

J. S. WENTWORTH.
FASTENING MECHANISM.
APPLICATION FILED OCT. 11, 1918.

1,377,295.

Patented May 10, 1921.
2 SHEETS—SHEET 1.

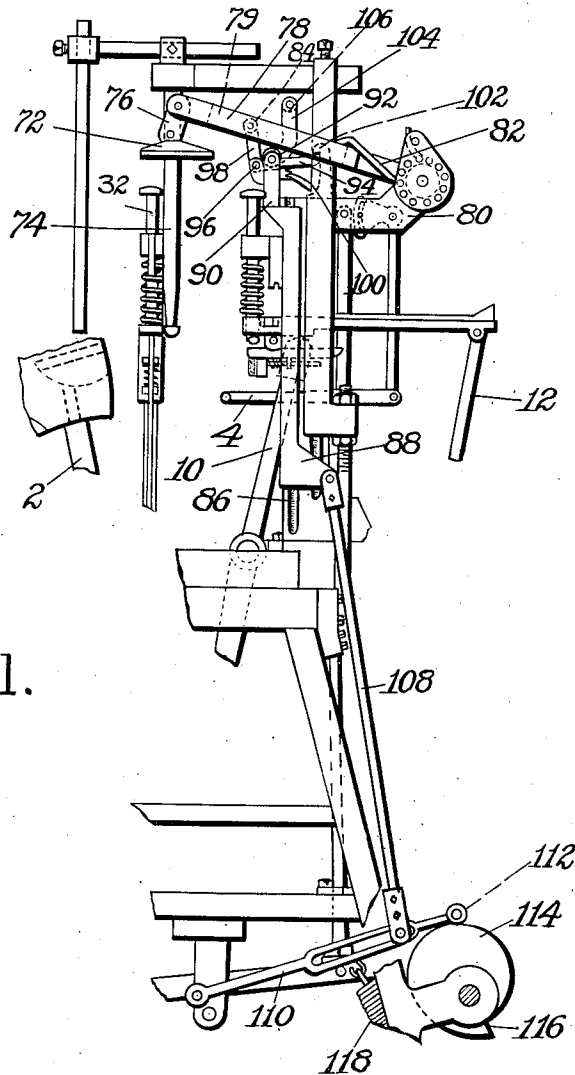


Fig. 1.

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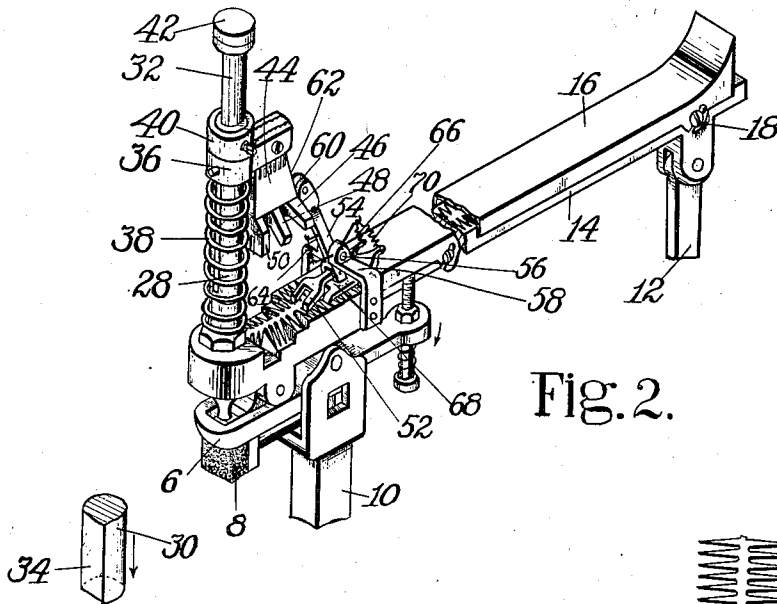


Fig. 2.

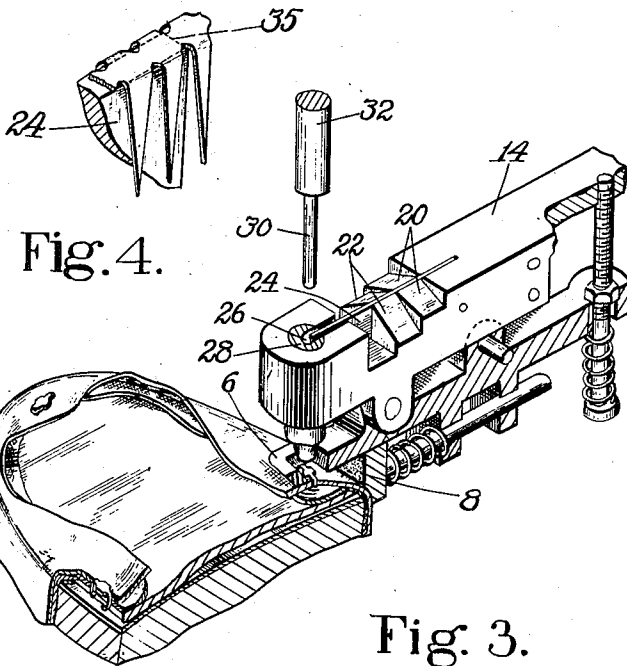


Fig. 3.



Fig. 5.

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UNITED STATES PATENT OFFICE.

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FASTENING MECHANISM.

1,377,295.

Specification of Letters Patent.

Patented May 10, 1921.

Original application filed March 27, 1914, Serial No. 827,596. Divided and this application filed October 11, 1918. Serial No. 257,728.

To all whom it may concern:

Be it known that I, JESSE S. WENTWORTH, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain Improvements in Fastening Mechanisms, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to fastening mechanism, this application being a division of my co-pending application Serial No. 827,596 filed on March 27, 1914, for Letters Patent for improvements in assembling machines. The invention is herein illustrated with reference to fastening mechanism particularly designed for use in the manufacture of boots and shoes for securing the margin of the upper to the sole or insole in the assembling of the parts of the shoe, but it will be understood that in its broader aspects the invention is not limited to mechanism designed particularly for shoe work.

The illustrative embodiment of the invention comprises means for forming and driving fasteners of a type commonly known as staples. An important feature of the invention consists in novel means for forming a staple progressively by successive operations upon the same portion of the material of the staple contributing step by step to bend the material into the final shape of a staple. The construction shown has means for forming staples in succession from a blank staple strip by operating repeatedly upon the staple leg forming portions of the strip in different locations to which the strip is fed to bend the different leg portions of the strip progressively into final shape. An important advantage of bending the blank by successive operations to form the staple, as distinguished from a single continuous bending operation, consists particularly in the elimination of excessive strains both upon the material and upon the forming mechanism.

A further feature of the invention consists in a novel construction of staple forming means so organized as to operate upon a plurality of different staple forming por-

tions of a blank staple strip to bend corresponding portions of the material of different staples in different respective degrees of approach to final staple shape, the construction shown having means for completing a bending operation on one portion of the material coincidentally with the bending of another portion of the material partially into staple shape.

Still another feature of the invention resides in a novel organization comprising a staple driver and means movable with the driver to form staples, the illustrative embodiment of the invention comprising means constructed and arranged for operation in each staple driving movement of the driver to bend corresponding portions of the material of different staples in different respective degrees of approach to final staple shape for forming the staples progressively.

The above and other features of the invention, including novel driving means and certain details of construction and combinations of parts, will now be described with reference to the accompanying drawings and pointed out in the claims.

In the drawings:—

Figure 1 is a view in side elevation of a portion of the machine shown in the pending application of which this is a division, showing the fastening mechanism of the present invention;

Fig. 2 is a perspective view of a portion of the mechanism including one of the staple forming and driving devices;

Fig. 3 is a view on a larger scale of a portion of the structure shown in Fig. 2 and illustrating its operative relation to the work;

Fig. 4 is a detail view of a portion of the staple forming means and of the staple driver, and

Fig. 5 shows a blank staple strip adapted to be used in the operation of the mechanism shown in the other figures.

The illustrative machine (Fig. 1), which is shown and described more completely and in detail in said co-pending application, is provided with a jack 2 upon which the parts of the shoe are assembled, the jack being movable rearwardly to carry the shoe into engagement with a back stop 4. When the

shoe is in this position the upper, the lining and the counter are wiped over upon the heel portion of the sole or insole and fastened at the heel end and at opposite sides of the heel seat. In order to perform these operations the machine is provided with three separate mechanisms each including a wiper 6, an abutment pad 8 to limit the movement of the wiper over the shoe and a staple forming and driving device arranged to form a staple from a blank strip and to drive the staple through an opening in the wiper 6 to secure the overwiped margin of the upper materials on the shoe bottom. Each of these three mechanisms is supported on a pair of parallel links 10 and 12 which are movable in the manner explained in said co-pending application to carry the mechanism toward the shoe into operative position.

Carried by the links 10 and 12 is a raceway 14 constructed to receive a blank staple strip, which may be substantially flat and have pairs of oppositely projecting prongs as shown in Fig. 5, the raceway having a cover 16 adjustably secured thereon by means of screws 18 passing through inclined slots in the cover to permit the cover to be positioned at different distances from the top of the raceway in order to accommodate staple strips of different thicknesses. At the forward end of the raceway 14 are a plurality of staple forming anvils or dies 20, 22 and 24, the dies 20 and 22 each having a pair of oppositely inclined molding surfaces, the surfaces of the die 20 being inclined at a comparatively small angle to the plane of the raceway 14 and the surfaces of the die 22 being inclined at a larger angle to said plane to cause a portion of the staple strip to be bent progressively toward the required shape by the operation of the different dies in succession. The anvil or die 24 extends forwardly from the die 22 and is substantially rectangular in transverse contour for imparting the final shape to the staple, this die extending part way into the driving aperture 26 of a staple driving tube 28 which terminates in a nozzle in line with the opening in the wiper 6.

Supported for reciprocating movement in the aperture 26 of the staple driving tube is a driver 30 carried by a driver rod 32, the driver having a flattened side portion 34 providing an edge to cooperate with a cutting edge 35 at the end of the die 24 to sever the staple from the strip. Confined between a nut near the lower end of the tube 28 and a collar 36 secured to the rod 32 and slidable on the tube is a spring 38 which normally maintains the driver in its elevated position determined by engagement of the collar 36 with a stop collar 40 adjustably secured to the upper end of the tube 28. The upper extremity of the rod 32 is provided with a

head 42 arranged to be engaged by mechanism hereinafter to be described for operating the driver.

Secured to the sliding collar 36 is a staple former 44 carrying three staple forming members or dies 46, 48 and 50, constructed respectively to cooperate with the dies 20, 22 and 24 to form a staple. It will be evident that when the driver rod 32 is forced downward the die 46 engages the oppositely projecting prongs of the staple strip which are positioned over the molding surfaces of the die 20 and bends these prongs a small extent determined by the slope of said surfaces. At the same time, by reason of a previous forward feed of the staple strip as will be hereinafter explained, the die 48 engages prongs which in a previous operation of the mechanism were shaped on the die 20 and bends them still farther into conformity to the slope of the surfaces of the die 22. Coincidentally, moreover, the die 50 engages a portion of the strip previously shaped on the die 22 and bends it into its final shape over the die or anvil member 24 while the driver in its downward movement severs a completely formed staple from the strip and drives it.

In order to feed the staple strip forward the required distance following each operation of the staple former and the driver, there is provided a pawl 52 arranged to engage the prongs of the staple, this pawl being pivotally suspended on the lower end of a lever arm 54 which is pivoted at 56 on a bracket 58 and at its upper end carries a roll 60 engaging a sloping service surface 62 on the rear end of the staple former 44. A spring 64 connected to the arm 54 tends to hold the arm with the roll 60 in engagement with the surface 62, and a second spring 66 connected to the rear end of the pawl 52 tends to hold the pawl in position to engage the staple strip. When the former 44 descends, as hereinbefore explained, the roll 60 riding upon the inclined surface 62 permits the arm 54 to be swung by the spring 64 in a direction to retract the pawl 52 over the staple strip for engagement with the next succeeding pair of prongs on the strip, and when the former rises after performing its operation upon the strip the inclined surface 62 operates the arm 54 to force the pawl forwardly and thus feed the strip the required distance to carry the respective pairs of prongs into position for the succeeding operations to be performed thereon as well as to carry a completely formed staple at the end of the strip into position to be severed and driven by the driver 30. In order to prevent the strip from being retracted by the backward movement of the pawl 52, a holding pawl 68 is provided for engagement with the prongs of the strip, this pawl being pivoted on the bracket

58 and held by a spring 70 continually in engagement with the strip.

Prior to their operation upon the shoe the several fastening mechanisms, as hereinbefore explained, are moved inwardly toward the shoe, carrying the driver rods into comparatively close relation to one another beneath a hammer member 72 which is mounted for vertical sliding movement upon a downhold member 74. The member 72 is connected by a link 76 with a hammer arm 78 which is pivoted at its outer end to a bracket 80 and is operated upon by a comparatively strong spring 82 which tends to swing the arm downwardly. The arm 78, as indicated in Fig. 1, is provided with a slot 79 within which is mounted a roll 84. Mounted for vertical movement in a guide-way groove 86 formed in the frame of the machine is a slide 88 upon the upper end of which is a bifurcated projection 90 carrying two rolls 92 located respectively beneath portions of the arm 78 at opposite sides of the slot 79. Extending between the fork projections 90 in such manner as to clear the rolls 92 is one arm 94 of a tripping pawl in the form of a bell-crank pivoted at 96 to the frame and provided with an upwardly extending arm 98 the end of which is arranged to be located at times under the roll 84 to hold the hammer arm 78 and the member 72 in raised position. The tripping pawl is held normally in the position indicated in Fig. 1 with the end of its arm 98 under the roll 84 by means of a spring 100 which co-operates with a stop 102 on the frame to determine the position of the pawl. In order to operate the pawl to release the arm 78 the machine is provided with an arm 104 extending upwardly from the projection 90 of the slide 88 through the slot 79 in the arm 78 and carrying a roll 106 arranged to extend over the horizontal arm 94 of the pawl.

For operating the slide 88 the lower end of the slide is connected by a rod 108 to a pivoted lever 110, the lower end of the rod being adjustable lengthwise of a slot in the lever. The lever 110 at its outer end carries a roll 112 which rests upon the periphery of a cam 114, this cam being provided with a drop portion 116. A comparatively strong spring 118 is connected to the lever 110 and holds the roll 112 yieldingly in engagement with the cam.

When the several drivers have been positioned over the work as hereinbefore explained, with the driver rods beneath the hammer member 72, rotation of the cam 114 to carry its drop portion 116 beneath the roll 112 causes the lever 110 to be suddenly released to the action of the spring 118 which pulls the lever and its connected parts downward and thus causes the roll 106 to engage the horizontal arm 94 of the tripping pawl and swing the pawl to withdraw

the end of its arm 98 from under the roll 84, thus permitting the hammer 72, 78 to descend under the influence of the spring 82 and operate the several driver rods and the connected staple forming mechanisms. Upon a continued rotation of the cam the lever 110 is gradually raised, thus causing the rolls 92 to engage and lift the hammer arm 78 until the roll 84 passes above the upper end of the arm 98 of the pawl and permits the pawl to be swung by its spring 100 into position to carry the end of the arm 98 again beneath the roll for holding the hammer in its elevated position. Coincidentally the several staple driving and forming mechanisms are moved outward away from the shoe to their initial positions in the manner explained in the copending application, all parts of the machine being relocated in starting position in readiness to operate upon another shoe.

It will be understood that the drawings show only one of a variety of different forms of fastener in the production of which the invention may be utilized with advantage, and that the term "staple" as used herein is not to be regarded as limited in scope by the specific illustration of the drawings.

Having described the invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In mechanism of the class described, the combination of staple forming means constructed to form a staple from a staple blank progressively by different successive bending operations upon the same portion of the material of the staple, and means for operating said staple forming means.

2. In mechanism of the class described, the combination of a staple former, means constructed and arranged to coöperate with said staple former to bend a staple blank step by step into staple shape through a plurality of successive operations of said former upon the same portion of the material of the staple, and means for imparting operative movements to said staple former.

3. In mechanism of the class described, the combination of a plurality of staple forming dies constructed and arranged for bending the same portion of the material of a staple step by step into staple shape upon the presentation of the blank to the different dies in succession, means for effecting relative movement of the material and the dies between bending operations to present the material to a different die, and means coöperating with said dies to form the staple.

4. In mechanism of the class described, the combination of means for bending a portion of a blank staple strip partially into the shape of a staple, and means for operating subsequently upon the bent portion of the material of the staple to complete the bending operation coincidentally with the bending

of another portion of the strip partially into staple shape.

5. In mechanism of the class described, the combination of a plurality of dies constructed and arranged for bending different portions of a blank staple strip in different respective degrees of approach to final shape to form the legs of a plurality of staples, and means cooperating with said dies to bend the different portions of the strip.

6. In mechanism of the class described, the combination with means for feeding forward intermittently a blank staple strip from which staples are to be formed, of means constructed to operate upon the strip between successive operations of the feeding means to bend corresponding portions of the material of different staples in different respective degrees of approach to final staple shape.

7. In mechanism of the class described, the combination with means for feeding a blank staple strip from which staples are to be formed, of means for severing a formed staple from the end of the strip and driving it, and connected means for forming staples from the strip constructed and arranged to operate upon each staple a plurality of times in succession coincidently with a plurality of staple driving operations to bend the leg portions of the staple progressively into their final shape.

8. In mechanism of the class described, the combination with means for feeding a blank staple strip from which staples are to be formed, of means for severing a formed staple from the end of the strip and driving it, and means for operating upon the strip coincidently with an operation of the driving means to bend a portion of the strip into a partially formed staple and at another portion of the strip to complete a bending operation begun in a previous operation of the driving means.

9. In mechanism of the class described, the combination with means for feeding forward intermittently a blank staple strip from which staples are to be formed, of means for operating upon the same portion of the material of the staple a plurality of times alternately with operations of the feeding means to bend said portion of the material progressively into the shape of a staple.

10. In mechanism of the class described, the combination with staple driving means, of means for feeding toward said driving means a blank staple strip from which staples are to be formed, a plurality of forming dies over which the strip is fed constructed to shape each staple progressively from the strip by successive bending operations of the different respective dies upon the same portion of the material of the staple,

and means constructed and arranged to cooperate with said dies to form the staples.

11. In mechanism of the class described, the combination with a raceway for a blank staple strip, of a plurality of forming dies at the end of said raceway constructed to shape each staple progressively from the strip by successive bending operations of the different respective dies upon the same portion of the material of the staple, and a former constructed and arranged to cooperate with the different dies to shape different portions of the strip substantially simultaneously.

12. In mechanism of the class described, the combination of means for bending portions of a staple blank partially into position to form the legs of a staple at one operation, and additional means for operating subsequently upon the partially bent leg portions of the staple to complete the bending operation.

13. In mechanism of the class described, the combination with means for feeding blank material having oppositely projecting prongs to form the legs of staples, of means for bending opposite prongs on said material partially into staple shape in one location of the material, and means for operating upon said partially bent prongs after the material has been fed to a different location to complete the bending operation.

14. In mechanism of the class described, the combination with a staple-driver, of means for feeding toward driving position a blank staple strip from which staples are to be formed, a plurality of forming dies constructed to shape each staple progressively by successive bending operations of the different respective dies upon the same portion of the material of the staple, and a former movable with said driver and constructed to cooperate with the different dies to form the staples.

15. In mechanism of the class described, the combination with means for feeding forward intermittently a blank staple strip from which staples are to be formed, of means for bending a portion of the strip partially into the shape of a staple in one location of the strip, and means for operating upon the same portion of the strip to bend it farther subsequently to a feeding movement of the strip from said first named location.

16. In mechanism of the class described, the combination with means for feeding forward intermittently a blank staple strip from which staples are to be formed, of means for bending a portion of the strip partially into the shape of a staple in one location of the strip, means for operating upon the same portion of the strip to bend it farther and complete the staple in another location of the strip, and means for sever-

ing and driving the completed staple in still another location of the strip.

17. In mechanism of the class described, the combination of means for forming a staple from a staple blank progressively by different successive bending operations performed on the same portion of the material of the staple in different respective locations of the blank, and means for feeding the blank between said different locations.

18. In mechanism of the class described, the combination with a staple driver, of means for feeding toward staple driving position a blank strip from which staples are to be formed, a plurality of forming dies constructed to shape each staple progressively from the strip by successive bending operations of the different dies upon the same portion of the material of the staple, and means cooperating with said dies to form the staples, one of the dies being constructed and arranged to guide the completed staple to driving position and having a shearing edge to cooperate with the driver to sever the staple from the strip.

19. In mechanism of the class described, the combination with a staple driver, of means for guiding toward staple driving position a blank strip from which staples are to be formed, means comprising a staple former movable with said driver for forming staples from the strip by successive bending operations upon the same portion of the material of each staple, means for engaging the strip to feed it forward, and mechanism operated by the movement of said former for imparting feeding movement to said strip engaging means.

20. In mechanism of the class described, the combination of a staple driving tube, a raceway, a plurality of staple molding surfaces at the end of said raceway constructed to bend a blank into a staple by successive steps, an anvil connected with said surfaces and projecting into the bore of said tube, a driver sustained yieldingly in alinement with said bore, staple forming dies carried by said driver and cooperating with said surfaces, feeding means for a staple strip having connection with said driver, and means for operating the driver to form, feed forward and drive successive staples.

21. In mechanism of the class described, the combination of a staple driving tube, a raceway, a plurality of staple molding sur-

faces at the end of said raceway constructed to bend a blank into a staple by successive steps, an anvil connected with said surfaces and having its end portion provided with a shearing edge projecting into the bore in said tube, a driver having a cooperating shearing edge and yieldingly sustained in alinement with said bore, staple forming dies carried by said driver for cooperating with said surfaces, staple-strip feeding means connected with said driver, and means for operating the driver to form, feed forward, cut off and drive successive staples.

22. In mechanism of the class described, the combination with a driver, of a hammer arm carrying a roll, a driver spring connected with said arm, a tripping pawl constructed to be moved under said roll for sustaining the hammer arm, a slide having a projection beneath said arm and an extension for engaging said pawl, and means for raising the slide to move up the arm and thereby put the spring under tension and permit the pawl to sustain the arm, and for thereafter reversely moving said slide to trip the pawl and release the arm.

23. In mechanism of the class described, the combination with a driver, of a member for operating said driver, spring means for imparting driving movement to said member, a device constructed and arranged to support said operating member in its initial position against the tension of said spring means, and means movable in one direction to operate said device and release the member and in the opposite direction to return the member into position to be engaged and held by said device.

24. In mechanism of the class described, the combination with a driver, of a hammer for operating said driver, spring means for imparting operative movement to said hammer, a pivoted bell-crank member arranged to support the hammer on the end of one of its arms against the tension of said spring means, and means movable in one direction to engage the other arm of said bell-crank member and operate it to release the hammer and in the opposite direction to engage the hammer and return it into position to be held by said member.

In testimony whereof I have signed my name to this specification.

JESSE S. WENTWORTH.