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ADJUSTABLE SUPPORTER FOR WIRE STITCHING MACHINES

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Fig. 3

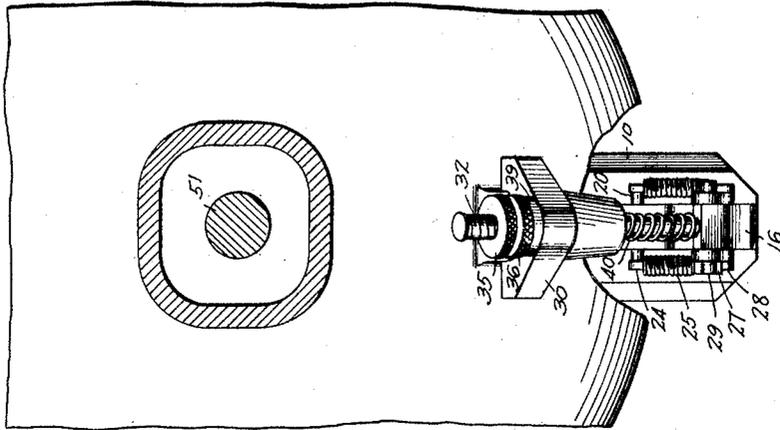


Fig. 2

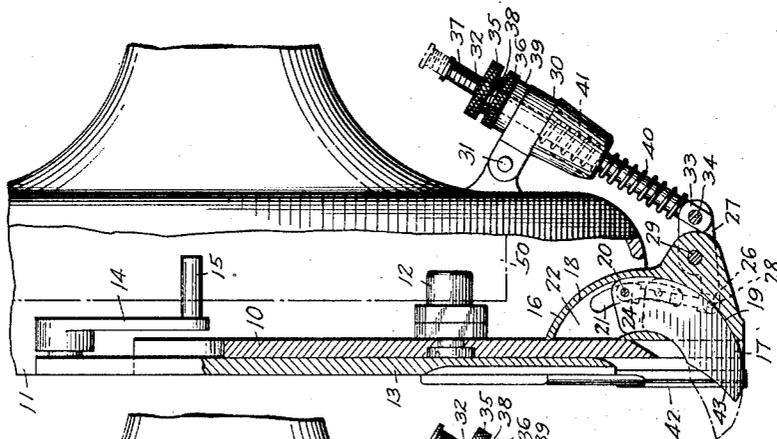
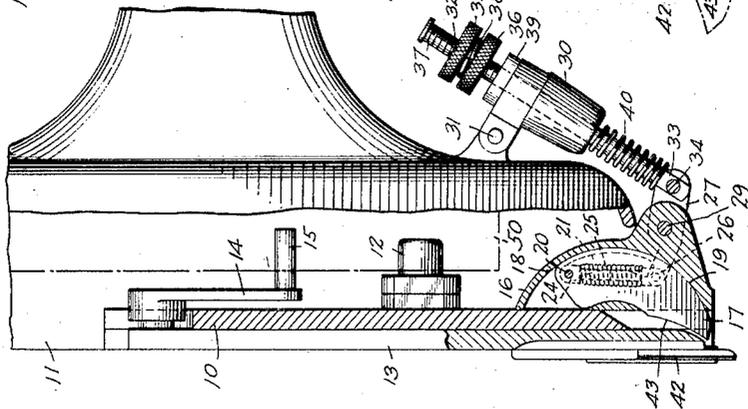


Fig. 1



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ADJUSTABLE SUPPORTER FOR WIRE STITCHING MACHINES

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This invention relates to wire stitching machines and particularly, to that type wherein a wire staple, which is formed by the machine, rests upon a staple supported prior to, and during the staple driving or stitching operation.

My invention is directed, particularly, to the staple supporter, and contemplates the provision of means for adjusting the extent of the movement of said supporter, so that only that portion thereof is used, which is necessary for the stitching operation. In wire stitching machines heretofore known, the stroke or extent of the movement of the staple supporter is always the same, regardless of the length of the particular staple formed and driven by the machine. This results in noisy operation and unnecessary wear on the drive mechanism for the supporter, which mechanism strikes the end of a guide slot at each end of the stroke. If thin paper is to be stitched, a further difficulty in previously known machines is that the supporter in its forward movement frequently damages such paper, owing to the unnecessary length of said stroke, and the consequent contact of the supported with the paper and its movement thereover.

In cases where manifolding books are to be stitched, such books frequently contain pages which are folded in such a manner that the ends of the pages just in front of the stitching point of the machine, form a much greater thickness than at the point where the book is to be stitched. When the supporter moves forward, therefore, it frequently strikes the free ends of the folded pages and throws them out of position and damages the pages or the book, owing to the excessively long stroke of the supporter. It further frequently happens that the end of the supporter rides up on the thicker folded pages of such books, and hence is raised up off the work to be stitched. The staple supported is thereby unable to perform its function properly, since it is raised out of position, and cannot support the lower part of the staple, which frequently buckles when driven into the work under these conditions.

My invention makes it possible to avoid the

above-mentioned disadvantages in constant stroke supporters, by providing means for adjusting said stroke within the necessary practical limits. I prefer to do this by regulating the forward limiting position of the staple supporter preferably without changing the extreme retracted or rearward position thereof.

The various objects of my invention will be clear from the description which follows, and from the drawings, in which,

Fig. 1 is a side elevation of part of a wire stitching machine, showing my new adjusting means applied thereto and showing the supporter in its fully retracted position.

Fig. 2 is a similar view of the same, showing the supporter in its partly extended position wherein its limiting forward position has been adjusted, so that it is not projected as far as possible, and showing in dotted lines the position of the parts when the supporter is adjusted for greater forward movement, and

Fig. 3 is a rear view of my new adjusting mechanism.

In that practical embodiment of my invention which I have illustrated by way of example, the usual reciprocating staple guide slide 10 is provided. Said guide slide is suitably reciprocated in the front block 11 in the usual manner, as by means of the pin 12, which is operated by the usual revoluble cam as 50 through the drive shaft 51 in a well known manner and hence which need not be further described. The reciprocating staple driver 13 is mounted in the guide slide 12 for vertical reciprocation in the usual manner, and is operated by the crank 14 through the pin 15, which in turn is inserted in a suitable groove in said cam 50 in a manner well known in the art. At the lower end of the guide slide is secured the hollow guide block 16 for the rocking staple supporter 17. The inner surface 18 of said block is curved arcuately to correspond with the lower convex surface 19 of the supporter.

The upper surface of the supporter is concave, and intersects the lower surface 19 to form the front edge of the supporter. Said supporter swings, rocks, or oscillates into and

out of the block 16, being guided in its rocking movement by the block 16. Preferably, near the upper end of said supporter, a pin as 20 passes therethrough and through the arcuate slots 21 in the side walls 22 of the block 16. At each of its ends, the pin 20 is provided with the spring-supporting pins 24, about each of which a spring 25 is arranged. Into the lower end of each of the springs 25, is inserted a similar supporting pin 26, which is secured to one of the levers 27 at 28. Each of said levers 27, is pivoted to the block 16 as by means of the pivot 29.

The means for adjusting the most forwardly position of the supporter will now be described. Said means comprises the relatively fixed bearing 30 secured to the rear part of the main frame as by means of the bolt 31, and having the adjusting screw 32 loosely passed therethrough. At its lower end, the adjusting screw is secured to the member 33, which is in turn supported by the shaft 34, suitably connected to the levers 27. At the upper threaded end 37 of the screw 32, the pair of adjusting stop nuts 35 and 36 are arranged preferably with the lock washer 38 therebetween. As indicated by the different positions of the screw 32 in Figs. 1 and 2, said screw moves bodily through the bearing 30 on the reciprocation of the block 16, but its movement downwardly is halted by the stop nuts.

A cushioning washer as 39, made of leather, rubber, or similar comparatively soft material is preferably interposed between the lower nut 36 and the top of the bearing 30, to take up or cushion the shock when the nut 36 is drawn down thereon on the downward movement of the screw 32.

To urge the screw toward that position thereof in which it is adjusted by the nuts 35 and 36, a spring as 40 abuts against the member 33 at one end, and at its other end, is inserted into the enlarged opening 41 of the bearing 30.

It will be seen that as the staple guide is reciprocated through its downward stroke, the block 16 being secured thereto, moves with it, thereby carrying downwardly, the pivot shaft 29 and the shaft or pin 34. It will be understood that at the beginning of this movement, the nuts 35 and 36 may have been lifted off the washer 39, (as in Fig. 1), depending on the adjustment thereof, and that the supporter 17 is in its retracted position, to which it has been moved by the driver 13 as will be later described. At the first part of the movement, therefore, the shaft 34, together with the screw 32 is carried downwardly until the nut 36 is drawn against the washer 39. Thereafter, further downward movement of the screw 32 and of the shaft 34 is prevented. As the pivot 29 is carried down further, the levers 27 are rotated in a counterclock-wise direction about the shaft 34. Such rotation

puts tension upon the springs 25, thereby drawing down the pin 20 along the cam slots 21 and consequently sliding the supporter in a clock-wise direction against the surface 19. It will be seen, therefore, that on the downward movement of the staple guide slide 10, the supporter is projected forwardly of the machine into the proper position and to the desired extent to receive the staple previously arranged in the staple groove 42 by means well known in the art. The prongs of the staple are arranged adjacent the upright sides of the supporter, while the cross bar rests in the concave surface 43.

The driver 13 may now move downwardly to engage and drive the staple. During the driving operation, the driver engages the concave surface of the supporter, and owing to the cam action therebetween, causes retraction of the supporter 17 into the block 16, the pin 20 moving upwardly in the slots 21, until it engages the end of the slot.

Thereafter, on upward movement of the slide 10, and consequently of the block 16 and of the pivot 29 the shaft 34 may also move upwardly to some extent, thereby moving the screw 32 bodily through the bearing 30, and if so moved to a sufficient extent, lifting the nut 36 off the washer 39.

The position of the adjusting nuts 35 and 36 on the adjusting screw 32 determines the point in the cam slots 21, at which the pin 20 will stop on the downward movement of the staple guide slide 10, and hence determines how far the supporter 17 is moved forwardly. In other words, when the adjusting nuts are at their lowermost positions on the screw 37, the stroke of the supporter 17 is the maximum, and when the nuts are at their highest positions on the screw, the stroke of the supporter is least. Intermediate positions of the adjusting nuts will correspondingly vary the stroke of the supporter between the innermost and outermost limits of the end of the forward stroke, but the limit of the rearward stroke preferably remains the same.

In the full-line positions of the parts shown in Fig. 2, the supporter 17 has been moved out as far as it can go, the driver 13 at this time being in its raised position ready to be lowered to engage the formed staple now resting on the supporter, and to drive the formed staple into the work while simultaneously retracting the supporter during the driving operation. The dotted line position of the parts indicates that the nuts 35 and 36 have been turned down toward the lower end of the screw, whereby the forward stroke of the supporter has been increased, as for example, when staples are to be driven through a thicker stack.

After the staple has been driven through the stack, it will be understood that the staple supporter remains in the retracted position into which it has been forced by the driver 13.

It will also be understood that the guide 10 moves upwardly through part of its stroke while the driver 13 remains down and in front of the supporter, whereby the supporter remains retracted throughout the upward stroke of the guide 10 and that upward movement of the guide 10 and consequently, of the block 16 carries the supporter upwardly with it, and may also force the adjusting screw through and beyond the bearing 30, so that said screw may project beyond the bearing in the uppermost position of the slide. When the guide 10 has reached its uppermost position, the driver 13 is also in its upper position and clear of the supporter as will be seen from Fig. 2, the supporter being ready to be moved forwardly on the next downward movement of the guide 10, as has been above explained. It will be seen that the beginning of the forward stroke of the supporter 17 is delayed for a period, depending on how near the adjusting nuts are to the end of the screw 32.

The nearer the nuts are to said end, the longer will it take for the supporter to begin its forward stroke and therefore, the shorter will be its complete stroke and the less distance will it be forwardly projected. It will further be seen that only the full forward stroke of the supporter allows the pin 20 to strike the lowermost ends of the slots 21. In machines heretofore in general use, where the supporter stroke is always the full stroke, this results in considerable unnecessary wear and shock on the machine parts, which I have avoided. If the slots 21 are made of sufficient length, it therefore becomes entirely unnecessary for the pin 20 to reach the lowermost ends of the slots at any time.

Furthermore, the forward limit of the supporter stroke can be adjusted to the length of the staples to be driven so that staples of different lengths contact with the supporter surface 43 at different points, thereby preventing the wear which would occur on said surface if the stroke of the supporter were always constant or independent of the length of the staples. It will also be seen that by adjusting the forward limiting position of the supporter, thin paper is not likely to be crushed or damaged by the supporter, and the free edges of the leaves of manifolded books need never come in contact with the supporter on its forward stroke and thus damage thereto is avoided, and raising of the supporter off the work, and consequently possibility of buckling the staple is also avoided.

It will further be seen that the use of the cushioning washer 39 absorbs the shock due to the drawing of the adjusting nuts downwardly toward the bearing 30, and that the operation of this part of the mechanism eliminates much of the noise which would

otherwise be caused by the striking of the pin 20 against the ends of the guide slots.

While I have shown and described a preferred embodiment of my invention, I do not wish to be understood as limiting myself thereto but intend to claim my invention as broadly as may be permitted by the state of the prior art and the terms of the appended claims.

I claim:

1. In a wire stitching machine, a staple supporter having a wedge-shaped front end adapted to support a formed staple while the staple is being driven by the machine, means for projecting said supporter forwardly, and adjustable means for limiting the forward position of said end to bring a predetermined part of said end into operation including an adjustable lever yieldingly connected to the supporter.

2. In a wire stitching machine, a staple supporter movable in an arcuate path, and means for adjusting the extent of the movement of the supporter including a screw operatively connected to the supporter and movable independently thereof, and means for varying the effective length of the screw.

3. In a wire stitching machine, a staple supporter movable in an arcuate path, and means for varying the forward limit of said path including an adjusting screw operatively connected to the supporter, and adjustable stop means on the screw for determining the effective length of the screw.

4. In a wire stitching machine, a hollow block having a pair of aligned arcuate slots in the side walls thereof, means for vertically reciprocating said block, a staple supporter inserted into said block for movement into and out of the block, a pin at the upper end of said supporter passing through said slots for limiting the rearward movement of the supporter, and means for varying the limit of the forward movement of the supporter, including an adjusting screw operatively connected to the pin, and adjustable stop means on the screw for determining the effective length of said screw.

5. In a wire stitching machine, means for driving a staple, a staple supporter adapted to support a staple during the driving operation of the staple driving means, means for rocking said supporter, and means including an adjustable screw yieldingly connected to the supporter for varying the extent of the rocking movement of the supporter.

6. In a wire stitching machine, a rocking staple supporter having an arcuate upper surface and an intersecting arcuate lower surface, and upright side walls joining said surfaces for supporting staples of different heights, means including a reciprocatory guide block in which the supporter is inserted for rocking the supporter forwardly

on the downward movement of the block, a reciprocatory staple driver for engaging the staple on the supporter, for driving said staple and for simultaneously retracting the supporter into the block, and means for varying the limit of the forward rocking movement of the supporter independently of the extent of the movement of the block.

7. In a wire stitching machine, a staple supporter, a reciprocatory guide block for the supporter, operatively connected to the supporter for rocking the supporter forwardly on the downward movement of the block, and means for varying the limit of the forward rocking movement of the supporter independently of the movement of the block.

8. In a wire stitching machine, a rocking staple supporter, reciprocatory guide means for the supporter for fixing the limit of the rearward rocking movement of the supporter and for rocking said supporter forwardly on the downward movement of said means, and means for varying the stroke of the supporter by determining the limit of the forward rocking movement thereof.

9. In a wire stitching machine, a forwardly and rearwardly rocking staple supporter, means for guiding said supporter in its rocking movement including a guide having an arcuate slot therein, and a pin at the upper end of the supporter entering said slot, and means for varying the stroke of the supporter including adjustable stop means operatively connected to the pin for determining the forward limiting position of the supporter.

10. In a wire stitching machine, a staple supporter mounted for rocking movement forwardly and rearwardly, a guide for the supporter having an arcuate slot therein, a member on the supporter entering said slot and guided thereby, the most rearward position of the supporter being determined by the engagement of said member with one end of said slot, and means for determining the limiting forward position of the supporter, comprising means for adjusting the extent of the movement of said pin from the aforementioned end of the slot.

11. In a wire stitching machine, a staple supporter mounted for rocking movement forwardly and rearwardly, a reciprocating guide for the supporter having a slot therein, a member carried by the supporter and entering said slot, and means for varying the movement of said member in said slot and thereby determining the limit of the forward movement of the supporter, comprising an adjusting screw, a lever pivoted at one end to one end of the screw, and operatively connected at its other end to said member, a pivot for the lever intermediate its ends and carried by the guide, a relatively fixed member for loosely supporting the screw, an adjustable

stop nut near the other end of the screw and beyond the bearing, and a cushioning washer on the screw between the nut and the bearing.

12. In a wire stitching machine, a staple supporter mounted for forward and rearward rocking movement, a slotted guide for the supporter, a guide member on the supporter entering the slot of the guide, and means for controlling the amount which the supporter moves out of the guide, comprising a bodily movable adjusting screw operatively connected to the guide member, and adjustable stops on said screw for halting the bodily movement of the screw when the guide member reaches a predetermined point in the slot.

13. In a wire stitching machine, a staple supporter mounted for forward and rearward movement, and means for controlling the extent of the forward movement of the supporter, comprising an adjusting screw operatively connected to the supporter and mounted for bodily movement, a relatively fixed bearing for loosely supporting said screw, and adjustable stop means on the screw for limiting the movement of said screw through the bearing in one direction and thereby limiting the forward movement of the supporter.

14. In a wire stitching machine, a staple supporter adapted to support a staple while the staple is being driven by the machine, means for moving said supporter alternately in opposite directions, and means for controlling the extent of the movement of the supporter in one direction, comprising a bodily movable member operatively connected at one end thereof to and movable independently of the supporter, and adjustable stop means on the member for limiting the extent of the bodily movement of the member in one direction.

15. In a wire stitching machine, a staple supporter mounted for forward and rearward rocking movement, and having flat, upright, parallel sides, and having a concave upper surface and a convex lower surface intersecting the upper surface, a hollow reciprocating block for the supporter having aligned slots in the side walls thereof, a pin connected to the supporter and entering said slots, a pair of spaced levers pivoted to the block below the lower ends of the slots, springs connecting the forward ends of the levers with the corresponding ends of the pin, an adjusting screw operatively connected at its lower end to the rear ends of the levers, a relatively fixed bearing through which said screw is passed for bodily movement therein, and adjustable stops on the screw for engaging said bearing on the downward bodily movement of the screw and thereby halting the forward movement of the supporter.

16. In a wire stitching machine, a swingable staple supporter, and means for limiting the extent of the forward movement of

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the supporter independently of the limit of
the rearward movement thereof, comprising
a bodily movable member operatively con-
nected to the supporter at its lower end, a
relatively fixed bearing loosely carrying said
member, an adjustable stop on the member
above the bearing, and a cushioning member
interposed between the stop and the bearing
engageable by the stop for halting the bodily
movement of the member in one direction.

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