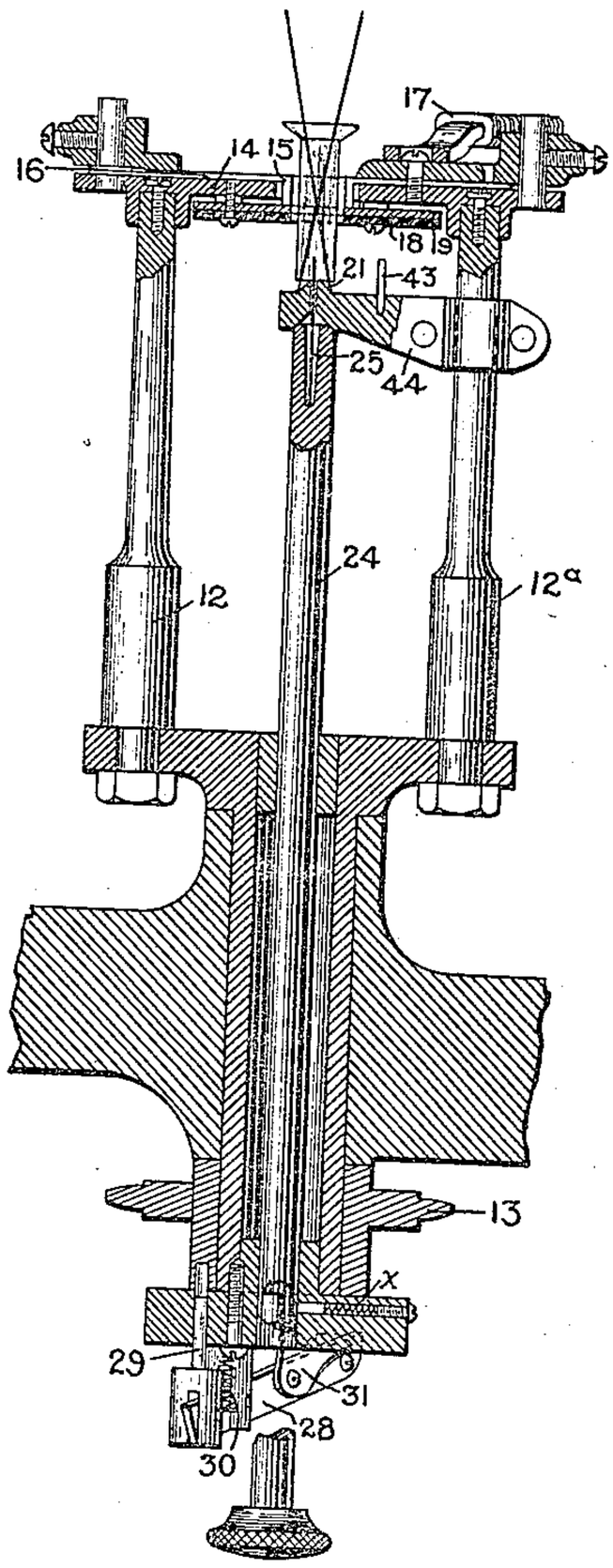
4 SHEETS—SHEET 3.

Fig. 3.



Witnesses.
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4 SHEETS—SHEET 4.

Fig. 4.

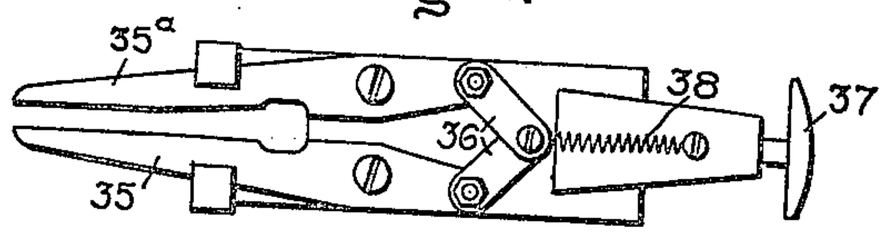

Fig. 5.

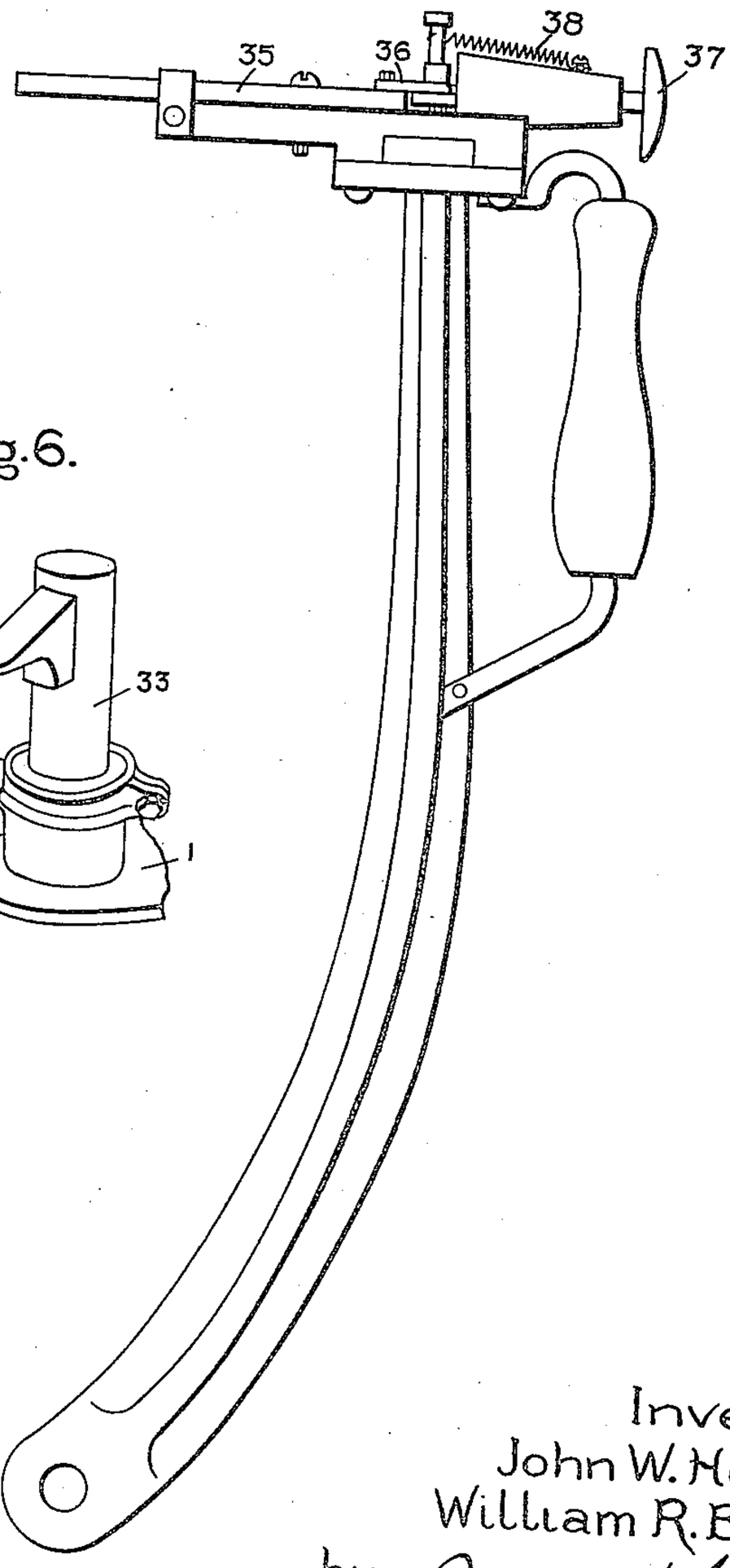

Fig. 6.

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UNITED STATES PATENT OFFICE.

JOHN W. HOWELL AND WILLIAM R. BURROWS, OF NEWARK, NEW JERSEY, ASSIGNORS TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

MACHINE FOR MAKING STEMS OF INCANDESCENT LAMPS.

No. 843,750. Specification of Letters Patent. Patented Feb. 12, 1907.

Application filed July 11, 1902. Serial No. 115,183.

To all whom it may concern:

Be it known that we, JOHN W. HOWELL and WILLIAM R. BURROWS, citizens of the United States, and residing at Newark, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Machines for Making Stems of Incandescent Lamps, of which the following is a specification.

In the manufacture of incandescent electric lamps the filament is mounted upon a glass pillar or "stem," as it is technically termed, which is connected by an all-glass joint with the lower end of the bulb, the leading-in wires which support the filament and serve to establish connections through the base of the lamp with the circuit being sealed into the top of the stem. These stems are commonly made by hand. The present invention involves a machine for making this part, the machine being also capable with slight modifications of being employed for the sealing-in operation or that part of lamp manufacture which involves the connection of the stem to the bulb.

The object of the invention is to permit the operations to be carried forward continuously and to increase the output, and it also has the advantage of requiring a less degree of skill on the part of the operator.

In carrying out the invention we provide a rotary spider on which are mounted one or more heads adapted to receive the glass piece or so-called "flare" from which the stem is made and to grip it while it is undergoing the operations necessary to fit it for use in the lamp. The head which carries the flare is capable of being shifted by the rotary frame into a blowpipe flame or fire, by which the glass is rendered sufficiently soft that its walls may fall or be pinched together to form an air-tight seal around the leading-in and anchor wires. The parts of the machine are so arranged that the flare may be placed in position and the wires quickly set in a proper and uniform relation to the point where the seal is to be effected, and when the proper degree of heat has been given the walls of glass fuse together, or, as is preferred, a pair of pincers are shifted quickly into position to squeeze the tubular end of the flare flat and form a seal around the wires.

While certain features of our invention may be practiced with a single rotary part or head in which the flare is treated, we prefer to use a plurality of these, so that two heating-flames may be employed, one afforded by an ordinary Bunsen burner, giving a lower degree of heat than the blowpipe-flame and which is used as a preliminary step to moderately heat the flare, and the other a blowpipe-flame in which the glass is brought to the proper degree of heat for forming the seal. The employment of two flames largely reduces the amount of breakage by permitting the flare to be brought gradually up to the welding or sealing temperature. Another advantage in employing a plurality of heads is that the operator's time may be more usefully employed, thus permitting an increased output per machine, and two operators may work at the same machine, one receiving a partly-treated stem from the other.

The invention embodies various novel features, which will be hereinafter more fully set forth, and definitely indicated in the claims.

In the accompanying drawings, which illustrate our invention, Figure 1 is a side elevation, partly in section, of a machine embodying our improvements. Fig. 2 is a top plan view. Fig. 3 is a sectional elevation of a part of the machine, showing the construction and mounting of one of the rotary heads. Fig. 4 is a detached view of the pincers employed to squeeze the walls of the flare. Fig. 5 is a side elevation of the pincers and the arm on which they are mounted, and Fig. 6 is a detached view of one of the stops for the rotary frame on which the heads are mounted.

1 represents the base of the machine, in the center of which is a hollow post or pillar, through which extends a gas-supply pipe 3 and the air-supply pipe 4, feeding a blowpipe flame or burner 5 through a blower 6. A similar arrangement of pipes and burners is mounted on the hollow post 2^a, a plurality of burners (three, as usually employed) being arranged so as to meet at a common point or focus where the flare is stopped during the operation of sealing the wires to the end of the stem. On the hollow standard 2 is mounted a pulley and gear secured to a sleeve 7, which engages a sprocket-chain kept

tight by means of a spring 10, pulling on an idler 11, which sprocket-chain and gear 9 communicate rotary movement to the gears 13 13^a 13^b 13^c, which communicate rotary motion to the heads in which the flares are inserted. These rotary heads are pivotally mounted on the arms of a spider, which may be revolved by hand on the center post. In each head is a sleeve, from the top of which project two arms, to which are connected the upright posts 12 12^a, to which is secured the flare clutch or holder. On the base 14 of this clutch are mounted two clamp-jaws 15 15^a, normally pressed together by the spring 16 at the hinged point and provided with a pivoted handle 17, having two slots, as indicated in Fig. 2, engaging pins fastened to the respective jaws, so that when the handle is shifted laterally the jaws are spread apart to admit the tubular end of the glass flare. One of these flares is shown in position in Fig. 3. Beneath the clutch is a metal plate, covered on the lower side with asbestos, as indicated at 18, Fig. 3, to diminish the effect of the blowpipe-flame on the top of the rotary head, this asbestos being secured to the metal plate 19 and lagged fast by screws to the top plate of the head. On one of the vertical posts 12 12^a is mounted a bracket or arm 44, the free end of which is perforated in alinement with the center of the anchor-rod 24, provided with a knob at the bottom, which permits it to be raised and lowered, being supported in any position at which it is set by a friction-piece controlled by a spring X. The top of the anchor-rod is countersunk with a flaring recess, as indicated at 25, to receive an anchor-wire for the stem. The perforation of the outer end of the arm 44 alines with this recess. The top of the arm at or near its end is provided with a beveled ridge 21, extending across the end of the arm and being of greater length than the diameter of the flare. This ridge supports the glass flare on its apex, the sloping sides 21 of the ridge acting as guides for the leading-in wires which rest on the arm 44 at the base of the ridge and are thus caused to diverge at a uniform angle and caused to occupy a uniform relation with respect to the edge of the seal. Thus in assembling the parts one operator opens the jaws of the clutch, inserts the tubular end of a glass flare until its bottom rests on the apex of the ridge, and inserts the anchor-wire. The lead-wires are afterward placed in position by an assistant operator, as seen in Fig. 3, the ends of the wires being on opposite sides of the ridge 21 and supported on the rests formed by the upper surface of arm 44 at the base of ridge 21, each lead-wire being tipped with platinum at the seal.

At the bottom of the rotary head are means for connecting and disconnecting it from its chain-operated gear-wheel 13. This is put into or out of clutching relation to the rotary head by means of a sliding pin 29, the position of which is controlled by a lever 28 and spring 30. This lever is mounted at an intermediate point on a fixed stud or post and carries a latch 31, adapted to engage a flange on the rotary head and maintain in a disconnected condition the gear and head. When it is necessary to prevent the head from revolving, as when the seal is being squeezed or when assembling the several parts, the outer end of the lever is raised either by a vertically-movable stop 33, operated by a pedal 46, controlled by the operator, or by engagement with one of the stationary stops 33^a 33^b, over which the lever is shifted when the spider is turned. The stops 33^a 33^b are each provided with a cam-face, as indicated in Figs. 1 and 6, which raises the lever sufficiently to shift the pin 29 out of clutching relation with the sprocket-gear 13, but not enough to bring the latch 31 over the flange on the rotary head. These cams cause the rotary motion of the heads to be discontinued, so that the operators may assemble or treat the stem. The stops are set in such a position with reference to the base of the machine that the rotary heads will be arrested in a convenient position for the operator to treat the stem. The cam-face of stop 33 is for the purpose of arresting the rotary movement of the head when in position for pinching the stem. In this position it is not desired to stop the rotary motion until the glass is heated to the proper degree of softness and ready for the sealing. Hence the normal position of the stop 33 is below the level of lever 28; but when the glass is properly heated the operator presses pedal 46, thereby raising stop 33 into the path of lever 28, disconnecting the head from gear 13 and bringing the head to a stop in the proper position for pinching the seal. The pincers for squeezing the glass and forming the seal are mounted on an arm which swings on a pivot clamped on the base around the stop 33. The pincers are shown in detail in Figs. 4 and 5. and comprise a pair of pivoted jaws 35 35^a, controlled by a toggle 36 and a push-button 37 and normally maintained in an open position by a spring 38, drawing on the toggle. When the button 37 is depressed, the jaws are forced together, and a pin 43 (see Fig. 2) limits their movement, so as to provide a uniform size for the seal. If one of the rotary heads needs attention requiring so much time that the operator does not wish to have any of the flares in the flames during that period, she may, while the spider is in an intermediate position, raise the end of lever 28 so far that the latch 31 comes over the flange on the rotary head. The head is thus held out of clutching relation to the gear until the operator releases the latch.

The machine is operated preferably by two

operators, one finishing the seal by operating the pincers, during which the second operator is properly arranging the assembly of the wires and flare before it is shifted into range of the preliminary heater 45, which is an ordinary Bunsen burner. The same operator who finishes the seal removes the finished stem from the machine and puts in a new flare and anchor-wire. She then shifts the spider ninety degrees, the partly-assembled flare being brought in front of the second operator who finishes the assembly by inserting the lead-wires. The machine is arrested in four different positions by means of a notched piece 39, mounted on a spring supported on a fixed post, which engages a projection on the four corners of the spider, as indicated at 40.

The machine is operated as follows: The spider is turned by hand until one of the heads is in line with the blowpipe flames or fire, where it is held by means of the spring-stop 39. While the glass is being softened, the operator who makes the seal places a flare in the holder on the next head in advance by opening the clutch and bringing the flare to rest on the ridge 21. She also places an anchor-wire in the anchor-rod 24. The glass is by this time sufficiently softened to permit the seal to be made and she stops the rotation of the head by pressing the pedal 46, raises the pincers, pushing them home around the flare, pushes in on the button 37 to effect the seal and then releases the button and withdraws the pincers. She then unlatches the spider-frame and shifts it ninety degrees in a left-handed direction, thereby bringing a new flare which has been under the influence of the Bunsen burner into the field of the blowpipe-flame and at the same time carries the partly-assembled flare before the assisting operator, who puts in the lead-wires and trues up the anchor-wire and the flare. Meantime the principal operator makes another seal on one head and puts a flare in the adjacent head. The frame is then shifted through another angle of ninety degrees, thus bringing the flare which was under the action of the preliminary heater into the blowpipe-flame. After the blowpipe-flame has brought the glass to the proper degree of softness the operator presses on the pedal connected with the stop 3 3, thus arresting the rotary movement of the head in the blowpipe-flame, raises the pincer-arm until the base of the jaws hits the post 12, when a pressure on the button 37 brings the jaws together just far enough to effect a perfect seal around all of the wires, the pin 43 preventing the glass being squeezed too thin. After the seal is effected the pincers are lowered away from the glass to prevent their being heated too much by the flames. The spider is then swung around through ninety degrees and the stem withdrawn. Thus the two operators will be kept busy continuously and the machine at minimum intervals will bring a fresh assembly of the stem parts into range of the preliminary and final heater.

What we claim as new, and desire to secure by Letters Patent of the United States, is—

1. A stem-making machine for incandescent lamps, comprising a flare-support adapted to be brought into coöperative relation to a blowpipe-flame, rests for the leads below the edge of the flare, and means for squeezing together the walls of the flare when softened by the flame.

2. A stem-making machine for incandescent lamps, comprising a flare-support adapted to be brought into coöperative relation to a blowpipe-flame, rests for the leads below the edge of the flare, and an anchor-wire support beneath the flare-support, said flare-support having an opening to admit the anchor-wire, and means for squeezing together the walls of the glass to seal the wires.

3. A stem-making machine for incandescent lamps, comprising a flare-clamp, rests for the lead-wires, and means for squeezing the lower end of the flare.

4. A stem-making machine for incandescent lamps, comprising a flare-support, rests for the lead-wires below the edge of the flare, a vertically-movable support for an anchor-wire, means for squeezing the flare, and a stop for arresting the squeezing devices at an exact position to make a uniform seal.

5. A stem-making machine comprising a support for the glass flare and the wires to be sealed in, gas-burners to afford a blowpipe-flame, movable pincers to squeeze the glass into a seal when soft, and a stop to limit the movement of the pincers.

6. A stem-making machine comprising a rotary head, a flare-support, blowpipe-burners, and movable pincers to squeeze a seal at the end of the flare.

7. A stem-making machine comprising a rotary head, a flare-support having a ridge for the flare, rests on a lower plane for the leads, blowpipe-burners to maintain a flame around the end of the flare, and means for effecting a seal around the leads.

8. A stem-making machine comprising a support for the flare and wires, blowpipe-burners, means for rotating the flare in the flame, a clutch for arresting or imparting rotary movement to the support, and means for operating the clutch.

9. A stem-making machine comprising a flare-support for maintaining the flare and leads in proper relative position, blowpipe-burners, means for rotating the support in the flame, a clutch for arresting or imparting the rotary motion, a stop for operating the clutch and arresting the head in a definite position, and movable pincers for squeezing the end of the flare to make a seal.

10. A stem-making machine comprising a

revoluble frame carrying a plurality of rotary flare-supports, blowpipe-burners, a stop to arrest the frame when the flares are in the focus of the flame, means for arresting the rotation of the supports, and pincers for squeezing the end of the flare into a seal.

11. A stem-making machine comprising a revoluble frame carrying a plurality of rotary flare-supports, a preliminary heater and a final heater for the flare at different circumferential positions in the path of travel of the flare, means for arresting the flare in the several heaters, and pincers for squeezing the end of the flare into a seal around the leads.

12. A stem-making machine comprising a revoluble frame carrying a plurality of rotary flare-supports at different angular positions, means for arresting the frame at definite positions, a heater to soften the glass, and a pivoted squeezing device adapted to be shifted to and from the frame and to engage and disengage the flare.

13. A stem-making machine comprising a revoluble frame carrying a plurality of rotary flare-supports at different angular positions, a spring-clamp for the flare on each support, means for arresting the frame at definite positions, a heater to soften the glass, and movable pincers to squeeze a seal around the wires at the end of the flare.

14. A stem-making machine comprising a revoluble spider, a plurality of flare-supporting heads on the several arms thereof, a spring clamp for each flare, a heater to soften the glass, means for arresting the spider when the flare is in the heater, and a squeezing device for effecting a seal.

15. A stem-making machine for incandescent lamps comprising a flare-support, means for supporting the leads with their ends projecting from the flare and in a definite relative position, and means for heating the parts to fuse the walls of the flare together about the leads.

16. A stem-making machine for incandescent lamps, comprising a flare-support, means for supporting the leads and anchor-wire in proper relative positions, and means for heating the parts to fuse the walls of the flare together.

17. In a machine for making stems for incandescent lamps, a supporting member, and a ridge thereon of greater length than the inside diameter of the tube from which the stem is made, on the top of which the tube is adapted to rest.

18. In a machine for making stems for incandescent lamps, a supporting member, and a ridge thereon of greater length than the inside diameter of the tube from which the stem is made, on the top of which the tube is adapted to rest, said ridge having an opening therethrough for the anchor-wire.

19. A stem-making machine for incandescent lamps comprising a flare-support, rests for the lead wires below the edge of the flare, a support for an anchor-wire, and means for effecting the seal.

20. A machine for making stems for incandescent lamps comprising a support for the flare, means for assembling the lead-wires in a fixed relation to the flare with their ends projecting therefrom, and means for heating the flare to effect a seal around the lead-wires.

21. A machine for forming incandescent-lamp mounts comprising a heater, a rotatable support for the mount-tube, and means for feeding the anchor-wires rotatable with said support, substantially as described.

22. A machine for forming incandescent-lamp mounts comprising a heater, a rotatable support for the mount-tube, and means for supporting the anchor-wires rotatable with said support, substantially as described.

23. A machine for forming incandescent-lamp mounts comprising a rotatable frame having rotatable apparatus thereon comprising a support for the mount-tube and a support for the anchor-wire, substantially as described.

24. The combination in a machine for forming incandescent-lamp mounts, of a ridge beneath the mount-tube, and means for forming the mount, the faces of said forming means being parallel to said ridge, substantially as described.

In witness whereof we have hereunto set our hands this 9th day of July, 1902.

JOHN W. HOWELL.
WILLIAM R. BURROWS.

Witnesses:
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JOS. D. FREDERICKS.