April 12, 1932. E. L. STARR 1,854,000

METHOD AND APPARATUS FOR MAKING CONTACT PINS

Filed July 13, 1929

Fig. 1.




Fig. 2.

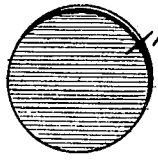



Fig. 3.




Fig. 4.

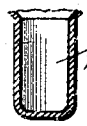



Fig. 5.

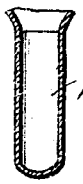



Fig. 6.

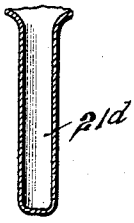



Fig. 7.

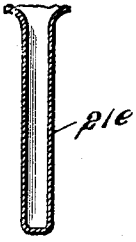



Fig. 8.

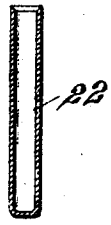



Fig. 9.

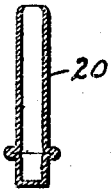



Fig. 10.

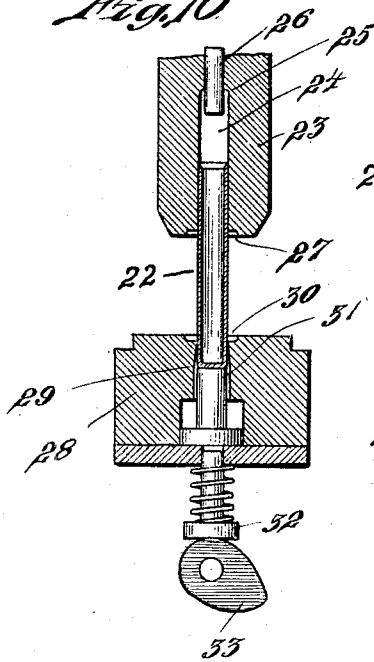



Fig. 11.

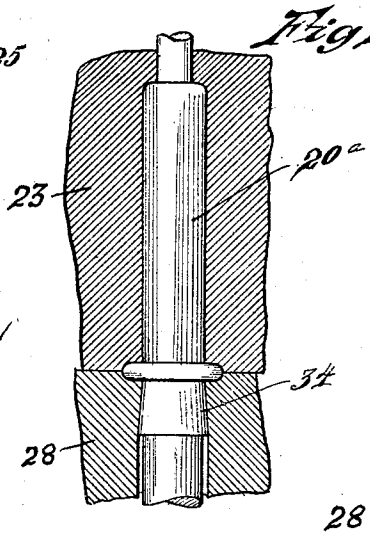
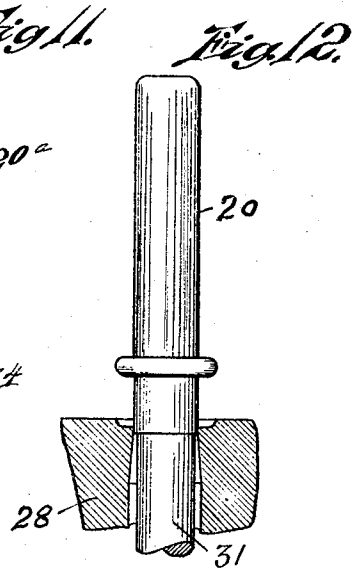



Fig. 12.




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ATTORNEYS.

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# UNITED STATES PATENT OFFICE

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## METHOD AND APPARATUS FOR MAKING CONTACT PINS

Application filed July 13, 1929. Serial No. 378,032.

The present invention relates to an improved method and apparatus for forming tubular contact pins, and is particularly pertinent to contact pins for vacuum tubes, portable connections, and the like.

One object of the invention is to facilitate the formation of tubular contact pins.

Another object is to reduce amount of manual handling and the number of manufacturing operations required.

A third object is to prevent sticking of the formed pin to the punch head of the forming machine.

Other objects and advantageous features will be more readily apparent from the detailed description following, in conjunction with the accompanying drawings, and will be particularly pointed out in the claims.

In the drawings:

Figure 1 is an elevation of the contact pin;

Figures 2 to 9 show steps in the formation of the contact pin;

Figure 10 shows the operative elements of the forming machine, with the pin in position for forming the flanged shoulder.

Figure 11 is a view showing the shape of the pin at the end of the forming of the shoulder; and

Figure 12 shows the completed pin as forced outwardly from the lower die of the forming machine.

The blank is usually drawn up from sheet stock to form a series of cups progressively diminishing in diameter and increasing in length, the drawing operations occurring successively in an eyelet machine until the required length and diameter are formed after which the cup is usually removed from the eyelet machine and placed in a separate machine to form the folded flange thereon, as it is found when using a die to form the flange in the eyelet machine that the pin will stick in the upper or head die because this die has greater frictional engagement with the pin so that the same cannot readily be removed; thus necessitating further handling of the article before finishing. It is the purpose of this invention to so form the die in which the flange is formed that this sticking in the head die will not occur, thus eliminating any necessity for extra handling of the pin and resulting in a completely automatic formation of the pin in an eyelet machine; and the following is a detailed description of the present embodiment of this invention illustrating one form of carrying out the same.

Referring to the drawings, the contact pin 20 is formed by drawing a blank 21 into the tubular form 22 shown in Fig. 8, the blank being successively drawn into the form or shapes 21*a*, 21*b*, 21*c*, 21*d* and 21*e*, usually in a so-called eyelet machine and then as an additional step in the same machine the tubular pin 22 is pressed between the vertically reciprocable punch head 23 which has a receiving recess 24 with a rounded end 25, a centering pin 26 and a flange receiving recess 27 at the lower portion thereof, and the base die 28. The head of the tube 22 is received in the lower die 28, which has a central recess 29, tapered as shown, and a flange-forming recess 30; a kick-out pin 31 is utilized as the base of the recess 29 and is reciprocated by a spring-pressed tappet 32 in response to the movements of the cam 33.

The formation of the completed pin is as follows:

The blank 21 is successively shaped as shown in Figs. 2 to 8, and then positioned between the lower die 28 and the punch die 23. Movement of the punch die towards the lower die causes the contact pin to assume the form 20*a* shown in Fig. 11, with the open end rounded, the shoulder flange formed between the recesses 27 and 30, and the head tapered and enlarged as at 34 within the recess 29. The punch head 23 is then moved upwardly, the pin remaining in the recess 29 because of the tapered enlarged head; upward movement of the kick-out pin 31 now forces the pin out thru the small end of the recess 29 to make the head cylindrical by removing the taper, the pin dropping from the lower die into the receiving basket.

The improved method and apparatus therefore eliminate sticking of the formed pin to the punch head, the formed pin being positively retained in the lower die, from where it is forced out by the kick-out pin.

While I have described one specific embodiment of an apparatus for accomplishing the novel method, such changes in procedure or in structure may obviously be made, as are within the scope of the invention as defined in the appended claims.

Claims:

1. In a method of forming tubular contact pins between a base die and a movable punch die, the step of enlarging the pin within the base die so as to be positively retained in the base die upon withdrawing movement of the punch die and removing the pin from the base die after withdrawing the punch die therefrom.

2. In a method of forming tubular contact pins between a base die and a punch die, the step of forming the pin with a taper converging towards the base die entrance so as to be positively retained in the base die upon withdrawing movement of the punch die and removing the pin from the base die after withdrawing the punch die therefrom.

3. In a method of forming tubular contact pins between a base die and a reciprocable punch die, the steps of spreading the pin in the base die to be positively locked in the base die upon withdrawing movement of the punch die, and then contracting the pin to eject it from the base die.

4. In a method of forming tubular contact pins between a base die and a reciprocable punch die, the steps of forming the pin with a taper converging towards the base die entrance so as to be positively retained in the base die upon withdrawing movement of the punch die, and ejecting the pin from the base die while removing the taper.

5. In a method of forming contact pins between two relatively movable dies, one of which has greater frictional engagement with the formed pin than the other, the step of spreading the pin within a recess in a selected die to be positively retained therein upon separation of the dies and removing the pin from said die after separation of said dies.

6. In a method of forming contact pins between two relatively movable dies, one of which has greater frictional engagement with the formed pin than the other, the step of spreading the pin in a selected die in a taper converging towards the opening thereof so as to be positively retained therein upon separation of the dies and forcing the pin from said die after separation of said dies.

7. A base die for the formation of contact pins comprising a pin receiving recess having an enlargement therein greater than the entrance to said recess, said recess having a movable base, said base being movable to eject a pin thru the entrance to said recess.

8. A base die for the formation of contact pins comprising a pin receiving recess having an enlargement therein greater than the entrance to said recess, said recess having a movable base, said base being movable to eject a pin thru the entrance to said recess, the sides of said recess receding from the entrance to form an enlargement.

9. A machine for forming contact pins comprising a base die, a pin receiving recess therein having an enlargement greater than the entrance to said recess, said recess having a movable base, said base being movable to eject a pin thru the entrance to said recess and a cooperating punch die.

10. A machine for forming contact pins comprising a base die, a pin receiving recess therein, the ends of said recess receding from the entrance to form an enlargement, said recess having a movable base, said base being movable to eject a pin thru the entrance to said recess and a cooperating punch die.

11. A machine for forming contact pins comprising a base die for receiving the head of the pin and having a recess therein, the sides of said recess receding from the entrance to form an enlargement, a flange-forming recess adjacent the said entrance, and a punch die having a recess for receiving the body of the pin and a flange-forming recess cooperating with the flange-forming recess of the base die.

12. In a method of forming tubular elements between a base die and a relatively elongated movable punch die, the step of changing the outer form of the element within the base die to a form different from that of the base die opening so as to lock the element in the base die against the frictional pull exerted by the punch die on its withdrawal movement and forcing the pin from said base die after withdrawal of the punch die.

13. In a method of forming tubular elements between a base die and a relatively elongated movable punch die, the step of spreading the element within the base die to be larger than the base die opening so as to lock the element in the base die against the frictional pull exerted by the punch die on its withdrawal movement and forcing the pin from said base die after withdrawal of the punch die.

14. In a method of forming tubular elements between a base die and a relatively elongated movable punch die, the steps of changing the outer form of the element within the base die to a form differing from that of the base die opening so as to lock the element in the base die against the frictional pull exerted by the punch die on its withdrawal movement, and then changing the outer form to conform to that of the base die opening for ejection of the element from the base die.

15. In a method of forming tubular elements between a base die and a relatively elongated movable punch die, the steps of spreading the element within the base die to

be larger than the base die opening so as to lock the element in the base die against the frictional pull exerted by the punch die on its withdrawal movement, and then constricting the element to conform to the base die opening for ejection of the element from the base die.

In testimony whereof I affix my signature.

EVERETT L. STARR.