May 6, 1930. E. F. NICKL ET AL 1,757,542

SIDE PINNING MACHINE

Filed March 17, 1926 4 Sheets-Sheet 1

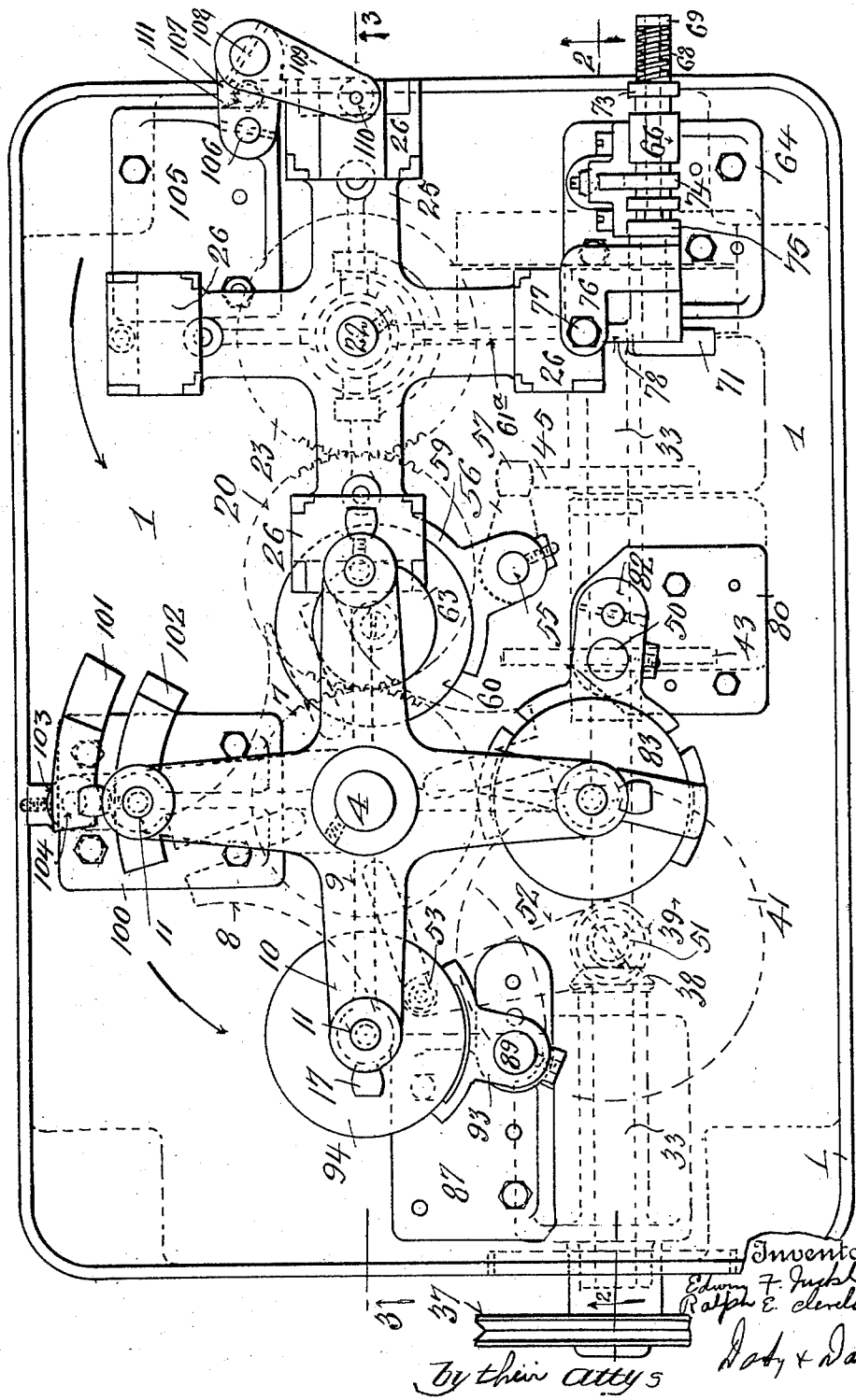


Fig. 1.

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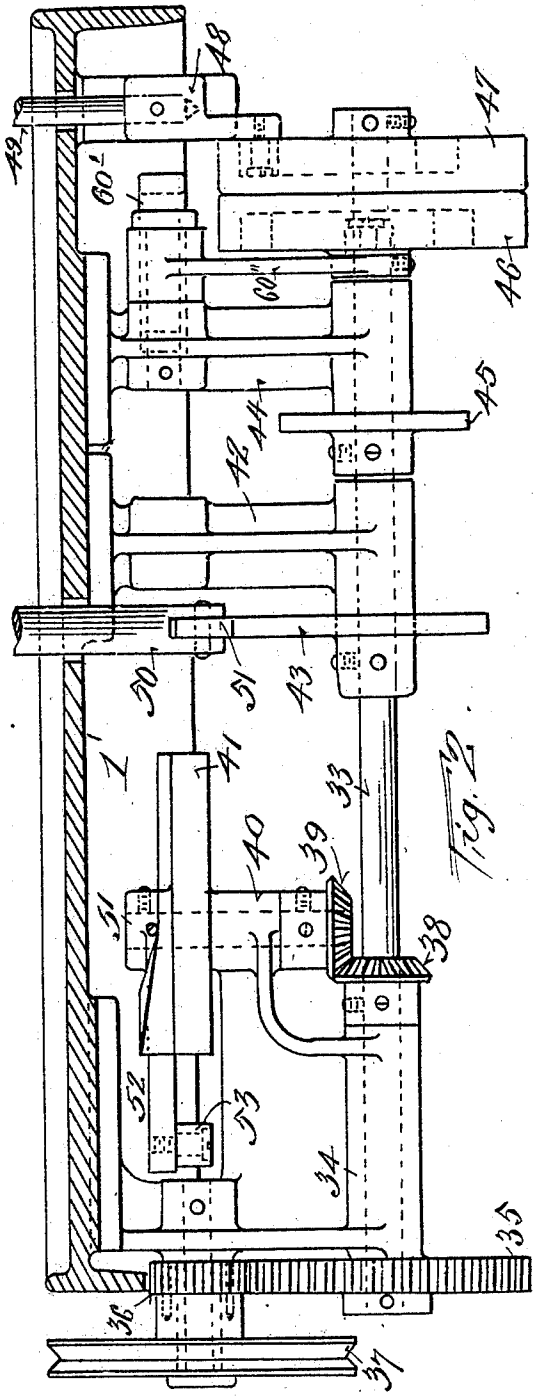


Fig. 2.

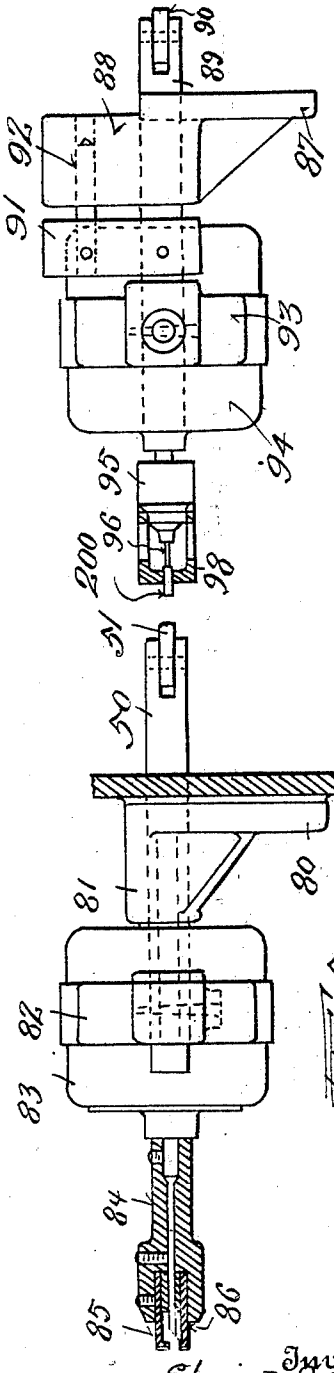


Fig. 6.

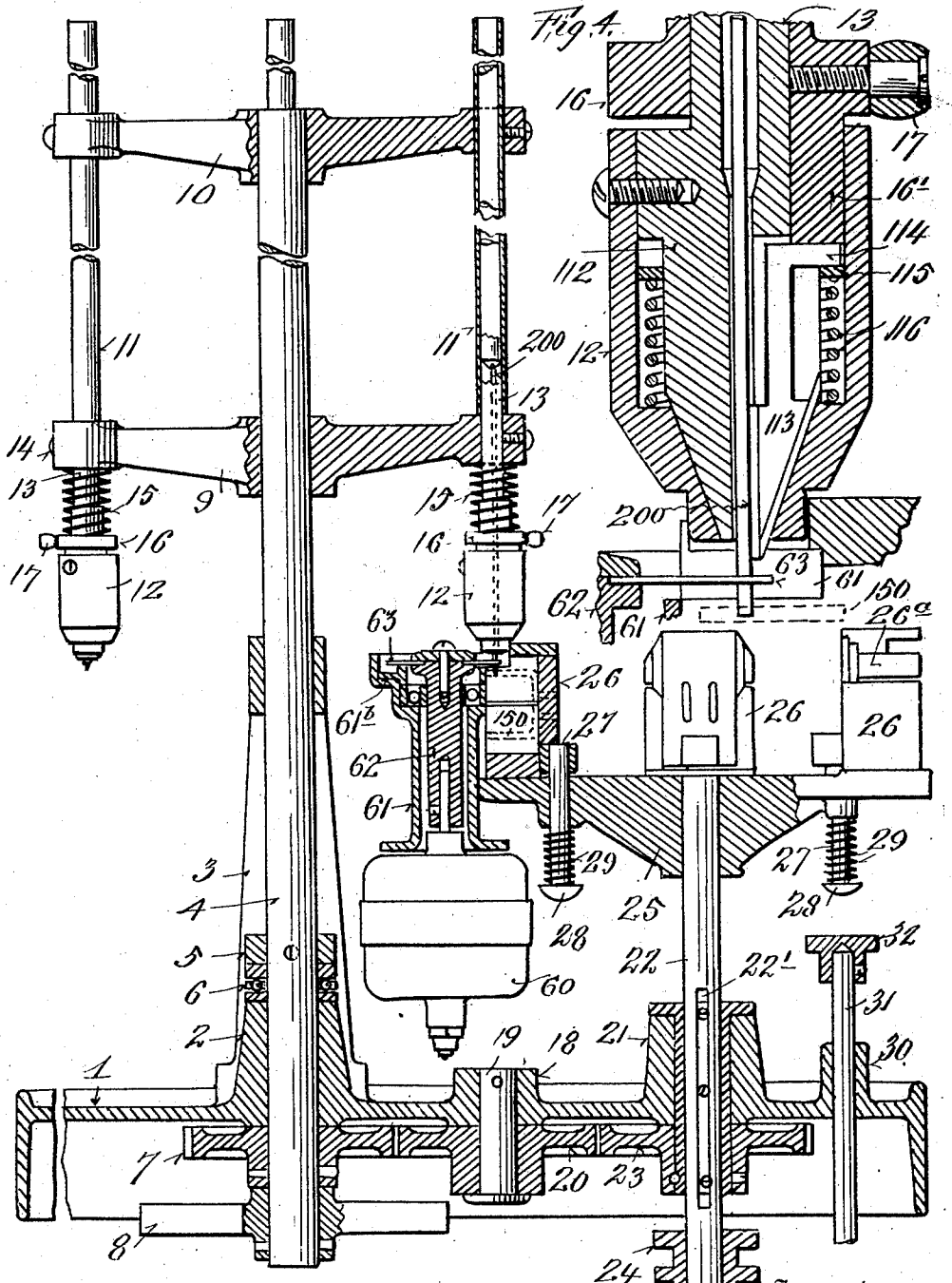
Fig. 5.

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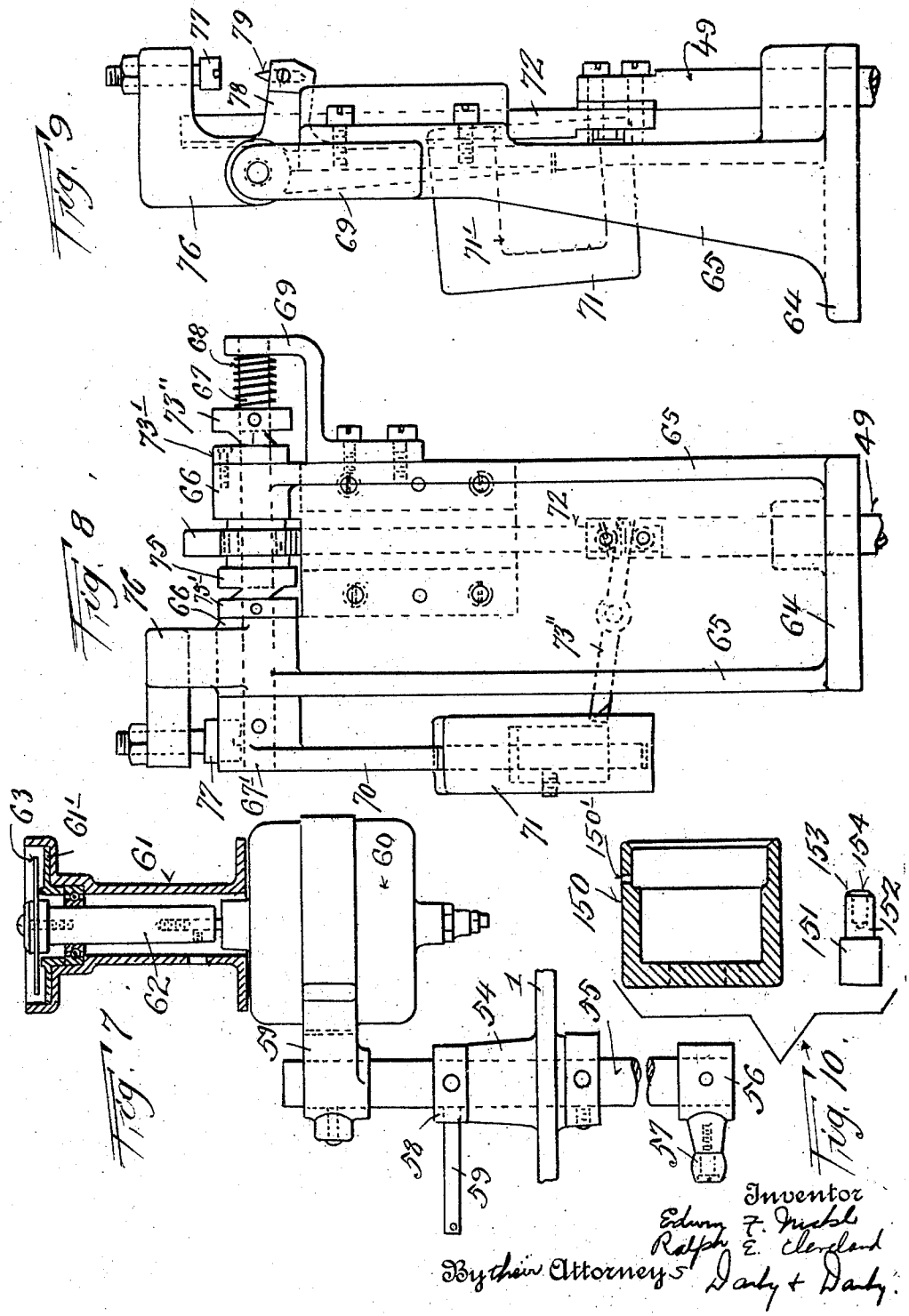
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SIDE PINNING MACHINE

Filed March 17, 1926 4 Sheets-Sheet 4



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Patented May 6, 1930 1,757,542

UNITED STATES PATENT OFFICE

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SIDE PINNING MACHINE

Application filed March 17, 1926. Serial No. 95,216.

This invention relates to automatic machinery.

One of the objects of this invention is the provision of an automatic machine for the purpose of forming, inserting and riveting pins in the bases of lamps and similar articles. As is well known, many devices are secured in place by means of what is known as a bayonet joint. For instance, vacuum tubes, as used in the radio industry, are held in their sockets by means of bayonet joints in which a pin is rigidly secured to the base of the lamp and is intended to cooperate with a slot in the socket wall to secure it therein.

Another object of this invention is the provision of a relatively simple device whereby all the operations necessary for the production of a pin and the securing of it in place are performed automatically.

Another object of this invention is the production of a new and novel device for the above purpose which is simple and easy to construct and efficient in operation and maintenance.

This invention resides substantially in the combination, construction, arrangement and relative location of parts, as will be more fully pointed out hereinafter, and shown in the accompanying drawings.

Referring to the drawings, in which the same reference numerals will be used throughout the several views to indicate the same or similar parts,

Fig. 1 is a top plan view of the device of my invention showing the parts mounted under the bed plate in dotted lines.

Fig. 2 is a cross sectional view taken on the line 2—2 of Fig. 1, looking in the direction of the arrows, with some of the parts broken away for the sake of clarity. This view clearly shows the power operating means.

Fig. 3 is a cross sectional view taken on the line 3—3 of Fig. 1, looking in the direction of the arrows, with some of the parts removed, showing the method of mounting the two spiders.

Fig. 4 is an enlarged detailed view in cross section showing the construction of the stock holding chuck.

Fig. 5 is a side elevational view with parts in cross section of the power driven milling device.

Fig. 6 is a side elevational view with some parts in cross section of the power driven drill.

Fig. 7 is a side elevational view partly in cross section showing the power driven cutter.

Fig. 8 is a side elevational view of the gravity operated riveter.

Fig. 9 is an end elevational view of the same element.

Fig. 10 comprises a longitudinal cross sectional view of a base and an elevational view of a pin in finished form to be inserted therein for riveting.

Originally it has been a rather difficult task to prepare and mount the small securing pin used in the well known bayonet connection, the pin being so small that it is difficult to handle during machining and riveting operations. It is therefore one of the prime purposes of our invention to provide an automatic machine by means of which the pins may be readily made in large quantities from the raw materials, inserted in place and riveted.

The particular operations which we perform on the raw material consist in feeding and gauging the stock in its supporting chuck so that it protrudes a predetermined distance beyond the jaws of the chuck. The next operation consists in drilling a small depression in the end of the projecting stock, then turning a shoulder and taper on the free end thereof, inserting the reduced portion into a hole in the base to which the pin is to be secured, cutting the completed pin from the stock, and then riveting it in place.

In Figs. 1 and 3, at 1, is shown the base plate which has protruding upward therefrom an integral hollow lug 2. Extending at a somewhat greater height and held over the lug 2 is a standard 3 having a bar shoulder at the top, in which is journalled a vertical shaft 4 which in turn passes through the hollow lug 2.

Secured to the shaft is a small collar 5 which supports the rotatable vertical shaft 4 on a ball bearing mounting 6, which in turn rests on the projection 2. Keyed to the lower end of the shaft 4 is one element 8 of a Geneva gear and keyed on the shaft 4 between the element 8 and the base plate 1 is a gear wheel 7. Rigidly secured to the upper free end of the vertical shaft 4 are two spiders 9 and 10 which form a cross with four projecting arms, as clearly shown in Fig. 1. Secured to the ends of the arms are a plurality of hollow tubes 11 within which slide the shank 13 which forms part of the chucks 12. Small set screws 14 extend through the ends of the spider arms to hold members 13 to prevent the chucks from rotating in their supports. Mounted between a collar 16, secured to the chuck 12 and the free ends of the arms 9 are springs 15 which tend to force the chucks downwardly. Small cam followers 17 are mounted for rotation on the collar 16, as is clearly shown in Fig. 4. Journalled in the lug 18 on the base plate 1 is a short shaft 19 which supports the gear 20, meshing with the gear 7 and the gear 23, which is rigidly secured to the vertically extending rotatable shaft 22 which is mounted in a journal 21 forming part of the base plate. The vertical shaft 22 has secured to its lower end, which projects below the base plate, a cam 24 and formed in the side of the shaft 22 is a key way 22′ for a purpose which will appear later.

Integral with the shaft 22 is another spider 25 forming a cross with four projecting arms, as is clearly shown in Fig. 1. Attached to the upper faces of the spider 25 are the base chucks 26 which are so constructed that the upper portion 26^a may slide vertically on the lower portion 26. This motion is caused by means of a short plunger 28 which extends through the spider 25 and is secured to the lugs 27 on the side of the movable part 26^a of the base chucks. These base chucks are to be used to hold the bases of lamps and similar articles while the pin is being riveted in place.

Mounted on the bed plate 1 for sliding movement at 30 is a rod 31 having a cap 32 which is intended to cooperate with the plungers 28 as they move directly over it. The rod 31 and its cap 32 are caused to move vertically by means of a foot operated pedal which is not shown in the drawings.

In Fig. 2 is shown a horizontally extending shaft 33 journalled in the supports 34, 42 and 44 which depend from the base plate 1. At 38 and 39 are mitre gears of which 38 is secured to the shaft 33, and 39 is secured to a vertical rotatable shaft 51 mounted in the bearing 40. Keyed to this shaft is a cam 41, and the other element of the Geneva gear, 52. Mounted on this element 52 is a cam member 53 which cooperates with the slots in the element 8 and the Geneva movement to cause the spiders 9 and 10 to rotate 90° for each rotation of the shaft 51. Since the shaft 22 is connected to the shaft 4 by means of gears 7, 20 and 23, the spider 25 will also rotate through an intermediate motion, an angle of 90° at the same time as the spiders 9 and 10 are moved.

At 35 on one end of the shaft 33 is a gear which meshes with a small pinion 36 secured to the driving pulley 37 journalled in a support on the bed plate 1. Adjacent the support 42 is a cam 43 connected to the shaft 33, and between the supports 42 and 44 is another cam 45 connected to the shaft 33. At the extreme end of the shaft 33 are two cams 46 and 47 which are also keyed to the shaft 33. Riding in the cam groove of cam 47 is a cam follower 48 to which is secured a vertical movable shaft 49 extending through the bed plate. The cam groove in the cam 46 cooperates with the cam follower on the end of arm 60″ which is mounted to rotate about a short shaft 60′. A short arm, 61^a, (shown in Fig. 1) is attached to the collar on the upper end of the arm 60.

Cooperating with the cam 43 is a cam follower 51 journalled in the end of the vertical movable shaft 50 which extends through the bed plate 1 for a purpose which will appear hereinafter.

Referring to Figs. 1 and 7, in which is shown the power operated cutter, 54 is a hollow support integral with the base plate 1 in which is journalled a vertical shaft 55 having keyed to its lower end a collar 56 on which is mounted for rotation a cam follower 57 which cooperates with the cam 45 to cause the shaft 55 to rotate about a vertical axis. Secured to the shaft 55 and resting on the hollow lug 54 is a collar 58 having an extension 59′ to which is to be secured a coiled spring (not shown in the drawings), and which in turn is to be secured to some fixed point in order to hold the cam follower 57 against the cam 45 so as to always oppose any motion of the shaft 55 due to the cam 45.

Bolted to the upper end of the shaft 55 is an arm 59 which supports a small electric motor 80. Encircling the saw support 62 which is attached to the end of the shaft of the motor is a bracket casing 61. A small circular saw 63 is mounted in the upper end of the member 62 and is guided by a collar structure 61′.

In Figs. 1, 8 and 9, are different views of the structure of the riveting element. The riveter consists of a base plate 64 bolted to the bed plate 1 of the machine having vertically extending arms 65 with bearing journals 66 at their upper ends to form a support for a rotatable shaft 67. Bolted to one of the upstanding arms 65 is a small lug 69 in which one free end of the shaft 67 is mounted to form one abutment for a spring 68

which presses at its other end against a cam follower 73 keyed to the shaft 67. In the other bearing 66 is journalled a short shaft 67′ to which is rigidly keyed at one end the cam 75′. On the other end of the short shaft 67′ is an arm 70 having attached to its free end a large weight 71. The vertical slidable rod 49 previously mentioned, extends upwardly through the base plate 1 and the plate 64, and is attached at its upper end to a rack 72 which cooperates with a pinion 74 keyed to the long shaft 67. Pivoted on one of the supports 65 is a short lever 73″ having one end extended into an opening 71′ in the weight 70, and the other end pivotally secured to the vertical movable shaft 49 and rack 72. On the other end of the short shaft 67 is a cam follower 75 which cooperates with the cam 75′ rigidly secured to the short shaft 67′. The cam 75′ is constructed with ridges on its surface to form a structure similar to a pawl and ratchet. Bolted to one side of the bearing 66 is a cam 73′ which cooperates with the cam follower 73 keyed to the shaft 67. Supported on the other bearing 66 is a short arm 76 into which is bolted a small riveting anvil 77 having a depression in its end which cooperates with hammer 79 mounted on the short arm 78 formed integral with the collar on the upper end of the arm 70 to form in effect a bell crank lever.

The operation of the riveter is as follows: As the cam 47 rotates, it forces the vertical slidable rod 49 upwardly, carrying with it the rack 72 which, meshing with the teeth on half of the gear 74, causes the short shaft 67 to rotate. Rotating with the shaft 67 is cam follower 75 which catches in the teeth on the cam 75′ and causes the short shaft 67′ to which it is keyed to rotate with it. This carries the arm 70′ and its weight to be raised, looking at the device, as shown in Fig. 9. This causes the arm 79 to be withdrawn away from the anvil 77. While this is occurring, the cam follower 73 is travelling over the surface of the cam 73′ which has a raised portion on it so that the shaft 67 is gradually moved to the right, viewing the device as in Fig. 8, until the cam follower 75 is withdrawn out of contact with the teeth on the cam 75′ against the action of the spring 68 until the short shaft 67′ with its weighted arm 70 is freed. The weight then descends under the action of gravity forcing the hammer up against the anvil, causing it to perform the riveting operation, which will be described hereinafter. The pivoted rod 73″ is intended to extend past the edge of the weight 71, as shown in Fig. 8, so that when the arm 70 and is weight 71 descend under the force of gravity, it will extend past the edge of the weight to prevent it from bounding backwards after reaching the end of its downward stroke, rod 49 having in the meantime descended, carrying the pivoted arm 73 back to its normal position.

In Figs. 1 and 5 is shown a milling device which consists of a supporting block 80 to be secured to the base plate 1, and having an integral lug 81 in which is slidably mounted the shaft 50, and a rotatably mounted cam follower 51. Mounted on the shaft 50 is a bracket 82 which supports a small electric motor 83 having a chuck 84 mounted on its shaft, which is used to hold a milling member 85 and a taper cutting member 86 so that as the raw stock is fed into the end of this structure, a shoulder is cut on it by the element 85, and a taper is cut on its end by means of the element 86.

In Figs. 1 and 6 is shown the device for drilling a small hole in the end of the pin. This consists of a block 87 to be secured to the base plate, as shown in Fig. 1, and having an integral lug 88, through which extends a slidable shaft 89 having a cam follower 90 on its lower end. A short link 91 is keyed to the shaft 89, and has mounted in it a short pin 92 to slide in a guiding hole in the lug 88 to prevent the shaft 89 from rotating. Bolted to the upper end of shaft 89 is a bracket 93 formed to support a small electric motor 94. Attached to the free end of the shaft of the motor 94 is a chuck 95 for holding a drill 96 within a centering cage 98 secured to the periphery of the chuck 95. The stock 200 is fed through a small hole in the end of the cage 98 against the point of the drill to have a small hole drilled in the end of it.

At 100 is a small plate bolted to the bed plate 1, which supports the standard 103 and a cam surface 101 intended to cooperate with the rollers 17 on each of the chucks so that as the roller rolls up on to the cam surface 101, the chuck jaws are moved upwardly to free the stock, permitting it to fall down into contact with the gauge surface 102 so that it will project a predetermined distance beyond the jaws of the chuck. As the cam roller 17 rolls over the surface 101, the chuck jaws grip the stock 200 as will appear more clearly hereinafter. The cam surface 101 is mounted on a short rod 104 which extends into a lug 103 secured to the base plate 100 so that by means of the set screw, as shown in Fig. 1, the height of the cam face 101 with respect to the base plate may be varied. Thus the amount which the movable jaws of the chuck will be raised by the cam follower 17′ by the cam face 101 may be varied.

Another plate 105 bolted to the bed plate 1 has projecting into it a small centering pin 106 keyed to a short arm 107 which is forced upwardly to its normal position by means of a spring 111. The short arm 107 is secured to a vertical rod 108 mounted to slide vertically under the action of a foot operated pedal not shown. Keyed to the rod 108 and above the arm 107 is a short arm 109 having

depending from its end a centering pin 110 which is intended when the foot pedal is depressed, to pull the arm 109 downwardly to cooperate with a small hole 150′ on the side of the base 150 held in the chuck 26.

Referring now to Fig. 4, in which is shown an enlarged cross sectional view of the chuck 12, 16 is the collar with its cam roller 17 secured to the part 13 of the chuck. The jaw guide 112 is screwed to the chuck casing, as shown, while the jaw 113, (there being three of these jaws) by means of the projection 114, cooperates with a spring pressed washer 115, the spring 116 being inserted between the end of the casing of the chuck 12 and the washer 115 to force the chuck jaw 113 upwardly against an integral projection 16′ on the collar 16. As the cam roller 17 rolls on to the inclined cam surface 101, the collar 16 is forced upwardly releasing the tension on the spring 116, which forces the jaws 113 upwardly so as to free the stock 200 which may fall by gravity until its lower end contacts with the gauging surface 102 shown in Fig. 1. As the roller 17 moves out of contact with the cam surface 101, the spring 15 (Fig. 3) forces the collar 16 back into normal position against the action of spring 116 forcing the jaw 113 downwardly to clamp the stock between it and the jaws 112.

Referring to Fig. 10, as described, the base to receive the bayonet pins is shown at 150 with the small hole 150′. A completed pin ready for insertion in the hole 150′ is shown at 151, having a shoulder 152, the tapered end 153 and the counterbore 154.

We will now explain the operation of our device:

Referring particularly to Fig. 1, the arrows show the direction of rotation of the spiders mounted on the shafts 4 and 22. The stock 200 is placed in all four of the hollow rods 11 to project down into the chucks. Power is applied to the pulley 37 which causes the shaft 33 to rotate and with it, the element 52 of the Geneva movement which cooperates with the other element 8 and the Geneva movement to rotate the rod 4 and with it the spiders 9 and 10, so that the cam follower 17 riding up on the cam 101 raises the movable jaws of the chuck to allow the stock 200 to fall down in contact with the gauging surface 102. After this operation, the Geneva movement causes the chuck in which the rod has been gauged, to move over the cam surface 101 so as to clamp the stock tightly in position. At the end of this second movement, the stock is presented to the drill driven by the motor 94 which drills a small hole in the end of the rod, the drill being fed upwardly by means of the cam 41 acting through the vertical shaft 89. At the end of this operation, the drilling rod moves to the third position directly over the miller driven by the motor 83, where the shoulder and taper are turned on the end of the rod through the agency of the cam 43 forcing the rod 50 upwardly and carrying the miller with it. The next operation then consists in inserting the pin in a base, which is done by the chuck moving to the fourth position, which is the position shown in Fig. 1. While these operations have been taking place, the operator has placed in the base chucks 26 bases which are centered by depressing the foot pedal (not shown), to force the centering pin 110 into the small hole 150′. The centered chucks then move around while the gauging, drilling and milling operations take place, so that, as the rod is moved into position, as shown in Fig. 1, a centered base has also moved into this position, the spiders 9 and 25 having moved in unison through the agencies of the gears, as previously explained. The shaft 33 has by this time rotated the cam 46 so as to move the arm 60″ pivoted at 60′, and with it the arm 61′, which has on its end a cam follower to cooperate with the cam 24 on the lower end of shaft 22 so as to force the base directly under the prepared stock upwardly so that the reduced portion of the stock is forced into the hole 150′, as is shown in Fig. 3. The cam 45 has now rotated to such a position that it forces the cam follower 57 in such a direction as to rotate the shaft 55, and with it the power driven saw 63 so as to cut off the inserted pin. This arrangement is also clearly shown in Fig. 3. The bell crank lever comprising arms 60″ and 61ª, is now rotated back to its normal position by the cam 46 so as to drop the vertically slidable shaft 22 and its spider 25 down to normal position. The inserted pin is now ready for riveting. The spider rotates another quarter of a turn, carrying the base with its inserted pin into cooperative relation with the riveter mounted on the plate 64. The cam 47 on the shaft 33 is now rotating to such a position that the vertically slidable rod 49 moves upwardly, and with it the rack 72, to rotate the weight 71 to a raised position. The cam 73′ has then forced the cam follower 75 out of contact with the roughened surface of the cam 75′ so as to free the weight 71, which then falls by the force of gravity, driving the hammer 79 into the drilled end of the pin, which has its other end resting against the anvil 77 to rivet the pin in place. This explanation, while directed merely to the operations on one pin and base, applies of course to all the pins and bases which are being secured together. It is evident that these operations are continuous, and it is only necessary for the operator to keep the machine supplied with wire stock and mount the bases in the chucks and center them, the rest of the operations being automatic.

Having now described the construction and operation of our device, we wish it to be distinctly understood that we do not desire to

be limited to the exact details of construction and operation, since it is evident to one skilled in the art that many modifications may be made without involving invention. We therefore define the spirit and scope of our invention by the appended claims.

What we seek to secure by United States Letters Patent is:

1. In a machine of the character described the combination of a rotatable member carrying a plurality of vacuum tube bases, each base having an opening to receive a pin, a support carrying a stock of pin material, means for cutting said material to predetermined lengths, means for intermittently rotating said support to bring the cut material successively into registry with the openings in said bases, and means effective upon each of said registries to rivet said cut material in the base opening.

2. In a side pinning machine for forming pins from stock and mounting them in bases for lamps and similar articles, the combination of means for supporting the stock, and means for intermittently rotating said supporting means with means for supporting the bases or similar articles and means for intermittently rotating said base supporting means.

3. In a side pinning machine for forming pins from stock and mounting them in bases for lamps or similar articles, the combination of means for supporting the stock and means for intermittenly rotating said supporting means with means for supporting the bases or similar articles comprising lever operated chucks for holding them.

4. In a side pinning machine for forming pins from stock and mounting them in bases for lamps or similar articles, the combination of means for supporting the stock and means for intermittently rotating said supporting means with means for supporting the bases or similar articles comprising lever operated chucks for holding them, and means for intermittently rotating said base supporting means.

5. In a side pinning machine for forming pins from stock and mounting them in bases for lamps or similar articles, the combination of means for supporting the stock and means for intermittently rotating said supporting means with means for supporting the bases or similar articles comprising lever operated chucks for holding them, and means for forming a pin and inserting it in a base or similar article.

6. In a side pinning machine for forming pins from stock and mounting them in bases for lamps or similar articles, the combination of means for supporting the stock and means for intermittently rotating said supporting means with means for supporting the bases or similar articles comprising lever operated chucks for holding them, means for forming a pin, means for inserting it in a base and means for riveting the pin in the base.

7. In a side pinning machine for forming pins from stock and mounting them in bases for lamps or similar articles, the combination of means for supporting the stock and means for intermittently rotating said supporting means with means for supporting the bases or similar articles comprising lever operated chucks for holding them, means for forming a pin, means for inserting it in a base and means for riveting the pin in the base, all of said means being operated from a common source of power.

8. In a side pinning machine for forming pins from stock and mounting them in bases for lamps and similar articles, the combination of a support having mounted therein a spider for holding the stock and a spider for holding the bases with means for intermittently rotating said spiders.

9. In a side pinning machine for forming pins from stock and mounting them in bases for lamps and similar articles, the combination of a support having mounted therein a spider for holding the stock, a spider for holding the bases and means for intermittently rotating said spider, with means for feeding, gauging, drilling, forming a shoulder and taper, inserting and sawing off the pin from the stock.

10. In a side pinning machine for forming pins from stock and mounting them in bases for lamps and similar articles, the combination of a support having mounted thereon a spider for holding the stock and a spider for holding the bases, with a plurality of means for forming the pins, and means for riveting the pins in the bases.

11. In a side pinning machine for forming pins from stock and mounting them in bases for lamps and similar articles, the combination of a support having mounted thereon a spider for holding the stock and a spider for holding the bases, with a plurality of means for forming the pins, and means for riveting the pins in the bases, said means comprising an anvil and gravity operating hammer.

12. In a side pinning machine for forming pins from stock and mounting them in bases for lamps and similar articles, the combination of a spider for holding the stock mounted on a support for intermittent rotation, a spider for holding the base mounted on the support for intermittent rotation, and means for causing said spiders to rotate in unison, with independent power driven means for forming the pin, inserting it in a base and riveting it.

13. In a side pinning machine for forming pins from stock and mounting them in bases for lamps and similar articles, the combination of a spider for holding the stock mounted on a support for intermittent rotation, a

spider for holding the base mounted on the support for intermittent rotation, and means for causing said spiders to rotate in unison, with independent power driven means for forming the pin, lever operated means for holding the base on its supporting spider, means for inserting the pin, cutting from the stock and riveting it in place.

14. In a side pinning machine for forming pins from stock and mounting them in bases for lamps and similar articles, the combination of a table member, spider means for supporting stock, spider means for supporting a base, both of said means being mounted on a support so as to be intermittently rotated in unison, means for forming and inserting a pin in a base and means for riveting the pin, comprising a support having a shaft journalled therein, a weight mounted on said shaft and having a hammer therein, an anvil on said shaft support, means for raising said weight and means for releasing said weight to permit it to fall freely to rivet the pin.

15. In a side pinning machine for forming pins from stock and mounting them in bases for lamps and similar articles, the combination of a table member, spider means for supporting stock, comprising a plurality of chucks mounted on said stock supporting spider, cooperating means on said chuck and table for opening said chuck to free the stock for gauging, means for supporting a base, means for forming and inserting a pin, and means for riveting the pin.

16. In a side pinning machine for forming pins from stock and mounting them in bases for lamps and similar articles, the combination of a table member, spider means for supporting stock, means for supporting bases comprising chucks having a movable part and a stationary part, said movable part being mounted on a spring pressed plunger sliding in a supporting means, a push rod for sliding the plunger to open the base holding chucks, and means for forming the pins.

17. In a side pinning machine, a bed plate, a plurality of rotatable spiders mounted on said bed plate, means for rotating said spiders, a plurality of chucks on said spiders, and means for forming a pin, means for inserting it and gravity means for riveting it.

18. In a side pinning machine, a bed plate, a rotatable stock holding spider, a rotatable base holding spider, means on said plate for causing said spiders to intermittently rotate said spiders in unison, means for forming a pin comprising an independently driven drill, mill and cutter, means for inserting the finished pin, comprising cam means for sliding the base holding spider transversely of the bed plate, and means for riveting the pins in place.

19. In a machine of the character described, means for supporting a vacuum tube base, said base having a hole in the wall thereof to receive a pin, means for supporting said base for rotary motion, means effective when said base reaches a certain point in its rotary motion for forcing a pin into the opening therein, and means for riveting said pin in said opening.

20. In a machine of the type described, the combination with means for forming a pin and means for supporting a base of means for affixing the pin to the base while in said support.

In testimony whereof we have hereunto set our hands on this 26th day of February A. D., 1926.

EDWIN F. NICKL.
RALPH E. CLEVELAND.