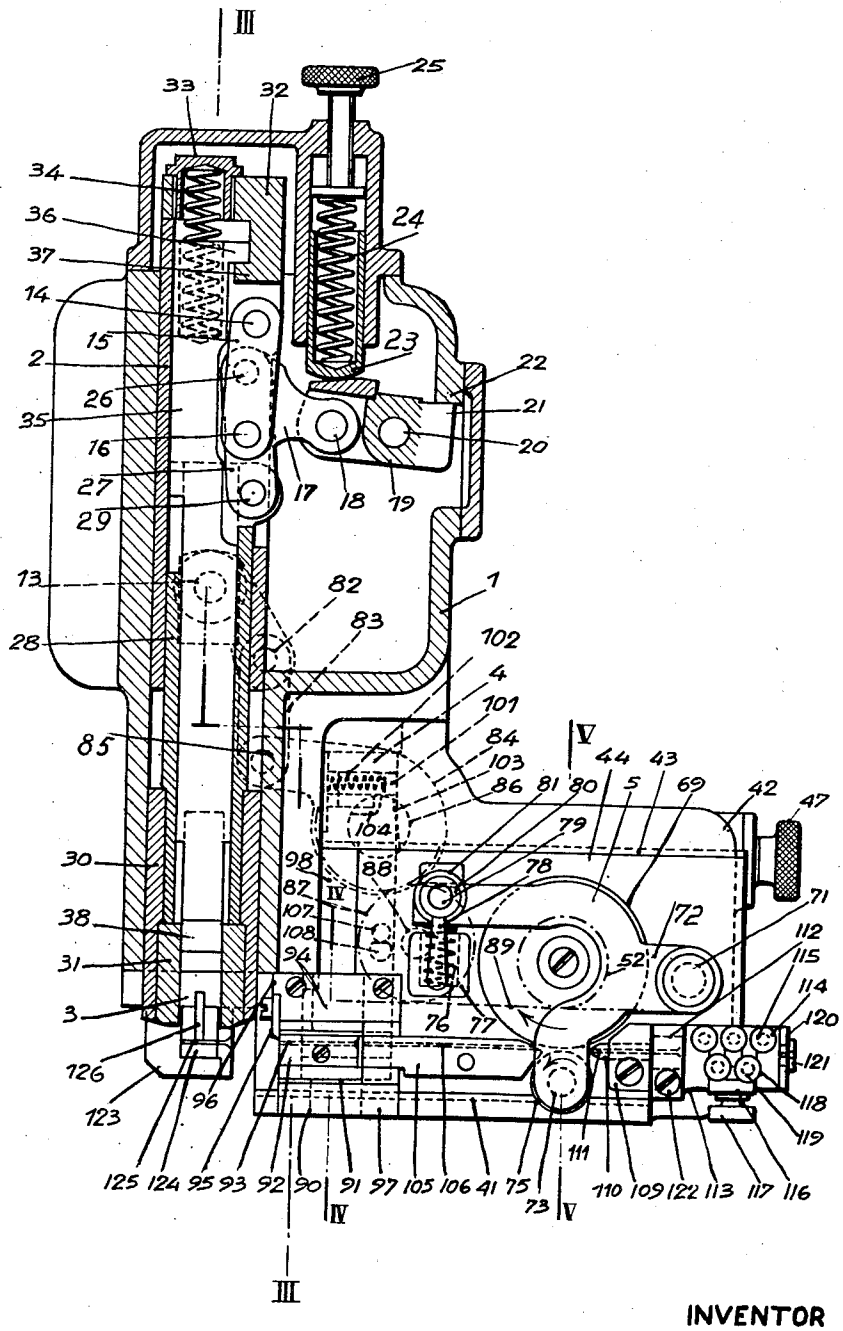
Nov. 6, 1951 A. DUTELLE 2,574,380

STAPLE FORMING AND SETTING MACHINE

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Fig. 1.



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Fig-2

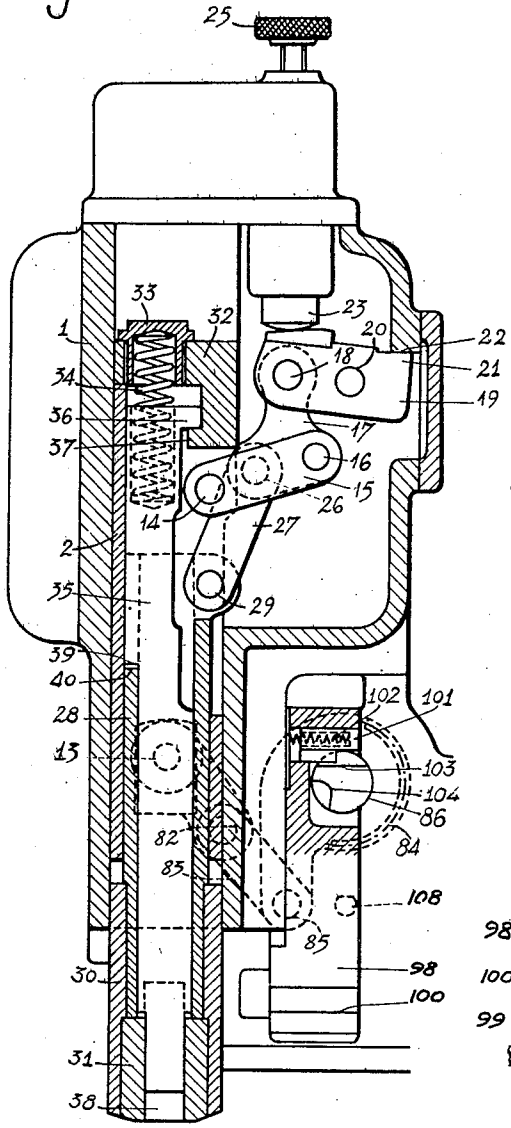


Fig-15

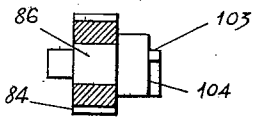


Fig-16

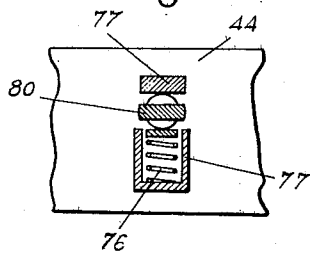
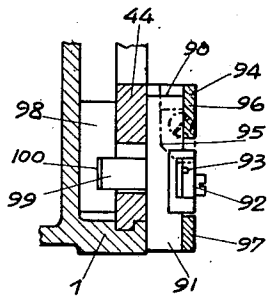


Fig.4.



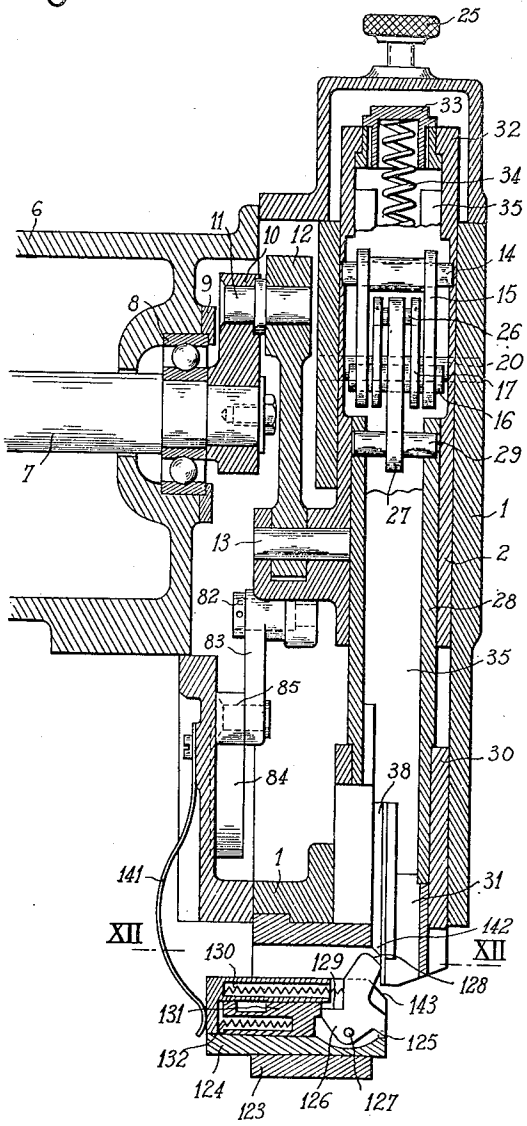
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STAPLE FORMING AND SETTING MACHINE

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Fig. 3



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Fig.10.

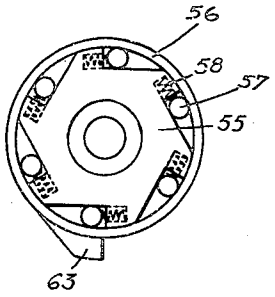


Fig.5.

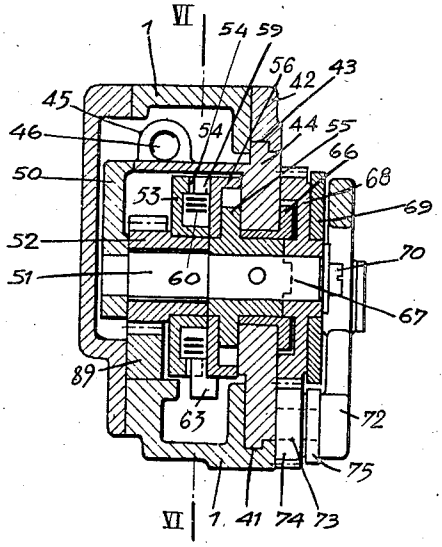


Fig.11

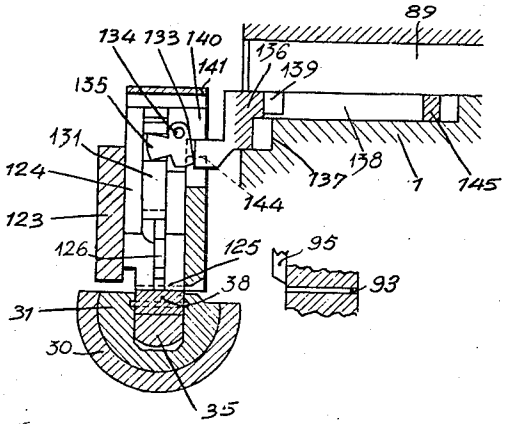


Fig.12.

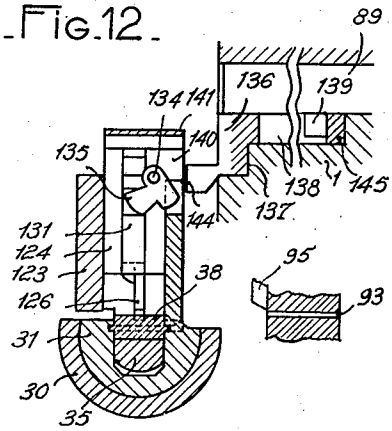


Fig.13.

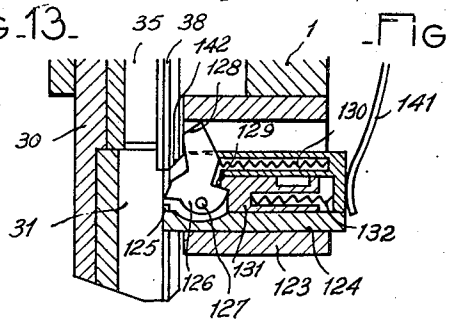
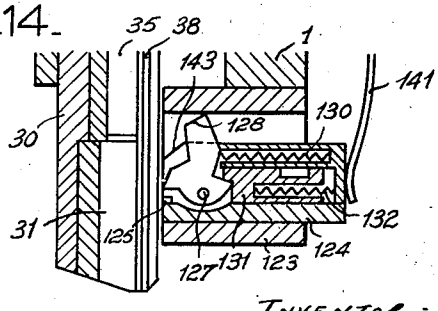


Fig.14.



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Fig.6.

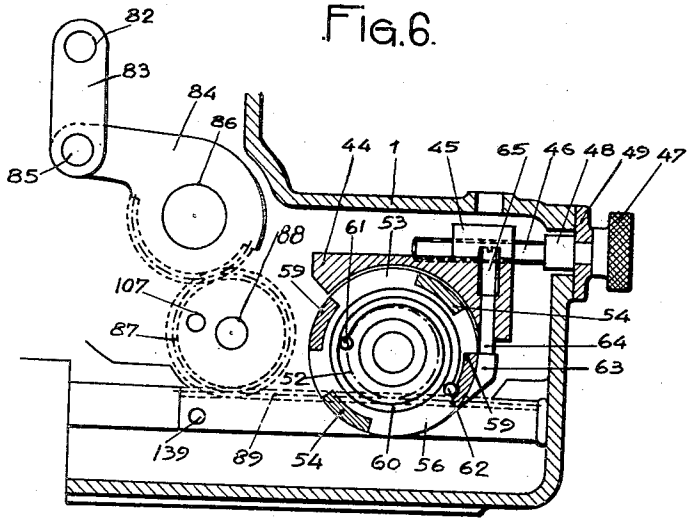


Fig.7.

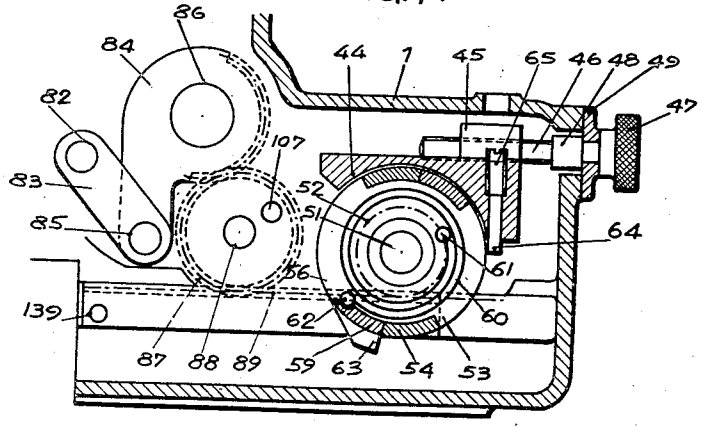


Fig.8.

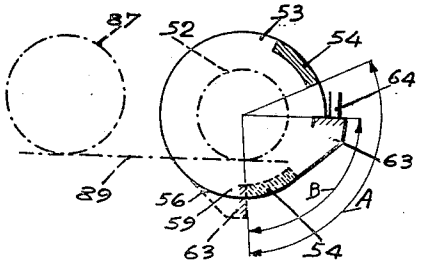
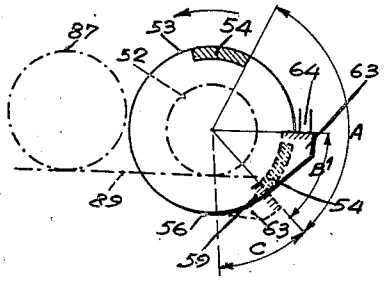


Fig.9.



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UNITED STATES PATENT OFFICE

2,574,380

STAPLE FORMING AND SETTING MACHINE

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Application April 13, 1948, Serial No. 20,729
In France June 12, 1947

2 Claims. (Cl. 1—2)

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In staple-fastening machines wherein it is required to adjust or vary the length of the legs of the staple-fastener to compensate for the variable thickness of the materials or work to be clipped together, such adjustment was in the past effected exclusively by displacing the wire-cutting mechanism, while the wire-feeding mechanism remained in a fixed position with respect to the center axis of the staple forming means. The result was that in all of such prior machines, it was impossible to guide the wire through a closed conduct throughout the entire distance separating the feed mechanism from the severing mechanism, and it was thus necessary to allow for a certain amount of free space along which the wire was not guided at all. In such conditions, whenever the wire, urged by its feed mechanism, found any difficulty in penetrating into the staple forming means as a result of an out-of-line condition thereof or any slight burr produced on cutting, the wire was liable to form loops or to buckle within the space in which it was not subjected to a guiding action, and the machine would jam. This formed a serious drawback in all of the known machines, because of the losses in time caused by the steps which had to be taken to reset the machine into operation. Said drawback is the more troublesome as the current trend is more and more to use machines provided with multiple clipping or fastening heads, and the jamming of one head would be enough to suspend the operation of the whole machine. Moreover, the risk of jamming is still increased by the fact that it is just when the wire being used is of thin gauge and consequently weak that the gap along which the wire is not guided is long, because a thin gauge wire is used in making the shorter staples, for which it is necessary to leave a particularly large interval or gap in which the wire is not subjected to the action of any guiding means between the feed mechanism and the cutting mechanism.

Further, in all known machines, straightening of the wire is effected by means of a straightening device located either before the wire-feed means or after said feed means. Moreover, in all such machines, the straightening device is fixed in position. The plane in which it straightens out the wire therefore always remains the same, whereas the plane in which the wire may be curved is varied according to whether the axis of the reel of wire extends vertically, horizontally or at an angle. It follows that the straightening step is defectively carried out in a very great number of instances and that the provision of the straightening device often only yields a deceptive result. Moreover, in machines wherein the wire straightener is placed before the feed mechanism, the wire is guided after issuing from the straightener through a curved duct the effect of which is again to impart a curvature to the wire which should have been straightened out. In known machines wherein the straightener is located after the feed mechanism, the wire does remain in a straight duct, but since it is pushed towards the straightener, that is it is inserted into said straightener by a pushing action exerted thereon, it will have a tendency to buckle or form loops in the latter.

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It is known besides that staple fastening machines also are existent wherein the movements of all of the members which participate in forming the staple are derived from a common reciprocatory movement obtained either through an eccentric or a lever, a slide, a cam or any equivalent mechanism providing a reciprocatory motion.

In prior art, in staple fastening machines having the above described features, the wire bending members and the staple driving members always moved down to the same pre-selected distance with respect to the anvil on which the work to be fastened is placed.

Such machines therefore do not allow for variations in the thickness of said work. Such machines moreover only allow the performance of relatively simple operations and in particular do not permit of handling work or materials wherein the thickness is liable to accidental variations, as is the case for instance for boxes of unplaned wood where it may happen that the thickness of the sheets of wood varies and where it may occur as a result of a coincidence that it is necessary to clip together two portions which are both exceptionally thin or exceptionally thick. Such thickness variations in the work to be clipped, even when not very considerable as considered individually may thus build up to an amount which no longer enables proper operation of known staple fastening machines wherein the staple forming and driving means always move down to a fixed distance from the anvil. This is so because if, as a result of an excessive thickness of the elements to be clipped, said member does not move down, with respect to the anvil, to the spacing for which they have been set, the operation of the staple fastening machine will be arrested because of jamming of the movable members of the machine and formation of the staple on the elements to be

clipped, or stalling of the motor driving the machine.

The main object of the present invention with a view to overcome said drawback, is to provide in a staple fastening machine of the character described, a staple forming device wherein the wire feeding mechanism and the wire cutting mechanism are mounted on a common frame, and the assembly including said feed means and said cutting means is adjustably positionable with respect to the center axis of the staple forming means, for the purpose of obtaining the desired variations in the length of the legs of the staple, when clipping series of work with various average thickness. The feed and the cutting means occupy a fixed relative position with respect to each other, whereby the wire is adapted to be positively guided throughout the entire distance separating both said mechanisms. Should, as a result of imperfect straightening of the wire or defective cutting due for instance to excessive wear in the cutters, loops or distortion resulting from buckling of the wire have a tendency to occur, such distortion can only appear between said cutters and the staple forming members. At that point however, and inasmuch as the cutters will have severed the loops or buckled sections of the wire, such loops or buckled sections are no longer able to cause jamming of the machine.

Another object of the present invention, is to provide a staple forming device of the character described wherein the adjustment of the length of wire for the formation of staples to be used with a series of work having a determined average thickness is obtained by the relative location of the frame supporting the feed and cutting means with respect to the staple forming members, in such a condition that, on one hand, both legs of said staples are always the same in length and, on the other hand, said length corresponds to the average thickness of said series of work to be clipped. This object is achieved by correlating with a given displacement of the frame, corresponding to a change in the average thickness for another series of work, a length of wire which is twice that of said displacement and in the same direction as the latter. In other words, if, for passing from a series to another series the average thickness of which is greater than for the first one, the frame moves away from the staple forming members by an amount x, the length of the severed section of wire increases by $2x$ each of the legs of the staple being increased by the extent x.

Another object of the present invention is to provide a staple forming device of the character described wherein the wire straightener is angularly adjustable so that the straightening plane may be made to coincide with the actual plane of curvature of the wire, at the will of the operator of the machine and independently of the positioning of the axis of the reel of wire. Moreover, the straightener is located before the feed mechanism and in such a manner that the latter exerts a pull on the wire which is passing through the straightener. By the use of such means, buckling of the wire is avoided and, from the point where the wire issues from the straightener and until that at which it reaches the staple forming means, it passes through positive guiding conducts throughout, all arranged in alignment with each other.

A further object of the present invention is to provide a staple forming device of the character described wherein the staple forming and driving means are caused to move down to a variable spacing from the anvil, thus allowing for variations in the thickness of the work, such variations being taken up by suitable spring means.

Finally, the staple forming mechanism and the wire cutting mechanism comprise members which are all controlled in such fashion that the staple will at no time be subject to deformation or injury. Furthermore, severing of the wire is effected right after the feeding of the wire and in a sufficiently long period of time to avert the use of excessive speeds in the mechanism.

The ensuing disclosure made in reference with the accompanying drawings given by way of non-restrictive examples will clearly show in what way the invention may be practically carried out:

Fig. 1 is an elevational view partly in cross-section on the longitudinal axis of the device, of the mechanism controlling the wire bending and staple driving means, said mechanism being shown in its top dead center position.

Fig. 2 is a similar view in section on the same axis as Fig. 1 but showing the mechanism in its lower dead center position, this figure further including a partial cross-section along the longitudinal axis, of the wire-cutting control mechanism.

Fig. 3 is a section on line III—III of Fig. 1 illustrating an example involving the control of the machine through an eccentric after the wire has been fed to the inside former.

Fig. 4 is a section on line IV—IV of Fig. 1 and showing the wire cutting apparatus.

Fig. 5 is a section on line V—V of Fig. 1 and showing the wire-feed mechanism.

Figs. 6 and 7 are sections on line VI—VI of Fig. 5 showing the position of the wire-feed means respectively at upper dead center and lower dead center.

Figs. 8 and 9 are diagrams showing how the variations in the amount of feed of the wire may be determined as a function of the positioning of the wire feed mechanism.

Fig. 10 is a detailed view of the free-wheel means in the wire-feed mechanism.

Fig. 11 is a horizontal cross-section of Fig. 3 taken on line XII—XII.

Fig. 12 is a view similar to Fig. 11, the groove of the inside former facing the outside former.

Fig. 13 is a vertical longitudinal cross section, at larger scale, of the lower part of the forming head when the outside former contacts the wire carried by the inside former.

Fig. 14 is a view similar to Fig. 13, the outside former having attained its lower dead center.

Figs. 15 and 16 are partial sections of various cams of the machine.

In the exemplary embodiment of the staple forming device shown in the accompanying drawing, the machine shown comprises all of the above-specified improvements, as will clearly appear from the ensuing description thereof.

In the machine shown, a staple forming head **1** contains a slide block **2** movable within said forming head **1** and adapted to transmit its motion to a staple-forming mechanism **3**, a wire cutting control mechanism **4** and a wire feed mechanism **5**.

The movement of the slide-block **2** may be imparted thereto from an eccentric as in the exemplary form shown in Fig. 3. In this example

the forming head 1 is secured to a frame 6 which carries a shaft 7 actuated at its opposite end by a motor through a clutch not shown. The shaft 7 supported in a ball-bearing 8 secured to the frame 6 through a flange 9, carries an eccentric 10 keyed thereon. The crank-pin 11 of the eccentric 10 is adapted to actuate the control slide-block 2 through a connecting rod 12 pivoted as at 13 to the slide-block 2. The slide-block therefore performs a rectilineal reciprocatory motion which it will be understood could be imparted thereto by any other suitable means such as a lever, a pin-and-slot device, a cam and the like.

The slide-block 2 (Figs. 1 and 2) carries a pin 14 on which is pivoted a connecting rod 15 pivoted in turn through a pin 16 thereof to a toggle member 17. The toggle member 17 is rotatable on a pin 18 carried by a lever 19. Said lever 19 is pivoted on a spindle 20 which is fixedly secured in the head 1. The lever 19 is abutted through the shank 21 thereof against a stop 22 of the head 1. Moreover, the lever 19 is held in position by a piston 23 urged by a spring 24 the pressure of which is adjustable through a set screw 25 provided with a knurled head whereby pin 18 has a predetermined fixed position with respect to slider 2. The toggle 17 carries a pin 26 through which it is pivoted to a toggle link 27. The link is pivoted at its opposite end to the slide block 28 of an outside former through a pivot pin 29. The slide-block 28 supports at its lower end a part 30 in which are secured the benders 31 which function to bend the wire against a mandrel to be described later.

The slide-block 2 has secured thereto a part 32 in which is secured a nut 33 forming a socket housing a spring 34. The spring 34 presses against the slide-block 35 of a driver retained in position with respect to the slide-block 2 through a shank 36 thereon applied against the shoulder 37 of the part 32. The slider 35 supports at its lower end the plunger 38 of the driver the function of which is to drive the staple which has been formed by the former into the material to be fastened.

The head 1 carries at its base a slide way 41 (Figs. 1 and 5). The head 1 also has secured thereto a part 42 comprising a slide-way 43. According to a feature of the invention both slide-ways 41 and 43 are adapted to hold the wire-supporting frame 44 which may move towards and away from the vertical axis of the above described staple forming and driving members. The position of the wire supporting frame 44 is adjusted in accordance with the desired length of the legs of the staple, by means now to be described. The wire supporting frame 44 comprises a boss 45 (Figs. 5 and 6) engaged by a set screw 46 the other end of which has a knurled knob 47 pinned to it. The shoulder 48 of the screw 46 engages a cover-plate 49 of the head 1.

The wire carrier 44 supports the wire-feed means which are arranged as follows (Figs. 5 to 7).

The wire carrier 44 carries a member 50 adapted to form a bushing for a shaft 51. A pinion 52 is freely rotatable on the shaft 51 and carries a casing 53 formed with a symmetrical pair of projecting lugs 54. A one-way clutch 55 secured on the shaft 51 is driven only in one direction from the overrunning clutch cage 56 through the medium of rollers 57 urged by springs 58 (Fig. 10). In the opposite direction, the clutch cage 56 is freely rotatable with respect to the clutch 55 without being able to drive the latter. The overrunning clutch cage 56 carries a symmetrical pair of stops 59 opposite the projections 54 of the casing 53. A spiral spring 60 fastened at one end 61 to the casing 53 and at its opposite end 62 to the cage 56 is adapted to maintain contact between the projections 54 of the casing 53 and the stops 59 of the cage 56. Moreover, the cage 56 carries an abutment 63 adapted to engage the end 64 of an adjusting screw 65 supported by the wire carrier 44. The screw 65 serves to bring both legs of the staple accurately to a common length when adjusting the machine.

The clutch 55 and the shaft 51 rotate within the cage 56 of the wire carrier 44. The clutch 55 carries a drive member 67 which meshes with a gear 68. The gear 68 has secured to it a feed roller 69. The assembly including gear 68 and roller 69 which is secured to the clutch 55 by means of the screw 70 is bodily rotatable with the clutch 55 only in the direction opposite to that in which the wire is fed.

The wire carrier 44 carries a pivot pin 71 having a lever 72 pivoted thereon. The lever 72 carries at one of its ends a pivot pin 73 on which is pivoted a gear 74 meshing with the gear 68 and supporting a roller 75. The other end of the lever 72 is acted on by a spring 76 seated against a boss 77 of the wire carrier 44. A key 78 is secured to a pin 79 carrying a cam 80 adapted to engage a boss 81 of the wire carrier 44. The action of the spring 76 is to rock the lever 72 around the pin 71 and clamp the wire between rollers 69 and 75. The key 78 makes it possible through the cam 80 to compress the spring 76 and move the rollers 69 and 75 apart to allow the insertion of wire into the machine.

The wire feed mechanism is controlled through the following means:

The slide-block 2 (Figs. 1 and 3) carries a pin 82 on which is pivoted link 83 adapted to transmit movement to lever 84 through pin 85. The lever 84 which is formed with a partial set of gear-teeth carries the pivot pin 86 (Figs. 6 and 7) rotatable in the head 1 and is adapted to mesh through said gear portion with an intermediate pinion 87 rotatable on a shaft 88 also supported in the head 1. The pinion 87 in turn meshes with a rack bar 89 slidable in a slideway of the head 1 and arranged to actuate drive pinion 52 (Fig. 5).

The wire carrier 44 also carries the wire cutting mechanism illustrated in Figs. 1, 2 and 4. In the groove 90 formed in the wire carrier 44 a slide-block is movable, said slide-block carrying the rectangular cutter 92 in which is formed a duct 93 through which the wire is fed. The slide-block 91 is retained in said groove through strips 94 and 97 secured on the wire-carrier 44. The strip 94 has secured thereon a cutter 95 which bears against a shank 96 of the strip 94. When the slide block 91 rises, the wire in the duct 93 is severed by the cutter 95. Movement of the slide-block 91 is ensured by the part 98 slidable in a slide-way of the head 1. The slide-block 91 carries a projection 99 engaging a groove 100 in the part 98. The slide-block 91 is thus adapted to be actuated regardless of its position relative to the part 98. The part 98 at its top is formed with a groove in which movable latch 101 is retained in place by a spring 102. Moreover, the shaft 86 of the toothed lever 84 carries a cam 103 and a socket 104. Finally, the cutter 92 is extended by a wire

guide 105 formed with an entirely closed conduit 106 adapted to completely guide the wire from the point at which it issues from the rollers 69 and 75 as far as the cutter 92 (Fig. 1).

Lastly, the wire carrier 44 supports a wire straightening means which will now be described. The carrier 44 is formed with a boss 109 (Fig. 1) in which is secured a wire guide 110 formed with a duct 111 through which the wire extends. The wire guide 110 comprises a cylindrical head 112 on which is secured the frame of the straightener 113. The frame 113 carries three cylindrical rollers 114 rotatable on pins 115 secured in the frame 113. The straightener frame 113 moreover comprises a slideway in which is mounted a slide-block 116 adjustable through a set screw having a knurled head 117. The slide-block 116 carries two cylindrical rollers 118 journalled on pins 119 secured in the slide-block 116. Said slide-block is so arranged that its rollers 118 are in alternating relationship with the rollers 114 of the frame 113. Finally, the frame 113 carries a projection 120 in which is arranged a wire inlet guide 121.

The wire, inserted into the wire guide 121, extends in between the rollers 118 and 114 and then enters the guide 119 before reaching the feed rollers 69 and 75. The straightening of the wire is obtained by acting on the knob or button 117 which moves the straightening rollers towards each other. The straightener frame 113 is rotatable on the cylindrical head 112 and is clamped in position with the screw 122. It may thus be adjusted in such a way that the straightening plane, as defined by the plane of the rollers 118 and 114 will coincide with the plane in which the wire is cambered, regardless of the positioning of the wire reel. Moreover the straightener frame is placed before rather than behind the feed rollers 69 and 75 so that the latter will draw on the wire passing through the straightener. Finally, the guide 121, duct 111 and duct 106 are aligned so as to avert curving the wire again after its having passed through the straightener.

The staple-forming means shown in Figs. 3 and 11 comprises a support 123 secured on the head 1. Within a groove of the support 123 an inside former 124 is movable, said inside former being formed with a groove 125 into which the wire is fed. The wire is clamped through a clamp member 126 movable around the axis 127 of the inside former 124. The clamp member 126 is formed with a camming portion 128 and a shank or foot portion 129. It further is urged by a spring 130 bearing against the inside former 124. A latch member, movable in a groove of the inside former 124 and subjected to the urge of a spring 132 is adapted to be brought over the foot 129 of the clamp member 126 to maintain the latter in opened condition.

The latch 131 is controlled through the lever 133 movable around the vertical pivot axis 134 fixed in the inside former. The lever 133 is adapted to act upon the latch 131 through its arm 135 engaging a groove formed in the latch 131, and is actuated from a part 136 slidable in a groove 137 formed in the head 1. The part 136 is formed with a slot 138 and is controlled through a pin 139 projecting from the wire-feed control rack 89 each time said rack reaches an end of its stroke.

The part 136 is further adapted to be brought to a position opposite the foot 140 of the inside former 124 to prevent the latter from being moved forward under the action of the spring 141 continually urging the inside former towards the outside former 31.

The machine operates as follows:

Assuming the mechanism to be in its condition relating to an upper dead center position of the slide block 2, the inside former 124 urged by the spring 141 has its foot 140 abutting against the edge 144 of the support 123. The groove 125 of the inside former 124 in which there is a portion of wire retained by means of the clamp 126 lies accurately below the grooves of the outside former 31 (Figures 12 and 14).

The slide block 2 starting downward by means of the link 15 rocks the toggle 17 about the pivot 18. The toggle 17 therefore, by means of the link 27, presses against the outside former causing the latter to form the wire in the inside former and to move down into engagement with the work while retaining the staple which is to be driven into the material. Simultaneously, the slide block 2 drives the driver 38.

The outside former 31 in its downward movement bends the wire thus forming both legs of the staple. The driver 38 also moves downwards and when the inclined plane portion 142 thereof engages the cam portion 128 of the latch 126, the driver 38 rocks said latch about its axis and causes the nose of the latch to release the web of the staple to place it in outside former. However, in this movement, the foot 129 of said latch 126 has assumed a position under the latch 131 and the latter, as urged by the spring 132, moves forward over said foot 129, thus holding the clamp 126 in its opening position (Fig. 13).

The downward motion of the outside former is continuous until the free pivot axes 18, 26 and 29 are approximately in alignment. At this moment and due to the position assumed by the link 15 (Fig. 2), the downward movement of the slide block 2 can only impart to the toggle 17 a slight rotational movement adapted to bring the pivot pin 26 to a point located a very short distance away from the line of the axes 18 and 29 on either side of said line. During this last portion of the stroke of the slide block 2, the outside former remains substantially stationary, because of its engagement with the surface of the work.

On the other hand, the slide block 2 in its downward movement rotates the lever 84 and the pinion 87 which drives the rack 89 leftwardly of the drawing. The rack 89 in turn drives the pinion 52 rigid with the casing 53 (Fig. 5). The casing 53 (Fig. 6) will therefore be rotated, but in an initial phase of its rotation its movement will exert no other action than that of releasing the spiral spring 60 connecting it with the cage 56. After the movement at which the shank 54 of the casing 53 engages the stop 59 of the cage 56, the casing 53 will start driving the cage 56 and the latter as a result of the wedging of the free wheel rollers 57 (Fig. 10) will rotate the clutch 55 and the feed roller 69 (Fig. 5). This movement will continue until the slide block 2 reaches its lower dead center position (as shown in Fig. 7). Thus, the feeding of the wire will not be effected throughout the entire period of rotation of the casing 53, but only from that point in said rotation at which the casing 53 starts driving the cage 56 through its projection 54. This has been illustrated in the diagram of Fig. 8 in which the angle of rotation of the casing 53 is shown at A and the angle of rotation of the cage 56 effective to feed the wire is shown at B.

The driver 38 proceeding on its path of travel causes the inside former 124 to recede when the incline 142 of said driver comes into engagement with the incline 143 of the inside former 124, and thus brings the groove 125 of said inside former opposite to the duct 93 in the cutters (Figs. 11 and 13) while disengaging said groove from the outside former 31. As described above in the downward action of the slide block 2 the wire is fed forward and said wire will accordingly penetrate into the groove 125 in the inside former 124 without these movements being interfered with either by the clamp 126 now open or by the outside former 31 which is disengaged from said groove 125.

At the end of the downward stroke of the slide block 2, the driver will drive the staple positioned between the parts forming the outside former 31 into the work material. Should the thickness of the work be greater than that for which the machine has been set, it will clearly be seen as in Fig. 2 that, as the pivot pin 29 is stopped, through engagement with the work, the movement of the slide block 2 will result in moving the pin 18 carried by the lever 19 up again. Such upward movement of the lever 19 will compress the spring 24. Similarly, the excess thickness of the work will result in compressing the spring 34 after the driver 38 will have completely driven the staple into the work.

In order to avert the driver 38 causing the web of the staple to penetrate too deeply into work materials of soft consistence, the driver 35 is formed with a projection 39 which is adapted to press down on a shank 40 of the outside former 28 when the driver 38 reaches a level flush with said outside former, so that the driver and the outside former descend together and together compress the soft material, whereby the web of the staple does not cut out said material.

At the end of the downward travel of the slide block 2, this corresponding with the end of the wire feeding step, the projection 139 of the rack member 89 engages the part 136 causing it to act upon the lever 133 which thus pushes the latch 131 backwards (Fig. 11). In this movement, the latch 131 releases the foot 129 of the clamp 126 and said clamp under the action of its spring 130 is then caused to clamp the length of wire contained in the groove 125 of the inside former 124. But the part 136 has also been brought to a position opposite to foot 140 of the inside former 124, thereby preventing the latter from moving forward in registration with the outside former 31 under the effect of its spring 141.

The feed of the wire, caused by the downward movement of the slide block 2, terminates at lower dead center, that is at the position shown in Fig. 2. The slide block 2 then rises up again carrying with it the lever 84 and turning the shaft 86 clockwise. The cam 103 engages the latch 101 and raises the part 98 which controls the slide block 91. Said slide block 91 rises also and the wire which is located in the duct 93 is severed by the cutter 95.

At the beginning of the return stroke of the slide block 2, the wire is severed as described above and the inside former 124 is, through the clamp 126 thereof, holding a length of wire intended for a succeeding staple.

In the return stroke, the above described movements for the feed mechanism are effected in reverse direction (Fig. 7). The casing 53 exerts a pull on the cage 56 through the spiral

spring 60 and carries said cage with it until the stop 63 of the cage 56 engages the stop screw 64. At that point the cage 56 will stop and the casing 53 proceeding on its movement stretches the spiral spring 60 until the slide block 2 reaches its upper dead center position (Fig. 6) but in the return movement of the cage 56 the free wheel rollers 57 are released and the clutch 55 together with the feed roller 69 remains stationary, the friction stress due to the pressure of the roller 69 being much greater than that of the roller 57 against the cage 56.

Simultaneously in its upward movement the slide block 2 drives up the outside former 31 and the driver 38 to their original position.

The abutment 107 carried by the pinion 87, upon reaching upper dead center, engages the shank 199 of the part 98, forcing the latter down and thereby causing it to open the cutters to permit another stop of feed of the wire. But in this movement of the part 98 however, the latch 101 was caused to penetrate into the socket 104 of the shaft 86. In the movement of the shaft 86 in the reverse direction, the edge of said socket engages the end of the latch 101 and ejects the latter without causing any movement of the part 98. Then, after the cam 103 has cleared its path of travel, the latch 101 urged by the spring 102 resumes its position indicated in Fig. 2 and is then ready to perform its wire cutting function.

At the end of the return stroke of the slide block 2, the driver 38 has disengaged the cam 128 from the clamp 126 and the outside former will again have moved up above the groove 125 of the inside former 124, thus allowing the nonbent length of wire to pass under them. At that time, the projection 139 of the rack member 89 acting on the end 145 of the part 136 moves the latter towards the right and the inside former 124 the foot 140 of which is now released is moved forward under the action of its spring 141. The inside former 124 then is restored to its initial position enabling a fresh staple to be formed.

In connection with the diagram shown in Fig. 8 it has been shown that the rotation of the casing 53 is represented by the angle A, whereas the feed of the wire only is represented by the angle B as determined by the positioning of the projection 54 at lower dead center condition of the slide block 2 and the stop 64. It will now be assumed that the wire carrier 44 is shifted to produce a different rate of feed of the wire and that said wire carrier is brought nearer to the axis of the staple forming mechanism as shown in the diagram of Fig. 9.

The angle of rotation A of the casing 53 will still have the same extent as previously since the extent of said angle is determined by the stroke of the slide block 2, which is fixed, however, shifting of the wire carrier 44 will have caused the pinion 52 to be rotated along the rack 89, a certain angle C in the direction of the arrow. Movement of the casing 53 will therefore also be displaced a similar angle C as with respect to the position shown in Fig. 8, while maintaining the same extent or amplitude as before. The position of the projection 54 at lower dead center condition of the slide block 2 having changed by the amount of the angle C and the stop 64 having remained in its previous position, the new wire feed angle B1 will now become equal to the former angle B minus the angle C.

But the angle C represents the displacement of the wire carrier, equal to x. Since the feed

roller 69 is twice as large in diameter as the pitch circle of the pinion 52, the reduction C by which the angle of rotation has decreased will correspond to a decrease in the wire feed equal to $2x$, this being the requisite condition for both legs of the staple to remain equal in length.

The above discussion may be repeated when the wire carrier 44 moves away from the axis of the staple forming mechanism.

What I claim is:

1. In a staple forming and setting machine, the combination of a forming head including a reciprocable main slide-block, reciprocable staple forming and staple driving means controlled by said main slide block and a rack driven by said main slide block, a wire carrier supported by said head and the initial location of which with respect to said head is adjustable according to the theoretical thickness of the materials to be clipped together, a pinion integral with a casing formed with diametrically opposed projections, pivotally carried by said carrier and engaging said rack, a free wheel device coaxial with said pinion having a cage formed with diametrically opposed stops opposite to said projections and an abutment at the level of one of said stops, a feed roller twice as large in diameter as pitch circle of said pinion, means for connecting said feed roller with said free wheel device, an adjustable stop fixed on said carrier for engaging said cage abutment, and resilient means connected respectively with said casing and said cage for driving said cage by said casing when said stops are not in contact with said projections and when said abutment is not in contact with said adjustable stop, cutting means secured on said carrier at a fixed spacing from said pinion and adapted to sever the fed wire in blanks to be formed and driven by said head, a reciprocatory mechanism connected with said main slide block, means for adjusting the initial location of said wire carrier with respect to said head according to said theoretical thickness, whereby the length of wire delivered from said feed roller to said cutting means is adjusted according to said theoretical thickness, and means for guiding uninterruptedly the wire from said feed means to said cutting means throughout a rectilineal path of travel.

2. In a staple forming and setting machine, a forming head comprising a reciprocable control slide-block, a lever and toggle device operated by said control slide-block, an outside former connected with said lever and toggle device, resilient means for limiting the downward stroke of said outside former for excess thickness of the materials to be clipped together, a driver connected with said control slide-block for driving the staples into said materials and formed with a shank for bearing on said outside former when the lower end of said driver reaches the position of the lower end of said outside former, and a second resilient means for limiting the downward stroke of said driver for excess thickness of said materials.

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