

Sept. 16, 1930.

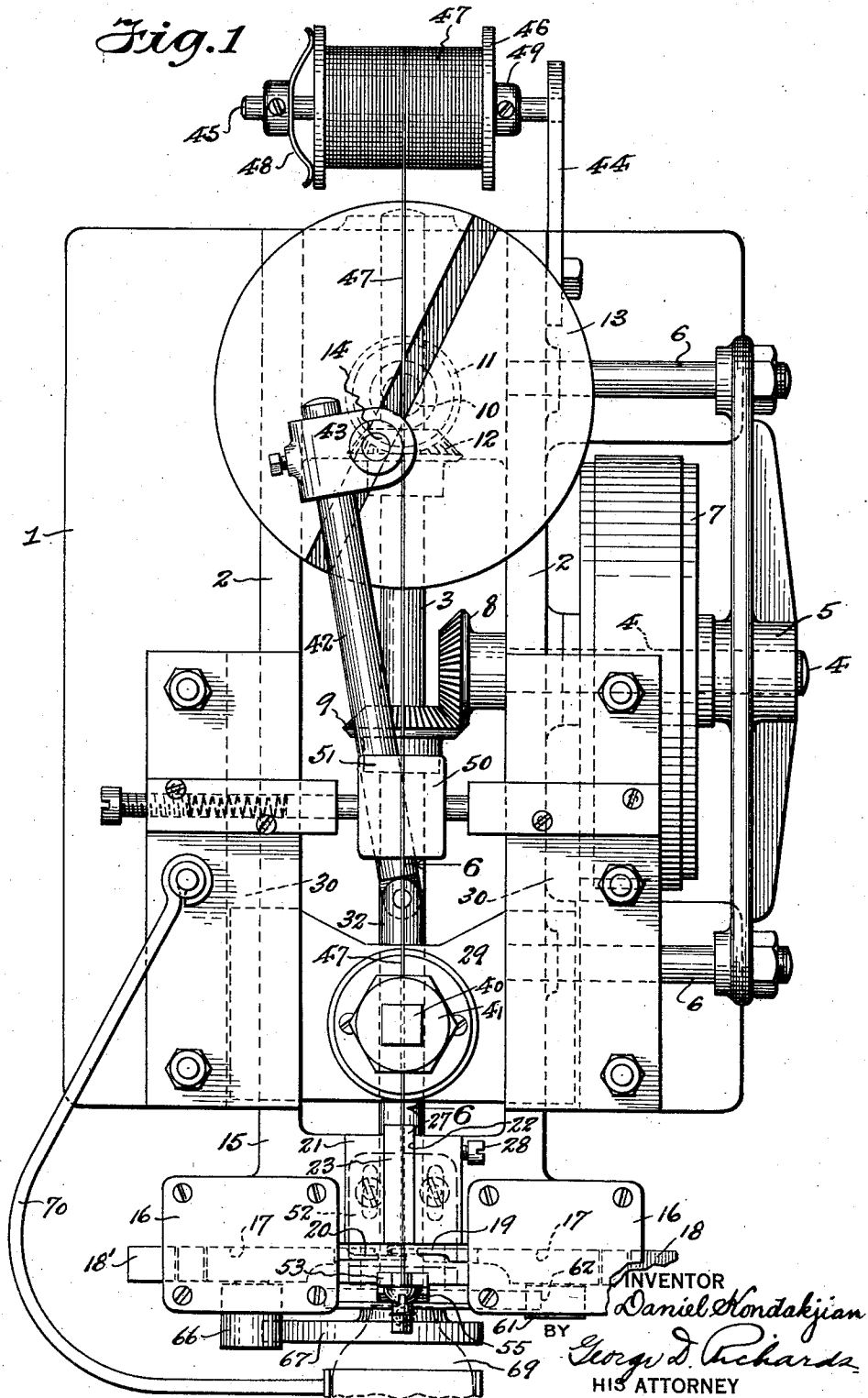
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1,775,770

MACHINE FOR MAKING WIRE FORMATIONS

Filed July 31, 1929

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Fig. 2

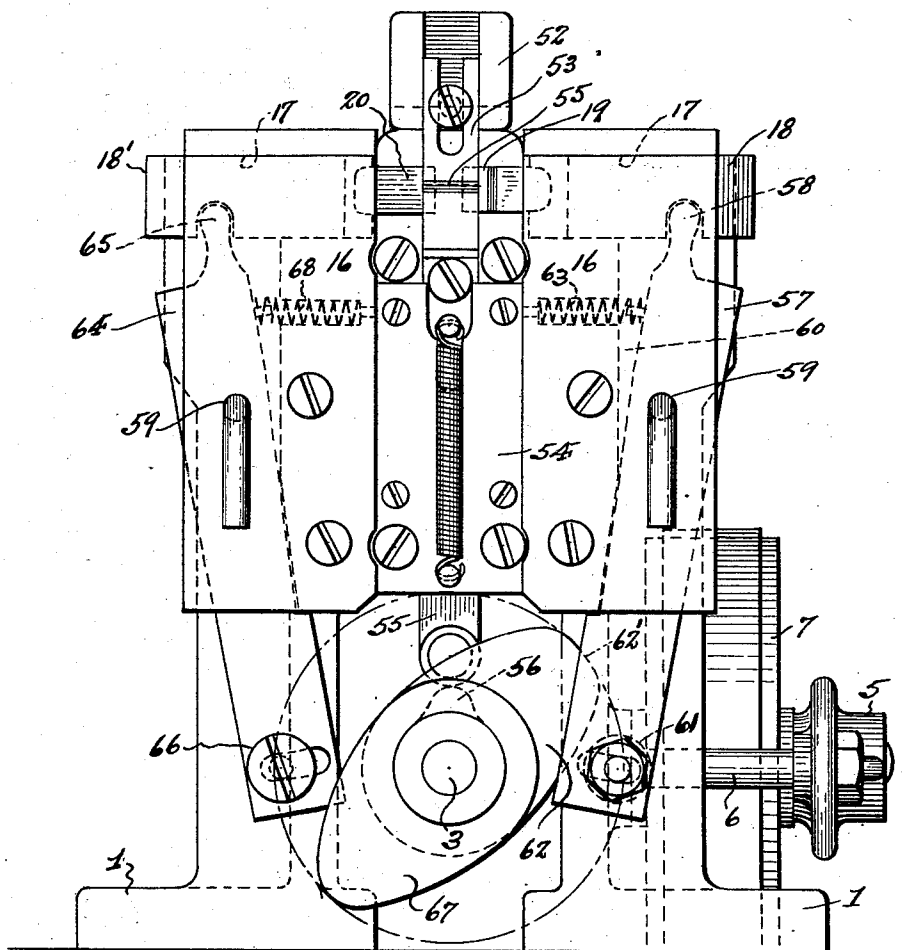


Fig. 3

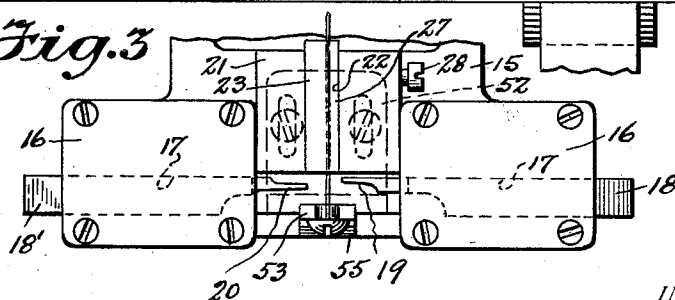


Fig. 11



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Fig. 4

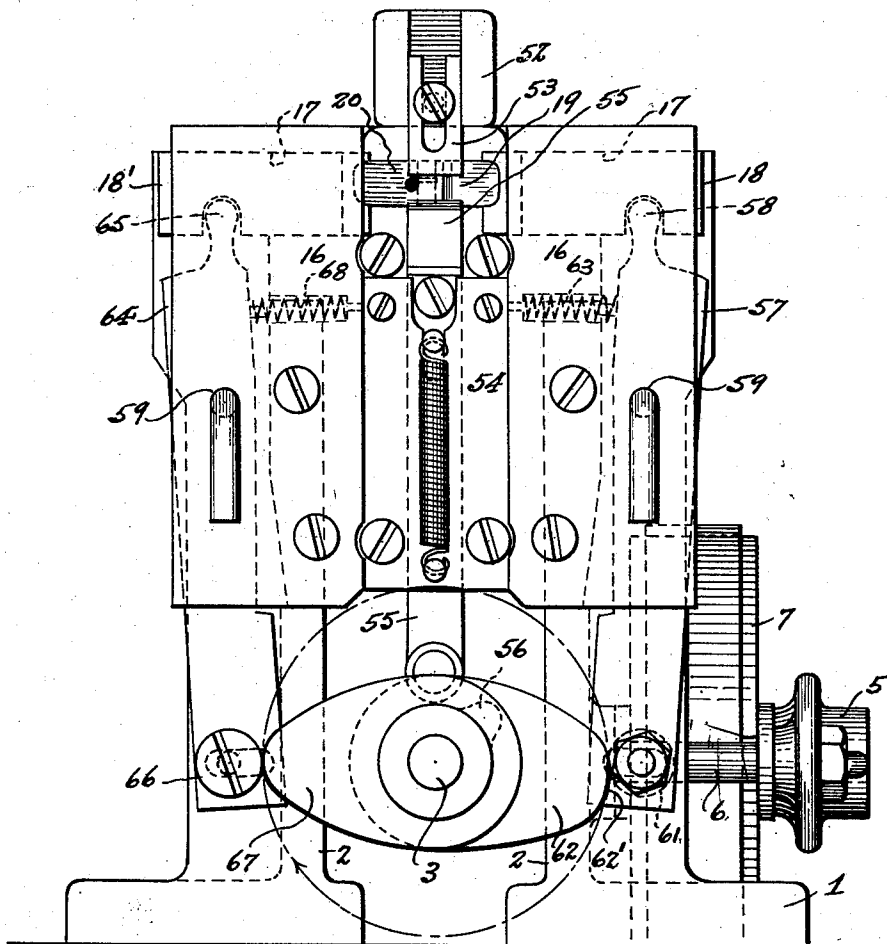
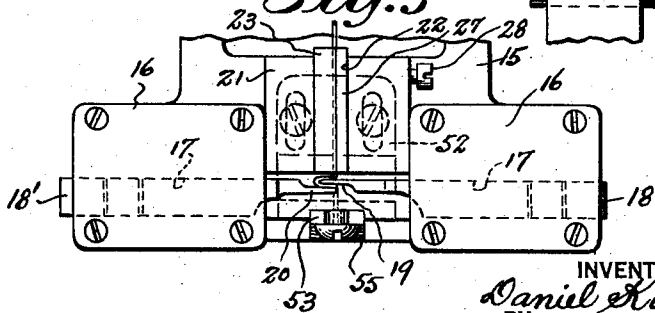


Fig. 5



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Fig. 6

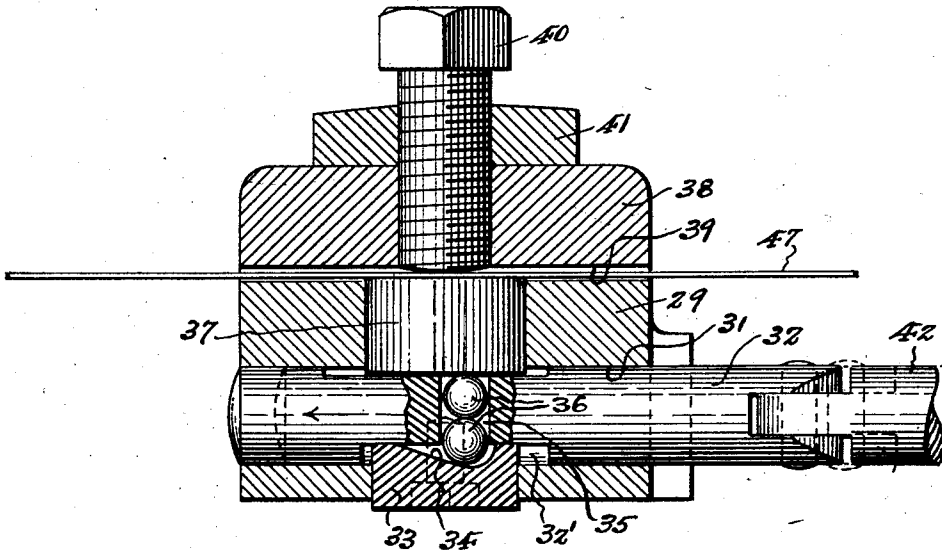


Fig. 7

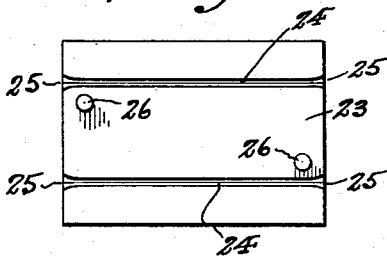


Fig. 8

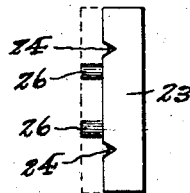


Fig. 10

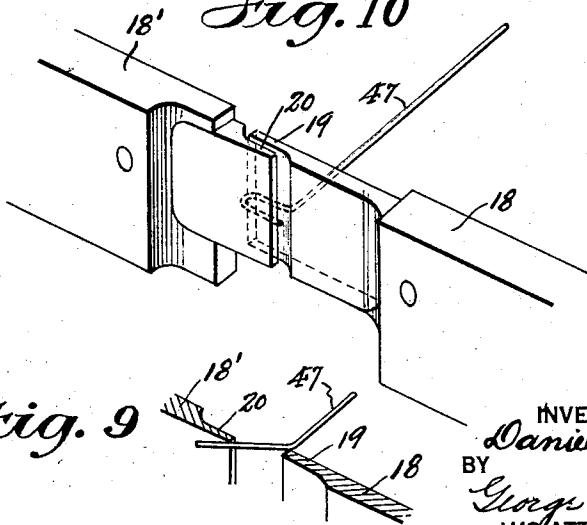
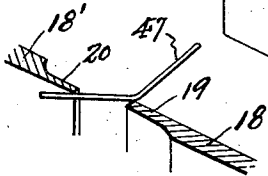


Fig. 9



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MACHINE FOR MAKING WIRE FORMATIONS

Application filed July 31, 1929. Serial No. 382,525.

This invention relates to machines for making wire formations; and the invention has reference, more particularly, to an automatic machine for making filament support wires for incandescent electric lamps, radio tubes and the like.

The invention has for its principal object to provide a simple and efficient automatic machine adapted to feed wire from a source of supply, bend the same into the desired formation and then sever the same to provide complete filament support wires ready for mounting in incandescent lamps, radio tubes and similar devices.

The invention has for a further object to provide a novel construction and arrangement of bending dies together with means for automatically operating the same in properly timed relation.

Other objects of this invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the same.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which:—

Fig. 1 is a top plan view of the machine made according to and embodying the principles of this invention; Fig. 2 is a front end elevation of the same, with the wire severing means operative after the completion of a desired wire formation and preparatory to the making of a succeeding wire formation; Fig. 3 is a fragmentary top plan view of the wire severing means in operative position; Fig. 4 is a front end elevation of the machine, with the wire bending dies operative to produce the desired wire formation; Fig. 5 is a fragmentary top plan view of the wire bending dies operative to produce the wire formation; Fig. 6 is an enlarged vertical longitudinal section of the wire feeding means of the machine, said view being taken on line 6—6 in Fig. 1; Figs. 7 and 8 are respectively an inner face view and an end elevation of a wire guiding and supporting means which is cooperative with the bending dies; Fig. 9 is a fragmentary view showing the initial operative movements of the wire bending dies; Fig. 10 is a fragmentary view showing

the completion of the operative movements of the wire bending dies; and Fig. 11 is a side elevation of a completed wire formation.

Similar characters of reference are employed in all of the hereinabove described views, to indicate corresponding parts.

Referring to the drawings, the reference character 1 indicates the base of the machine frame, the latter including laterally spaced longitudinally extending upstanding side members 2. Journaled in suitable bearing supports connected with the machine frame, and so as to extend longitudinally of the latter between the side members 2 is a driven shaft 3. A laterally disposed driving shaft 4 is journaled at its inner end in one of said side members 2, and at its outer end in a bearing bracket 5 carried on off-setting supports 6 extending from the adjacent side member 2. Fixed on said driving shaft 4 is a driving pulley 7, adapted to be belt driven from any suitable source of power. Fixed on the inner end of said driving shaft 4 is a bevel gear 8 which meshes with and drives a bevel gear 9 fixed on said driven shaft 3.

Journaled in the rearward end portion of the machine frame is a vertical shaft 10 having on its lower end a bevel gear 11 which is driven from another bevel gear 12 fixed on said shaft 3. Fixed on the upper end of said vertical shaft 10 is a crank-wheel 13 to which is adjustably mounted a crank-stud 14, whereby the stroke of the crank may be varied according to the length of wire to be fed to the bending dies of the machine, as will subsequently appear.

Supported from the front end of the machine frame is a head bracket 15 having a pair of laterally spaced head blocks 16 carried thereby. Formed in the upper portion of each head block is a horizontally disposed guideway 17. Mounted in the guideway of the right hand head block, for reciprocating movement therein, is a primary bender member 18 having at its forward end a primary bending die 19. In like manner, mounted in the guideway of the left hand head block, for reciprocating movement therein, is a second bender member 18' carrying a secondary

bending die 20. Said bending dies 19 and 20 are oppositely reduced in thickness at their free end portions so that the same may be moved together in overlapping cooperative relation for producing a hook-shaped bend in the manner to be subsequently described.

Said head bracket 15 is provided at its upper end with a bifurcated portion 21 forming a receiving socket 22 (see Fig. 1), for retaining in operative relation to the primary bending die 19 a wire guiding and supporting means. This wire guiding and supporting means, in preferred form, comprises a body member 23 having in its inner face a V-shaped wire guide groove 24 having flared mouths 25 at its ends. Said body member 23 is provided, for projection from its inner face, with dowels 26. A cover plate 27 perforated to correspond to the position of the dowels 26 of the body member 23, is engaged over the inner side of the latter to close over the wire guide groove. The assembled body member 23 and cover plate 27 is inserted in the receiving socket 22 and secured against movement by a set-screw 28. When thus mounted, the wire guiding and supporting means will be disposed with its forward end located behind the rear face of the primary bending die 19 for a distance approximating the thickness of the wire operated on. As shown in Figs. 7 and 8, the body member 23 may be provided with a plurality of wire guide grooves 24, subject to selective use, and these wire grooves may be the same size or of different sizes whereby the wire support may be selectively used with either one or the other of two sizes or thicknesses of wire.

As a part of the means for automatically supplying wire to be operated on by the bending dies, a wire feeding device is provided. This wire feeding device comprises a slide-block 29 longitudinally reciprocable in guides 30 provided in connection with the laterally opposed side members 2 of the machine frame. Said slide-block 29 is provided with a central longitudinal bore 31 in which in longitudinally movable a plunger bar 32. Secured in the underside portion of said slide-block 29, with its upper portion intersecting the bore 31, is wedge block 33. Said wedge block 33 is provided in its upper face with a forwardly and upwardly inclined wedge groove 34. The plunger bar 32 is provided with a vertical transverse opening 35 to receive a vertically movable lift means. The lift means is preferably provided in the form of a pair of steel balls 36, the combined diameters of which are in excess of the diameter or thickness of said plunger bar 32. With the plunger bar retracted to the rearward limit of its movement relative to the slide-block 29, the lowermost ball 36 will be engaged in the deepest end of said wedge groove 34, and the upper ball will drop within the upper end of said opening 35. Vertically slidable in the

upper portion of said slide block is a movable jaw piece 37. Secured to the upper side of said slide block is a top-member 38, having in its underside a channel 39 to provide a wire passage. Adjustably fixed in said top-member 38 is a set-screw 40 carrying a jam nut 41 for locking the same in desired adjusted position. The inner end of said set-screw 40 opposes said movable jaw-piece 37 and thus serves as a stationary jaw-member, whereby the wire threaded through said channel 39 may, at proper times, be gripped by and between the movable jaw piece 37 and said stationary member. Pivotaly connected with the rearward end of said plunger bar 32 is a connecting-rod 42, having at its rearward end an adjustably mounted tail block 43 which is journaled on the crank-stud 14 of the crank-wheel 13. The underside of said plunger bar 32 is provided with a longitudinal notch 32'. Said notch straddles the wedge block 33, and is of a length in excess of the width of the latter, so that a limited independent movement of said plunger bar relative to the slide-block 29 is permitted.

Affixed to the rearward end of the machine frame is a bracket arm 44 which carries a spindle 45, and rotatably mounted on the latter is a spool 46 upon which is wound a supply of wire 47. Said spool is maintained under frictional tension against undue momentum by a spring brake 48 which is fixed on the spindle 45 to bear against the spool as backed by a positioning collar 49 which is also fixed on the spindle.

In order to prevent any rearward retraction of the forwardly fed portion of the wire 47, when the wire feeding means is retracted after an operative stroke, a pair of frictional gripping blocks are provided, the same preferably consisting in a stationary block 50 on one side of the wire and a spring pressed yieldable gripping block 51 on the opposite side of the wire, said gripping blocks being located rearwardly of the path of movement of said slide of movement of said slide block 29, and being suitably supported in connection with the side members 2 of the machine frame.

Carried on the head block 15 is a supporting member 52, which is secured so as to project over and beyond the bending dies 19 and 20. Adjustably secured to the forward end of said supporting member 52 is a fixed cutter blade 53. Vertically reciprocable in a suitable guide provided by a plate 54, which is secured to the lower portion of the front face of said head block 15, is a movable cutter blade 55, which moves into and out of cutting relation to the aforesaid fixed cutter blade 53. Properly timed actuation of said movable cutter blade is produced by means of a cam 56 which is fixed on and rotated by said driven shaft 3. The supporting member 52 is shown in front elevation in Fig. 4, in order to avoid

hiding the underlying die members 19 and 20, is shown by broken lines in Figs. 2 and 5.

The means for actuating the bending die 19 comprises a pivoted lever device 57, the upper end of which is operatively connected with bender member 18 by ball and socket connection 58. Said lever member is vertically disposed for oscillation in transverse vertical plane on a fulcrum pin 59 which is fixed in the left hand head block 16, and said head block 16 is cut away on its outer side to form a receiving space 60 for said lever. The lower end of said lever is provided with a roller stud 61 which is operatively engaged by a cam 62 fixed upon and driven by said driven shaft 3. The upper end of said lever 57 is biased to initial outwardly swung position by a spring 63 which is mounted in the head block 16, as shown more especially in Figs. 2 and 4. This arrangement also assures that the lower end of the lever is normally inwardly swung to maintain the roller stud 61 in the path of the cam 62.

In like manner the bending die 20 is actuated by a similarly mounted lever member 64, having at its upper end a ball and socket connection 65 with the bender member 18', and having at its lower end a roller stud 66 operatively engageable by a cam 67, also fixed on and rotated by said driven shaft 3. Said lever member 64 is also biased to normal initial position by a spring 68.

In the operation of the device the relative movements of the bending dies 19 and 20 are such that the bending die 19 operates with a leading movement before the movement of the bending die 20 occurs. In other words the bending die 19 is first moved to wire bending position and then is maintained in such wire bending position until and while the bending die 20 completes its wire bending movement. This is accomplished by so shaping the cam 62 that it leads the cam 67, and by further providing a dwell surface 62' whereby said primary bending die actuating mechanism is held in operative position while the secondary bending die operating means is being actuated by the cam 67.

In the operation of the machine the timing of the several mechanisms is such that the bending die devices will be actuated while the wire feeding device is performing its retractive stroke.

The operation of the wire feeding means is as follows:—

The free end of the wire 47 is carried forward and threaded through the channel 39 of the wire gripping device, and is thence passed through the wire guiding and supporting means so that the same extends through a groove 24 of the body member 23 thereof. The forward end of said wire extends between the initially separated bending dies 19 and 20

to a point forwardly spaced from the opposed portions of said dies, at which point is located said wire cutting or severing mechanism. Assume that the slide block 29 has been retracted to its rearmost position by the operation of the driving crank mechanism so that continued rotation of the latter will produce a forward stroke of said slide block 29. As such forward stroke is initiated, the plunger bar 32 will first move slightly forward relative to the slide block 29, thus carrying the lower ball 36 against the inclined plane of the wedge grooves 34, thereby causing the balls 36 to rise and in turn to lift the movable jaw-piece 37 into engagement with the wire so as to grip the latter in conjunction with the opposed set screw 40. As this occurs, the continued movement of the crank will cause the slide block 29 to move forwardly in its guides and, since the wire is gripped by and between the jaw-piece 37 and set screw 40, said wire will be propelled forwardly with the forwardly moving slide block, and will be drawn off of the spool during such movement. The free end of the wire will, therefore, be moved forwardly through the wire guiding and supporting means, so as to project beyond the same and between the then inactive and retracted bending dies 19 and 20. The setting of the cam 56 which controls the operation of the wire severing means is such that this cam actuates the movable cutter 55 prior to the operation of the bending dies, thus severing a previously produced wire formation for discharge from the machine and into a receptacle 69 supported by a carrying arm 70 (as indicated in Fig. 1). After the operation of the wire severing mechanism, and while the wire feeding mechanism is being retracted, the cams 62 and 67, as rotated by the shaft 3, produce operative projection of the bending die devices. In the operation of the bending dies, the cam 62, which leads the cam 67, first engages the stud 61 of the lever 57 so as to cause an inward swinging movement of the upper end of said lever 57. This inward swinging movement of the lever 57 produces a forward stroke of the bender member 18 thereby carrying the bender die 19 into engagement with the end of the wire which projects forwardly from the wire guiding and supporting means. Upon contact of the bending die 19 with said free end portion of the wire the latter is bent laterally to the left. After the bending die 19 has thus engaged and initiated the primary bending effect on the free end of the wire 47, the cam 67 is timed to engage the stud 66 of the lever 64 so as to initiate the forward movement of the bender member 18', thus advancing the bending die 20 so that it moves behind the free end of the bent portion of the wire 47, as shown more especially in Fig. 9 of the drawings. Following these operations the cam 62 completes the forward

movement of the bending die 19 and holds the same in forwardly moved operative position due to the dwell surface 62' with which said cam 62 is provided. While the bending die 19 is thus caused to dwell at the end of its bending stroke, the cam 67 completes the forward stroke of the bending die 20, thus doubling back the free end portion of the bent end of the wire around the end of the bending die 19 and back upon itself, as shown in Fig. 10, thereby completing the desired wire formation. The wire formation when completed consists in a U-shaped hook member laterally extending relative to the longitudinal axis of the wire, such formation being shown in Fig. 11. Upon the completion of the operative stroke of the bending die 20, the cams 62 and 67 will simultaneously move away from the studs of the respective levers 57 and 64 so that cam pressure is released from the latter and the biasing springs 63 and 68 will simultaneously cause a retraction of the levers, bending members and bending dies 19 and 20 to normal initial positions.

By the time the above described wire bending operations have been completed the slide block 29 of the wire feeding mechanism has been completely retracted and is ready for a forward wire feeding stroke. Upon completion of this wire feeding stroke, the wire 47 is advanced for the required distance according to the length of shank portion which the completed wire formation is to possess, and consequently at the end of the forward feeding stroke of the wire feeding mechanism the wire severing means is again actuated to cut off the completed wire formation for discharge from the machine, whereupon the above described wire bending operations are repeated.

It will be obvious from an inspection of the drawings and from the above description that the above described operations are continuously repeated while the machine is being driven so that wire formations of the desired kind are successively produced in an automatic manner.

It will be obvious that the machine is compact and simple in its construction and that there is very little likelihood of the same getting out of order during operation on a production basis.

The wire formation which the machine is designed to produce is utilized to provide an upstanding support within an incandescent electric lamp or radio tube bulb, with the hook element at its upper end whereby a filament member may be engaged therein so as to be supported in the manner familiar to those skilled in the art of electric lamp and radio tube construction.

As many changes could be made in the above described construction, and many apparently widely different embodiments of this invention could be made without depart-

ing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:—

1. In a machine of the kind described, the combination with a machine frame of a driven shaft, a reciprocable wire feeding means, a crank means driven from said shaft for actuating said wire feeding means, a wire severing means including stationary and movable cutting blades, an actuating cam on said shaft for operating said movable cutting blade, opposed reciprocable wire bending dies mounted between said wire feeding means and said wire severing means, a wire guiding and supporting means in juxtaposition to said bending dies, oscillatable lever members for actuating said bending dies, and lever actuating cams on said shaft, said cutter blade cam and said lever actuating cams being in such timed relation to the operation of said wire feeding means that the former operates at the end of the wire feeding stroke to cause the severing of a previously made wire formation prior to the operation of the latter to actuate said bending dies to produce a succeeding wire formation.

2. In a machine of the kind described, the combination with a machine frame of a driven shaft, a reciprocable wire feeding means, a crank means driven from said shaft for actuating said wire feeding means, a wire severing means including stationary and movable cutting blades, an actuating cam on said shaft for operating said movable cutting blade, opposed reciprocable wire bending dies mounted between said wire feeding means and said wire severing means, a wire guiding and supporting means in juxtaposition to said bending dies, oscillatable lever members for actuating said bending dies, and lever actuating cams on said shaft, said cutter blade cam and said lever actuating cams being in such timed relation to the operation of said wire feeding means that the former operates at the end of the wire feeding stroke to cause the severing of a previously made wire formation prior to the operation of the latter to actuate said bending dies to produce a succeeding wire formation, and means to hold advanced wire against retraction during the recovering stroke of said wire feeding means.

3. In a machine of the kind described, a pair of opposed reciprocable bending dies comprising a primary bending die and a secondary bending die, the free ends of said dies being adapted to overlap one another on completion of their operative strokes, a wire guiding and supporting means in juxtaposition to said bending dies and cooperative with the primary bending die in the making of the initial wire bend, oscillatable levers for

actuating said bending dies, rotatable cams for actuating said levers, and said cams being so related that the one serving to operate the primary bending die actuating lever leads the one serving to operate the secondary bending die actuating lever and furthermore possesses a dwell section for holding the primary bending die in actuated position while the secondary bending die completes its operative stroke.

4. In a machine of the kind described, a pair of opposed reciprocable bending dies comprising a primary bending die and a secondary bending die, the free ends of said dies being adapted to overlap one another on completion of their operative strokes, a wire guiding and supporting means in juxtaposition to said bending dies and cooperative with the primary bending die in the making of the initial wire bend, oscillatable levers for actuating said bending dies, rotatable cams for actuating said levers, said cams being so related that the one serving to operate the primary bending die actuating lever leads the one serving to operate the secondary bending die actuating lever and furthermore possesses a dwell section for holding the primary bending die in actuated position while the secondary bending die completes its operative stroke, and spring means for biasing said actuating levers to normal initial positions.

5. In a machine of the kind described, a driven shaft, a reciprocable wire feeding means, a wire severing means, a pair of opposed reciprocable bending dies comprising a primary bending die and a secondary bending die, a wire guiding and supporting means in juxtaposition to said bending dies, oscillatable levers for actuating said bending dies, rotatable cams on said shaft for actuating said levers, said cams being so related that the one serving to operate the primary bending die actuating lever leads the one serving to operate the secondary bending die actuating lever and furthermore possesses a dwell section for holding the primary die in actuated position while the secondary bending die completes its operative stroke, and timed actuating means operated by said shaft for first actuating said wire feeding means to dispose wire to be bent in the path of said bending dies and then actuating said wire severing means to cut off a previously made wire formation prior to the operation of said bending dies to produce a succeeding wire formation.

6. In a machine of the kind described, a driven shaft, a reciprocable wire feeding means, a wire severing means, a pair of opposed reciprocable bending dies comprising a primary bending die and a secondary bending die, a wire guiding and supporting means in juxtaposition to said bending dies, oscillatable levers for actuating said bending dies, rotatable cams on said shaft for actuating

said levers, said cams being so related that the one serving to operate the primary bending die actuating lever leads the one serving to operate the secondary bending die actuating lever and furthermore possesses a dwell section for holding the primary die in actuated position while the secondary bending die completes its operative stroke, timed actuating means operated by said shaft for first actuating said wire feeding means to dispose wire to be bent in the path of said bending dies and then actuating said wire severing means to cut off a previously made wire formation prior to the operation of said bending dies to produce a succeeding wire formation, and means to hold advanced wire against retraction during the recovering stroke of said wire feeding means.

7. In a machine of the kind described, a wire feeding means comprising a reciprocable slide block, a plunger bar mounted in said slide block for limited longitudinal movement therein, said plunger bar having a vertical transverse opening therein, a lift means movable in said opening, a wedge block fixed in said slide block to intersect the path of movement of said plunger bar, said wedge block having an upwardly and forwardly inclined wedge groove cooperative with the lower end of said lift means, a movable jaw means controlled by said lift means, a stationary jaw means cooperative with said movable jaw means, said slide block having a wire passage aligned with the opposed ends of said jaw means, and means connected with said plunger bar to both actuate the jaw means and reciprocate said slide block.

In testimony that I claim the invention set forth above I have hereunto set my hand this 15th day of July 1929.

DANIEL KONDAKJIAN.