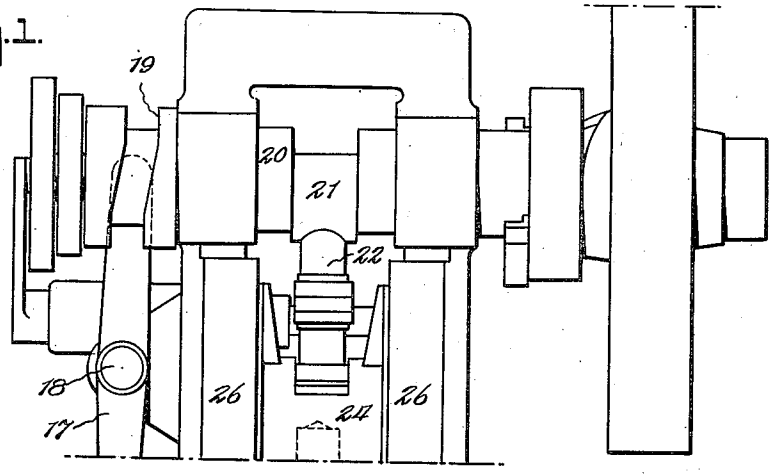
Aug. 10, 1943. A. J. KOSHA 2,326,660

MACHINE FOR MAKING SOCKET PINS

Filed July 31, 1941 4 Sheets-Sheet 1

Fig. 1.



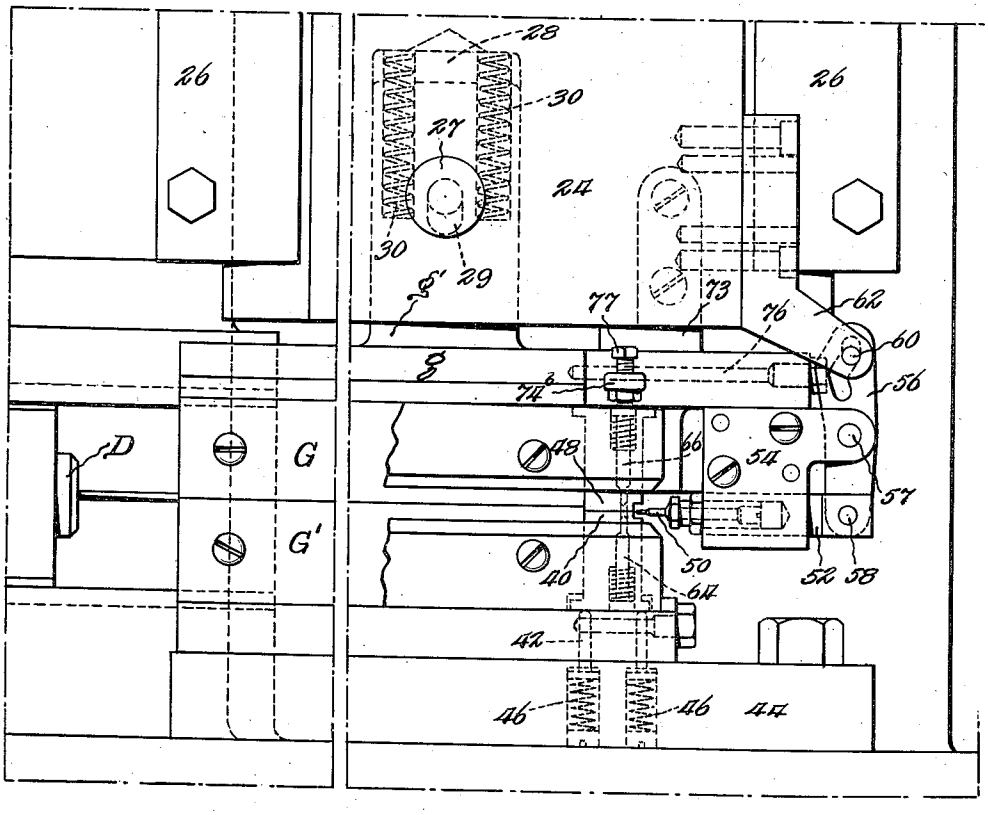


Fig. 2.

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MACHINE FOR MAKING SOCKET PINS

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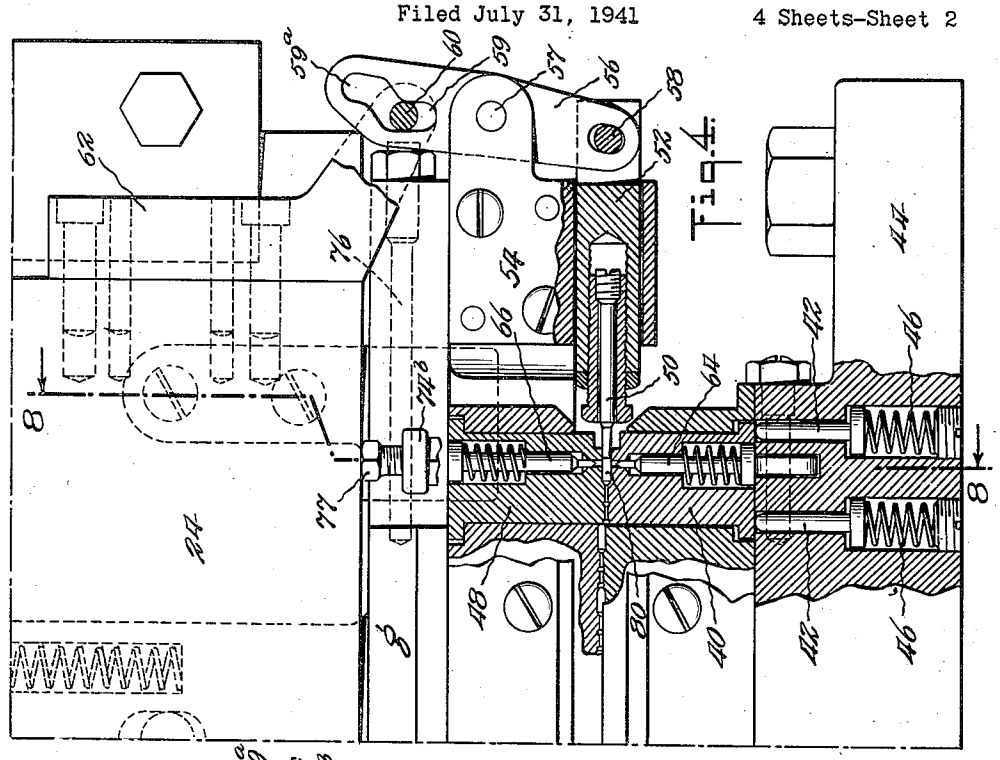


Fig. 4.

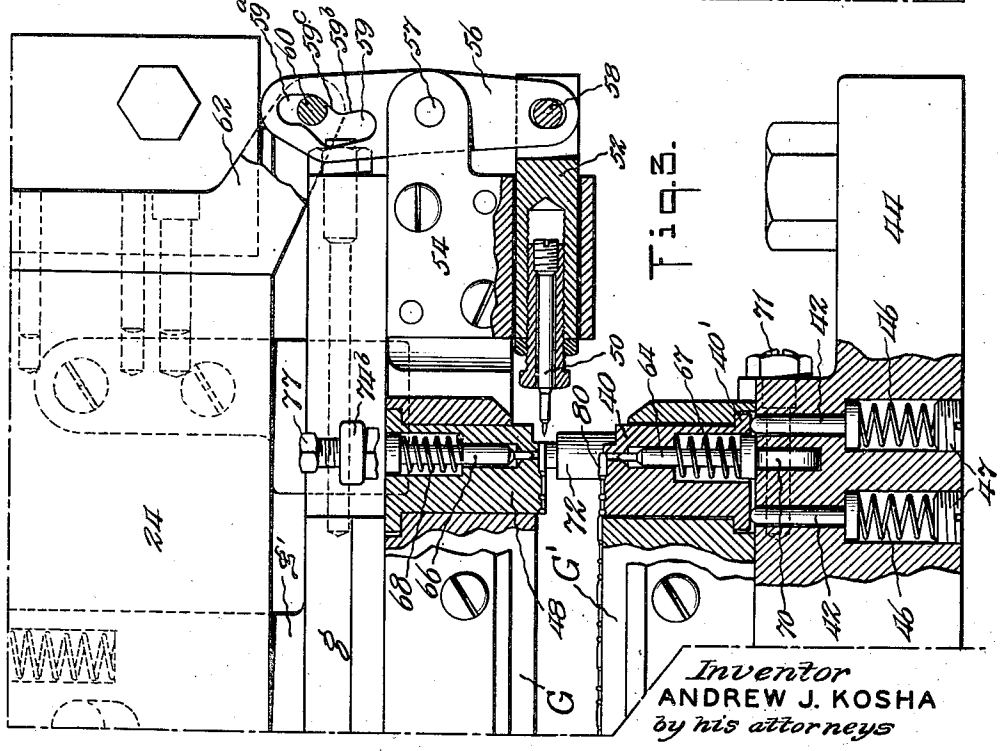


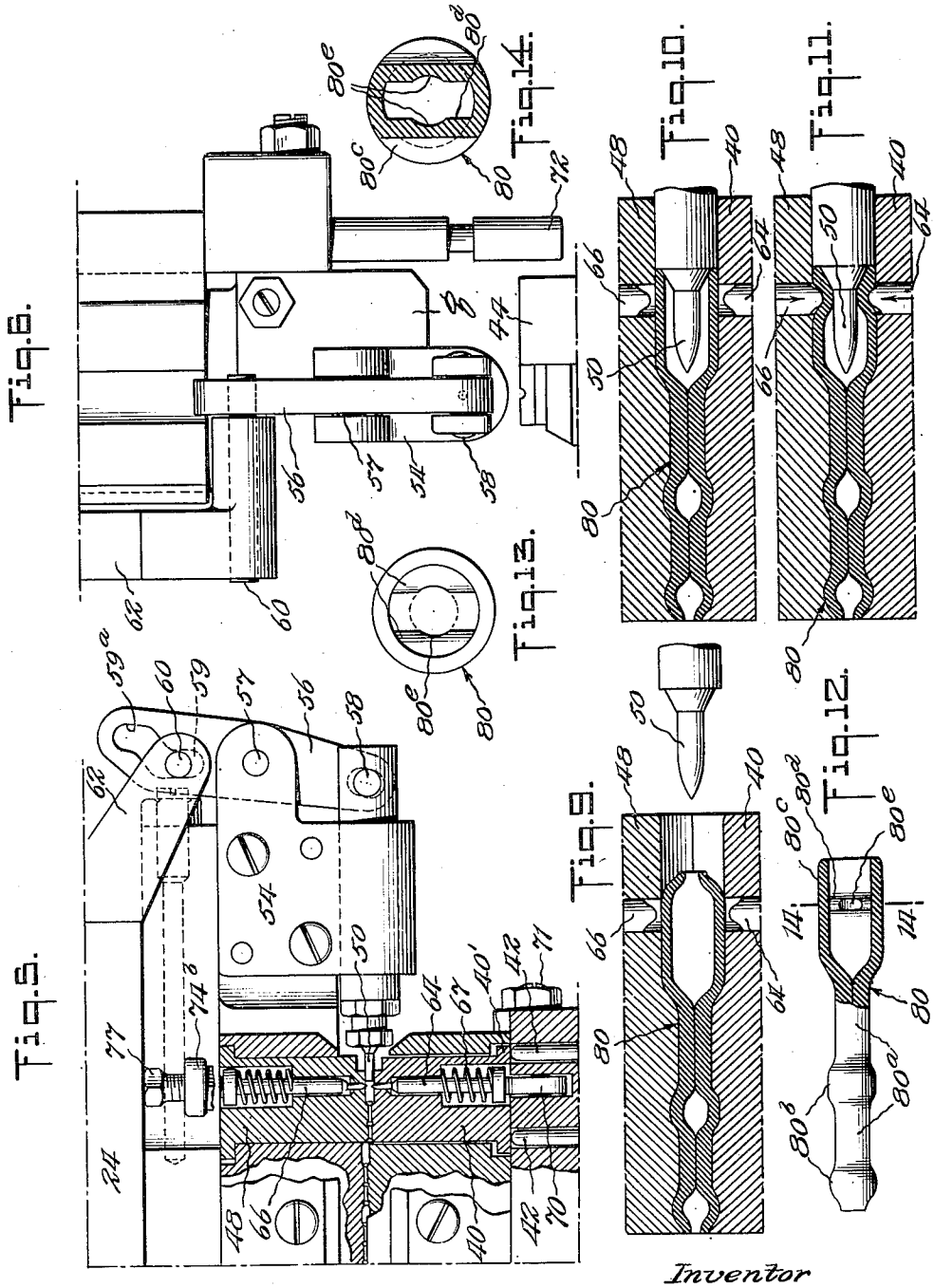
Fig. 5.

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MACHINE FOR MAKING SOCKET PINS

Filed July 31, 1941 4 Sheets-Sheet 3



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MACHINE FOR MAKING SOCKET PINS

Filed July 31, 1941 4 Sheets-Sheet 4

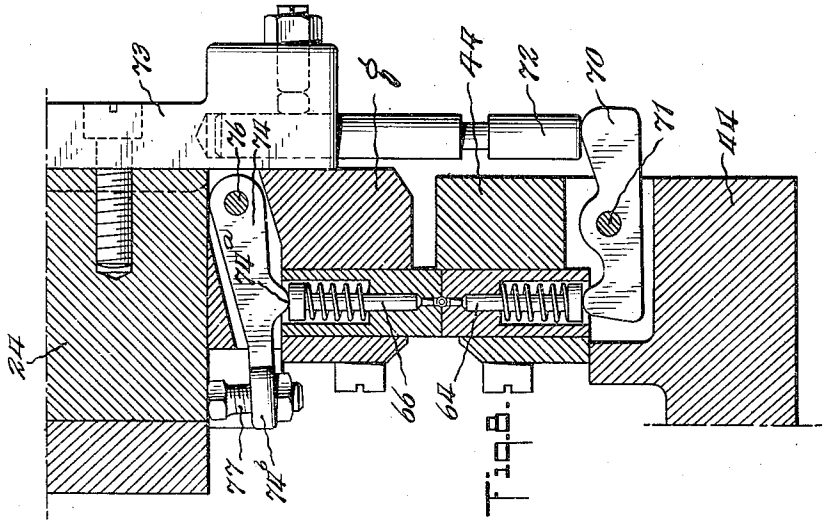


Fig. 8.

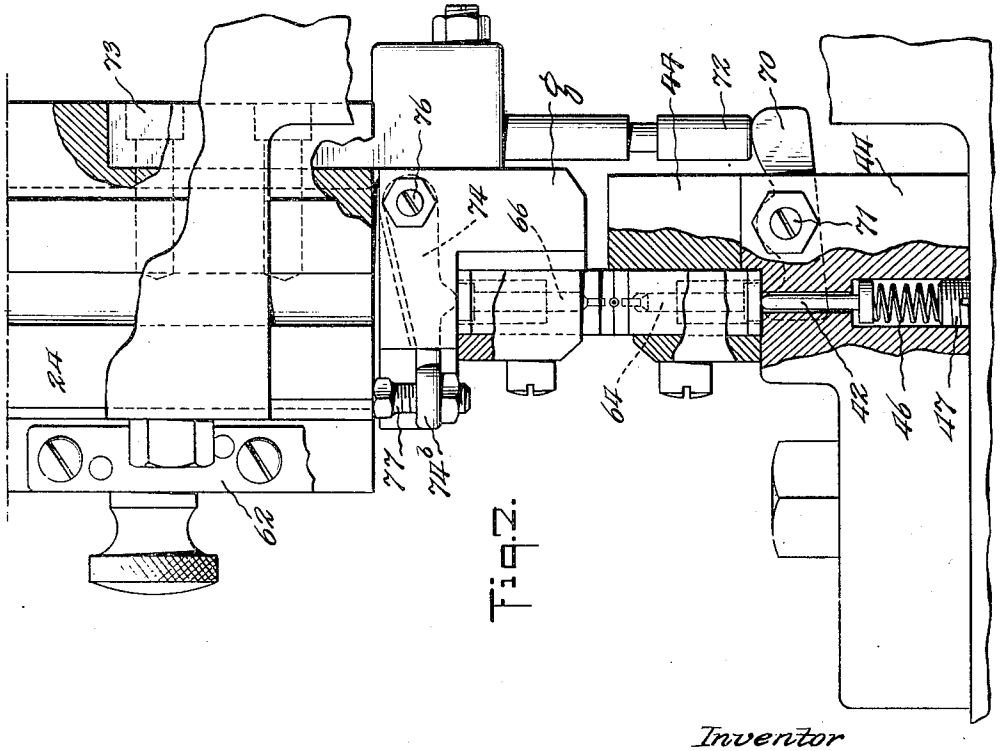


Fig. 7.

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Patented Aug. 10, 1943 2,326,660

UNITED STATES PATENT OFFICE

2,326,660

MACHINE FOR MAKING SOCKET PINS

Andrew J. Kosha, Stratford, Conn., assignor to The Bead Chain Manufacturing Company, Bridgeport, Conn., a corporation of Connecticut

Application July 31, 1941, Serial No. 404,939

16 Claims. (Cl. 113—1)

This invention relates to machines for making small tubular devices and more particularly to machines for making socket pins for radio tubes from flat strip material and it is an object to provide a machine of the type described which will produce a socket pin having an opening of a predetermined extent between inwardly extending projections formed in the pin wall and which serve to retain and make contact with the projecting contact pins of radio tubes.

In the drawings—

Figure 1 is a partial view in elevation of the upper portion of a machine of the type to which this invention is applied.

Figure 2 is a broken view in elevation of the lower portion of the machine of Figure 1 arranged in accordance with this invention, the parts being drawn to a larger scale than in Figure 1 and some parts being broken away to show other parts more clearly;

Figure 3 is a fragmentary view, drawn to a still larger scale and partly in elevation and partly in vertical section, of the structure shown in Figure 2, the parts being shown as positioned when the dies are separated;

Figure 4 is a view similar to Figure 3, the parts being shown as positioned when the dies have separated the partially formed socket pin from the remainder of the material strip and the pin has been opened at one end;

Figure 5 is a view similar to Figure 3, the parts being shown as positioned when the nicking punches are forming the inwardly extending projections in the pin;

Figure 6 is a view in elevation, looking from the right in Figure 5;

Figure 7 is a view partly in elevation as in Figure 6 and partly in vertical section, parts being broken away to show other parts more clearly;

Figure 8 is a partial view in vertical section taken as on line 8—8 of Figure 4;

Figures 9, 10 and 11 are fragmentary sectional views showing the relation of the mandrel and nicking punches to the pin during the end opening and nicking operations; Figure 9 showing the socket pin separated from the strip and held by the dies preparatory to the end opening operation; Figure 10 showing the mandrel in the pin after completion of the end opening operation and preparatory to the nicking operation and Figure 11 shows the nicking punches forcing the wall of the pin against the mandrel at the completion of the nicking operation;

Figure 12 is a view partly in elevation and partly in section of a complete socket pin;

Figure 13 is a view in end elevation, drawn to a larger scale, of the pin shown in Figure 12 as seen looking from the right in that figure; and

Figure 14 is a sectional view of the socket pin taken as on line 14—14 of Figure 12.

In the drawings the invention is shown in connection with a machine for forming socket pins which is of the general construction shown in the Goodridge and Gagnon Patent No. 1,087,876, issued February 17, 1914, only such parts of the machine being shown as is necessary to illustrate the application of the invention thereto. The parts shown comprise the main drive or crank shaft 20 having a crank 21 to which a connecting rod 22 joins a die gate or slide 24 arranged to travel in the guide ways 26. The slide 24 is recessed, as at 28, forming a pocket in which extends the shank or stem g' of a die holder g carrying the upper or movable die G. A pin 27 engaging in openings in the slide 24 and in a slot 29 in the stem g' secures the die holder g to the slide 24. Springs 30, seated in recesses in the stem g' and confined between the stem g' and the slide 24 normally hold the die holder g at its lower position on the slide 24 but permit of relative movement of the slide 24 and die holder g. The movable or upper die G cooperates with a lower or fixed die G', which is so positioned that the dies are engaged for an appreciable period upon each operation of the movable die G.

The main shaft 20 is also provided with a grooved cam or cam track 19 engaged by a lever 17 pivotally mounted as at 18 and connected to the drawing die D. The shape of the cam path 19 and its relation to the crank 21 is such that, while the dies G and G', are engaged, the die D is moved to the left, as seen in Figure 2, to shape into a tube a length of the strip metal fed thereto equal to the length of a socket pin the dies G and G' holding the strip material against longitudinal movement while the die D fashions a length of the tube, and the die D is moved to the right, while the dies G and G' are separated, a distance equal to the length of a socket pin so as to shift the material with relation to the dies G and G', step by step for the various forming and swaging operations necessary in shaping the socket pin from the continuous metal tube formed by the die D, the resistance to movement of the strip material in the die D being sufficient to cause the strip material to move with the die D when the dies G and G' are separated.

At its end, removed from the die D, the lower or fixed die G' is provided with a movable die portion 40 having a shoulder 40' which limits up-

ward movement of the die portion 40 to a position in which it alines with the lower die G'. The die portion 40 is pressed upwardly by plungers 42 mounted in openings in the base 44 and engaged by springs 46 confined between the heads of the plungers 42 and threaded plugs 47 closing the plunger openings. Cooperating with the die portion 40 is a die portion 48 fixed in the movable die G, the die portion 48 being arranged to project beyond the remainder of the die G so as to depress the die portion 40 upon engagement of the dies G and G'. The die portions 40 and 48 are so arranged with respect to the dies G and G' that movement of the material by the die D places only a single socket pin between these die portions and depressing the die portion 40 by the die portion 48 serves to separate the pin engaged by these die portions from the strips.

As shown in Figure 9, the forming of the socket pins in a string, attached end to end, causes the socket portion of the pin to be partially closed at its outer end and in order to open this end of the pin there is provided a mandrel 50 adjustably mounted in a slide 52 carried by a bracket 54 attached to the die holder *g*. The mandrel 50 is operated by means of a lever 56 pivotally mounted, as at 57, on the bracket 54 and having a slot at its lower end receiving a pin 58 on the slide 52 and an irregularly shaped slot 59 at its upper end receiving a pin 60 projecting from a bracket 62 attached to the slide 24. The slot 59 comprises two end portions 59^a and 59^b which are substantially parallel but offset from each other and are joined by a portion 59^c inclined to the axes of the other portions.

The mandrel 50 is positioned to enter the end of a socket pin held against the die portion 48 and, being mounted on a bracket attached to the die holder *g*, maintains that position at all times. The pin 60 being attached by bracket 62 to the slide 24 is not moved relatively to the slot 59 so long as the die holder *g* and slide 24 move together but upon engagement of the dies G and G' and the movement of the slide 24 relatively to the die holder *g* the pin 60 is moved along the portion 59^c of the slot 59, operating the lever 56 and advancing the mandrel 50 to enter the socket pin held between the die portions 40 and 48 and open the end of the pin as shown in Figure 10. The length of the slot portion 59^c is sufficient to provide the desired movement of the mandrel 50 but not sufficient to accommodate the full movement of the pin 60 so the slot portion 59^b is provided in which the pin 60 may move without operating the mandrel during the last part of the movement of the slide 24 downwardly relatively to the die holder *g*.

Slidably mounted in the die portions 40 and 48 are the nicking punches 64 and 66, respectively, which are normally held retracted by the springs 67 and 68, respectively. To operate the punch 64 there is provided a lever 70, pivotally mounted on a pin 71 inserted in the die base 44. The lever 70 has one end extending into a slot in the base 44 beneath the head of the punch 64 and the other end projecting beyond the base 44 in position to be engaged by a plunger 72 adjustably mounted in a bracket 73 attached to the slide 24. To operate the punch 66 there is provided a lever 74 mounted in a slot in the die holder *g*. The lever 74 is pivoted at its inner end on a pin 76 inserted in the die holder *g* and is provided with a projection 74^a engaging the head of the punch 66. At its outer end the lever 74 is formed with a threaded eye 74^b to receive an adjustable abutment 77 positioned to have its upper end engaged by the slide 24. The adjustments of the plunger 72 and the abutment 77 are such that the levers 70 and 74 are operated to operate the punches 64 and 66 during that period of the motion of the slide 24 relatively to the die holder *g*, when the pin 60 is moving in the slot portion 59^b and the mandrel 50 is being held stationary in the socket pin. With the mandrel 50 held in position in the pin during the operation of the punches 64 and 66, the mandrel 50 serves to accurately determine the distance between the inner faces of the indentations formed in the pin by the punches 64, 66 as shown in Figure 11 so that the minimum inner dimension of the pins formed on the machine will be uniform.

Upon completion of the downward movement of the slide 24 relatively to the die holder *g* the slide 24 starts to move upwardly relatively to the die holder *g*, the springs 30 holding the dies G and G' engaged. Upon the start of the relatively upward movement of the slide 24, the pressure upon the levers 70 and 74 is withdrawn and the springs 67 and 68 retract their respective punches. During this movement the pin 60 is moving in the slot portion 59^b and the mandrel 50 is held in the pin until the punches 64 and 66 are fully retracted. The pin 60 then moves in the slot portion 59^c and retracts the mandrel 50. The slot 29 in the slide 24 permits the springs 30 to hold the dies G and G' engaged until the mandrel is fully retracted from the pin and thereafter the pin 29 causes the dies G and G' to be separated and the spring pressed plungers 42 raise the movable die portion 40 into position to receive the next pin which is placed upon the die portion 40 by the movement to the right by the tube drawing die D. The socket pin 80 is shown in Figure 12 as comprising substantially solid portions 80^a, hollow portions 80^b, and a pin receiving end portion 80^c as the result of the swaging and shaping by the dies G and G' of the tube drawn by the die D. The pin receiving portion 80^c has the inwardly extending projections 80^d formed by the nicking punches adjacent its outer end. In practice, the plunger 72 and abutment 77 may be set so that when the nicking punches are at the limit of their inward movement they are spaced apart a less distance than the diameter of the mandrel plus twice the thickness of the metal of the socket pin wall. This results in flowing slightly the metal of the pin wall so that the projections 80^d are formed with small cylindrical portions as at 80^e which are of exactly the diameter of the mandrel and thus definitely determine the smallest inner dimension of the pin receiving portion.

The particular socket pin shown and described is not claimed herein as it is claimed in my application Serial No. 422,451, filed December 10th, 1941.

What I claim is:

1. In a socket pin making machine, means for forming a tube from flat strip material, means for shaping said tube into a pin having a tubular portion partially closed at one end, a mandrel for opening the partially closed end of said pin and means for grooving said tubular portion cooperating with said mandrel in determining the size of a reduced opening in said tubular portion.

2. In a socket pin making machine, means for shaping a pin having a tubular portion from a continuous tube, said tubular portion having a partially closed end, means for separating the pin

from the continuous tube and holding said pin, a mandrel for opening said partially closed end and means for forcing opposite portions of said tubular portion inwardly to a depth determined by the mandrel.

3. In a socket pin making machine, means for shaping a pin having a tubular portion from a continuous tube, said tubular portion having a partially closed end, means for separating said pin from a continuous tube and holding said pin, a mandrel for opening said partially closed end and means for transversely grooving said tubular portion, said mandrel limiting the closing of said tubular portion by said grooving means.

4. In a socket pin making machine, means for shaping a pin having a tubular portion from a continuous tube, said tubular portion having a partially closed end, means for separating said pin from the continuous tube and holding said pin, a mandrel for opening said partially closed end and means for transversely grooving said tubular portion on opposite sides thereof, said mandrel insuring a predetermined opening between said grooves.

5. In a pin making machine, a fixed die and a movable die cooperating to shape socket pins from tubular material, means for operating said movable die, means connecting said operating means and movable die providing a predetermined period of engagement of said fixed and movable dies upon each operation of said movable die, a mandrel for opening an end of the pin and means connecting said mandrel and operating means for operating said mandrel while said dies are engaged.

6. In a pin making machine, a fixed die and a movable die cooperating to shape socket pins from tubular material, means for operating said movable die, means connecting said operating means and movable die providing a predetermined period of engagement of said fixed and movable dies upon each operation of said movable die, means for grooving the pin and means for operating said grooving means from said operating means while said dies are engaged.

7. In a pin making machine, a fixed die and a movable die cooperating to shape socket pins from tubular material, means for operating said movable die, means connecting said operating means and movable die providing a predetermined period of engagement of said fixed and movable dies upon each operation of said movable die, a mandrel for opening an end of the pin, means for grooving the pin and means for operating said mandrel and grooving means from said operating means while said dies are engaged.

8. In a pin making machine, a fixed die and a movable die cooperating to shape socket pins from tubular material, means for operating said movable die, means connecting said operating means and movable die providing a predetermined period of engagement of said fixed and movable dies upon each operation of said movable die, a mandrel for opening an end of the pin, means for grooving the pin and means for operating said mandrel and grooving means in succession from said operating means while said dies are engaged.

9. In a pin making machine, a fixed die and a movable die cooperating to shape socket pins from tubular material, means for operating said movable die, means connecting said operating means and movable die providing a predetermined period of engagement of said fixed and movable dies upon each operation of said movable die, a mandrel for opening an end of the pin, means for grooving the pin, means for operating said mandrel from said operating means while said dies are engaged to open the pin end and to retain said mandrel in the pin and means for operating said grooving means from said operating means while said mandrel is retained in said pin.

10. In a pin making machine, a fixed die and a movable die cooperating to shape socket pins from tubular material, means for operating said movable die, means connecting said operating means and movable die providing a predetermined period of engagement of said fixed and movable dies upon each operation of said movable die, a movable die portion in said fixed die, a cooperating die portion in said movable die displacing said movable die portion with respect to said fixed die at each operation of said movable die, pin grooving means in said movable die portion and said cooperating die portion and means operated by said die operating means for operating said grooving means during engagement of said dies.

11. In a pin making machine, a fixed die and a movable die cooperating to shape socket pins from tubular material, means for operating said movable die, means connecting said operating means and movable die providing a predetermined period of engagement of said fixed and movable dies upon each operation of said movable die, a movable die portion in said fixed die, a cooperating die portion in said movable die displacing said movable die portion with respect to said fixed die at each operation of said movable die to separate a pin from said tubular material and hold said separated pin, a mandrel for opening an end of said separated pin and means for operating said mandrel from said die operating means to open an end of said separated pin while said separated pin is held by said movable and cooperating die portions.

12. In a pin making machine, a fixed die and a movable die cooperating to shape socket pins from tubular material, means for operating said movable die, means connecting said operating means and movable die providing a predetermined period of engagement of said fixed and movable dies upon each operation of said movable die, a movable die portion in said fixed die, a cooperating die portion in said movable die displacing said movable die portion with respect to said fixed die at each operation of said movable die, to separate a pin from said tubular material and hold said separated pin, a mandrel for opening an end of said separated pin, means for operating said mandrel from said die operating means to open an end of said separate pin while said separated pin is held by said movable and cooperating die portions, means in said movable and cooperating die portions for grooving the pin and means for operating said grooving means from said die operating means in succession to said mandrel while the pin is held by said movable and cooperating die portions.

13. In a pin making machine, a fixed die and a movable die cooperating to shape socket pins from tubular material, means for operating said movable die, means connecting said operating means and movable die providing a predetermined period of engagement of said fixed and movable dies upon each operation of said movable die, a movable die portion in said fixed die, a cooperating die portion in said movable die

displacing said movable die portion with respect to said fixed die at each operation of said movable die to separate a pin from said tubular material and hold said separated pin, a mandrel for opening an end of said separated pin, means for operating said mandrel from said die operating means to open an end of said separated pin and to retain said mandrel in said separated pin while said separated pin is held by said movable and cooperating die portions, means in said movable and cooperating die portions for grooving the pin held by said die portions and means for operating said grooving means while said mandrel is retained in the pin.

14. In a pin making machine, a fixed die and a movable die cooperating to shape socket pins from tubular material, means for operating said movable die, means connecting said operating means and movable die providing a predetermined period of engagement of said fixed and movable dies upon each operation of said movable die, a movable die portion in said fixed die, a cooperating die portion in said movable die displacing said movable die portion with respect to said fixed die at each operation of said movable die to separate a pin from said tubular material and hold said separated pin, a mandrel for opening an end of said separated pin, means for operating said mandrel from said die operating means to open an end of said separated pin and to retain said mandrel in said separated pin while said separated pin is held by said movable and cooperating die portions, means in said movable and cooperating die portions for grooving the pin held by said die portions and means for operating said grooving means while said mandrel is positioned to limit the operation of said grooving means.

15. In a pin making machine, a fixed die and a movable die cooperating to shape socket pins from tubular material, means for operating said movable die, means connecting said operating means and movable die providing a predetermined period of engagement of said fixed and movable dies upon each operation of said movable die, a movable die portion in said fixed die, a cooperating die portion in said movable die displacing said movable die portion with respect to said fixed die at each operation of said movable die to separate a pin from said tubular material and hold said separated pin, a mandrel for opening an end of said separated pin, means for operating said mandrel from said die operating means to open an end of said separated pin and to retain said mandrel in said separated pin while said separated pin is held by said movable and cooperating die portions, means in said movable and cooperating die portions for grooving the pin held by said die portions and means for operating said grooving means while said mandrel is positioned to limit the operation of said grooving means, said mandrel and said grooving means being withdrawn from engagement with said pin while said pin is held by said movable and cooperating die portions.

16. In a pin making machine, a fixed die and a movable die cooperating to shape socket pins from tubular material, means for operating said movable die, means connecting said operating means and movable die providing a predetermined period of engagement of said fixed and movable dies upon each operation of said movable die, a movable die portion in said fixed die, a cooperating die portion in said movable die displacing said movable die portion with respect to said fixed die at each operation of said movable die to separate a pin from said tubular material and hold said separated pin, a mandrel for opening an end of said separated pin, means for operating said mandrel from said die operating means to open an end of said separated pin and to retain said mandrel in said separated pin while said separated pin is held by said movable and cooperating die portions, means in said movable and cooperating die portions for grooving the pin held by said die portions and means for operating said grooving means while said mandrel is retained in position to maintain a predetermined minimum opening in the pin.

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