

April 22, 1924.

1,491,272

G. W. PERKINS

BUCKLE FASTENING MACHINE

Filed Jan. 3, 1922

2 Sheets-Sheet 1

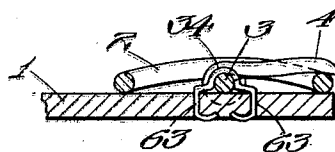
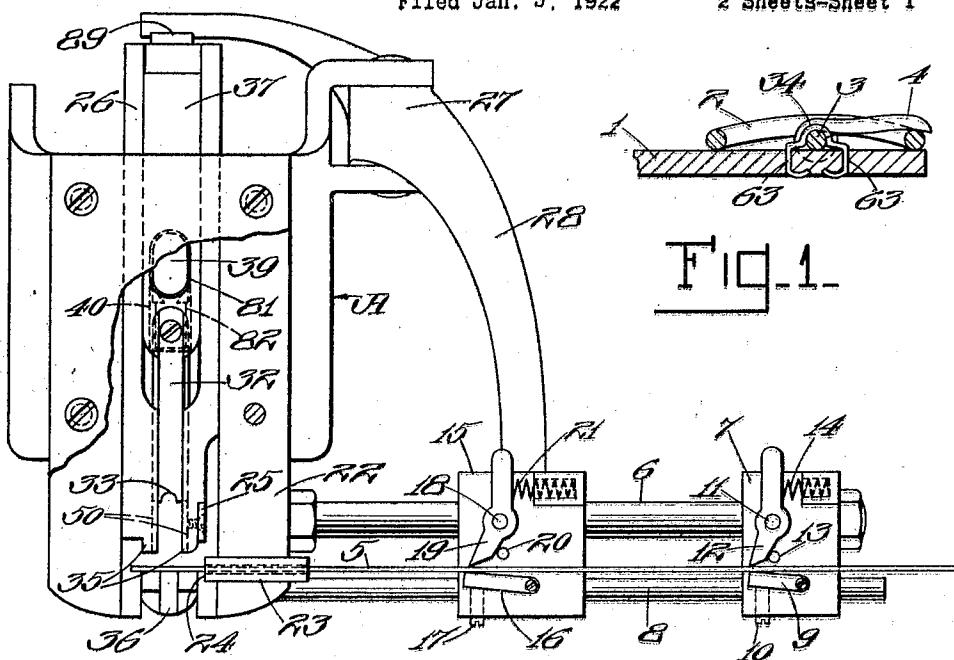


Fig. 1.

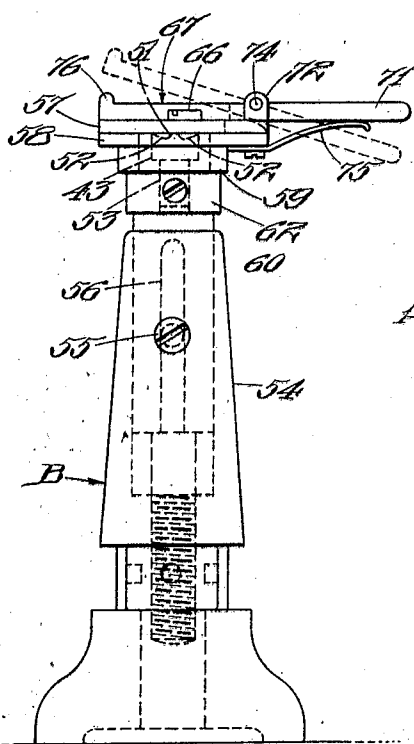


Fig. 2.

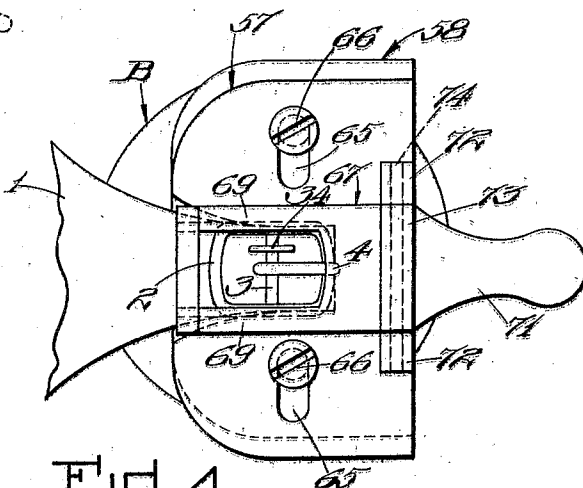


Fig. 4.

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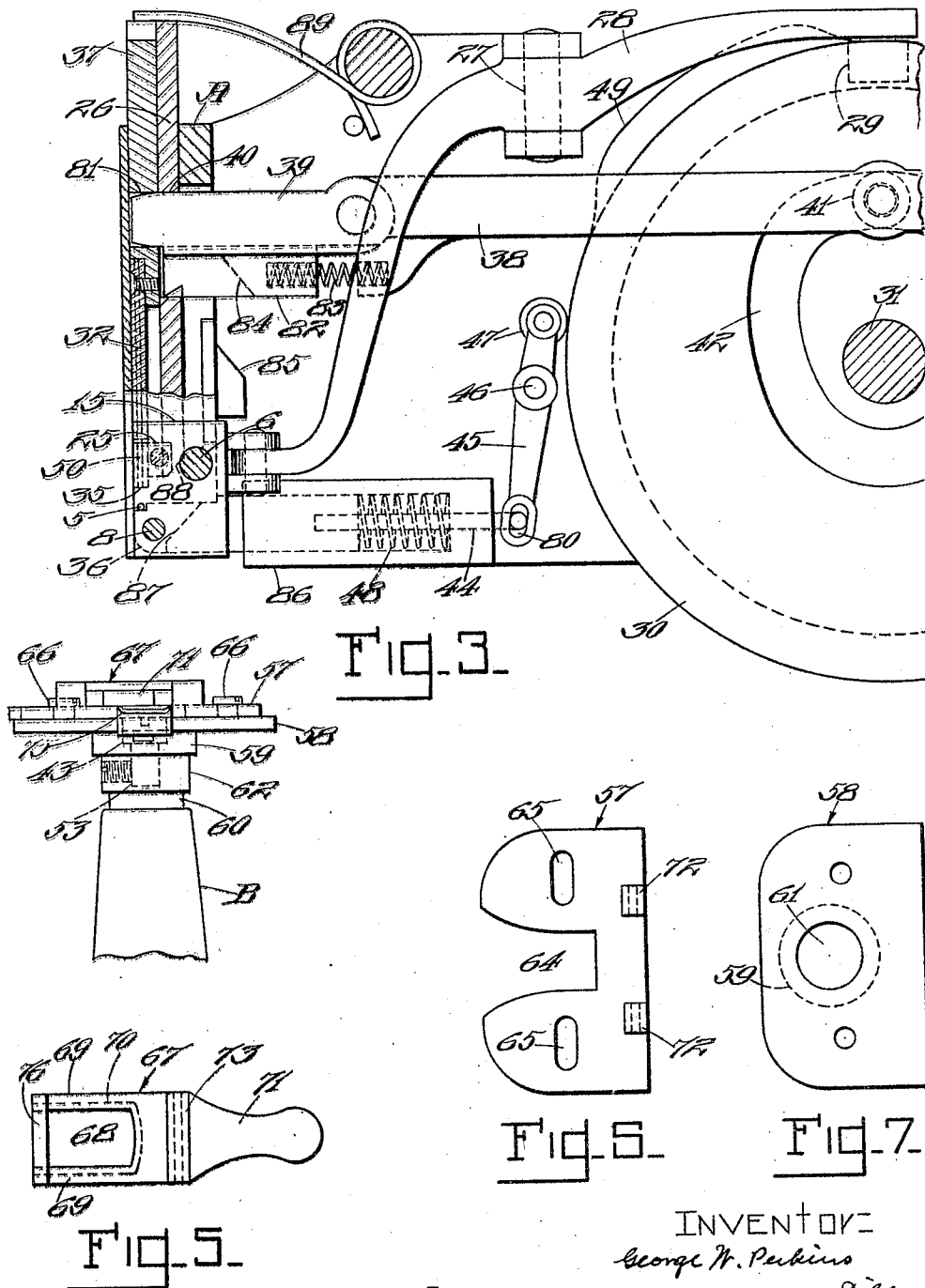
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2 Sheets-Sheet 2



INVENTOR:
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UNITED STATES PATENT OFFICE.

GEORGE W. PERKINS, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HEATON PENINSULAR BUTTON FASTENER COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

BUCKLE-FASTENING MACHINE.

Application filed January 3, 1922. Serial No. 526,501.

To all whom it may concern:

Be it known that I, GEORGE W. PERKINS, a citizen of the United States, residing at Boston, county of Suffolk, State of Massachusetts, have invented a certain new and useful Improvement in Buckle-Fastening Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

It has long been common to attach buttons to shoes by means of staples. It is quite in vogue to employ buckles on certain classes of shoes, especially pumps and slippers in connection with a strap and in some cases the buckles have been attached to the shoe by means of staple fasteners. So far as I am aware this has heretofore been performed by the use of hand tools. The object of my invention is to provide a machine for forming the staple fasteners and attaching the buckle by means of the staple fasteners to a shoe or any other article.

One feature of the invention relates to the means for forming a staple. Another feature of the invention relates to a buckle holder for holding the buckle in proper position during the operation for forming and attaching the buckle by means of a staple to the article. Another feature of the invention relates to the guide for the material to which the buckle is to be attached. Other features of the invention will be more fully explained hereafter in the specification and defined in the claims.

For convenience of description of the invention, particular reference is made to its application in the fastening of a buckle to a shoe, although it is to be understood that the invention broadly covers the use of the machine for any purpose to which it is adapted.

The invention will be fully understood from the following description when taken in connection with the accompanying drawings, and the novel features thereof will be pointed out and clearly defined in the claims at the close of this specification.

In the drawings, Fig. 1 is a section showing a buckle attached to an article by means of a staple, the parts being shown on an enlarged scale.

Fig. 2 is a front elevation of a machine embodying the invention.

Fig. 3 is a side elevation partly in section of the machine shown in Figure 2.

Fig. 4 is a plan view of the anvil and associated parts, showing the material inserted in the guide and a buckle inserted in the buckle holder, and one staple driven home on one side of the tongue of the buckle and the apparatus ready for the holder to be moved into position for another staple to be set on the other side of the tongue.

Fig. 5 is a detail view of the buckle holder.

Fig. 6 is a detail view of the guide for the material.

Fig. 7 is a detail view of the guide mount.

The machine shown in the drawings comprises mechanism for forming a staple, mechanism for feeding wire to the forming mechanism which cuts a blank from the wire as well as forms the staple, means for supporting the article to which the staple is to be attached over an anvil which cooperates with the staple forming and staple attaching mechanism, means for guiding the material to hold it in proper position during the stapling, and means for holding the buckle also in proper relation to the material.

Referring to the drawings, A represents the head of the machine which contains the staple forming and wire feeding mechanism, and B represents the base on which is mounted the anvil, the strap guide and the buckle holder. There is indicated at 1 a portion of a strap or other article to which the buckle is to be attached. The buckle as shown comprises a frame 2 of approximately rectangular contour, and a middle crossbar 3 which forms the pintle for a tongue 4.

Preferably the blank from which the staples are formed is cut from a wire which is fed to the forming mechanism intermittently as the staples are severally needed. Any suitable wire feed mechanism may be employed. That shown in the drawings is very similar to that shown in my former Patents, No. 982,440, August 12, 1913, and No. 1,017,628, February 13, 1912. It is not

deemed necessary to describe it in detail. In brief, a length of wire 5 may be run from a reel or any other suitable source of supply. Mounted fast on a rod 6 is a block 7, which is termed the "wire end block," and passing loosely through said block 7 is a rod 8 which serves as a guide. Pivoted to the block 7 is a rest 9 whose forward end rests on the adjustable stop screw 10 so that the free end of the rest arm 9 may be raised or lowered. The wire 5 passes over the top of the rest 9. Fulcrumed at 11 to said block 7 is a dog 12 whose pointed lower end engages with the upper side of the wire. The back of the dog rests against a stop pin 13. A spring 14 bears against the rear side of the upper arm of the dog to hold the lower arm of the dog by yielding pressure against the stop pin but allows the forward feed of the wire. The dog 12 prevents the wire from being moved backward.

Loosely mounted on the rod 6 is a block 15 which is termed the "feed block." Pivoted to the side of the block is a rest 16 the free arm of which rests upon the upper end of an adjustable screw 17. The block 15 is slidable on the rod 8 as well as on the rod 6. Fulcrumed at 18 on the block 15 is a dog 19 whose pointed lower end engages with the wire. There is provided a stop pin 20 for the lower arm of the dog and a spring 21 which bears against the upper arm of the dog to hold the dog in proper relation to the wire. The forward end of the rod 6 is made fast to the frame of the machine.

The forward end of the wire passes through a guide 23 and projects far enough beyond the guide at each feed movement so as to project a sufficient length of wire under the forming mechanism to form a blank for a single staple. The forward end 24 of this guide member 23 forms one of the cutter members for the wire, the wire being cut by a shearing action between the said cutting portion 24 and a movable cutter member 25 mounted on the vertically slidable former 26, the movement of which will be more particularly described hereinafter.

The means for actuating the feed is as follows:—Fulcrumed at 27 is a lever 28 the lower end of which is pivotally connected with the wire feed block 15, the upper arm of said lever being bent and provided with a roll 29 which engages with a cam 30 mounted on the shaft 31. The cam is so shaped that it will give to the feed block 15 a forward movement at the proper time in the operation and for a distance sufficient to carry the wire a distance equal to the length of the blank for a single fastener. When the block 15 moves forward the dog 19 causes the wire to move with the block. The dog 12 will yield sufficiently for the wire to ride under it and when the cam moves the feed block 15 backward the dog 12 will pre-

vent the wire from being pulled backward with it.

The mechanism for forming the loop and legs of the wire is as follows:—Vertically movable in guideways in the frame 22 is the staple former 26, in which is mounted a slide 37 carrying a combined staple driver and loop former 32 whose lower end is formed with a slot 33, shaped substantially to the contour of the small loop 34 which is to be formed in the head of the staple, so that in a later stage of the operation when the staple is driven into the strap, (as shown in Figures 1 and 4), said slotted member 32 will press down on the head of the staple and bend it over the pivot member 3 of the buckle, to form the loop 34 and drive the staple through the strap and clinch it as will be hereinafter described. In the meantime, however, the wire blank will be bent to form the legs of the staple by means of the two leg portions 35 of the slotted former 26, which bend the blank over the top of the staple forming anvil 36, said leg portions being spaced apart from each other sufficiently so that they will pass down on opposite sides of the anvil 36. During the descent of the former 26, the movable cutter member 25, which is carried by the former 26, will sever the projecting portion of the wire blank from the main body of the wire where it projects from the guide 23.

The leg former 26 and the combination loop former and staple driver 32 carried by the slide 37 are, during a part of their movement, moved together and during a part of the operation one has a movement relative to the other. The mechanism for operating the leg former and the loop former is as follows:—

A lever 38 is provided with an extension piece 39 which engages with a slot 40 in the former 26 and also extends far enough to engage with the slot 81 in the slide 37 which carries the loop former 32. The members 38 and 39 will hereinafter be referred to as the lever 38. The slot 40 in the leg former is vertically elongated, being longer than the vertical thickness of the lever extension 39 so that when the excess height of said slot 40 is not filled up by the lock, to be hereinafter described, the lever 38 may have a movement for a limited distance to carry the loop former slide 37 while the leg former 26 remains stationary.

The lever 38 carries a roll 41 which engages with a cam groove 42 in the cam 30. The lever 38 is shown as broken away in its right-hand portion beyond the roll 41, but it is supposed to be fulcrumed at some point at the right beyond the roll 41 so that the left-hand end of the lever is capable of being turned vertically up and down as the cam rotates, and this up-and-down movement of the lever actuates the leg-forming

member 26 and the loop-forming slide 37. It is not deemed necessary to show the fulcrumed end of the lever.

The locking device for the lever 38, previously mentioned, consists of a horizontal slide member 82 which slides in guideways in the underside of the lever extension 39, and its left-hand end is adapted to fit into the lower part of the slot 40 so that the lever extension 39 and the locking member 82 together will fill the slot 40. A spring 83 normally holds the said slide member 82 in its forward locking position, as shown in Figure 3. The left-hand portion of said slide member is formed with a cam surface 84. Fixed to the head of the machine is a cam 85 at some distance below the slide 82 and so located that after the lever 38 has been turned down at its forward end far enough to carry the leg former 26 a sufficient distance to cut the staple blank from the length of wire and to then bend the wire over the anvil 36 sufficient to form the legs of the staple, the said cam surface 82 will engage the cam 85, thereby causing the locking slide 82 to move to the right from the position shown in Figure 3, compressing the spring 83 in so doing and thus withdraw the locking member from the slot 40.

The lever 38 has a still further downward movement carrying with it the slide 37 with the loop former 32 and also the leg former 26 for the purpose of setting the staple, but in order to permit this it is necessary that the anvil 36 be moved out of the way. The mechanism for thus withdrawing the anvil is as follows:—

The arbor 36 is slidable in a path at right angles to the path of the leg former 26. As shown in Figure 3, the leg former is movable in a vertical direction and the anvil 36 is movable in a horizontal direction in a guide 86 in the head of the machine. The forward portion of the anvil is formed with a cam surface 87 and the leg former 26 is formed with a cam surface 88 at its lower end, which, when the leg former is moved far enough to form the legs of the staple, will engage the said cam surface 87 and move the anvil to the right, viewing it as in Figure 3, thus withdrawing the anvil from the path of movement of the leg former. A spring 48 normally holds the anvil in a forward position to support the wire blank ready for the forming operation of the staple but yields to the action of the cam 88 on the cam surface 87 of the anvil to permit the withdrawal of the arbor, and the spring is thereby compressed ready to throw the arbor forward again into operative position at the proper time.

Preferably, there is also provided auxiliary means for withdrawing the anvil as follows:—The rear end of the anvil is connected with one end of a rod 44, the other

end of which is connected with one end of a lever 45. Said lever 45 is fulcrumed at 46, one end of said lever being connected with said rod 44 and the other end of said lever carrying a roll 47 which engages with the cam 30. An elongated slot 80 in the lower end of the lever 45, through which the connection is made with the bent end of the arm 44, is to enable the rod 44 to move in a straight line while the lower end of the lever 45 swings in the arc of a circle. The periphery of the cam 30 is formed with a projection 49 which engages with the roll 47 on the lever 45 at the proper time to turn the lever 45 so as to retract the anvil out of the path of movement of the leg former 26 and the staple driver 32. This is timed to act simultaneously with the action of the cam face 88 on the former 26 upon the cam surface 87. This auxiliary anvil actuating mechanism may be omitted if desired. If employed, the spring 48 acts to throw the anvil forward in the manner already described.

After the staple has been formed by bending the cut blank over the anvil 36, the loop end will be engaged in grooves 50 in the inside faces of the two leg portions 35 of the leg former, so that the leg former may retain the staple and serve as a staple carrier in the downward descent of the former after the anvil 36 has been withdrawn.

As previously stated, the cam which actuates the leg former 26 to form the staple also carries down the loop former slide 37 and the loop former 32. After the locking member 82 has been withdrawn from the slot 40, as previously described, said lever 38 is capable of a still further downward movement relative to the leg former equal to the portion of the slot previously occupied by the locking member. The leg former 26, however, is given a further downward movement by means of a spring 89 which bears on the upper end of the leg former 26 by a yielding pressure, so that both the leg former and the loop former will be carried down together for a distance until the legs 35 of the leg former 26 engage the material with an elastic pressure against the anvil, while the loop former 32 is positively moved further down by the lever 38 to drive the legs of the staple through the material 1 and clinch them against the inclined faces 52 of the anvil.

Preparatory to the descent of the former 26, the strap 1 and the buckle 2 will be properly positioned by the operator above the anvil 43. The anvil 43 is formed with a central upwardly extending wedge or rib 51 and two opposite downwardly converging surfaces 52 on opposite sides of the rib 51. Said anvil 43 is suitably mounted in the standard B in any suitable manner. As

shown, the anvil has a shank 53 attached to a vertically adjustable member 60 which extends down into a column 54 and is adjustably secured therein by a screw 55. Vertical adjustment of the shank is permitted by reason of a vertically elongated slot 56 in the column.

At 57 is shown a plate which serves as a guide for the material or strap 1 to which the buckle is to be attached. Said guide is mounted on a plate 58 which I term the guide mount. Said guide mount 58 may be supported in any suitable way. As shown in Figure 7, said guide mount is provided with a hub 59 having a hole 61 of the right size and shape for it to slip over the anvil 43 and it is supported on an adjusting nut 62 which is secured to the member 60.

The guide 57 is formed with a slot 64 in one edge to receive the strap so that the strap may rest upon the upper side of the anvil 43. Said guide is positioned on the guide mount 58 by means of screws or pins 65 passing up from the guide mount through slots 65—65 in the two branch portions of the guide. Said slots 65—65 are elongated to permit adjustment of the guide laterally so that the strap and buckle may be moved after one staple is inserted on one side of the tongue 4 to bring it into position over the anvil to permit another staple to be driven on the other side of the tongue.

The buckle holder, shown in detail in Figure 5, consists of a bifurcated plate 67, said plate being formed with a slot 68 extending inward from one end and forming the two side branches 69—69. On the inner edges of these two side branches 69—69, there is formed a groove 70 which extends the full length of said side branches 69 and also across the head of the slot 68, as shown in Figure 5; that is, it extends around the three sides of the slot. The slot is of sufficient width to admit the frame 2 of the buckle into the groove, thus forming a sort of forked holder for the buckle. The said buckle holder is formed with a handle 71 to be grasped by the operator. The guide 57 is formed with two upwardly extending ears or bearing lugs 72—72 between which said buckle holder is pivoted, the holder being formed with a barrel 73 through which passes a pivot pin 74 which also passes through the lugs 72. Said buckle holder is normally maintained in a horizontal position just over the strap guide 57, as shown in full lines in Figure 2, by means of a spring 75. Said buckle holder may be turned up into the dotted line position shown in Figure 2 by pressing down on the handle 71 so that the strap 1 may be inserted in the guide 57 and project into the slot 64 and beneath the buckle and holder, as shown in Figure 4. Preferably, the two forward ends of the branches 69—69 of the buckle holder are

connected by a crosstie 76 for strengthening purposes.

Preliminary to fastening the buckle to the strap, the buckle will be inserted into the holder by sliding it in from the open end of the holder so that the side bars of the buckle frames will enter the groove 70 and be properly positioned with relation thereto. The buckle holder will then be turned up on its pivot, as shown by dotted lines in Figure 2, and the strap will be inserted in the slot 64, the end of the strap abutting the end of the slot, the strap being positioned for the buckle to be attached to the particular portion of the strap desired. The strap will also rest upon the top of the anvil 43. The buckle holder will be in position so that the pivot member 3 will rest on top of the rib 51 of the anvil. The guide will also be adjusted laterally by means of the slots 65 and the guide pins 66 which pass up through the guide slots 65 so that the guide may be positioned in such relation to the path of movement of the former 26 that when the former 26 descends, it will bring the ends of the staple carried thereby down into position to straddle the pivot bar 3 of the buckle at one side of the tongue 4, as shown in Figure 4. The continued descent of the staple driver 32 will drive the legs 63 of the staple through the strap 1 and cause them to clinch up against the under side of the strap by reason of the sloping sides 52—52 of the anvil 43, clinching the staple as shown in Figure 1. The arched slot 33 of the loop former 32 will engage the middle portion of the head of the staple and utilize the pivot 3 of the buckle as a die to form the small loop 34 which conforms to the curvature of the pivot bar 3.

The cutter 25 which is carried by the former 26 is mounted on the member 26 far enough above the lower end of the former so that the cutter will not come in contact with the buckle when the staple is driven home and clinched.

In Figure 4 there is shown one staple driven at one side of the buckle tongue 4. In order to position the buckle with relation to the forming and staple driving mechanism to drive the staple through that portion of the strap at the other side of the buckle tongue 4, the buckle holder and the guide 57 will be moved laterally so as to bring the pins 66 into the opposite ends of the slots 65 from that shown in Figure 4, so as to bring the portion of the pivot 3 of the buckle which is on the unstapled side of the tongue 4 into proper alignment with the staple driving mechanism so that upon the next descent of the former the second staple will be driven in proper place on the opposite side of the tongue from that which has been previously stapled.

Briefly speaking, in the operation of the machine the lever 33, aided by the locking member 82, moves down the leg former 26, to cut the wire and form the legs of the staple and at the same time carry down with them the slide 37 on which is mounted the loop former and driver 32. When the staple is formed, the cam surface 88 on the leg former 26 cooperates with the cam surface 87 to withdraw the anvil 36 from the path of movement of the leg former and combined loop former and staple driver. Then the cam surface 85 cooperating with the cam surface 84 on the locking member 82 moves the locking member out of engagement with the leg former 26. The continued downward movement of the lever 33 carries down with it the loop former 32 with its holder 37, and this together with the spring 89 carries the leg former 26 with the staple down to the anvil. At this point the spring 89 holds the member 26 against the material on the anvil with spring pressure, and by reason of elongated slot 40, the locking member 82 having previously been withdrawn, the lever 33 gives a further movement to the loop former and staple driver 32 to set the staple and form the loop 34 in the head of the staple.

What I claim is:

1. In a machine of the character described, an anvil, a guide mounted on the anvil to support an article to which a buckle is to be attached, means for holding a buckle in proper relation to the article to which it is to be attached, a reciprocable former which bends a blank to form a staple, said former being constructed to hold the formed staple, means for moving said former to position the staple with relation to the buckle, and means to drive the staple through the article to which the buckle is to be attached.

2. In a machine of the character described, a staple-forming anvil, a reciprocable former having a slotted end which bends a blank over the said anvil to form a staple, the former being constructed to carry the formed staple, a main anvil, means for actuating the former to form a staple and to then move to clamp the article to the main anvil, a driving member carried by the former, said driving member being movable with relation to the former, and means for actuating the said driving member to drive the legs of the staple through said article after said article is clamped to the anvil by the former, the driver being formed with a slot which cooperates with a portion of the buckle as a die to form a loop in the head of the staple.

3. In a machine of the character described, an anvil, a guide plate positioned above the anvil, and having an opening therein over

which the material to be stapled is positioned, means for holding a buckle superimposed upon said material above the anvil, and means for positioning a staple to straddle a portion of the buckle and drive the staple.

4. In a machine of the character described, an anvil, a mount for said anvil, a guide for the material to which the buckle is to be attached having a slotted opening for the anvil so that the material may be positioned on the guide above said opening and over the anvil, means for holding a buckle in proper position above the material and properly positioned with relation to the anvil, means for carrying a staple to a position to straddle a portion of the buckle and means to drive the legs of the staple through the material and clinch them.

5. In a machine of the character described, an anvil, a guide for the material to which the buckle is to be attached, a support for the guide having an opening through which the anvil extends, said guide having elongated slots, said mount having pins which engage with said slots, the elongated slots permitting lateral adjustment of the guide on the mount, and a buckle holder pivotally connected with said guide and adapted to hold a buckle in proper relation to the material on the guide.

6. In a machine of the character described, an anvil, a guide for the article to which a buckle is to be attached to support said article on the anvil, said guide having a slot to form an opening for the anvil, and means for holding the buckle on the article positioned on the anvil.

7. In a machine of the character described, an anvil, a guide for the material to support the material above the anvil, said guide having a slot in one edge which extends in far enough to form an opening above the anvil and for guiding the material to a position over the anvil, a mount on which said guide is supported, said guide being formed with elongated slots on opposite sides of the edge slot, and said mount being provided with guide pins which engage with said elongated slots and which permit lateral adjustment of the guide with relation to the anvil.

8. In a machine of the character described, an anvil, a guide for the material to support the material above the anvil, said guide having a slot in one edge which extends in far enough to form an opening above the anvil and for guiding the material to a position over the anvil, and a buckle holder pivotally mounted on said guide so constructed as to hold a buckle above said edge slot in proper alignment with the anvil.

9. In a machine of the character described, an anvil, a guide for the material to which the buckle is to be attached and having a slotted opening for the anvil so that the

material may be positioned on the guide above said opening and over the anvil, and means for holding a buckle in proper position above the material and properly positioning it with relation to the anvil.

10. In a machine of the character described, an anvil, a guide for the material to which the buckle is to be attached and having a slotted opening for the anvil so that the material may be positioned on the guide above said opening and over the anvil, means for holding a buckle in proper position above the material and properly positioning it with relation to the anvil, means for carrying a staple to a position to straddle a portion of the buckle, means to drive the legs of the staple through the material, and means for laterally adjusting the guide and buckle holder to different predetermined positions with relation to the anvil and former.

11. In a machine of the character de-

scribed, an anvil, a guide for the material to which a buckle is to be attached, whereby the material may be positioned over the anvil, means for holding the buckle properly positioned with relation to the material and the anvil, means for carrying a staple to a position to straddle a portion of the buckle, and means to drive the legs of the staple through the material and clinch them.

12. In a machine of the character described, an anvil, a guide for an article to which a buckle is to be attached, said guide having a slot to form an opening for the anvil, means for holding the buckle on the article positioned on the anvil, means for positioning a staple so as to straddle a portion of the buckle, and means to drive the legs of the staple through the material.

In testimony whereof I affix my signature.

GEORGE W. PERKINS.