

Oct. 18, 1927.

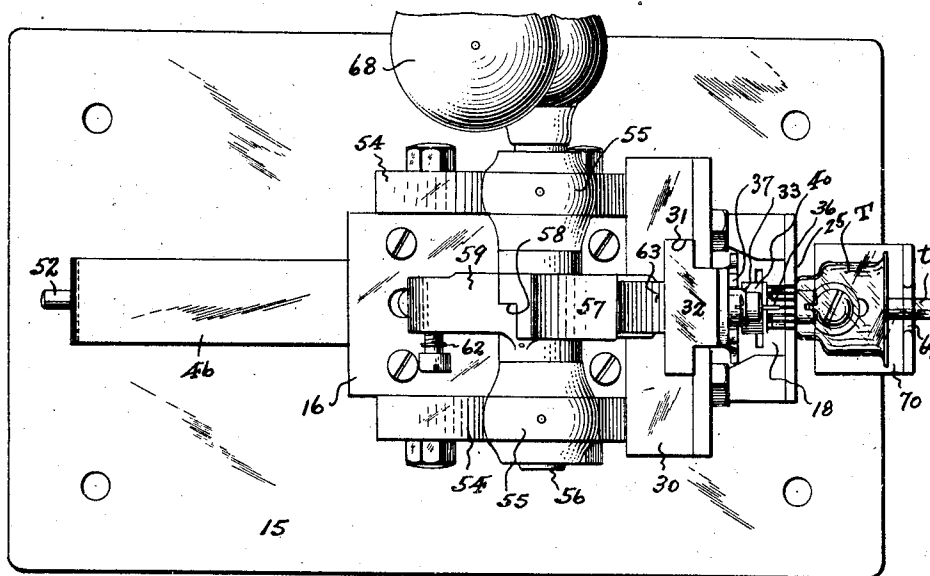
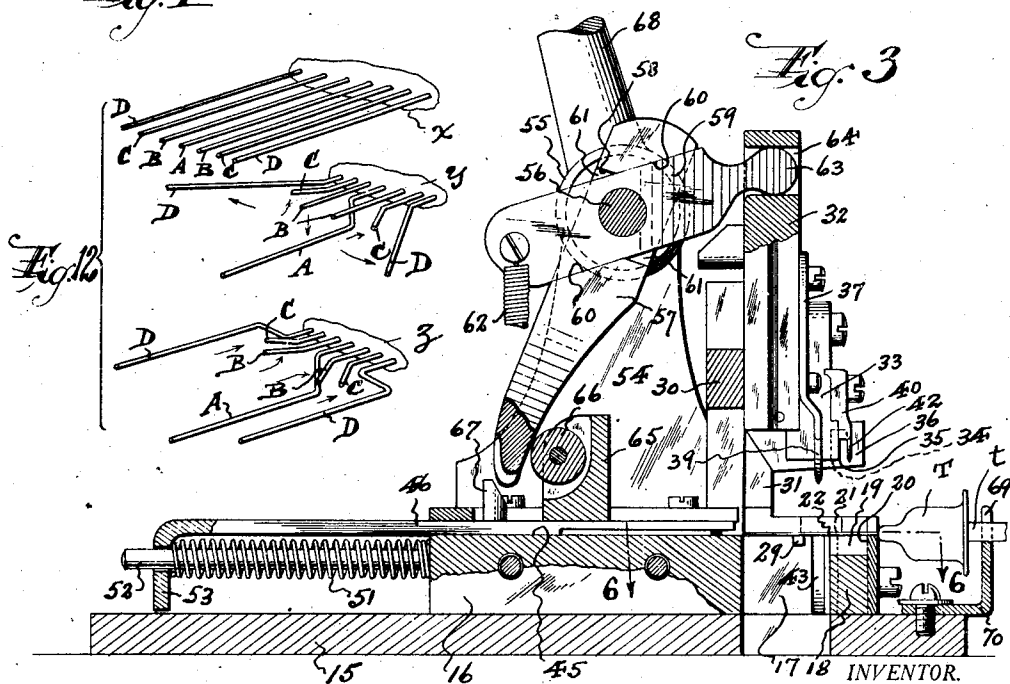
D. KONDAKJIAN

1,645,865

BENDING PRESS

Filed Dec. 10, 1926

3 Sheets-Sheet 1



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Frank J. & Richard,
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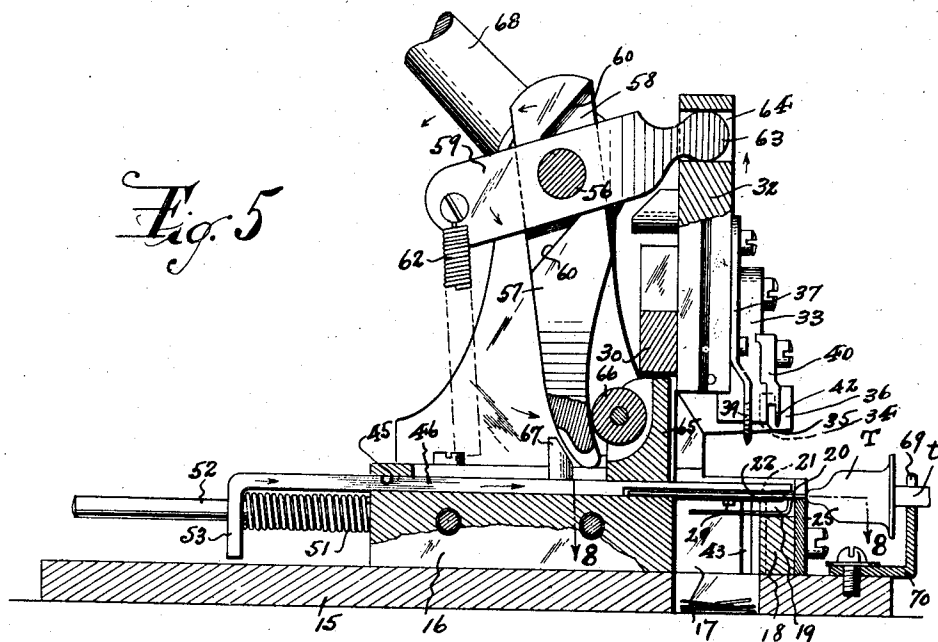
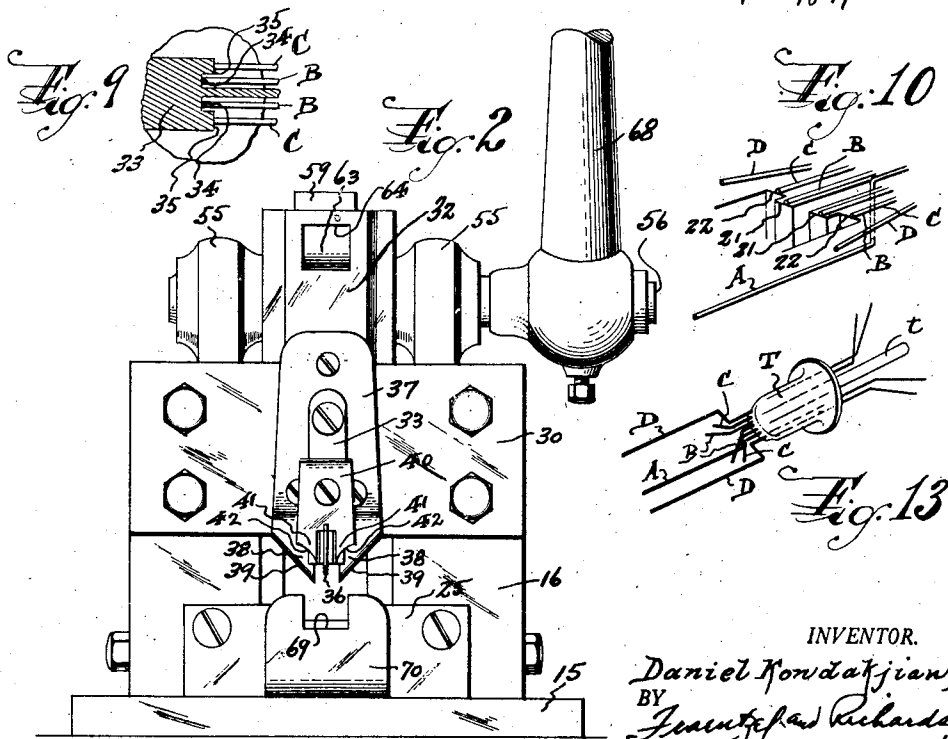
D. KONDAKJIAN

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BENDING PRESS

Filed Dec. 10, 1926

3 Sheets-Sheet 2



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Oct. 18, 1927.

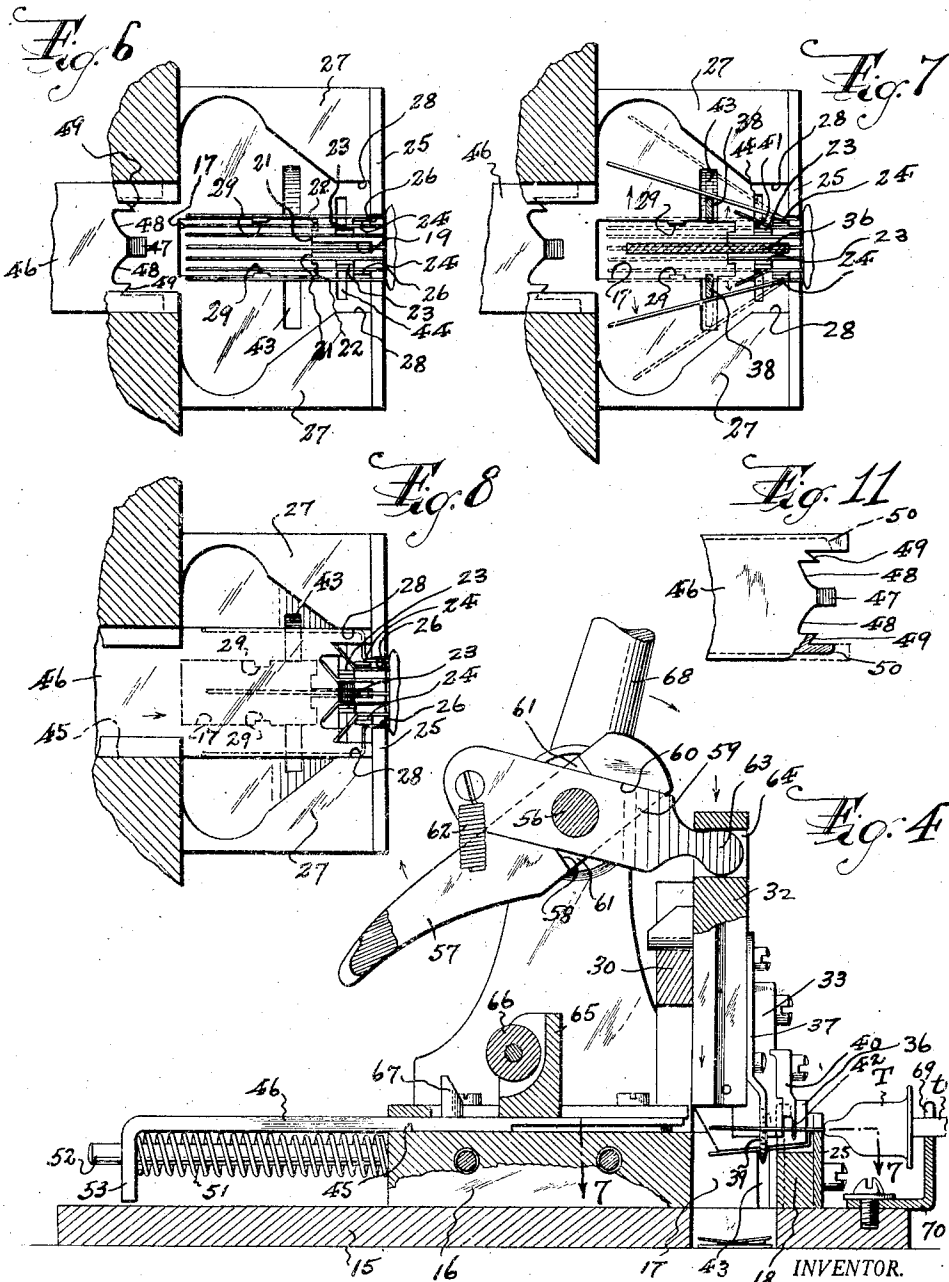
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D. KONDAKJIAN

BENDING PRESS

Filed Dec. 10, 1926

3 Sheets-Sheet 3



INVENTOR.
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UNITED STATES PATENT OFFICE.

DANIEL KONDAKJIAN, OF NEWARK, NEW JERSEY.

BENDING PRESS.

Application filed December 10, 1926. Serial No. 153,749.

This invention relates to improvements in cutting and bending presses for shaping the internal ends of the leads and supports for the elements of vacuum tubes or thermionic amplifiers.

The invention has for its principal object to provide a simple and easily actuated machine in the form of a cutting and bending press, by means of which the leads and supports for the filaments, grids and plates of vacuum tubes or thermionic amplifiers may be automatically and simultaneously shaped, in the process of manufacturing such devices, by substantially one operation, whereby rapid and accurate production may be assured, and necessity for costly hand work or separate cutting and bending operations may be eliminated.

To the above ends, this invention provides a novel cutting and bending press provided with cutting and bending dies or elements, certain of which are actuated by a vertically reciprocable plunger, and others of which are actuated by a horizontally reciprocable plunger, in combination with which is a novel arrangement and construction of compound plunger-actuating lever means by means of which properly timed cooperative movements of the respective plungers is produced by each single oscillation of a power transmission means.

The invention has for a further object to provide a novel detail arrangement and construction of cutting and bending die elements, whereby each lead and support wire connected with the tube base is wrought to desired finished form.

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

With the various objects of this invention in view, the same consists, primarily, in the novel automatic cutting and bending press hereinafter set forth; and, the invention consists, furthermore, in the novel arrangements and combinations of the various devices and parts, as well as in the details of the construction thereof, all of which will be hereinafter more fully described in the following specification, and then finally embodied in the claims appended thereto.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a plan view of the novel cut-

ting and bending press made according to and embodying the principles of this invention; Figure 2 is a front elevation of the same; Figure 3 is a longitudinal vertical section with the parts in normal initial position; Figure 4 is a similar longitudinal vertical section, showing the actuation of the vertical plunger to produce the first stage or phase of the cutting and bending operations; and Figure 5 is another longitudinal vertical section, showing the actuation of the horizontal plunger to produce the final stage or phase of the bending operations.

Figure 6 is a fragmentary horizontal section, taken on line 6—6 in Figure 3; Figure 7 is a similar view, taken on line 7—7 in Figure 4; and Figure 8 is also a similar view, taken on line 8—8 in Figure 5.

Figure 9 is a fragmentary horizontal section through a portion of the vertically reciprocable plunger, to show the cutting elements thereof; and Figure 10 is a fragmentary perspective showing the stationary anvil or cutting and bending block of the machine.

Figure 11 is a fragmentary part plan and part section of the bending elements of the horizontally reciprocable plunger.

Figure 12 is a collective perspective view, showing the stages or phases of the cutting or bending of the leads and supports of the tube base; and Figure 13 is a perspective view of a finished tube base.

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

Referring now to said drawings, the reference character 15 indicates a base plate upon which the mechanism of the novel cutting and bending press is mounted. Suitably fixed upon said base plate is a bed-block 16, which is cut away in its forward portion to provide a well 17 extending downwardly therethrough. That portion of the bed-block 16 which extends forwardly from the well 17 constitutes an anvil portion 18 for supporting the wires forming the leads and supports of the tube base. Extending from the well 17 longitudinally and centrally into said anvil portion 18 is a female bending member 19, the inner end of which provides a bending step 20, against which the central filament support wire A may be bent into desired shape. That end of the anvil portion 18 bounding the outer end of said well

17 is shaped to provide a pair of stationary shearing or cutting portions 21 against which the filament lead-supports B may be cut or trimmed to desired predetermined length. and is further shaped to provide another pair of stationary shearing or cutting portions 22, offset relative to the shearing or cutting portions 21, against which the grid supports C may be cut or trimmed to desired predetermined length. Fixed on said anvil portion 18, so as to project upwardly therefrom at proper locations are a pair of stationary bending posts 23, against which said filament lead-supports B may be bent into desired shape; and also fixed on said anvil portion 18 in proper locations are a second pair of stationary bending posts 24, against which said grid supports C may be bent into desired shape. Secured to the outer end of said bed-block 16, to extend transversely, is a plate 25 having an indented notch in its upper marginal portion, the sides 26 of which project above the level of said anvil portion 18, and provide bending steps against which the plate supports D of the tube bases may be bent. Said anvil portion 18 is provided along each side thereof, and in cooperative relation to said bending steps 26 with guide-blocks 27 suitably shaped to provide female bending die-portions 28 with which certain subsequently described male bending die elements of the horizontally reciprocable plunger cooperate in completing the shapes to which said plate supports D are to conform. The side walls of said well 17 are provided, flush with the surface of said anvil portion 18, with inwardly projecting lugs 29, which serve to preliminarily hold the said plate supports D against accidental depression into said well 17.

Secured to said bed-block 16, with its lower end straddling said bed-block, is an upstanding transversely disposed guide-plate 30 provided with a vertical slideway 31, in which is slidably mounted a vertically reciprocable plunger 32. Mounted on the lower end of said plunger 32 is a shear block 33 having at its forward face cutting edges 34 and 35, which respectively cooperate with said cutting portions 21 and 22 of the anvil portion 18, in shearing relation thereto upon descent of said plunger 32, all whereby said filament lead-support wires B and grid support wires C of a tube base are cut or trimmed to foreshorten the same to the desired length preliminary to bending the same into final desired shape.

Fixedly secured to the lower end of said shear block 33, to extend through the same from rear to front, and so as to project below its bottom end, is a vertical male bending member 36, which is adapted to move downwardly into said female bending member 19 of the anvil portion 18, so that its free outer end cooperates with said bending step 20,

whereby, upon descent of the plunger 32, the central filament support wire A of a tube base is bent downwardly into the desired offset form, as shown.

Also secured to said plunger 32, so as to straddle said shear block 33 is a transverse spreader plate 37 provided at its lower end and at each side of said shear block with spreader fingers 38 having downwardly and inwardly inclined lateral edges or spreader cam portions 39. Said spreader fingers 38 are so spaced laterally, that, upon descent of the plunger 32, the same will engage with their spreader cam portions 39 the plate support wires D of the tube base, so that the same are respectively spread laterally outward, and initially bent against the said bending steps 26.

Secured upon the face of said shear block 33, is another transverse spreader plate 40 which is provided at its lower end with laterally spaced spreader fingers 41, having downwardly and inwardly inclined lateral edges or spreader cam portions 42. Said spreader fingers 41 are so spaced laterally, that, upon descent of the plunger 32, the same will engage with their spreader cam portions 42 the grid support wires C of the tube base, so that the same are respectively spread laterally outwardly, and initially bent against the said bending posts 24.

The bed-block 16 is provided with lateral slots 43 and 44, respectively aligned with and so as to receive the respective pairs of spreader fingers 38 and 41 upon descent of the plunger 32.

The upper side of said bed block 16 is provided with a longitudinal slideway 45, in which is slidably mounted a horizontally reciprocable plunger 46. Said plunger 46 is forwardly movable over the anvil portion 18.

The forward end of said plunger 46 is provided with a central finger 47, upon the opposite sides of which are provided rearwardly and outwardly inclined bending cams 48, which, upon forward movement of the plunger 46, engage the extremities of the filament lead-support wires B to bend the same laterally against the bending posts 23, to thus bring the same into the final desired shape.

The forward end of said plunger 46 is further provided, in properly disposed position beyond the bending cams 48, with additional bending cams 49, which, upon forward movement of the plunger 46, engage the grid support wires C to complete the bending of the same laterally against the bending posts 24, to thus bring the same into final desired shape.

Also provided in connection with the forward end and sides of said plunger 46 are undercut bending cams 50, which, upon forward movement of the plunger, engage the

plate support wires D of the tube base, so that the same are finally bent against the bending steps 26 and guide blocks 27 into final desired shape.

5 Said plunger 46 is both retracted, and normally held in retracted position, by a compression spring 51 which is arranged on a suitable support 52 to extend between the rear end of said bed-block 16 and a depend-
10 ing tail-piece 53 with which the rear end of said plunger 46 is provided.

The means for producing properly timed operative movements of the respective plungers 32 and 46 consists of the follow-
15 ing mechanism:—

Supported on said base plate 15 and secured respectively against opposite sides of said bed-block 16 are a pair of bearing standards 54. Journaled in and extending
20 between the bearing members 55 of said standards 54 is an oscillatable spindle or rock-shaft 56. Fixed on said rock-shaft 56, intermediate the bearing members 55, is a depending primary lever member 57, the
25 lower free end of which terminates above and adjacent to said horizontally reciprocable plunger 46. Said primary lever 57 is provided in one side face with a substantially X-shaped countersunk seat 58. Freely
30 pivoted on said rock-shaft 56 is a forwardly extending secondary lever member 59, which is so disposed as to extend through said X-shaped seat 58 of said primary lever member 57. The above described association of
35 the lever members 57 and 59 is such, that portions of the sides of said X-shaped seat 58 provide abutments, as at 60, which engage the sides of the lever member 59, so that forward turning movement of said rock-
40 shaft 56, which swings rearwardly the lever member 57, will produce an operative downward swinging movement of said lever member 59; and, furthermore said X-shaped seat 58 provides clearance spaces 61, so that
45 upon rearward turning movement of said rock-shaft 56, said lever member 57 will be swung in operative forward direction without disturbing the normal initial position of the lever member 59. Said lever member 59
50 is both retracted to and held in normal initial position by a pull-spring 62 which is connected with its rearward end. The forward free end of said lever member 59 is provided with a knuckle 63 or other suitable
55 projection which is entered in a receiving slot 64, with which the upper end of said vertically reciprocable plunger 32 is provided, or any other suitable form of inter-connection may be provided, whereby the
60 oscillatory motion of said lever member 59 produces the operative vertical reciprocatory movement of said plunger 32.

Fixed to and projecting upwardly from said horizontally reciprocable plunger 46 is
65 an abutment lug 65 which is engaged by the

free end of the lever member 57, upon forward swinging movement of the latter, so that operative forward movement is transmitted to said plunger 46. If desired, said
70 abutment lug 65 may be provided with an anti-friction roller 66 to receive the contact of said lever member 57. Said plunger 46 is further provided, to the rear of said abutment lug 65, with a second lug 67, which is
75 engaged by the rear face of said free end of said lever member 57 at proper times to assure initiation of the retraction of the lever 46, so that any frictional retention of the bending cams of the latter after operation
80 will be overcome.

It is within the scope of this invention to operate the machine by hand or by power, and to such end the rock-shaft 56 may be accordingly provided with suitable power
85 transmission means. For the purposes of illustration, the drawings show the machine arranged for hand operation, the power being applied to the rock-shaft 56 by a hand-lever 68.

In the manufacture of vacuum tubes or thermionic amplifiers, a tube base T is provided, the same being usually made of glass, and through the body of which are passed the leads and support wires for the filament,
90 grid and plate elements of the tube. The said leads and support wires are originally straight and of substantially the same length as shown at X in Figure 12, and consequently before assembling the elements of
95 the tube in connection with said leads and support wires, it is necessary to size and shape the latter to suit the characters and relations of the said elements. The above described machine is adapted to perform
100 this work automatically and substantially by one operation. To such end the machine functions as follows:—

The tube base T is presented at the front of the machine, so that the leads and support wires extend through the indented notch in
110 the plate 25 to lay upon the anvil-portion 18 as illustrated in Figure 6, the exhausting stem or tube *t* of the tube base T being supported by the bifurcated portion 69 of a centering jig or bracket 70. After the tube
115 base T is thus applied in operative relation to the machine, the operator swings forwardly the hand-lever 68, thus producing a forward oscillatory movement of the rock-shaft 56 which produces a rearward swing
120 of the lever member 57, whereby the abutments 60 engage the lever member 59 to cause a downwardly swinging movement of the forward end of the latter, which is transmitted to the plunger 32, to produce an operative descending movement thereof (as
125 shown in Figure 4). The descent of the plunger 32 produces the preliminary phases of the lead and support wire shaping operations by which the filament support wire
130

A is bent into desired off-set shape, the filament lead-supports B are cut or trimmed to proper length, the grid supports C are both cut or trimmed to desired length and preliminarily laterally spread or bent, and the plate supports D preliminarily laterally spread or bent, all in the manner and by the means already above described, and as illustrated at Y in Figure 12 and also in Figure 7. The preliminary phase of the lead and support wire shaping operation of the machine being thus completed, the hand-lever 68 is thereupon swung rearwardly, thus producing a rearward oscillatory movement of said rock-shaft 56 which swings forward the depending lever member 57, thereby releasing the lever member 59 from the pressure of the abutments 60, so that the spring 62 may return said lever member 59 and plunger 32 to normal initial positions, and whereby continued forward swinging movement of the lever member 57 will slide forward the horizontally reciprocable plunger 46 (as illustrated in Figure 5) to operatively engage the preliminary shaped lead and wire supports of the tube T, so that the bending of the wires B, C and D is completed in the manner and by the means already above described, and as illustrated at z in Figure 12 and also in Figure 8, and whereby a finished tube base such as shown in Figure 13 is produced. After the above described operation, the hand lever 68 is returned to normal initial position to at the same time permit the retraction of said plunger 46 to its normal initial position, whereupon the machine is ready for a repetition of the above-described operation.

From the above description it will be apparent that this invention provides a comparatively simple and easily manipulated machine by the aid of which the shaping of the lead and support wires of vacuum tubes may be rapidly carried out, without requiring any special skill upon the part of the operator.

I am aware that some changes may be made in the construction of the cutting and bending press as above described and as illustrated in the accompanying drawings, without departing from the scope of and while still retaining the general principles of this invention. Hence I do not limit my invention to the exact arrangements and construction of parts, as described in the foregoing specification, nor do I confine myself to the exact details of the construction of the various parts as illustrated in the accompanying drawings.

I claim:—

1. In a machine of the kind described, a bed-block having an anvil portion at its forward end, a vertically reciprocable plunger above said anvil portion, means for slidably supporting said plunger, a horizontally re-

ciprocable plunger slidable on said bed-block and movable toward said anvil portion, cooperative means connected with said anvil portion and said respective plungers for cutting and bending the work, a rock-shaft, means for oscillating said rock-shaft, a primary lever-member fixed on said rock-shaft and cooperative with said horizontally reciprocable plunger, a secondary lever-member loosely mounted on said rock-shaft and cooperative with said vertically reciprocable plunger, and means on said primary lever member cooperative with said secondary lever-member whereby retractive movement of the former produces an operative movement of the latter.

2. In a machine of the kind described, a bed-block having an anvil portion at its forward end, a vertically reciprocable plunger above said anvil portion, means for slidably supporting said plunger, a horizontally reciprocable plunger slidable on said bed-block and movable toward said anvil portion, cooperative means connected with said anvil portion and said respective plungers for cutting and bending the work, a rock-shaft, means for oscillating said rock-shaft, a primary lever-member fixed on said rock-shaft and cooperative with said horizontally reciprocable plunger, a secondary lever-member loosely mounted on said rock-shaft and cooperative with said vertically reciprocable plunger, said primary lever-member having a substantially X-shaped seat to receive and embrace said secondary lever-member whereby oscillations of said rock-shaft produce operative movements of said respective lever-members to alternately move said respective plungers toward said anvil portion and the work supported thereon.

3. In a machine of the kind described, a bed-block having an anvil portion at its forward end provided with stationary work cutting and bending elements, a vertically reciprocable plunger above said anvil portion having work cutting and bending elements cooperative with said work cutting and bending elements of the latter, means for slidably supporting said plunger, a horizontally reciprocable plunger slidable on said bed-block and movable toward said anvil portion having additional work bending elements cooperative with said work bending elements of the latter, and means for producing alternate operative movements of said respective plungers toward said anvil portions and the work supported thereon.

4. In a machine of the kind described, a bed-block having an anvil portion at its forward end provided with stationary work cutting and bending elements, a vertically reciprocable plunger above said anvil portion having work cutting and bending elements cooperative with said work cutting

and bending elements of the latter, means for slidably supporting said plunger, a horizontally reciprocable plunger slidably on said bed-block and movable toward said anvil portion having additional work bending elements cooperative with said work bending elements of the latter; a rock-shaft, means for oscillating said rock-shaft, a primary lever-member fixed on said rock-shaft and cooperative with said horizontally reciprocable plunger, a secondary lever-member loosely mounted on said rock-shaft and cooperative with said vertically reciprocable plunger, and means on said primary lever-member cooperative with said secondary lever-member whereby retractive movement of the former produces an operative movement of the latter.

5. In a machine of the kind described, a bed-block having an anvil portion at its forward end provided with stationary work cutting and bending elements, a vertically reciprocable plunger above said anvil portion having work cutting and bending elements cooperative with said work cutting and bending elements of the latter, means for slidably supporting said plunger, a horizontally reciprocable plunger slidably on said bed-block and movable toward said anvil portion having additional work bending elements cooperative with said work bending elements of the latter, a rock-shaft, means for oscillating said rock-shaft, a primary lever-member fixed on said rock-shaft and cooperative with said horizontally reciprocable plunger, a secondary lever-member loosely mounted on said rock-shaft and cooperative with said vertically reciprocable plunger, said primary lever-member having a substantially X-shaped seat to receive and embrace said secondary lever-member whereby oscillations of said rock-shaft produce operative movements of said respective lever-members to alternately move said respective plungers toward said anvil-portion and the work supported thereon.

6. In a machine of the kind described, an anvil-portion having a drop-well therein, stationary cutting elements bordering said drop-well, and stationary bending elements; a vertically reciprocable plunger having a shear-block provided with cutting edges to cooperate with said stationary cutting elements, and spreading and bending elements to cooperate with said stationary bending elements; a horizontally reciprocable plunger having bending cams also adapted to cooperate with said stationary bending elements of said anvil-portion; and means for producing alternate operative movements of said respective plungers toward said anvil-portion and the work supported thereon.

7. In a machine of the kind described, an anvil-portion having a drop-well therein, stationary cutting elements bordering said

drop-well, and stationary bending elements; a vertically reciprocable plunger having a shear-block provided with cutting edges to cooperate with said stationary cutting elements, and spreading and bending elements to cooperate with said stationary bending elements; a horizontally reciprocable plunger having bending cams also adapted to cooperate with said stationary bending elements of said anvil-portion; means for producing alternate operative movements of said respective plungers toward said anvil-portion and the work supported thereon, comprising a rock-shaft, a primary lever fixed on said rock-shaft to actuate said horizontally reciprocable plunger, a secondary lever loosely mounted on said rock-shaft to actuate said vertically reciprocable plunger, and means on said primary lever to cooperate with said secondary lever whereby retractive movement of the former produces an operative movement of the latter.

8. In a machine of the kind described, an anvil-portion having a drop-well therein, stationary cutting elements bordering said drop-well, and stationary bending elements; a vertically reciprocable plunger having a shear-block provided with cutting edges to cooperate with said stationary cutting elements, and spreading and bending elements to cooperate with said stationary bending elements; a horizontally reciprocable plunger having bending cams also adapted to cooperate with said stationary bending elements of said anvil-portion; means for producing alternate operative movements of said respective plungers toward said anvil-portion and the work support thereon, comprising a rock-shaft, a primary lever fixed on said rock-shaft to actuate said horizontally reciprocable plunger, a secondary lever loosely mounted on said rock-shaft to actuate said vertically reciprocable plunger, and said primary lever having a substantially X-shaped seat to receive and embrace said secondary lever as and for the purposes described.

9. In a machine for shaping the lead and support wires of thermionic amplifier tubes, an anvil-portion having a female bending means for the central filament support wire, and bending abutments for the filament lead-support, grid support and plate support wires, said anvil portion having stationary cutting elements for trimming said filament lead-support and grid support wires; a vertically reciprocable plunger movable toward said anvil portion, said plunger having a male bending element for said central filament support wire, and spreader means for preliminarily spreading and laterally bending said grid and plate support wires, said plunger being further provided with cutting elements cooperative with said stationary cutting elements of said anvil por-

tion; a horizontally reciprocable plunger movable toward said anvil portion, said latter plunger having bending cams for bending said filament lead-support wires and completing the bending of said grid and plate support wires; and means for producing alternate operative movements of said respective plungers toward said anvil-portion and the work supported thereon.

10 10. In a machine for shaping the lead and support wires of thermionic amplifier tubes, an anvil-portion having a female bending means for the central filament support wire, and bending abutments for the filament

15 lead-support, grid support and plate support wires, said anvil portion having stationary cutting elements for trimming said filament lead-support and grid support wires; a vertically reciprocable plunger movable toward

20 said anvil portion, said plunger having a male bending element for said central filament support wire, and spreader means for preliminarily spreading and laterally bending said grid and plate support wires.

25 said plunger being further provided with cutting elements cooperative with said stationary cutting elements of said anvil portion; a horizontally reciprocable plunger movable toward said anvil portion, said latter plunger having bending cams for bending

30 of said filament lead-support wires and completing the bending of said grid and plate support wires; means for producing alternate operative movements of said respective plungers toward said anvil-portion

35 and the work supported thereon, comprising a rock-shaft, a primary lever fixed on said rock-shaft to actuate said horizontally reciprocable plunger; a secondary lever loosely

40 mounted on said rock-shaft to actuate said vertically reciprocable plunger, and means on said primary lever to cooperate with said secondary lever whereby retractive

movement of the former produces operative movement of the latter.

11. In a machine for shaping the lead and support wires of thermionic amplifier tubes, an anvil-portion having a female bending means for the central filament support wire, and bending abutments for the filament

50 lead-support, grid support and plate support wires, said anvil portion having stationary cutting elements for trimming said filament lead-support and grid support wires; a vertically reciprocable plunger movable toward

55 said anvil portion, said plunger having a male bending element for said central filament support wire, and spreader means for preliminarily spreading and laterally bending said grid and plate support wires,

60 said plunger being further provided with cutting elements cooperative with said stationary cutting elements of said anvil portion; a horizontally reciprocable plunger movable toward said anvil portion, said latter plunger having bending cams for bending

65 of said filament lead-support wires and completing the bending of said grid and plate support wires; means for producing alternate operative movements of said respective plungers toward said anvil-portion

70 and the work supported thereon, comprising a rock-shaft, a primary lever fixed on said rock-shaft to actuate said horizontally reciprocable plunger, a secondary lever loosely

75 mounted on said rock-shaft to actuate said vertically reciprocable plunger, and said primary lever having a substantially X-shaped seat to receive and embrace said secondary lever, as and for the purposes described.

80

In testimony that I claim the invention set forth above I have hereunto set my hand this 6th day of December, 1926.

DANIEL KONDAKJIAN.