July 6, 1948. S. LOEW 2,444,706

SLIDE FASTENER MACHINE

Filed Aug. 12, 1944

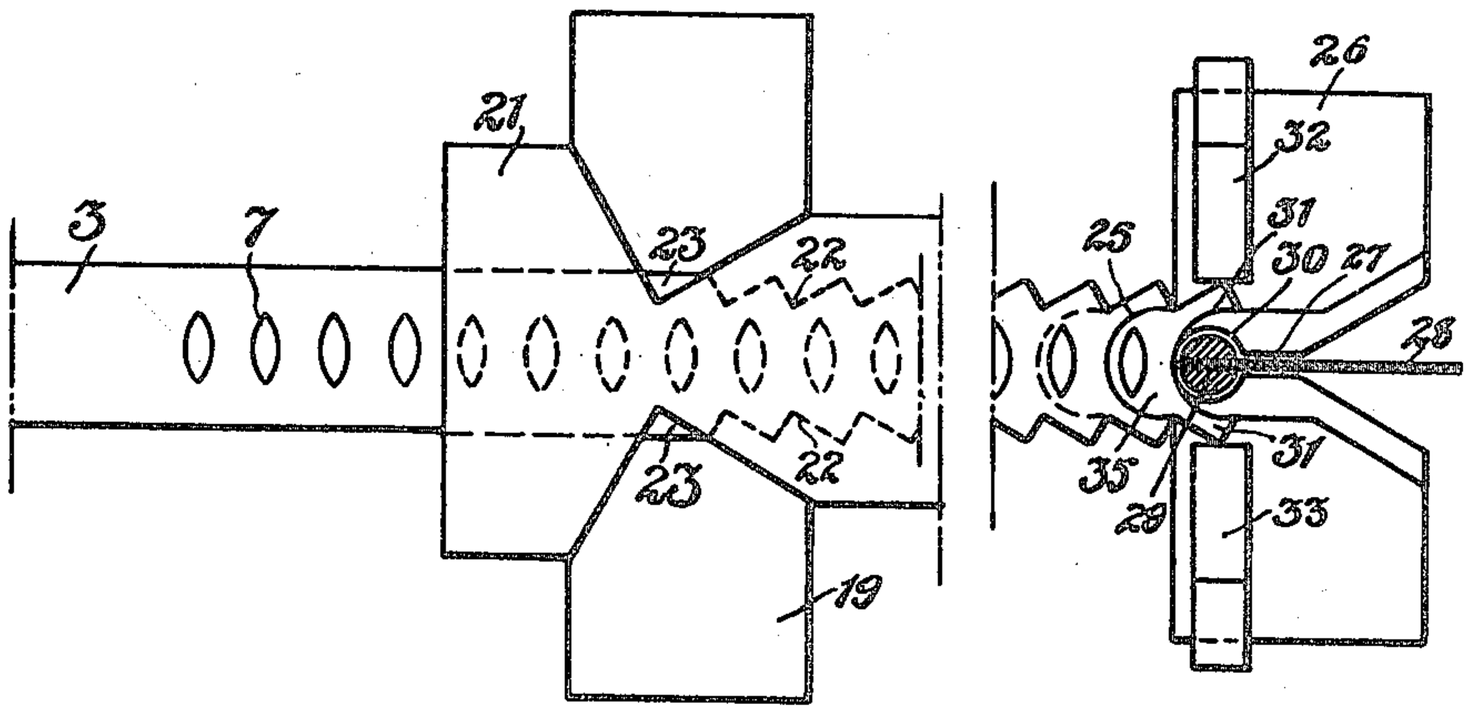

Fig. 1

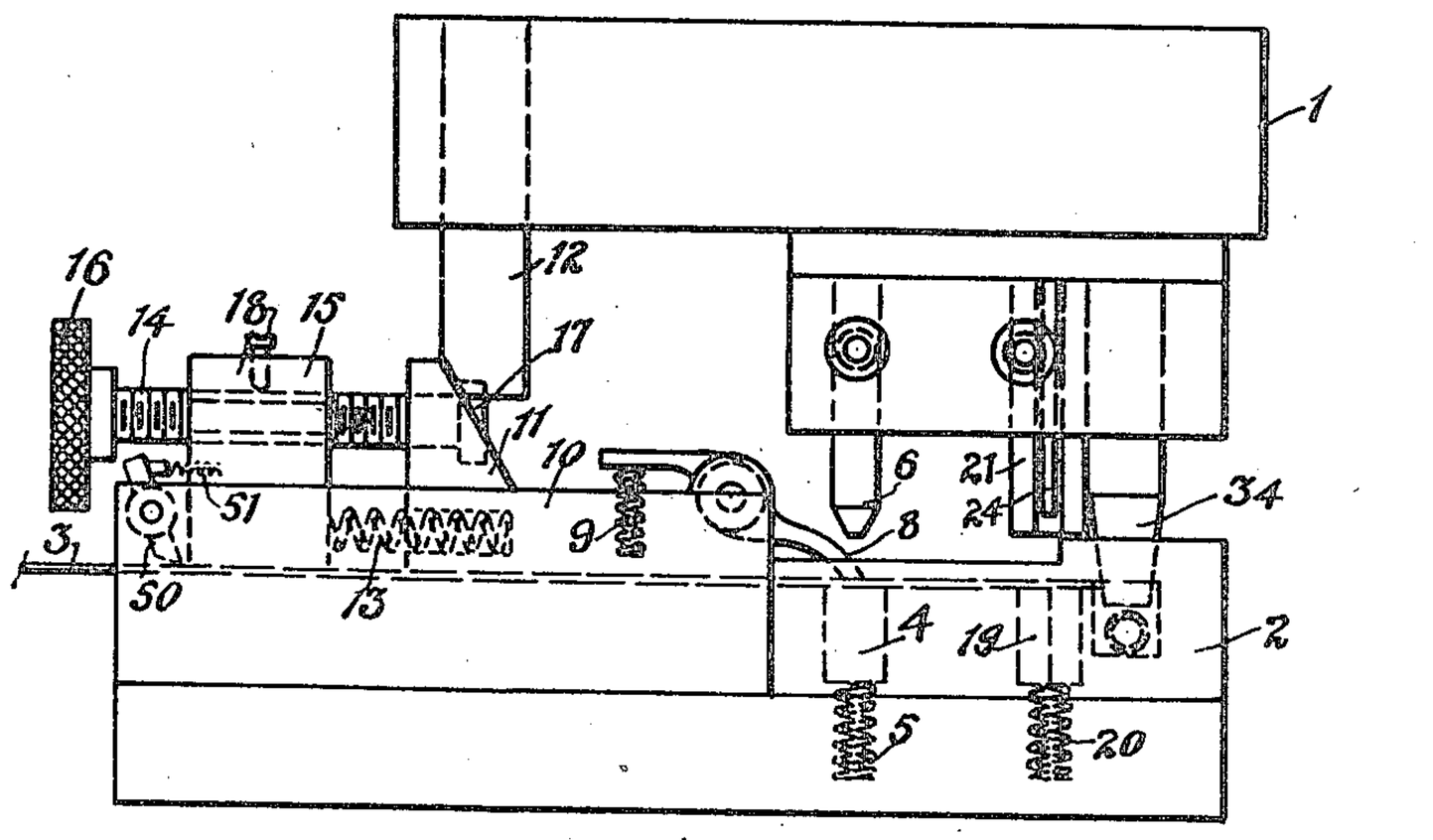

Fig. 2

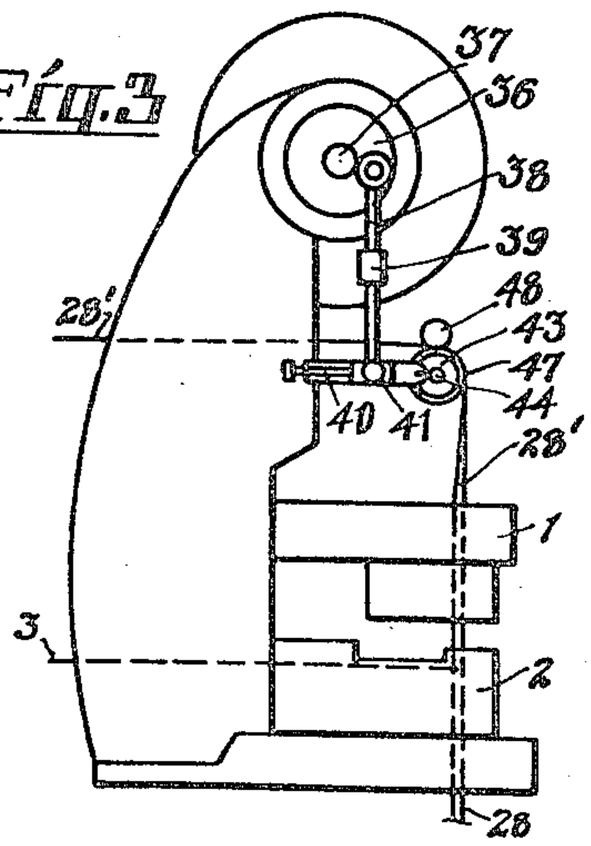

Fig. 3

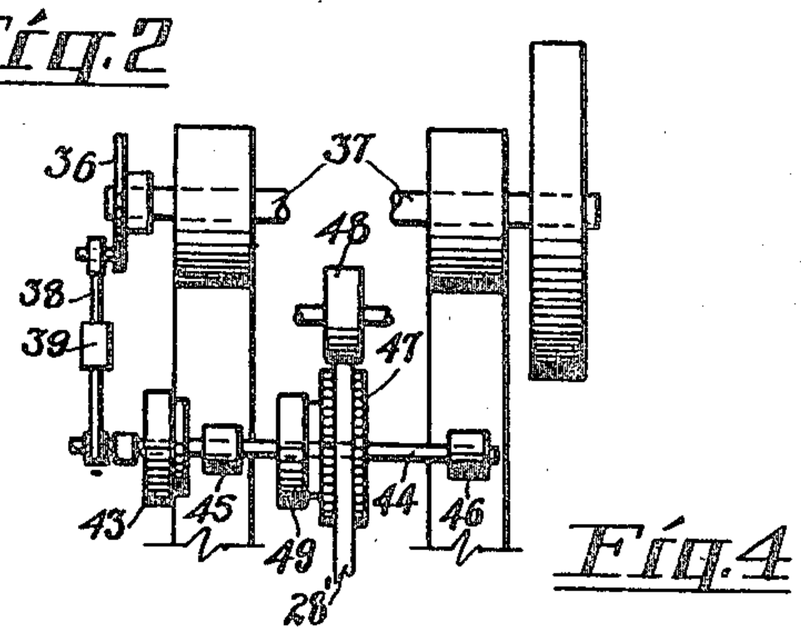

Fig. 4

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SLIDE FASTENER MACHINE

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5 Claims. (Cl. 153—1)

1

This invention relates in general to machines for the manufacture of slide fasteners, and more particularly to automatic machines for the manufacture of slide fastener stringers from which the finished slide fasteners are made.

The primary object of this invention is to provide a single machine for the complete manufacture of slide fastener stringers, wherein the operation is continuous.

Another object is to provide an improved machine for making slide fastener elements from stock wire with a minimum of waste.

Still another object is to provide greater precision in the attachment of the slide fastener elements to the stringer tape.

It is also an object of this invention to provide a slide fastener stringer of more durable construction.

Still another object is to reduce cost of operation in the manufacture of slide fastener stringers.

The foregoing objects together with others will be apparent from the following description considered in connection with the drawing in which:

Figure 1 shows a plan of the more important stages of operation.

Figure 2 shows an elevation of the main part of the machine.

Figure 3 is a diagram of the general arrangement of the machine in combination with a standard power press of which it is a part, and

Figure 4 is a front elevation of the spacer mechanism for spacing the fastener elements on the tape.

The machine as shown in the drawings, consists of an upper die 1 and a lower die 2. The stock wire which is flat is fed into the lower die 2 as shown at 3. When the wire 3 reaches the first station in the die 2 it is immediately over a forming die 4 which is supported on a spring or a plurality of springs 5. A punch 6 which is located in the die 1 constitutes the upper part of the die 4 so that when the die block 1 comes down, a cavity 7 is formed in the wire, generally of the shape shown in Figure 1. This cavity will hereinafter be referred to as the embryo.

The upper die 1 and lower die 2 are used in combination with a press. The upper die block is attached to the pitman of the press and the lower die block is fixed to the table of the press.

The lower die block 2 is provided with a reciprocating finger 8 which is pressed against the wire 3 at the point where cavity 7 has been formed, by means of a spring 9. The finger 8 is pivotally attached to a movable section 10

2

which is part of the die block 2. The section 10 is provided with a cam 11, and the die block 1 is provided with a corresponding cam 12. When the die 1 comes down to punch the embryo 7, the cam 12 slides against the cam 11 thus pushing section 10 with its attached finger 8 out of the way of the descending punch 6. When the punching operation of 6 is completed, the die 1 ascends allowing section 10 to move forward due to the action of spring 13. The finger 8 moves forward with the section 10. The point of the finger 8 is made so that it fits into the embryo 7, so that when the finger moves forward it pulls the wire 3 along with it so that the wire is advanced a predetermined distance. The distance the wire is advanced is determined by the following arrangement. A threaded bolt 14 is screwed into a tapped block 15 which is part of the die 2. One end of this bolt is provided with knurled head 16, and the other end of the bolt is provided with a stop 17. The cam 11 is bored with a hole to permit the passage of the bolt 14, but said hole is small enough to prevent the passage of the stop 17, so that by adjusting the length of the bolt 14 between the block 15 and the cam 11, the movement of the section 10 and the finger 8 is determined. A setscrew 18 locks the bolt 14 into position.

A plurality of embryos 7 are punched in the wire before said wire reaches the next stage of operation. At this stage the wire passes between a lower punching die 19 which is supported on a spring 20, and an upper die 21 which is part of the die block 1. An enlarged diagram of this set of punching dies is shown in Figure 1, where the action between the die 19 and the die 21 punches out a serration 22 on either side of the wire 3. The punched scrap 23 is blown away by means of compressed air through the pipe 24 which is situated in the grooved part of the die punch 21. The die 21 is also provided with a semi-circular cutting edge for the purpose of cutting out a semi-circular section as shown at 25, the use of which will be described in connection with the final stage in the making of the slide fastener stringer.

The final stage in the operation of the machine may be more fully comprehended by reference to both Figures 1 and 2. The lower die block 2 is also provided with a guiding block 26 which has a slot 27 for guiding the stringer tape 28. As this tape is usually finished on one of its edges with a pair of rounded cords 29, a circular guide 30 is also provided in the block 26 to accommodate the said cords. When the wire 3 reaches the po-

sition where the cord 29 nests within the died out section 25 which forms the inner wall of the element, the jaws 31 become located between two opposite clamping hammers 32 and 33. The die 1 is provided at this point with a pair of cams 34, 34. On the downward stroke of the die 1 the cams 34, 34 compress the hammers 32 and 33 against both sides of the element jaw 31 so that the element becomes permanently clamped to the tape 28 at its corded edge.

Throughout this entire operation the individual element as indicated by 31 remains an integral part of the wire 3, and only after the jaws have been clamped onto the tape, the element 35 is severed from the wire 3 along the line 25 by the die 21. This of course gives greater stability to the individual element than is provided in existing machines where such elements are individually and separately attached to the tape, thereby providing a greater degree of precision to the spacing of the elements on the tape.

The tape 28 is fed into the machine in a vertical position. It is held stretched to the required degree of tension between the reel on which it is originally wound and a spacing mechanism such as is shown in Figures 3 and 4. To an eccentric wheel 36 which is attached to the press shaft 37, is pivotally attached an arm 38 whose length is adjustable by means of a turnbuckle or some such mechanism 39. The arm 38 is also pivotally attached to a horizontal arm 40, the bearing at this point being on a movable block 41 for the purpose of adjusting the location of this bearing along the arm 40. One end of the arm 40 is eccentrically attached to a friction clutch 43. Shaft 44 is supported by bearings 45 and 46 which are in turn supported by the walls of the press. A knurled wheel 47 is mounted on the shaft 44 in a position above the guide block 26. The tape with the fastener elements attached thereto which will now be referred to as 28' rolls over the wheel 47 and is held tightly pressed against the knurls by an upper wheel 48. The wheel 47 is attached to the shaft 44 by means of a friction clutch 49 which is directly attached to the shaft 44, and the clutch 43 is similarly attached to the said shaft. The clutches 43 and 49 are so arranged as to provide rotation to the shaft 44 in one direction only so that one stroke caused by the eccentric 36 turns the shaft 44 while the return stroke has no effect upon said shaft. Thus an intermittent movement is imparted to the tape, the intermissions providing the proper spacing to the fastener elements 35.

In actual practice the machine operates in the following manner, although it is not intended thereby to limit this invention to the specific figures which follow. The flat wire is fed into the die and is moved forward by the reciprocating finger pushing on the embryo which has been drawn in an inverted position in the first station of the die. After the wire has fed forward twenty-seven times it is now in a position for the notching dies to function. These also are inverted with the male die being in the lower portion. At this point the only blanking out of the entire process takes place, and the wire leaving this point has the embryo formed therein and serrated edges. The strip continues to be fed forward so that it now lays on the die which blanks the element off the strip of wire. In order that the element that is to be cut off be held stationary while it is being attached to the tape, the cams that close the hammers now engage the said hammers so that the closing of the element jaw upon the tape takes place before the shearing off of the element is completed. In order that the element remain on top of the blanking die, the wire which is progressing through the die has to go down under the blanking punch, notching punch, and the impresseion punch. These punches are all the same length and therefore carry the wire down evenly, while the wire is thus going down it is supported by spring loaded pads which on the upward stroke of the press return to their normal level. The entire procedure is intermittently repeated.

The machine is also provided with a catch 50 in the lower die block 2 at the entrance of the stock wire. This catch is pressed against the stock wire by a spring 51. The catch is at an angle leaning away from the direction in which the wire 3 travels, so that the sharp edge of the said catch prevents the wire from backing out of die.

It is obvious that changes might be made in nonessentials of the structure of the machine while retaining the essentials of the invention and I do not consider it limited to the specific construction shown; therefore what I claim is:

1. An automatic machine for the manufacture of slide fastener stringers in combination with a press, comprising an upper die block which is attached to the pitman of the press and a lower die block which is fixed to the table of the press, a series of upper and lower dies or punches for successively drawing an embryo cavity, serrating the edges, and punching off individual elements from a stock wire, means for clamping said elements to a standard tape, and means for feeding said stock wire to the successive stages in the operation comprising a sliding section which is part of the lower die block, a reciprocating finger which pushes the stock wire by engaging the embryo cavity and which is part of said sliding section, a spring in compression which presses against one end of said finger to provide engagement between the finger and embryo in the stock wire, a cam in the upper die block which engages a corresponding cam on said sliding section which retains the reciprocating finger, a compression spring between said sliding section and a fixed part of the lower die block, reciprocating motion being provided by the action of said cam and spring, and means for controlling the extent of said motion including a threaded bolt which limits the motion of the sliding section imparted by the cam on said sliding section.

2. A machine for the manufacture of slide fastener stringers comprising in combination upper and lower die blocks for relative movement toward and from one another with reciprocating motion, punch and die means carried by the respective die blocks and operable with each reciprocation of the die blocks to form an embryo cavity in flat stock wire positioned between the die blocks, apparatus for feeding the stock wire forward including a finger that slides back and forth lengthwise of the flat stock wire with each reciprocation of the die blocks and in constant contact with the stock wire and against metal displaced by the operation of the punch and die that form the embryo cavity, finger-supporting and reciprocating mechanism carried by one die block, abutment means carried by the other die block in position to operate said mechanism for moving the finger with each reciprocation of the die blocks, and other die means carried by the die blocks, and to which the stock wire is fed by said finger, for shaping the end of the stock wire into

one end of a slide fastener element, and for cutting off the end portion of the wire stock to complete the slide fastener element after the element is in position astride a tape.

3. An automatic machine for the manufacture of slide fastener stringers including in combination a press, an upper die block attached to the pitman of the press and a lower die block fixed to the table of the press, a series of cooperative punches and dies carried by the die blocks for successively forming an embryo cavity, shaping the edges, and punching off individual elements from a stock wire after said elements have been successively advanced to positions astride a tape, clamping mechanism carried by one of the die blocks for clamping individual elements to the tape, deciprocating feeding mechanism carried by one of the die blocks for feeding the stock wire with a step-by-step motion past the successive dies and punches and to said clamping means, abutment means on one of the die blocks for operating the clamping mechanism and the feeding mechanism carried by the other die block with each stroke of the press, a spring for returning the feed mechanism after each stroke, a finger comprising a part of the feeding mechanism with an end portion that engages metal displaced by the forming of the endmost embryo cavity, and means for holding said end portion of the finger in contact with the stock wire.

4. A machine for the manufacture of slide fastener stringers comprising in combination with a press, a reciprocating finger operated by the movement of an upper die block connected to the pitman of the press for intermittently feeding the stock wire from which slide fastener elements are made, upper and lower die combinations for punching embryos in the stock wire, a notching die adjustably attached to the upper die block and a complementary notching die in a lower die block supported by a compression spring, the upper and lower notching dies being for the purpose of serrating or notching the edges of the stock wire to form the outer contour of the jaw of the fastener element, said die combinations also including means for shearing off

the individual fastener elements from the rest of the stock wire after each of said elements has been brought into a position astride a standard slide fastener tape, and means for attaching the elements to the standard slide fastener tape.

5. A machine for the manufacture of slide fastener stringers comprising in combination with a press, a reciprocating finger for feeding stock wire, dies for drawing embryos in said wire, dies for forming the edges of said wire and punching the individual fastener elements from the said stock wire, means for clamping the said elements to standard stringer tape, and means to feed the tape to space the fastener elements thereon including a shaft which is supported from the walls of the press above the upper die block, a knurled wheel mounted on said shaft by means of a friction clutch, a second friction clutch which is attached to the end of the shaft, an oscillating arm which is attached eccentrically to the second friction clutch and operatively attached at its other end to said main shaft, and a connecting rod between the said eccentric on the press shaft and the osculating arm, so that upon the rotation of the press shaft an intermittent motion in one direction is imparted to the spacer shaft and the knurled wheel thereon, and to the slide fastener stringer between the said knurled wheel and a pressure wheel provided for that purpose.

SIGMUND LOEW.

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