(No Model.) 2 Sheets—Sheet 1.

F. HART.

BOOK STAPLING MACHINE.

No. 538,039. Patented Apr. 23, 1895.

Fig. 1.

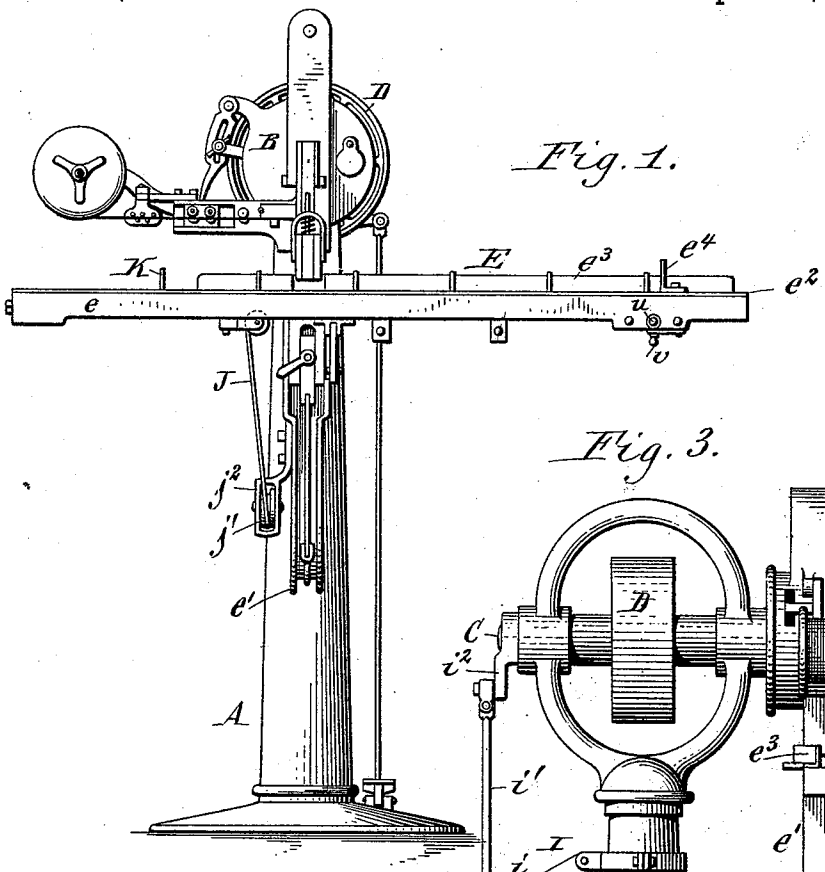


Fig. 3.

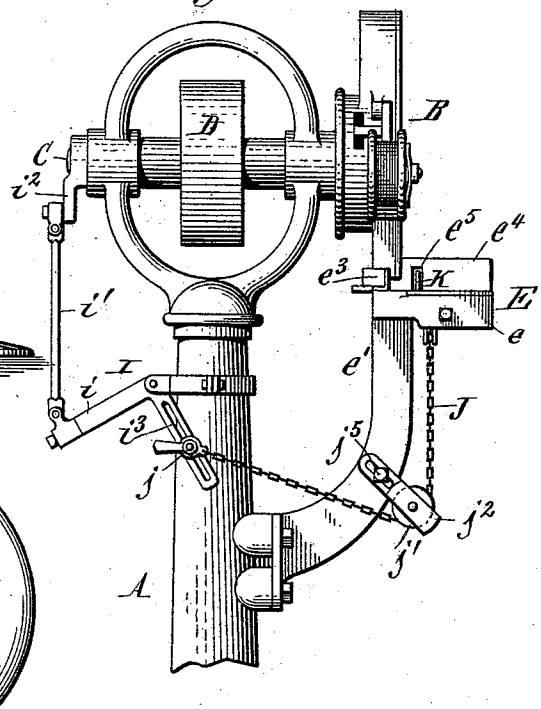
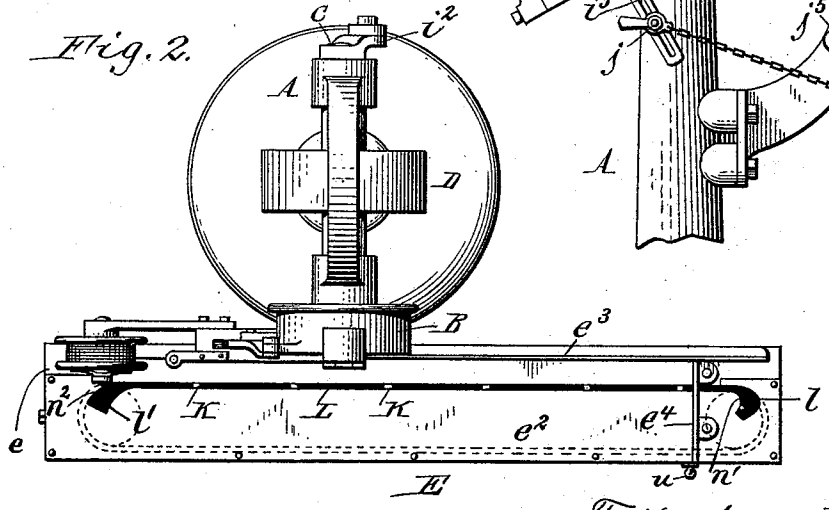


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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BOOK STAPLING MACHINE.

No. 538,039. Patented Apr. 23, 1895.

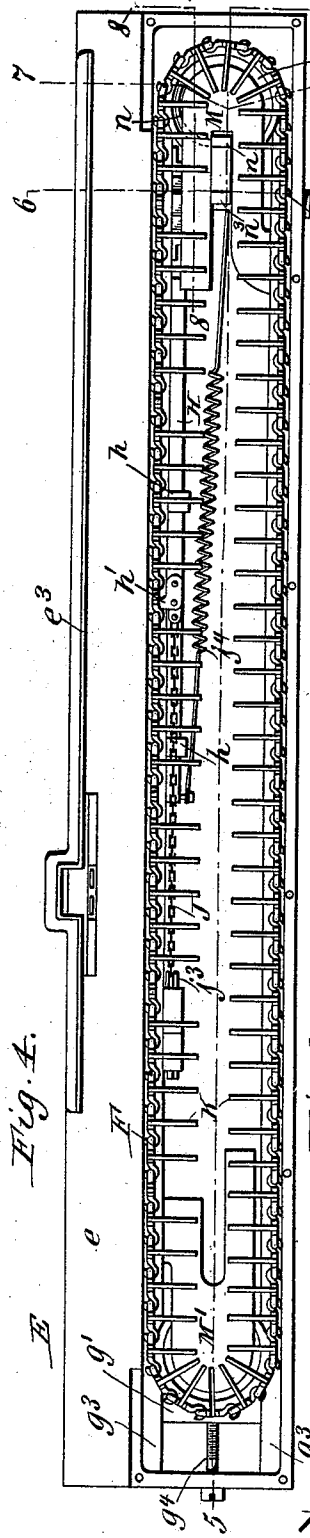

Fig. 4.

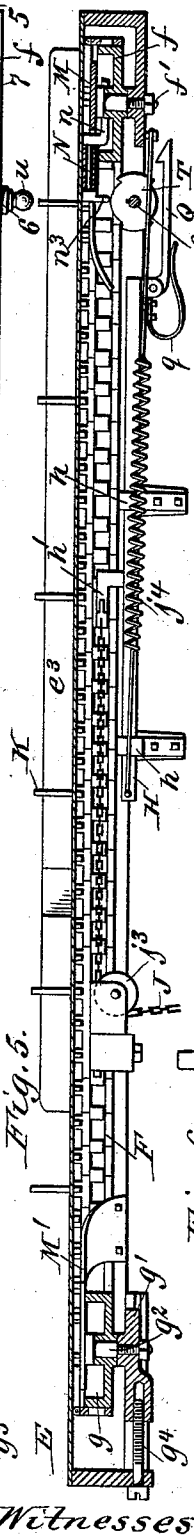

Fig. 5.

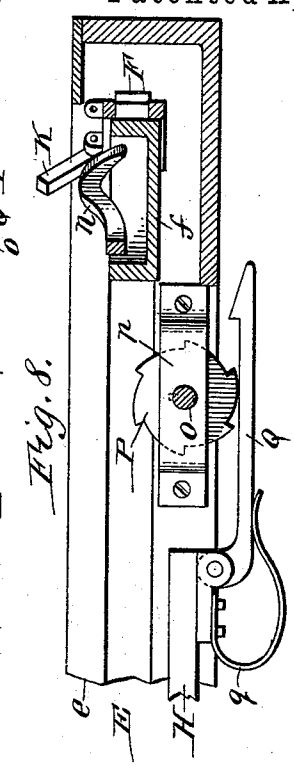

Fig. 8.

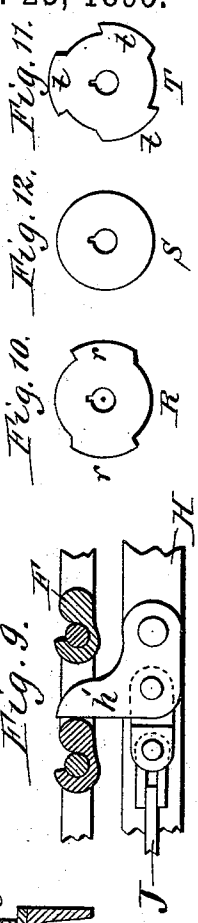

Fig. 9.

Fig. 10.

Fig. 12.

Fig. 11.

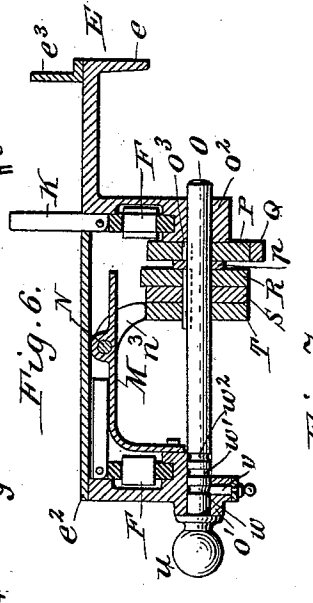

Fig. 6.

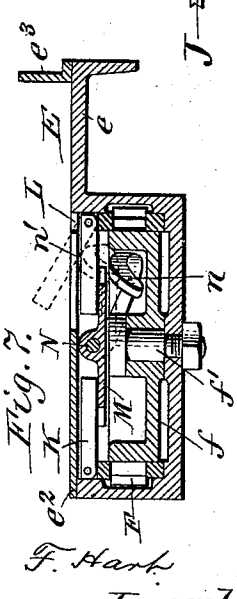

Fig. 7.

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UNITED STATES PATENT OFFICE.

FREDERICK HART, OF POUGHKEEPSIE, NEW YORK.

BOOK-STAPLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 538,039, dated April 23, 1895.

Application filed September 15, 1894. Serial No. 523,146. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK HART, a subject of the Queen of Great Britain, residing at Poughkeepsie, in the county of Dutchess and State of New York, have invented a new and useful Improvement in Wire-Stitching Machines, of which the following is a specification.

This invention relates to wire stitching machines which are employed for fastening the sheets of pamphlets and other blanks together by wire staples.

The object of my invention is to provide a reliable feed mechanism by which the blanks are automatically fed to the stitching mechanism and which can be easily adjusted so that the machine can be readily set for stitching blanks of different lengths or to vary the number of stitches in each blank.

In the accompanying drawings consisting of two sheets: Figure 1 is a front elevation of a wire stitching machine provided with my improved feed mechanism. Fig. 2 is a top plan view of the same. Fig. 3 is a fragmentary side elevation of the machine viewed from the discharge end thereof. Fig. 4 is a top plan view, on an enlarged scale, of the feed table with the top plate thereof removed for exposing the internal mechanism. Fig. 5 is a vertical longitudinal section of the feed table in line 5—5, Fig. 4. Figs. 6 and 7 are vertical cross sections, on an enlarged scale, in lines 6—6 and 7—7, Fig. 4. Fig. 8 is a vertical longitudinal section, on an enlarged scale, in line 8—8, Fig. 4. Fig. 9 is a fragmentary horizontal section of the carrier or feed belt and the actuating mechanism connected therewith. Figs. 10 and 11 are side elevations of the trip cams or disks whereby the number of stitches in the blank and the length of the blank may be varied. Fig. 12 is a similar view of the blank disk whereby the feed mechanism may be rendered inoperative when it is desired to feed the stitching machine by hand.

Like letters of reference refer to like parts in the several figures.

A represents the main frame of a wire stitching machine, B the stitching head arranged on the front portion of the frame, C the horizontal driving shaft journaled in the upper portion of the main frame, and D the driving pulley secured to the driving shaft, all of which parts may be of any suitable construction.

E represents a stitching or feed table upon which the blanks are placed by the operator and which is arranged underneath the stitching head. This table consists of an elongated frame e supported by an arm e', secured to the main frame and a plate e^2 secured to the top of the frame.

e^3 represents a longitudinal gage arranged lengthwise on the rear portion of the feed table and e^4 is a transverse gage arranged upon the right hand or receiving end of the feed table and pravided with a vertical slot e^5, Fig. 3. The operator places the blanks against the longitudinal and transverse gages.

F represents a feed chain or belt whereby the blanks are intermittently carried over the feed table and successively fed to the stitching mechanism. This belt is arranged with its carrying portion along the rear side of the frame and with its idle portion along the front side of the frame and consists preferably of chain links, each link being one inch long from center to center. The receiving portion of the feed belt passes around a sprocket wheel f which is journaled upon a vertical bolt f' arranged on the receiving end of the feed table frame. The delivery portion of the feed belt passes around a sprocket wheel g which is pivotally attached to a sliding plate g', by a vertical bolt g^2, Figs. 4 and 5. This plate is supported at its ends in guides g^3 formed lengthwise on the inner side of the table frame and is adjustably connected by a screw g^4, with the delivery end of said frame, whereby the delivery sprocket wheel may be shifted for tightening and taking up wear on the feed belt.

An intermittent forward movement is imparted to the feed belt by the following means:

H represents a reciprocating bar arranged lengthwise adjacent to the carrying portion of the feed belt and guided in loops h secured to the table frame. This bar is provided on its upper side with a laterally swinging pawl h', Figs. 4, 5 and 9, which is pivoted thereto and engages with the links of the adjacent portion of the feed belt.

I represents an elbow lever pivoted on the main frame and having its upper arm i connected by a link i' with a crank arm i^2 secured to the rear end of the main shaft, Fig. 3. The

movement of the elbow lever is transmitted to the reciprocating bar H by a draft chain J which is adjustably secured with its rear end by a clamp j to the lower slotted arm i^3 of the elbow lever and thence passes forwardly around a roller j' which is mounted on a bracket j^2 secured to the arm e', thence upwardly around a roller j^3, Fig. 5, which is mounted in a case secured to the table frame, and thence horizontally along the top of the reciprocating bar and is secured with its front end to the pawl h', Figs. 4, 5 and 9. During each upward movement of the crank arm i^2 the feed belt is carried forwardly through the medium of the above described connecting mechanism and during this movement the pawl h' is held in engagement with the feed belt by the pull of the draft chain. The backward movement of the reciprocating bar H and connecting parts is effected by a spring j^4, Figs. 4 and 5, secured with its ends to the table frame and the reciprocating bar, and during this movement the pawl rides over the links of the feed belt to obtain a new hold. By shifting the rear end of the draft chain lengthwise upon the lower arm of the elbow lever I the extent of the forward movement of the chain belt during each revolution of the crank arm may be varied. The bracket supporting the roller j' is secured to the arm e' by a bolt j^5 passing through a slot in said bracket which permits said roller to be adjusted for taking up slack in the draft chain.

K represents carrying fingers or wings whereby the movement of the feed belt is transmitted to the pamphlets or blanks placed on the table, to carry the same along. One of these fingers is pivoted to each link of the chain belt and these fingers are normally in a horizontal position below the top of the table, with their free ends projecting laterally from the inner side of the chain belt, as represented in Figs. 4 and 7.

Each of the carrying fingers of the feed belt is adapted to be elevated so as to project above the feed table in an upright position, whereby these fingers are enabled to engage with the rear ends of the pamphlets or blanks upon the feed table for carrying the same underneath the stitching head. Only such of the carrying fingers which are at the proper distance apart to properly feed the pamphlets or blanks are however successively elevated into the feeding position. The table is provided in its top with a slot L which is arranged in line with the slot in the transverse gage and lengthwise above the carrying portion of the feed belt. The carrying fingers are elevated into this slot at the front end thereof, which latter place is preferably located over the beginning of the carrying portion of the chain belt. At the rear end of the slot the fingers again drop through the slot below the top of the table. The main portion of the slot in the feed table is of the same width as the carrying fingers so that the latter are held steady in an upright position while passing through the same. The front and rear ends of the slot are provided with enlargements or widened portions l l', Fig. 2, which permit the fingers to be raised into an operative position at the beginning of the slot and to be dropped into an inoperative position at the end of the slot.

M M', Figs. 5, 6 and 7, represent guard plates which are arranged over the receiving and delivery sprocket wheels to prevent the carrying fingers from interfering therewith and which are secured to the adjacent portions of the table frame.

The mechanism whereby the proper carrying fingers are elevated into an operative position and the means for adjusting the machine for different numbers of stitches and different lengths of pamphlets or blanks are constructed as follows:

N, Figs. 5, 6, 7 and 8 represents a short rock shaft which is journaled lengthwise in a bearing formed in the guard plate M and which is provided at its front end with a cam arm n. The latter is provided on its curved free end with a cam face or incline which is arranged underneath the path of the carrying fingers. When the cam arm is depressed below the path of the carrying fingers the latter remain undisturbed in their inoperative horizontal position, as represented in Fig. 7. When the cam arm is raised so that its cam face stands in the path of the fingers, the finger striking it rides up on its cam face and is thereby turned and elevated through the enlarged front portion l of the slot L into an inclined position until it projects above the table, as represented in Fig. 8 and in dotted lines in Fig. 7. Before the carrying finger leaves the cam arm it is brought into engagement with the curved inner side n', Fig. 2, of the front enlargement of said slot, whereby the finger is conducted into the main portion of said slot and turned into its vertical operative position which it maintains while traveling through the main portion of the slot. Upon arriving at the opposite end of the slot the carrying finger engages against the curved outer side n^2 of the rear enlargement of said slot, which slightly tips the finger and causes the same to drop by gravity through said rear enlargement into its inoperative horizontal position. The rear end of the rock shaft N is provided with a depending trip arm n^3 whereby the cam arm is raised and lowered.

O, Figs. 5, 6 and 8, represents a transverse shaft which is journaled with its ends in bearings o' o^2 formed in the front and rear portions of the table frame near the receiving end of the table and which is capable of sliding lengthwise in said bearings. A ratchet wheel P having six teeth is mounted on this shaft between the rear bearing o^2 and a bracket p secured to the table frame, which prevents the ratchet wheel from moving lengthwise with the shaft while the wheel is compelled to turn with the shaft by means of a feather o^3.

Q is a pawl pivoted to the front end of the

reciprocating bar H and provided with a hook which is adapted to engage with the ratchet wheel P and which turns the latter the extent of one tooth for each stitch of the machine. This pawl is yieldingly held in its operative position by a spring *q*.

R, S, T, Figs. 10, 11 and 12, represent three disks adapted to engage with the free end of the trip arm n^3 and secured side by side on the transverse shaft O so as to partake of both the rotary and longitudinal movements of the shaft. The rear disk R is provided on diametrically opposite sides with two cams *r*. When this disk is arranged underneath the trip arm, the latter is lifted twice during each revolution of the transverse shaft. This causes the cam arm to elevate two carrying fingers for every revolution of the shaft or one finger for every third stitch, because every revolution of the shaft O which is produced by the ratchet wheel having six teeth, corresponds with six stitches, or in other words, every sixth revolution of the shaft corresponding with one of the six ratchet teeth corresponds with one stitch. The front disk T is provided on its periphery with three equidistant cams *t* and when the transverse shaft is shifted so that the front disk stands under the trip arm, the latter is lifted three times during each revolution of the transverse shaft and the cam arm elevates one of the fingers for every second stitch. The intermediate disk is provided with a plain peripheral face so that when this disk is moved underneath the trip arm, the latter will not be affected and none of the carrying fingers will be elevated, thereby throwing the automatic blank feeding mechanism out of gear when it is desired to feed the blanks to the stitching machine by hand.

The front end of the transverse shaft is provided with a thumb piece *u* for shifting this shaft lengthwise and the latter is held in its adjusted position by a spring pin *v* arranged in the table frame and engaging with one of three grooves *w w' w²* formed in the shaft.

In the position of the parts represented in the drawings the movement of the reciprocating bar is so adjusted by the connection of the chain J with the arm i^3 that it moves the feed belt forward three links or three inches during each stitch of the machine, and the front cam disk having three cams is in its operative position which causes a carrying finger to be lifted during every second stitch, or at the end of every second throw of the feed belt making a distance of six inches between the fingers, which adjustment is suited for placing two stitches in a blank about five inches long, the extra inch being allowed for clearance. If it is desired to place two stitches in a blank about eleven inches long the connection between the elbow lever I and the draft chain J must be adjusted so as to secure a throw of six inches of the feed belt for each stitch, whereby at the end of every second throw of the feed belt a carrying finger will be elevated, making a distance of twelve inches between the carrying fingers.

Assuming that the transverse shaft is shifted so that the rear cam disk having two cams stands under the trip arm and that the throw of the chain belt is still three inches for every stitch, a carrying finger will be elevated at every third throw of the feed belt or every third stitch, making a distance of nine inches between the fingers which is suitable for placing three stitches in a blank about eight inches long.

If it is desired to operate upon a blank of greater or less length without changing the number of stitches for each blank, it is only necessary to adjust the throw of the feed belt by shifting the clamp *j* so as to increase or reduce the distance between the stitches accordingly.

The range of adjustment of the feed mechanism as to the number of stitches and the length of the blanks operated upon can be increased by increasing the number of teeth and the size of the ratchet wheel and the number of cam disks and the number of cams on the same.

I claim as my invention—

1. The combination with the feed table and the stitching mechanism, of a traveling feed belt or chain, carrying fingers movably attached to the feed belt or chain, and a movable finger shifting device which operates upon such fingers as come in contact therewith and shifts such fingers to their operative position, substantially as set forth.

2. The combination with the feed table and the stitching mechanism, of a traveling feed belt or chain provided with movable carrying fingers which are normally arranged below the table in an inoperative position, and a movable finger shifting device whereby said fingers are elevated above the table for carrying the blanks over the table to the stitching mechanism, substantially as set forth.

3. The combination with the feed table provided with a longitudinal slot, and the stitching mechanism, of a traveling feed belt or chain, carrying fingers movably attached to the feed belt or chain and arranged normally below the feed table, and a movable finger shifting device, substantially as set forth.

4. The combination with the feed table and the stitching mechanism, of a feed belt or chain, provided with movable carrying fingers which are normally arranged below the table, a movable cam arm adapted to elevate said fingers above the feed table, and a cam disk whereby said cam arm is actuated, substantially as set forth.

5. The combination with the feed table, and the stitching mechanism, of a feed belt or chain provided with movable carrying fingers which are normally arranged below the table, a rock shaft provided with a cam arm whereby said fingers are elevated above the feed table, a trip arm secured to said rock

shaft, and a cam disk engaging with the trip arm for actuating said cam arm, substantially as set forth.

6. The combination with the feed table and the stitching mechanism, of a feed belt or chain, provided with movable carrying fingers which are normally arranged below the table, a rock shaft provided with a cam arm whereby said fingers are elevated above the feed table, a trip arm secured to said rock shaft, a rotary cam disk engaging with the trip arm for actuating said cam arm, and a ratchet mechanism for intermittently turning said cam disk, substantially as set forth.

7. The combination with the feed table and the stitching mechanism, of a feed belt or chain provided with movable carrying fingers which are normally arranged below the table, a rock shaft provided with a cam arm whereby said fingers are elevated above the feed table, a trip arm secured to said rock shaft, a rotary shaft capable of lengthwise and rotary movement, and a series of disks secured to the rotary shaft, said disks being provided respectively with a plain face, a double cam and a triple cam and capable of moving lengthwise with the rotary shaft for bringing either of said disks into engagement with said trip arm, substantially as set forth.

8. The combination with the feed table and the stitching mechanism, of a feed belt or chain provided with carrying fingers wheels supporting said feed belt or chain, and guards arranged over said wheels to prevent said fingers from interfering with said wheels, substantially as set forth.

9. The combination with the feed table and the stitching mechanism, of a feed belt or chain provided with carrying fingers and a reciprocating bar provided with a pawl engaging with said feed belt and actuating the same, substantially as set forth.

10. The combination with the driving shaft provided with a crank arm, the feed table and the stitching mechanism, of a feed belt or chain provided with carrying fingers, a reciprocating bar provided with a pawl engaging with said feed belt or chain, an elbow lever having one of its arms connected with the crank arm, a draft chain adjustably connecting the other arm of the elbow lever with said pawl and adapted to move the pawl forwardly, and a spring for moving the pawl backwardly, substantially as set forth.

Witness my hand this 29th day of August, 1894.

FREDERICK HART.

Witnesses:
F. H. M. HART,
HY. HART.