

M. CHRISTENSEN.
BOOK DELIVERY MECHANISM.
APPLICATION FILED NOV. 7, 1918.

1,362,849.

Patented Dec. 21, 1920.

4 SHEETS—SHEET 1.

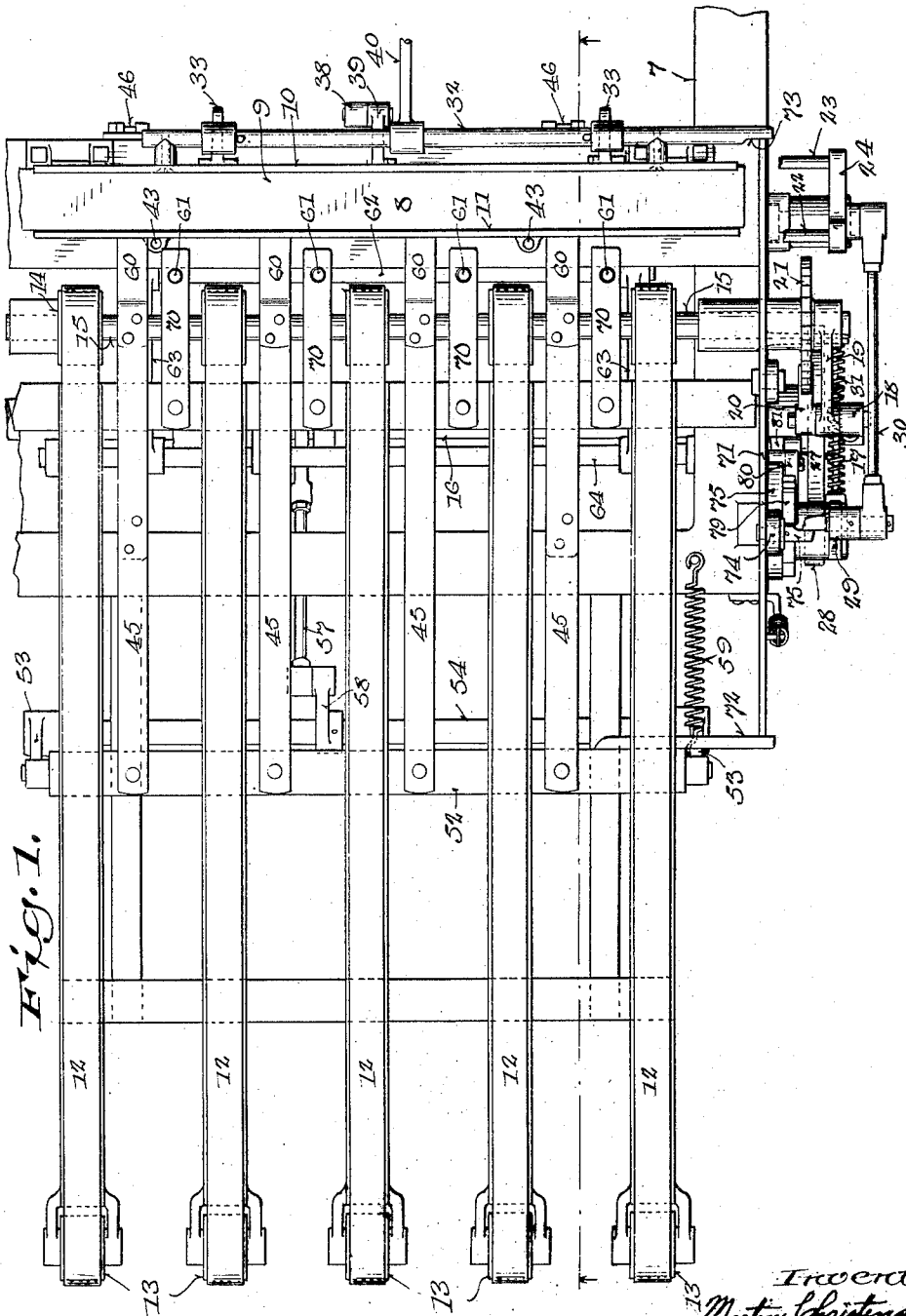


Fig. 1.

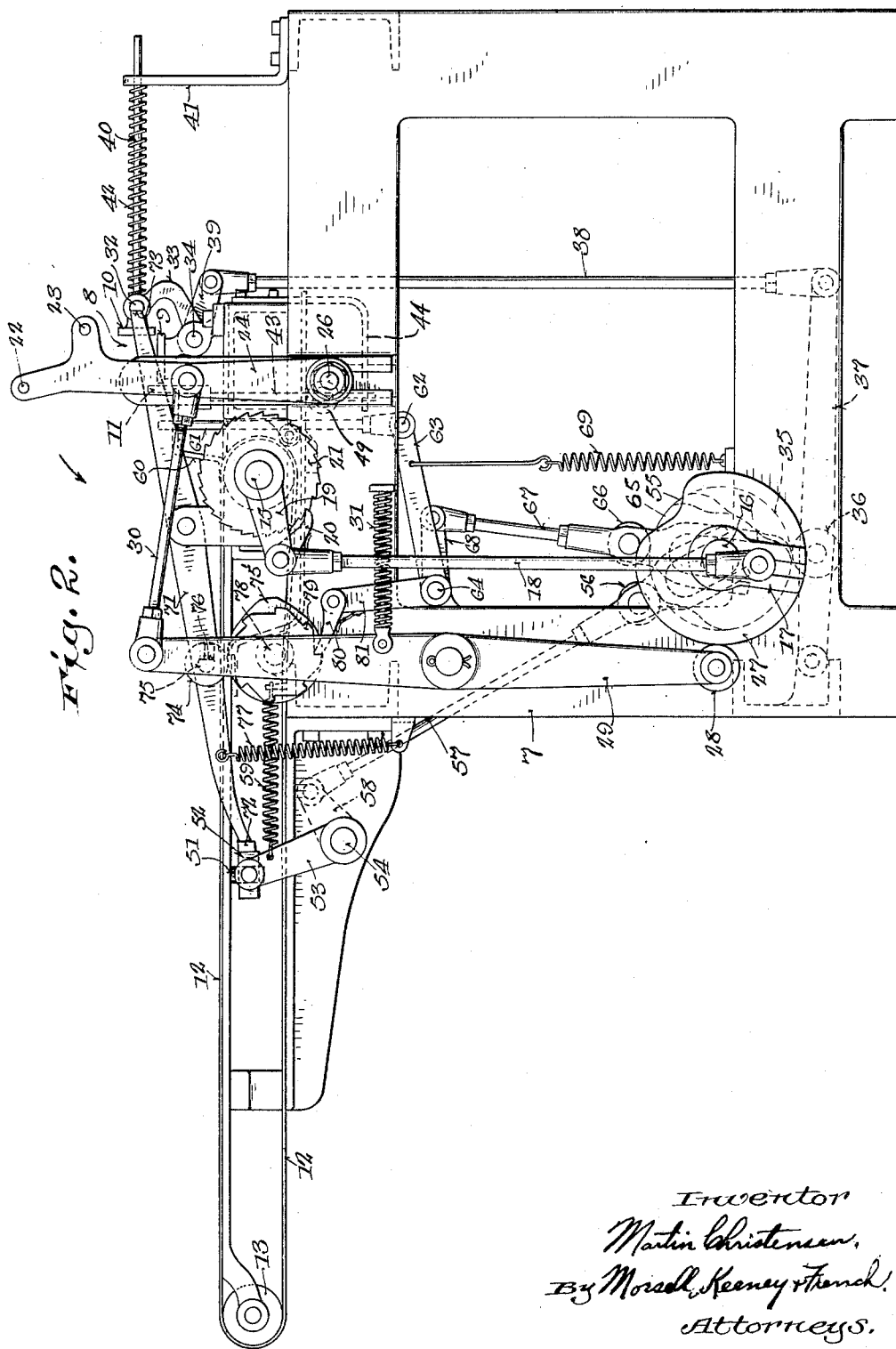
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4 SHEETS—SHEET 2.



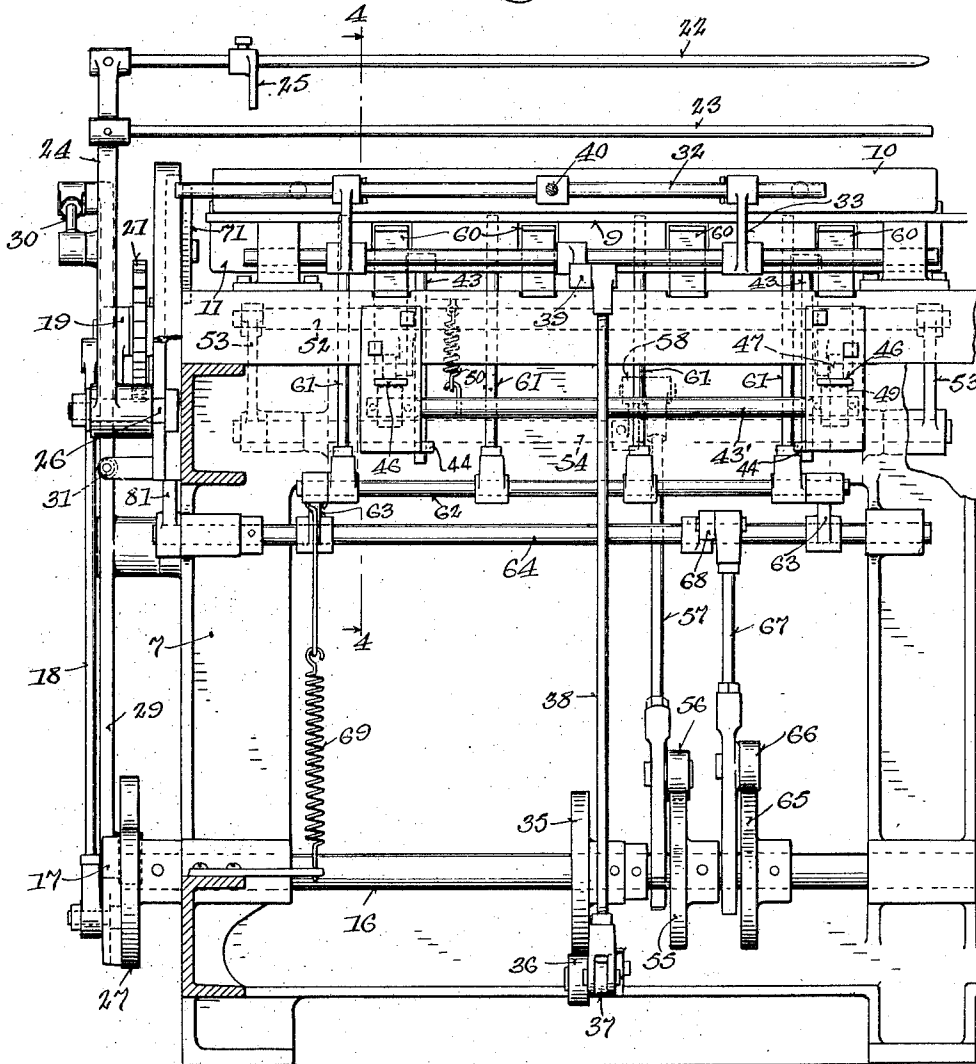
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4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 4.

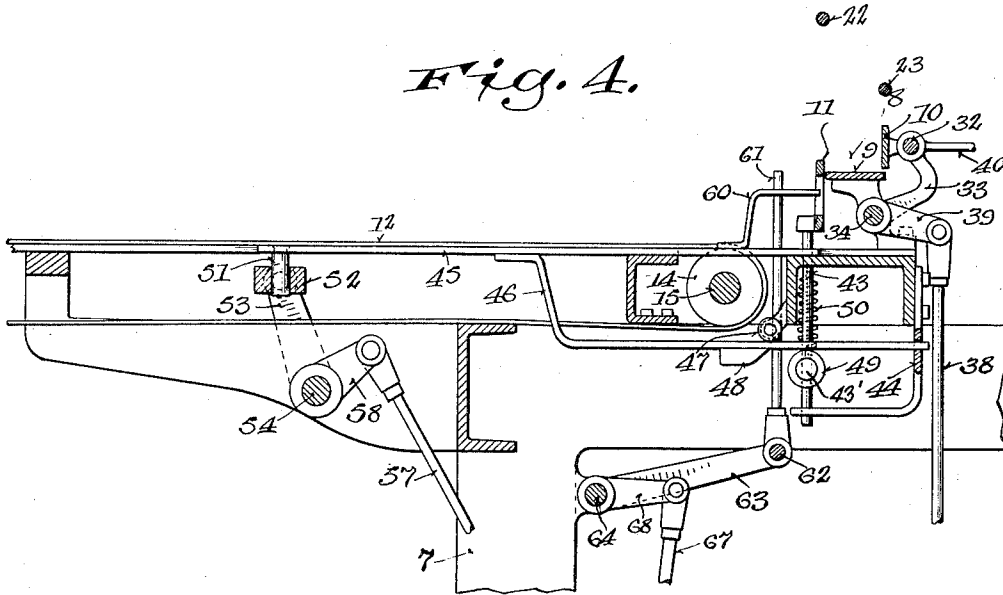


Fig. 5.

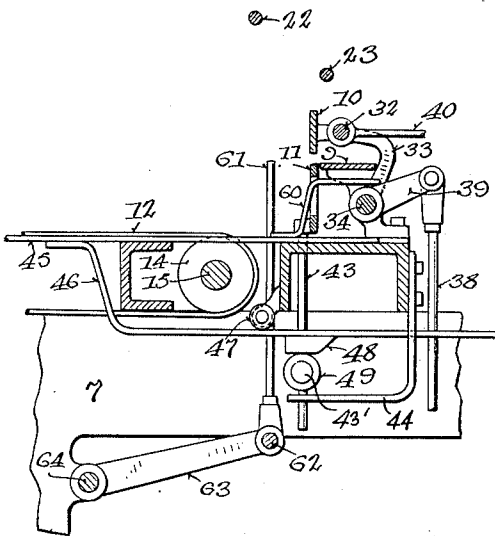
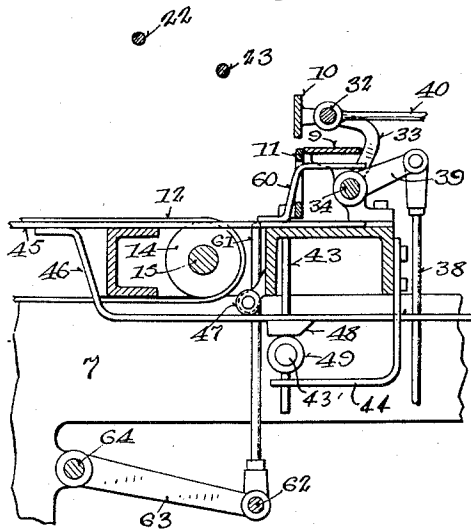


Fig. 6.



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UNITED STATES PATENT OFFICE.

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BOOK-DELIVERY MECHANISM.

1,362,849.

Specification of Letters Patent.

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Application filed November 7, 1918. Serial No. 281,561.

To all whom it may concern:

Be it known that I, MARTIN CHRISTENSEN, a citizen of the United States, and resident of Racine, in the county of Racine and State of Wisconsin, have invented new and useful Improvements in Book-Delivery Mechanism, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

The present invention relates to certain new and useful improvements in book-stitching machines and refers more particularly to the delivery mechanism employed in discharging the bound signatures from the machine.

This invention has for one of its objects to provide mechanism for delivering bound signatures from book-stitching machines which will be positive in operation and which is so constructed as to prevent the bound signatures from becoming caught in the trough while being ejected therefrom.

A further object of this invention is to provide a delivery mechanism for book-stitching machines in which the signature trough sides provide means for ejecting the bound signatures to move them directly downwardly in front of the trough unto the delivery carrier.

With the above and other objects in view which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

In the accompanying drawings I have illustrated one complete example of the physical embodiment of my invention constructed according to the best mode I have so far devised for the practical application of the principles thereof, and in which:—

Figure 1 is a plan view of the delivery mechanism embodying the invention;

Fig. 2 is a side view thereof;

Fig. 3 is a rear elevation thereof;

Fig. 4 is a section taken on the line 4—4 of Fig. 3 and Fig. 1;

Figs. 5 and 6 are detail sectional views of parts of the mechanism shown in Fig. 4,

showing said parts in different operative positions.

In book-stitching machines after the groups of signatures are bound by the stitchers they are transferred to the delivery mechanism either by the stitcher feed or an auxiliary feed and are carried by the delivery mechanism away from the machine and in connection with the mechanism here shown it is to be assumed that suitable means are to be provided for transferring or carrying the bound signatures to the delivery mechanism which is mounted upon the frame 7 of the machine.

The bound books are carried from the stitchers to the trough 8 of the delivery mechanism which is formed by a bottom plate 9 and movable side plates 10 and 11 and mechanism is provided for successively ejecting the books from this trough and moving them onto endless belts 12 mounted on rollers 13 and 14, the rollers 14 being mounted on a shaft 15 which is driven intermittently from the stitcher drive shaft 16 by a crank 17, a connecting rod 18 adjustably connected at one end to said crank and pivotally connected at its other end to a crank 19 loosely mounted on the shaft 15, said rod 18 carrying a spring pressed pawl 20 which engages a ratchet wheel 21 fast on the shaft 15 whereby the bound signatures deposited on the belts 12 are carried away from the machine.

During the passage of the signatures into delivery position in the trough 8 their upper portions are guided between spaced part guide bars 22 and 23 carried by a swinging bracket 24, the guide bar 22 being placed higher than the bar 23 so that when the brackets are tipped forwardly toward the belts 12, the book will slip down beneath the bar 23 and then fall forwardly toward the belts 12. A stop 25 is adjustably secured to the bar 22 to limit the travel of the book in the trough 8 and is adjusted to accommodate the length of book being handled. The brackets 24 are adjustably connected to pivots 26 so that they may be adjusted to accommodate books of different heights.

The mechanism for swinging the brackets consists of a cam 27 on the shaft 16 engaging a roller 28 carried by a lever 29 which is operatively connected to one of the brackets 24 by a link 30, the roller being held against the cam 27 by a spring 31,

The ejecting mechanism consists of means for moving the plates 10 and 11 to discharge the book from the trough 8 and means for insuring the positive forward movement of the book upon the belts 12.

The plate 10 is pivotally secured to a shaft 32 which is loosely pivotally mounted in arms 33 secured to a rock shaft 34 which is oscillated at the desired intervals by means of a cam 35 on the shaft 16, roller 36, lever 37, connecting rod 38 and crank 39. To provide for substantially straight line movement of the plate 10 across the trough 8 a rod 40 is secured to the shaft 32 and runs in a guide bracket 41 and a spring 42, mounted on the rod between the bracket 41 and shaft 32, serves to hold the lever 37 with its roller 36 up against the cam. This construction produces a straight transverse movement of the plate 10 across the trough 8 thus pushing the lower portion of the book from the bottom of the trough.

The plate 11 is mounted on vertically reciprocating pins 43 guided in the machine frame and in brackets 44 and connected together near their lower ends by a shaft 43'. The pins 43 are moved downwardly by the inward movement of the bars 45 carrying depending bars 46 which are slidably mounted upon rollers 47 mounted in the frame and guided at their rear ends in the brackets 44, said bars 46 carrying cam projections 48 engageable with rollers 49 rotatably mounted on the shaft 43'. The pins are moved upwardly to maintain the plate 11 in normal position by means of springs 50. The bars 45 at their outer ends carry pins 51 which are loosely slidably mounted in a connecting frame bar 52 pivotally mounted on crank arms 53 of a rock shaft 54. This rock shaft is oscillated at the desired time by a cam 55 on the shaft 16, roller 56, connecting rod 57, forked at its lower end, and crank 58, the roller 56 being yieldingly held against the cam by a spring 59. With this construction the play between the frame bar 52 and the pin 51 permits of substantially straight line reciprocation of the bars 45.

The means for insuring the positive forward movement of the books upon the belts 12 consists of the movable apron formed by the bars 45 carrying angled bar stops 60, and movable stop pins 61. The bar stops 60 move with the bars 45 and the mechanism for accomplishing this has already been described.

The stop pins 61 are connected to a shaft 62 which is loosely pivotally connected to a crank arm 63 on a rock shaft 64 which is moved by a cam 65 on the shaft 16, roller 66, connecting rod 67, forked at its lower end, and crank 68. A spring 69 normally holds the roller 66 against the cam 65.

The pins 61 are reciprocated continually in the guides 70 but the other parts are pre-

vented from operating when no book is in the trough by means of a locking lever 71 which at one end is adapted to engage a stop 72 carried by the bar 52 at its other end to engage a flattened portion 73 of the shaft 32 and intermediate its ends it carries a roller 74 provided with a stop 75' adapted to engage a stop 76 on the lever 29, Figs. 1 and 2. When the lever engages stops 72, 73 and 76 the rollers 56, 36 and 28 are prevented from entering into the depressions in the cams 55, 35 and 27 respectively so that the rod 37 and levers 38 and 29 will not be operated and consequently the respective linkages connecting these last named elements with the bars 45, plates 10 and 11, stops 60 and brackets 24 will not be operated.

The lever 71 is pivotally supported intermediate its ends and is moved to permit the various parts of the delivery mechanism to operate at the desired time by a cam 75 which engages the roller 74 held to the cam by a spring 77. This cam is mounted on a shaft 78 which carries what may be termed a "timing" ratchet wheel 79 engaged by a spring pressed pawl 80 mounted on a crank 81 carried by the rock shaft 64 so that, on every revolution of the shaft 16, the shaft 78 is moved by cam 35, roller 66, rod 67, crank 68, shaft 64, crank 81, pawl 80 and ratchet wheel 79 the distance of one tooth of the ratchet wheel and once during every revolution of the shaft 78 the cam 75' lifts the roller 74 and lever 71 to throw said lever out of engagement with the stops previously mentioned and thus permit the delivery mechanism to operate and by the use of a proper timing wheel 79 the ejecting mechanism will be put into operation when the completed book is in the trough and will be stopped previous to the movement of another book into the trough.

The operation of the device in brief is as follows: With the lever 71 in "locking position" a book is transferred from the stitchers into the trough 8, the parts being in the position shown in Fig. 4. The cam 75 then lifts the roller 74 and thereby swings the lever 71 out of engagement with the stops 72, 76 and 73 allowing the ejecting means to operate. During this operation the bracket 24 swings forwardly part way, the plate 11 moves down below the level of the bottom plate 9, the plate 10 moves across the trough 8, the stops 60 move rearwardly beneath the plate 9 and the pins 61 remain up, as shown in Fig. 4, under which conditions the book is moved forwardly off its support. Then the bracket 24 completes its movement and the book slips down below the guide rod 22 and is pushed forwardly at its upper portion by the rod 23 and falls upon the bars 45 and the belts 12, the parts being in the position shown in Fig. 6. The books are

thus delivered to a position directly below the trough. Then the belts 12 and stops 60 start to move the book forwardly, the stops 60 now moving forwardly with the bars 45 and on the return of the apron 45 with the stops 60, the book is prevented from moving back with said apron by the pins 61 which now move up into the path of returning book and a further movement of the belt carries it away from the machine and the parts of the ejecting mechanism resume their former positions and are again locked against actuation until the next book is presented to the trough. The belt 12 is preferably given a step by step movement so that the books are carried away from the machine in overlapping condition to facilitate stacking.

What I claim as my invention is:

1. In a delivery mechanism, the combination, with a trough, of means for ejecting the book from said trough, means for carrying the book away from the machine comprising endless belts and a reciprocating apron provided with back stops, and stop means for preventing the return of the book on the return of the apron.

2. In a delivery mechanism for book-stitching machines, the combination with a trough and endless belts arranged with their receiving ends on a plane below that of the trough, of means for ejecting the books from the trough onto the belts, and locking means for securing said ejecting means against actuation while a book is being moved into the trough and including a pivotally mounted locking lever having one end releasably engageable against said ejecting means to prevent the operation thereof, and having means engageable therewith to disengage said end from the ejecting means.

3. In a delivery mechanism for book-stitching machines, the combination with endless delivery belts, of a trough comprising a bottom plate, a vertically movable front plate, and a rear plate movable across the trough to deliver the books onto the belts, the receiving ends of the belts being on a lower plane than the trough bottom plate whereby the books are placed thereon in substantially stacked relation.

4. In a delivery mechanism, the combination, with endless delivery belts, of a trough comprising a bottom plate and movable side plates, and means for moving the front side plate downwardly and the rear side plate across the trough to deliver the book onto the belts, and means for positively insuring a forward movement of the books upon the belts.

5. In a delivery mechanism, the combination, with a trough, of means for ejecting the book therefrom, means for carrying the book away from the machine comprising endless belts and a reciprocating apron provided with back stops, and reciprocating pins for preventing the return of the book on the return of the apron.

6. In a delivery mechanism, the combination, with endless delivery belts, of a trough comprising a bottom plate and movable side plates, means for moving the front side plate downwardly and the rear side plate across the trough to deliver the book onto the belts, and means for positively insuring the forward movement of the books upon the belts comprising a reciprocating apron provided with back stops and reciprocating stop pins.

7. In a delivery mechanism, the combination, with endless delivery belts, of a trough comprising a bottom plate and movable side plates, means for moving the front side plate downwardly and the rear side plate across the trough to deliver the book onto the belts, and means for positively insuring the forward movement of the books upon the belts comprising a reciprocating apron provided with back stops and reciprocating stop pins, and means for preventing operation of the side plates while a book is being moved into the trough.

8. In a delivery mechanism, the combination, with endless delivery belts, of a trough comprising a bottom plate and movable side plates, movable brackets, guide bars carried by said brackets above the trough, and means for moving the front side plate downwardly, the rear side plate across the trough and for swinging the brackets forwardly to deliver the book onto the belts.

9. In a delivery mechanism, the combination, with a trough, of means for ejecting the book from said trough, means for carrying the book away from the machine comprising endless belts and a reciprocating apron provided with back stops movable to a position beneath the trough, and stop means for preventing the return of the book on the return of the apron.

10. In a delivery mechanism, the combination of a trough comprising a bottom support and movable side plates, a swinging bracket carrying book engaging guides, a delivery carrier, and means for moving the side plates and bracket to eject the book from the trough and move it directly downwardly in front of the trough and onto the delivery carrier.

In testimony whereof I affix my signature.
MARTIN CHRISTENSEN.