Nov. 14, 1950 J. I. NASMITH 2,530,312

WIRE STITCHING MECHANISM

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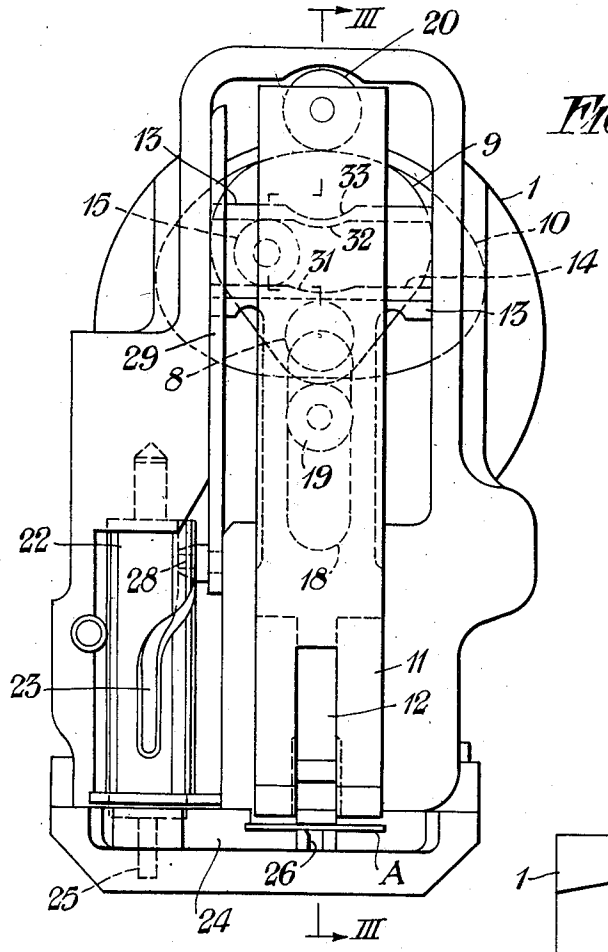


FIG. 1.

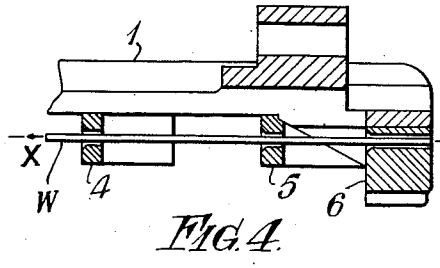
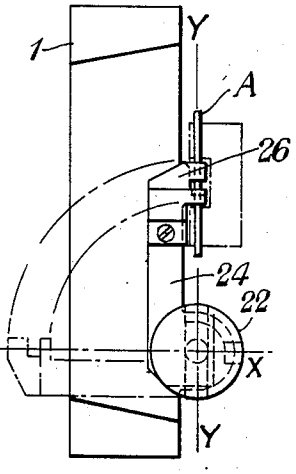


FIG. 4.



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FIG. 2.

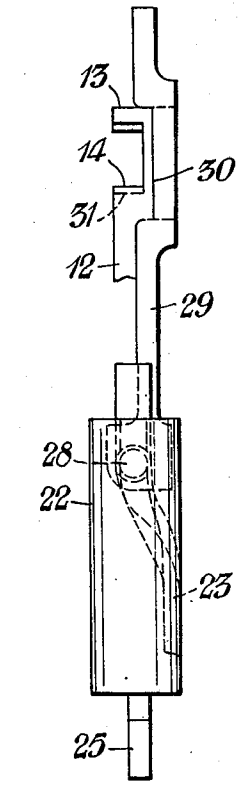


FIG. 3.

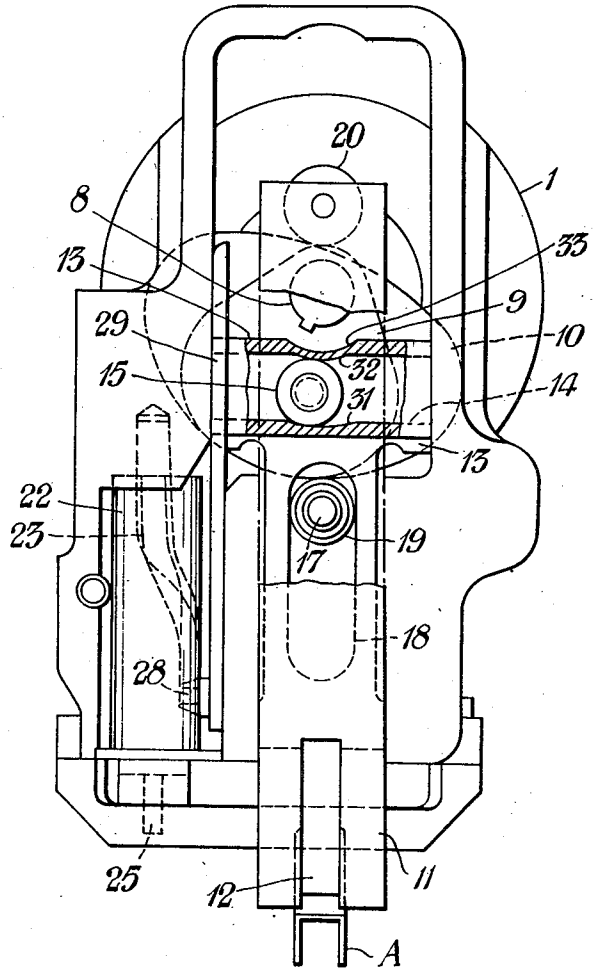
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FIG. 5.



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WIRE STITCHING MECHANISM

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7 Claims. (Cl. 1—2)

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In the functioning of discontinuous wire stitching mechanism, it is always necessary to feed and cut off from the supply spool a length of wire, hereinafter also called a staple blank, from which the staple is subsequently formed.

In the general case, the position of the cutting mechanism and the amount of wire fed to form the staples, must be varied to suit the thickness of work being operated upon. In known wire stitching mechanism, when short staples are used for small thicknesses, the cut-off mechanism has to be brought close in towards the central axis along which the staple is formed and driven, and this introduces constructive disadvantages in that the various members operative in forming and driving the staple cannot be made as robust and durable as desirable, these deficiencies being particularly felt when thick or otherwise difficultly penetrable materials have also to be operated upon.

It is one object of the present invention to provide means whereby these constructive deficiencies are avoided.

According to the invention, wire stitching mechanism comprises means whereby the fed and cut staple blank required to form the staple is bodily transported from a position in which it is severed from the stock to another functionally unrelated position in which it is subsequently formed and driven.

Such transporting of the cut length of wire may vary in nature according to the type of wire stitching mechanism adopted or according to the means available for driving the transporting member or mechanism, subject to the condition necessary to carry the invention into practical effect, namely that the longitudinal axis of the blank is moved between planes not parallel to one another.

In one of the possible modes of applying the invention the staple blank is transported by rotational motion about a suitably chosen axis directed at right-angles to the length of the staple blank. Such axis may be situated at a position removed from the axis in which the forming takes place by a distance sufficient to allow the benefits of the invention to be realised, a convenient construction being one in which the said rotation axis is parallel to the forming axis and cuts the long axis of the blank.

A new transporting element and its operating mechanism are introduced for this transporting purpose into the stitching mechanism. Alternatively one of the elements taking part in the forming of the staple may be modified to fulfill also the function of the transporting element.

A typical example of a construction carrying the invention into effect will now be described in more detail with reference to the accompanying drawings.

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In this example the vertical plane through the line of feed, in which wire stock is fed and cut off, is situated at right angles to the vertical plane in which the staple is formed, and to one side of the axis of the formed staples, these positions being constructively, but not functionally related, the wire transporting element thus carrying the cut blank between position at right angles to each other and being mounted for this purpose on a suitably disposed vertical axis in the machine framing.

In the example referred to the transporting element, operating as described, is also adapted to co-operate in forming the staple in conjunction with the member known and referred to hereinafter as the upper staple former, and also known as the outside former.

The transporting element thus performs also the office of the member referred to hereinafter as the lower forming element and commonly known as the bending block, loop bar or inside former of known wire stitching mechanism. In practice, cases may occur in which the introduction of a transporting element separate from the lop bar is better adapted for the purpose in view.

Referring to the accompanying drawings,

Figure 1 is a front elevation of the stitching head of a wire stitching machine incorporating mechanism according to the present invention.

Figure 2 is a side elevation of a cam and an actuating member therefor appearing in Figure 1.

Figure 3 is a side elevation of the stitching head and associated parts of the machine frame, and taken partly in section along the line III—III of Figure 1.

Figure 4 is a fragmentary plan view taken partly in section along the line IV—IV of Figure 3 and indicating the two end positions of the transporting element.

Figure 5 is a front elevation showing the parts at a time in the working cycle different from that in Figure 1.

In these figures the fixed parts of the machine frame, indicated by the reference 1, are shown only insofar as necessary to make clear the construction and operation of the mechanism according to the invention.

W indicates the wire stock, which is fed intermittently by feed gripper 2 and non-return gripper 3, through wire guiding devices 4, 5 and 6, these defining a horizontal line of feed indicated in the drawing by X—X. The lengths of wire from which the staples are formed are severed from the stock by a knife 7. The mechanism for actuating the feed grippers, the non-return grippers, and the knife 7 form no part of the present invention and are therefore not shown in the drawing, but it is to be understood that these parts are actuated in their proper time relationship with the mechanism now to be de-

scribed. Similarly it is to be understood that means are provided for adjusting the length of wire to be fed.

The arrangement of the staple forming and driving elements, and the transporting element, and the actuating mechanism therefor is as follows.

A horizontal cam shaft 8 rotating in fixed bearings in the stitching head carries cams 9 and 10, for controlling, in the manner hereinafter described, the motion of an outside staple former 11 and also actuating by means to be further described a staple driver 12, the said former and driver being guided for vertical movement in the stitching head along a common axis and defining a vertical plane, indicated by Y—Y, in which the staple is formed. The rear side of the staple former is recessed to take a cross-head 13, carried at the top of the staple driver and having a substantially horizontal track 14 for a cam roller 15 mounted on a pin 16 secured to the cam 9. The centre of the cam track is dipped at the parts 31, 32 for a purpose to be described.

A pin 17, fast to the former 11 passes through a vertical slot 18 in the driver 12, and carries a cam roller 19 co-operating with the periphery of cam 10 for controlling the down stroke of the former 11.

A cam roller 20, mounted on a pin 21 at the top of the former 11, co-operates with the periphery of cam 9 for controlling the return stroke of the former 11.

A barrel cam 22, has a peripheral groove 23 covering an angle of 90°, and is rotatable, in fixed bearings in the frame, about a vertical axis cutting the line of feed of the wire.

The transporting element 24, which also fulfils the function of an inside former, is keyed fast to the bearing spindle 25 of the barrel cam. The head 26 of the transporting element has a wire receiving groove 27, and is otherwise shaped as an inside former, being of the necessary width to allow the forks of the outside former 11 to pass on either side when forming the staple.

A cam roller 28 runs in the cam groove 23, and is carried at the end of a cam actuating member in the form of a connecting rod 29, vertically guided in the frame and grooved at 30 to receive the end of the cross-head 13 carried by the staple driver.

The cam groove 23 is cut so that when the connecting rod 29 is vertically reciprocated by the staple driver 12, the barrel cam, and the transporting element 24, swings between two end positions at right-angles, in one of which, shown in full lines in Figures 1, 3 and 4 the groove 27 of the transporting element is in the forming plane Y—Y, and in the other position, shown in broken lines in Figure 4, the groove 27 is in line with the line of feed X—X. In each of these positions the transporting element is stationary for a period represented by the straight portions of the cam groove 23.

The cycle of operations is as follows:

Assuming the parts are in the "forming position" shown in full lines in Figure 4, a staple blank A, has been fed to the element 24, cut off, and transported into position beneath the outside staple former and staple driver. The blank A is now about to be formed and driven. On cam shaft 8 and the cam assembly 9, 10 rotating clock-wise, cam roller 15 begins to move to the right in the cam track 14. Whilst the cams are rotating through somewhat less than 90°, corresponding to the travel of cam roller 15 to an equivalent position on the right-hand side of the forming axis, cam roller 28 moves a small distance up and down in the upper straight portion of cam groove 23, the transporting element remaining stationary. During this time the periphery of cam 10 has moved cam roller 19, and with it the upper former 11, a sufficient distance downward to form the staple, the head of which is still held in the groove 27.

On continued rotation of cam shaft 8, the cam roller 15 and driver 12 move down on the driving stroke, and when the cams have moved 180° from the position of Figure 1, the cam roller 28 has travelled into the lower straight portion of cam groove 23, thereby turning the barrel cam and the element 24 counterclockwise through 90° to the "feeding position" shown in chain lines in Figure 4. During and after this time the formed staple is being driven into the fork, the outside staple former 11 meantime remaining in its lowest position due to the shape of the periphery of the cams.

In the "feeding position" a fresh length of wire is fed by the feed grippers 2 and 3 to the transporting element 24 and is cut off.

The driver 12 in the meantime is completing its down stroke. In this portion of the cycle the crank pin 16 and roller 15 are moving from right to left in the cam track 14, and, when passing the central curved portions 31, 32 of the cam track, whose curvatures correspond to the circular arc described by the roller 15 on the cam shaft centre, the driver 12 remains stationary and the roller 28 remains stationary in the lower straight portion of cam groove 23. During this part of the stationary dwell period the driven staple is clinched. Figure 5 shows the position of the parts when the cam roller 15 is approaching the end of the curved portion 31 of the track.

When the cam roller 15 has reached the left hand end of the circular portion of the cam track 14, the driver 12 rises and completes its return stroke to the position of Figure 1, the former 11 meanwhile also assuming its uppermost position, and the element 24 after a further stationary period moving again into the "forming position" to present the fresh blank in position beneath the upper forming and driving elements. The cycle of forming, driving, and feeding as above described is now repeated.

With the construction according to the invention, the cutting off mechanism need never be brought close to the central forming axis of the formed staple and the cutting off and forming and driving elements can be made as robust as desirable without restriction.

The invention may be carried into effect and adapted to the various types of wire stitching mechanism in different constructive ways subject to the introduction of a transporting element or the constructive modification of an existing element to operate between the two independent positions and so transport the cut blanks as and when required.

I claim:

1. In wire stitching mechanism of the kind in which an outside staple former and a staple driver reciprocate along a common axis to form and drive staples, means for intermittently feeding wire stock along a line removed from said common axis and substantially at right angles thereto, a transporting element adapted to receive and hold the fed wire in the line of feed, means for cutting off a staple blank from the fed wire, and means for moving the transporting

element from the feeding position in which the wire is fed and cut into the forming position in which the blank is formed into a staple and driven into the work, the said feeding and forming positions being such that the longitudinal axis of the staple blank is moved between vertical planes rotationally removed from each other.

2. Wire stitching mechanism according to claim 1, wherein the transporting element incorporates an inside staple forming element which when in the forming and driving position co-operates with the said outside staple former in the forming of the staple.

3. In wire stitching mechanism of the kind in which an outside staple former and a staple driver reciprocate along a common axis to form and drive staples, means for intermittently feeding wire stock along a line removed from said common axis and substantially at right-angles thereto, a transporting element adapted to receive and hold the fed wire in the line of feed, means for cutting off a staple blank from the fed wire, cam mechanism for moving the transporting element in timed relationship with the working cycle of the outside staple former and driver, from the feeding position in which the wire is fed and cut, into the forming position in which the blank is formed into a staple and driven into the work, said cam mechanism comprising a member connected to the transporting element and another member connected to the driver and adapted to convert a portion of the reciprocatory motion of the driver into oscillatory motion in a plane at right-angles thereto, so that the longitudinal axis of the staple blank is moved between vertical planes rotationally removed from each other.

4. Wire stitching mechanism according to claim 3 wherein the motion of the transporting element is timed in relationship with the working cycle of the staple former and driver so as to have stationary dwell periods in two end positions, one of said periods corresponding with

the feeding and severing of a length of wire from stock and the other of said periods corresponding with the subsequent forming of the staple.

5. Wire stitching mechanism according to claim 3, wherein one of the members of the cam mechanism is connected to a cross-head carried by the driver, which cross-head has a cam track traversed by a crank pin and cam roller driven by a cam shaft controlling the motion of the former and driver.

6. Wire stitching mechanism according to claim 3, wherein the mechanism for actuating the transporting element comprises a barrel cam mounted for rotation with the transporting element on a common axis parallel with the line of motion of the staple driver, said barrel cam being driven by a cam roller and pin reciprocated by the said staple driver.

7. In wire stitching mechanism the combination of a supporting frame, wire feeding elements disposed in said frame defining a horizontal line of feed of the wire stock, a wire cutter for cutting blank lengths of wire from said stock, an outside staple former and a staple driver reciprocated along a common vertical axis laterally removed from said line of feed, and a transporting element adapted to receive and hold the blank in the feeding position and to transport the cut off blank to the forming position in which the staple is formed and driven, said transporting element thereby performing rotational motion about a vertical axis common to the respective planes of the feeding and forming positions.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,983,384	McClure	Dec. 4, 1934