May 1, 1962 C. H. HEIGL ET AL 3,032,336

COLLATOR AND STITCHER

Filed July 20, 1959 3 Sheets-Sheet 1

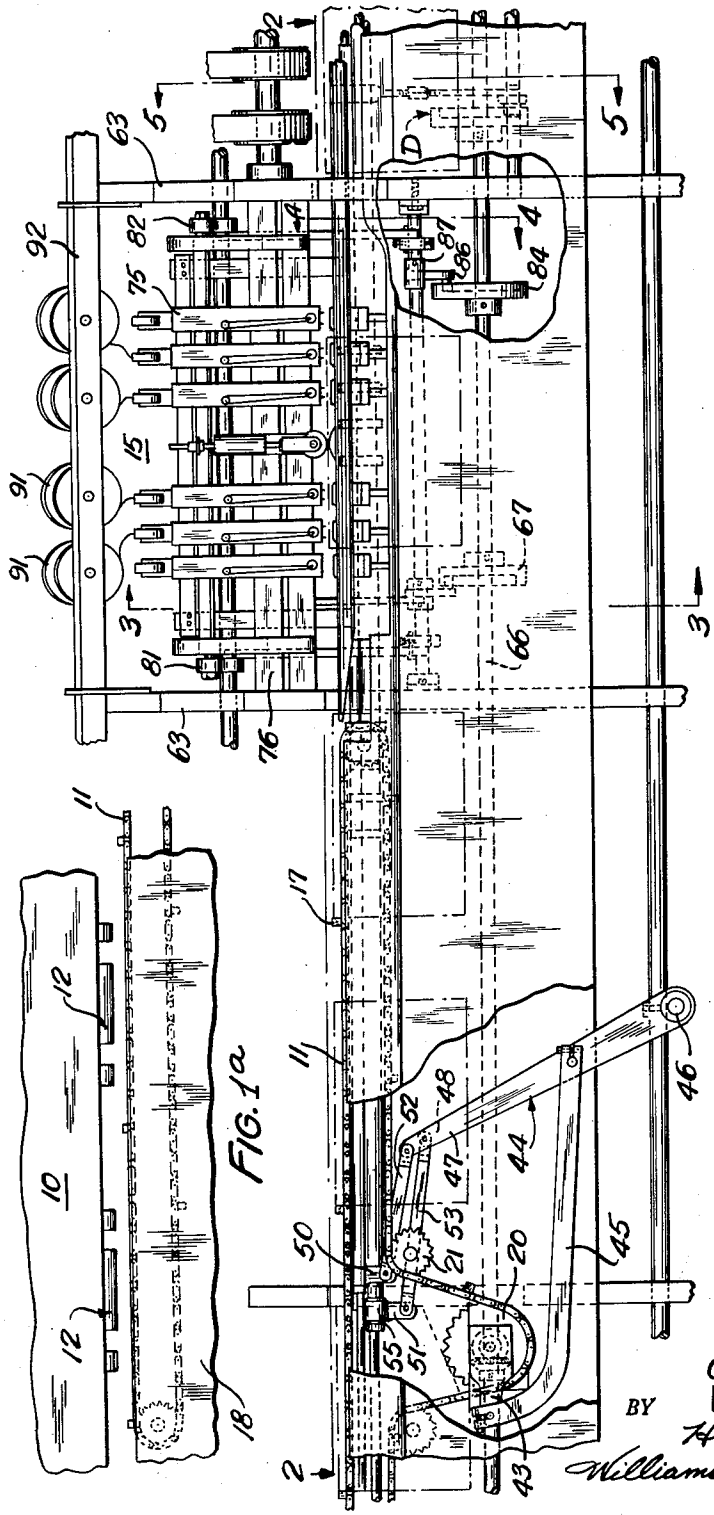


FIG. 1

FIG. 1a

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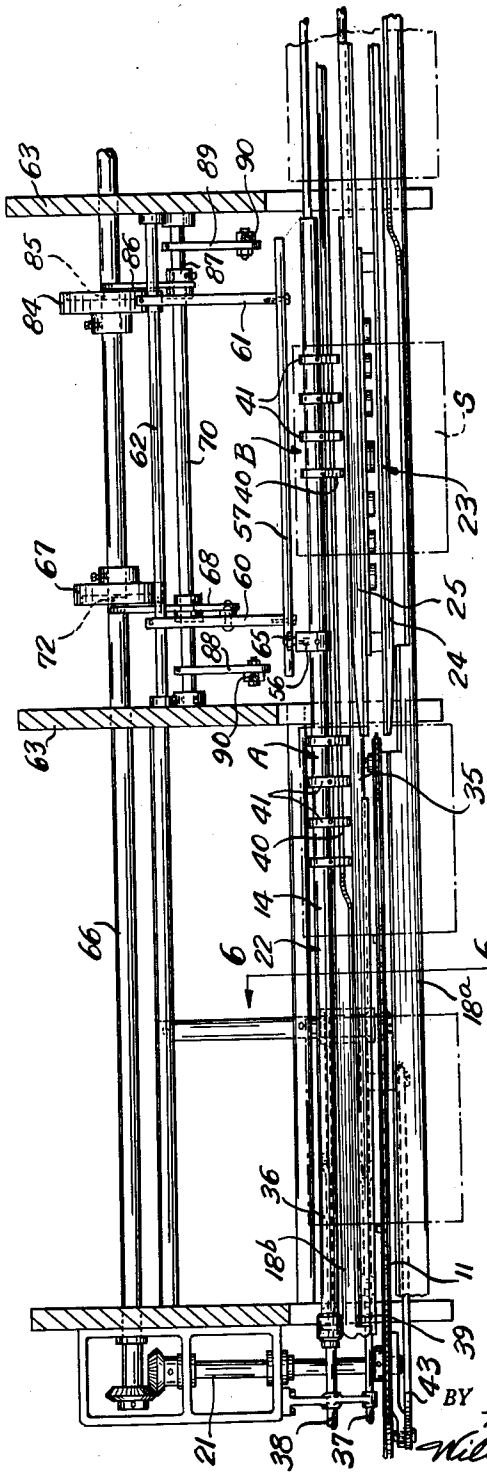


FIG. 2

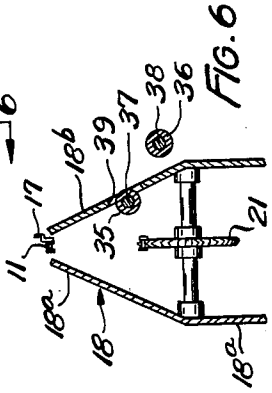


FIG. 6

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COLLATOR AND STITCHER

Filed July 20, 1959 3 Sheets-Sheet 3

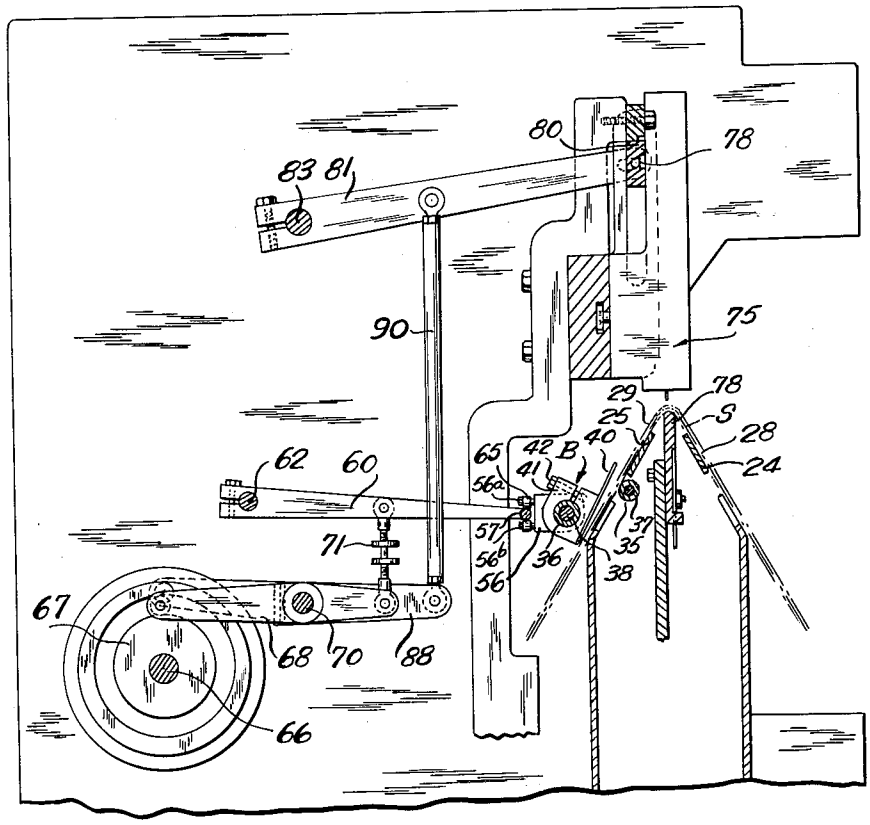
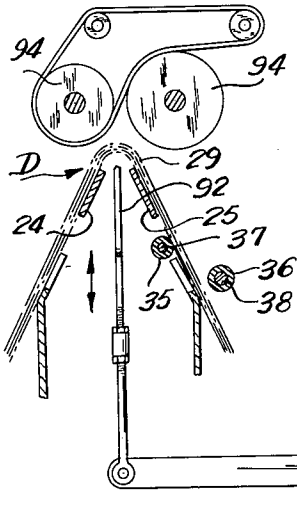


FIG. 3



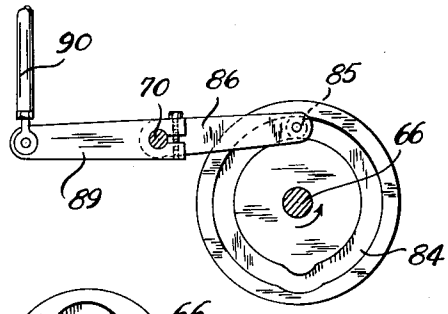


FIG. 4

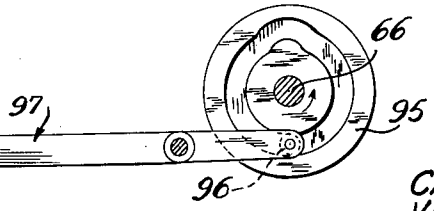


FIG. 5

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United States Patent Office 3,032,336 Patented May 1, 1962

3,032,336

COLLATOR AND STITCHER

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Filed July 20, 1959, Ser. No. 828,188
10 Claims. (Cl. 270—53)

The present invention relates to a mechanism for moving a signature, or similarly folded sheet, or a plurality of signatures collated to form a book, magazine, pamphlet or the like, along a saddle and, more particularly, to a mechanism for taking collated signatures from the chain conveyor of a collating machine and transferring them to a stitcher and then subsequently delivering the stitched collated signatures from the stitcher. For the sake of simplicity, the term "book" is used hereinafter to designate a plurality of signatures or folded sheets superposed on one another to form a book, magazine, pamphlet, or the like.

An important object of the present invention is to provide a new and an improved transfer apparatus for taking a book from the delivery end of a gathering conveyor chain of a signature collator and for transferring or indexing the books to a stitcher, the transfer apparatus being actuated from the drive for the conveyor chain to minimize timing problems and being such that the books are moved from the collator to the stitcher at a rate accelerated over their movement by the conveyor chain to enable a larger portion of the period between the times that successive books are delivered from the collator to be allotted to the stitching of the book.

Another object is to provide a new and an improved apparatus, as in the foregoing object, in which the apparatus also effects delivery of a stitched book, from the stitcher as a book to be stitched is being transferred from the collator-conveyor to the stitcher.

It is also an object of the present invention to provide a novel and an improved transfer mechanism having a reciprocable carriage for effecting the transfer of a folded sheet or book of such sheets along a saddle from a pick-up position to a subsequent position, the carriage being so constructed and arranged that it can be made of light-weight materials and with relatively small mass as compared to prior art carriages thereby enabling the carriage to quickly accelerate or decelerate.

It is further the object of the present invention to provide a novel and an improved transfer mechanism for moving a folded sheet, such as a signature, or a book of such sheets, along a saddle which mechanism is of a novel, simplified, light-weight and improved construction and is readily adjustable to facilitate the pickup and delivery of the work.

In accordance with one feature of the present invention, a carriage reciprocable to effect the transfer of a book from the exit end of a conveyor chain of a collator to a stitching apparatus is reciprocated by a crank arm driven from the drive for the conveyor chain so that the crank arm is reciprocated once for each revolution of the sprocket which drives the chain conveyor, the single revolution of the crank providing movement of the book from the conveyor chain to the stitcher and the return of the carriage. The carriage in the preferred and illustrated embodiment comprises a pair of sliding tubes which are disposed on opposite sides of one-half of a book supported on a saddle along which it is to be moved with the tubes extending parallel to the saddle and the tube on the outer side of the book carrying gripping means comprising a finger which is actuatable toward and from engagement with the tube on the inner side of the book to effect a clamp and release of a book disposed between the

tubes, the tubes being slidably supported by stationary guide rods or bars received within the tubes. In the preferred and illustrated carriage, the tubes on the outer side of the signature is rockably about its axis to actuate the clamping means and rocking of the tube is accomplished by means which do not interfere with the axial movement of the tube. The gripping means preferably comprises a plurality of fingers which are preferably adjustable along the tube supporting the fingers to facilitate the handling of different size signatures and the adjustment of the pickup and deposit positions of the carriage. It is to be understood that the transfer carriage of the present invention may also be used to transfer a single signature or folded sheets as well as a book thereof.

Further objects and advantages of the present invention will be apparent from the following detailed description of the preferred embodiment thereof made with reference to the accompanying drawings forming a part of the present specification for all matter disclosed therein and in which:

FIGS. 1 and 1A are fragmentary front elevational views of a collating and stitching apparatus embodying the present invention;

FIG. 2 is a horizontal sectional view taken approximately along line **2—2** of FIG. 1;

FIGS. 3, 4 and 5 are vertical sectional views respectively taken approximately along lines **3—3**, **4—4** and **5—5** of FIG. 1; and

FIG. 6 is a sectional view taken approximately along line **6—6** of FIG. 2.

While the present invention is susceptible of various modifications and uses where it is desirable to move a signature or a similarly folded sheet between or from one position to a subsequent position in an indexing operation, it is particularly useful when embodied in a collating and stitching apparatus to move or transfer a book of signatures from the collator to the stitcher and is preferably embodied in the apparatus in such a manner that the timing between the delivery of the articles from the collator and their pickup and transfer by the mechanism for moving the book to the stitcher does not present particular problems.

Referring to the drawings, a collator and stitching apparatus is shown as comprising a collator **10** which includes an endless conveyor chain **11** that moves past a plurality of stations **12** to gather individual signatures to be transferred to a stitcher **15**. The collator is shown in FIG. 1A and the stitcher **15** is best shown in FIGS. 1 and 3.

Referring to FIGS. 1 and 6, the conveyor chain **11** has spaced lugs **17** thereon which extend upwardly to move signatures with the chain **11** and a saddle guide **18** is disposed over the chain **11** to support the signatures as they are moved by the chain. The saddle guide **18** has an inverted V-shape and is comprised of front and rear sheet metal members **18*a***, **18*b*** which extend downwardly from the top of the saddle guide and diverge outwardly away from each other to provide the inverted V-shape. The guide may be formed from the sheet metal forming the lower front of the collator. As shown, the saddle guide **18** has a slot in the top thereof through which the lugs **17** extend and the slot extends for the length of the saddle guide.

The signature depositing stations **12** are adapted to each drop a signature so that the fold of the signature lies along the top of the saddle guide and a leaf thereof extends to each side of the guide **18**. As a lug **17** on the chain **11** moves past the first station **12**, a signature is dropped from the station onto the saddle guide **18** in advance of the lug and the signature is picked up by the lug **17** and moved with the chain. As the lug **17** passes the following station, another signature is dropped onto the

signature being pushed by the lug 17 and a book of signatures is delivered to the exit end of the chain 11, which is shown in FIG. 2. While only two stations 12 are shown in FIG. 1A, additional stations may be provided if desired.

The chain 11 is driven by a sprocket 20, shown in FIG. 1, which engages the lower or return run of the chain 11 and the lugs 17 are spaced on the chain a distance apart which is substantially equal to the circumference of the sprocket 20 so that as the sprocket 20 is rotated through one complete revolution a lug 17 reaches the return end of the conveyor provided by the chain 11 to deliver a book from the conveyor. The stations 12 are, in the illustrated embodiment, spaced apart approximately a distance equal to the circumference of the sprocket 20 so that each revolution of the sprocket 20 advances each lug 17 from one station to the following station, but it will be understood by those skilled in the art that the apparatus of the stations could be timed to properly deposit signatures even though the stations are not so spaced. The sprocket 20 may be driven through an intermittent motion mechanism which imparts an intermittent motion to the sprocket 20.

The collator has not been shown or described in detail since the structure thereof and its particular manner of operation is not necessary for an understanding of the present invention except for that structure hereinbefore described. The structure of the actual collator may be of various conventional constructions well known to those skilled in the art, and suffice it to say that the collator functions to deliver signatures to the conveyor chain 11 as the latter is moved past a plurality of signature depositing stations 12. The delivery of the signatures from the stations 12 are timed so that the signatures are delivered to the chain in advance of a particular lug 17 to provide a book of signatures at the delivery end of the conveyor chain.

It should be noted that in the illustrated conveyor chain the lugs 17 are fixed to extend from one side of the chain 11 so that the chain may pass around the sprocket 20 and an idler sprocket 21 therefor without interference between the lugs and the sprockets.

The books which are delivered by the conveyor chain 11 are transferred to the stitcher 15 by a transfer mechanism which comprises a reciprocable carriage 22, best shown in FIG. 2. The books delivered by the conveyor chain 11 move from the exit end of the conveyor chain, shown in FIGS. 1 and 2, onto a saddle 23 which is an inverted V-guide having a lengthwise slot on the top thereof. The saddle 23 is formed by a pair of flat members 24, 25 which diverge downwardly and outwardly from each other and which extend from the exit end of the conveyor chain 11 through the stitcher 15 and support the books in their movement from the exit end of the conveyor 14 to a stitching position in the stitcher 15 for stitching by the stitcher and for movement from the stitcher 15 to a delivery apparatus, not shown. As is apparent from the drawings, the signatures of the book being delivered from the conveyor chain are folded in an inverted V-shape and the leaves 28, 29 on the opposite sides of the fold ride respectively on the members 24, 25.

The carriage 22 for effecting a transfer of the books from the conveyor chain 11 to a position to be operated upon by the stitcher 15 and then from the stitcher 15 comprises a pair of tubes which extend parallel to the saddle 23 and are laterally spaced from each other. These tubes are designated by the reference numerals 35, 36, respectively. The tube 35 and the tube 36 are supported on respective guide and support rods 37, 38 and are axially slidable relative to the guide and support rods. The tubes 35, 36 and the rods 37, 38 extend parallel to the saddle 23 on the rearward side of the saddle, and the rod 37 and the tube 35 thereon are disposed immediately adjacent the under or bottom longitudinal edge of the

saddle member 25 so that the periphery of the tube 35 extends just beyond the plane of the outer side of the saddle member 25. The tube 35 extends into a cutout 39 in the rear sheet metal member 18*b* and is disposed so that the signature moving along the saddle guide 18 will ride over the end of the tube 35 without hanging up. If desired, the end of the tube may be beveled and the outer periphery of the tube 36 may extend a small distance outwardly of the plane of sheet metal member 18*a* to facilitate the clamping of the signature as described hereinafter. The supporting guide rod 38 and the tube 36 thereon are disposed in laterally spaced relationship to the rod 37 and tube 35 so that the leaves on that side of the book fold of a book on the saddle 23 extend downwardly between the tubes 35, 36. The tube 36 carries gripping means in the form of a plurality of fingers 40 which are actuatable toward clamping engagement with the tube 35 to clamp the leaves disposed between the tubes 35, 36. The fingers 40 are each supported on an individual clamp block 41 clamped to the outer periphery of the tube 36 and which has a clamp screw 42 operable to release the clamp block to allow the same to be adjusted along the tube 36. The tube 36 is rotatable about its own axis and relative to the rod 38 to rock the fingers 40 toward and away from the tube 35 to actuate the fingers 40 in their clamping and release movements.

As is shown in FIG. 2, there are two groups of the fingers 40 mounted on the tube 36 and the tube 36, as well as the tube 35, extends for a substantial distance into the stitcher 15. For the sake of clarity in reference, the group of fingers will be referred to as finger set A and finger set B. The finger sets are supported on the tube 36 so that if the finger set B is adjacent the stitching position the finger set A is at the exit end of the conveyor chain 11 where a book being delivered from the conveyor chain 11 onto the saddle 23 has the leaves 29 thereof disposed to be clamped by the fingers 40 of the set A when rocked toward engagement with the tube 35. The rocking of the tube 36 to clamp the book at the exit end of the conveyor chain 11 also rocks the fingers of group B into engagement with the book in stitching position so that this book is delivered or moved with the carriage 22 as the latter is moved to the right, as viewed in FIG. 2. The tubes 35, 36 of the carriage 22 are reciprocated in unison on the rods 37, 38 by mechanism which, in the illustrated embodiment, is driven from the shaft for driving the sprocket 20.

The mechanism for reciprocating the carriage 22 comprises a crank arm 43 fixed to the drive shaft 21 for the sprocket 20, as is shown in FIGS. 1 and 2. The crank arm 43 is connected to a rocker member 44 by a connecting rod 45, the connecting rod 45 being pivoted to both the crank arm 43 and the rocker member 44. The U-shaped rocker member 44 is supported for rocking movement about a shaft 46 having an axis parallel to the drive shaft 21 and comprises a pair of arms 47, 48 which extend upwardly from the shaft 46. The upper ends of the arms 47, 48 are pivotally connected to depending lugs 50, 51 on tubes 35, 36, respectively, by links 52, 53 respectively. The lugs 50, 51 depend from the left-hand ends of the tubes 35, 36 as the latter are viewed in FIGS. 1 and 2 and the links 52, 53 are pivoted to the respective ones of the lugs 50, 51 and arms 47, 48.

The lug 51 carried by the tube 36 is formed as part of a collar 55 which is supported on the tube 36 so that the tube may rotate with respect thereto but is held against axial movement with respect to the tube 36 by the use of any suitable means such as snap rings.

The tube 36 is rocked, in the illustrated embodiment, to actuate the fingers 40 by means of a connection which does not interfere with the axial movement of the tube 36. In the preferred and illustrated embodiment, the connection comprises a yoke member 56 which is adjustably clamped to the tube 36 and which has a pair of outwardly

extending arms 56*a*, 56*b* which receive a bar 57 that is disposed adjacent the tube 36. In the illustrated and preferred embodiment the bar 57 is supported at its opposite arms by arms 60, 61 fixed to a rock shaft 62 supported between spaced frame members 63. The arms 60, 61 are movable or reciprocable upwardly and downwardly to move the bar 57 upwardly or downwardly to rock the tube 36 through the yoke or U-shaped member 56. In the preferred embodiment, the bar 57 is fixed to the ends of the arms 60, 61 and the U-shaped member 56 has a roller 65 mounted on the end of each of the arms 56*a*, 56*b* and which ride on the upper and lower sides, respectively of the bar 57. This construction permits the U-shaped member 56 to move past the arms 60, 61 and reduces friction between the bar 57 and the U-shaped member.

While the U-shaped member 56 has been shown as carried by the tube 36 and the bar 57 supported adjacent the tube 36 and rocked to effect movement or rocking of the tube 36, it will be understood by those skilled in the art that the parts may be reversed or that other connections or means may be used to effect a rocking of the tube 36. For example, the tube 36 could be provided with a cam slot which receives a pin supported on a frame member adjacent the tube 36 so that as the tube 36 is reciprocated, the operation of the cam slot effects a rotation of the tube 36 at each end of its path of reciprocation.

The stroke of the carriage is designed so that the movement of the fingers A will be sufficient to move a book on the saddle 23 from the exit end of the conveyor chain 11 to a stitching position and also so that the movement of the fingers B will effect a delivery of a book from the stitcher 15 to a delivery apparatus D. It will be appreciated by those skilled in the art that the stroke of the carriage may be greater than that necessary to merely move the book from the exit end of conveyor 11 to a stitching position since the fingers 40 may be operated to release the signature when the signature is in position and the carriage allowed to overtravel before it is returned to pick up the following signature.

The rocking of the arms 60, 61 to effect the clamping and release of a book is accomplished, in the illustrated embodiment, by the drive which also effects the rotation of the sprocket 20 and the crank arm 43. As is best shown in FIG. 3, this drive comprises a drive shaft 66 which extends along the rear side of the apparatus, as the latter is viewed in FIGS. 1 and 2. To rock the arms 60, 61 and the bar 57, the drive shaft 66 has a cam 67 thereon which cooperates with a cam follower carried by one end of a rocker lever 68 which is journaled on a shaft 70 so as to be rotatable with respect thereto and which is connected at its other end to the arm 60 by a link 71, as is best shown in FIG. 3. The link 71 is an adjustable link and is pivotally connected to the lever 68 and to the arm 60 intermediate its ends. The cam 67 is such that the rocker lever 68 is actuated counterclockwise when the drive is at the point in its cycle where the fingers 40 are to be actuated to clamping position and is actuated clockwise when the fingers are to be actuated to a release position. It will be understood that the fingers 40 are actuated to a clamp position once during each cycle at the time that they are to advance the book and are actuated to a release position when they have delivered the book and the carriage is to be returned. The drive shaft 66 is geared with the drive shaft 21 so that they rotate in one-to-one ratio. It will be appreciated by those skilled in the art that timing problems are considerably simplified by reason of the fact that the crank arm 43 is driven so that it is rotated through a complete revolution for each revolution of the sprocket 20 for driving the conveyor chain 11 and by the fact that the cam 67 is rotated one-for-one from the same shaft which is connected to drive the sprocket 20 and crank arm 43. Because of the described structure, the stitcher, once timed, will always be properly timed even though the speed of the collator is varied.

The mechanism for stitching the book when it is in stitching position does not per se constitute a part of the present invention and any conventional apparatus may be utilized. For purposes of completeness, a stitcher is shown in the drawings which comprises a plurality of conventional stitcher heads 75 supported on a mounting plate 76 extending parallel to the saddle 23 above the stitching position. The stitching heads 75 each includes a movable stitching element for inserting a staple, not shown in detail, but which is reciprocated vertically toward engagement with a respective clincher block 78 supported in the space between the members 25, 24 of the saddle 23 and over which the book rides as it is moved into stitching position by the carriage 22. The stitching heads 75 each insert a staple into the book when the movable element thereof is actuated. The movable stitching element of each stitching head 75 includes a lug 78 which is received in a groove in an actuating bar 80 extending parallel to the stitching head 75 on the rearward side thereof, as the latter are viewed in FIG. 1. The bar 80 is supported at the end of a generally horizontal pair of arms 81, 82 which are fixed at their ends remote from the bar 80 to a rock shaft 83. The rock shaft 83 is rocked to move the bar 80 vertically by a cam 84 on the shaft 66. The cam 84 cooperates with a cam follower 85 mounted on one end of a lever 86 which has its other end fixed to a block 87 pinned to the shaft 70 as is best shown in FIG. 1. The shaft 70 has arms 88, 89 fixed thereto which are disposed below the arms 81, 82 and are connected thereto by individual connecting rods 90 so that the arms 81, 82 and, in turn, the bar 80 are moved vertically upon rocking movement of the shaft 70 effected by the cam 84. It can be seen, therefore, that the rotation of the shaft 66 effects a rocking of the arms 81 and 82 to reciprocate the bar 80 to actuate the stitcher heads at the proper point in their cycle. In the illustrated embodiment six stitcher heads are shown, but only four of the stitcher heads are illustrated as being in use. Each of the four stitcher heads in use is fed from a spool of wire 91 mounted above the stitcher heads on a frame member which extends between the frame members 63.

As mentioned above, the finger set B on the tube 36 is operated to effect movement of the stitched book from the stitching position along the saddle to a delivery position over a delivery apparatus D. When the carriage 22 is reciprocated from left to right as viewed in FIGS. 1 and 2 to move a book from the conveyor chain to stitching position, the finger set B moves from stitching position to the delivery position to index the stitched book from the stitching position.

When a book is in the delivery position on the saddle 23, it is in position to be engaged by a feeder plate 92 which is supported below the saddle 23 for vertical reciprocatory movement through the slot in the top of the saddle. When the feeder plate 92 is moved vertically, it pushes the book disposed on the saddle above the feeder plate into a nip formed by a moving delivery belt 93 and a roll 94. The feeder plate is reciprocated from a cam 95 fixed to the shaft 66 and which cooperates with a cam follower 96 fixed to one end of a rocker lever 97 having its other end pivotally connected to the feeder plate 92 to effect vertical reciprocation of the latter upon a rocking movement of the lever 97. The delivery apparatus D may be of a conventional construction and does not per se form a part of the present invention and has not therefore been shown or described in detail.

In the illustrated and preferred embodiment the chain 11 and carriage 22 are timed so that the carriage 22 is retracted when a book reaches the end of the conveyor chain 11. At this point, the cam 67 has started to close the fingers 40 against the bar 35 and continued rotation of shafts 21 and 66 operates to move the carriage 22 forwardly, to effect a closing of the fingers 40, to move

the book at the exit end of the conveyor to the stitching position and to deliver the stitched book at the stitching position to the delivery position above the feeder plate 92. The motion of the carriage 22 is a harmonic motion and as the carriage 22 approaches the end of its forward or advance movement, the carriage is slowed and just before it reaches the end of its travel the cam 67 preferably operates the arms 81, 82 so that the fingers 40 start to open just in advance of the time that the carriage reaches its right-hand position, as the carriage is viewed in FIGS. 1 and 2. Continued rotation of the crank 43 will effect the return of the carriage 22 with the fingers 40 open and when the revolution of the crank is completed, the carriage will again be ready to clamp the following book being delivered by the conveyor chain 11 to transfer the same to a stitching position and to deliver the stitched book from the stitching position to the delivery apparatus.

It can be seen from the foregoing that the present invention provides a new and an improved stitching apparatus and a new and an improved means for effecting the transfer of a signature or a similarly folded sheet or a book of such sheets or signatures from one position to a following position. The apparatus for effecting the transfer of the signature or book is extremely lightweight and compact so that the direction of movement thereof can be readily and quickly reversed. The apparatus is also so constructed and arranged that when the invention is embodied in a collating and stitching apparatus, timing problems are minimized and the stitcher and transfer mechanisms are operated in timed relationship with the collator, once the apparatus has been properly timed, even though the speed of the collator is varied.

Further modifications, constructions and arrangements of the present invention will occur to those skilled in the art, and it is hereby our intention to cover such constructions, modifications and arrangements which fall within the spirit and scope of the invention as described herein.

Having thus described our invention, we claim:

1. In a signature collating and stitching apparatus including an endless conveyor chain having spaced signature conveyor means thereon and movable past a plurality of signatures depositing stations to gather individual signatures at each station and deliver a book of signatures at the exit end thereof, a saddle forming an extension of said conveyor chain and disposed to receive the signature therefrom with the signature straddling the saddle, a stitcher, said saddle extending to said stitcher and being adapted to support a book of signatures in position to be stitched thereby, a sprocket for driving said chain, said sprocket having a circumference equal to the distance between said spaced signature conveying means whereby a book is delivered from said conveyor chain for each revolution of said sprocket, a shaft for rotating said sprocket, said sprocket being fixed to said shaft, a reciprocable carriage supported for movement between the exit end of said conveyor chain and said stitcher, gripping means on said carriage for gripping a book at the exit end of said conveyor chain and for moving the book along said saddle to said stitcher, drive mechanism for effecting reciprocation of said carriage comprising a crank arm fixed to said shaft whereby said crank arm and sprocket are rotated in a one-for-one relationship, and means for actuating said gripping means in relationship to the reciprocation of said carriage.

2. In a signature collating and stitching apparatus including an endless conveyor chain having spaced signature conveyor means thereon and movable past a plurality of signature depositing stations to gather individual signatures at each station and deliver a book of signatures at the exit end of the chain, a saddle forming an extension of said conveyor chain and disposed to receive the book therefrom with the book straddling the saddle, a stitcher, said saddle extending to said stitcher and being adapted to support a book in position to be stitched thereby, a sprocket for driving said chain, said sprocket having a circumference equal to the distance between said spaced signature conveying means whereby a book is delivered from said conveyor chain for each revolution of said sprocket, drive means for rotating said sprocket, a carriage reciprocable between the exit end of said conveyor chain and said stitcher, gripping means on said carriage for gripping a book at the exit end of said conveyor chain and for moving the book with said carriage to move the book along said saddle to said stitcher, drive mechanism for effecting reciprocation of said carriage comprising a crank arm and means connecting said crank arm to said drive means to rotate said crank arm a revolution for each revolution of said sprocket at any speed of said sprocket, and means for actuating said gripping means in relationship to the reciprocation of said carriage, said carriage comprising first and second spaced tubes extending in the directions of reciprocation of said carriage, and means supporting said tubes for reciprocatory movement between said chain and said stitcher and in spaced relationship to each other to receive one side of the book therebetween as the book moves to the exit end of the conveyor comprising first and second elongated stationary members received by respective ones of said tubes, said gripping means being carried by one of said tubes.

3. In a signature collating and stitching apparatus including an endless conveyor chain having spaced signature conveyor means thereon and movable past a plurality of signature depositing stations to gather individual signatures at each station and deliver a book of signatures at the exit end of said conveyor chain, a saddle forming an extension of said conveyor chain and disposed to receive the book therefrom with the book straddling the saddle, said saddle extending to said stitcher and being adapted to support a book of signatures in position to be stitched thereby, a sprocket driving said chain, said sprocket having a circumference equal to the distance between said spaced signature conveying means whereby a book of signatures is delivered from said conveyor chain for each revolution of said sprocket, drive means for rotating said sprocket, a reciprocable carriage movable along said saddle between the exit end of said conveyor chain and said stitcher, gripping means on said carriage for gripping a book of signatures at the exit end of said conveyor chain to cause the signatures to move along said saddle with the carriage to said stitcher, drive mechanism for effecting reciprocation of said carriage comprising a crank arm and means connecting said crank arm to said drive means to rotate said crank arm a revolution for each revolution of said sprocket at any speed of said sprocket said carriage comprising a pair of elongated members extending parallel to said saddle and supported in laterally spaced relationship on one side of said saddle and disposed to receive therebetween leaves of the book of signatures on said one side of said saddle with one of said elongated members being immediately adjacent the inner one of the leaves, said gripping means being on the other elongated member and the latter elongated member being rockable on its axis to actuate said gripping means toward and away from engagement with the one elongated member to effect a clamping and release of the leaves disposed therebetween, stationary means supporting said elongated members for reciprocation, said mechanism for reciprocating said carriage being operatively connected to reciprocate said elongated members in unison, and means for rocking said other elongated member relative to said stationary means.

4. In a signature collating and stitching apparatus, the structure as defined in claim 3 wherein said elongated members are tubes and the stationary means supporting the tubes for reciprocation are respective rods received within the tubes.

5. A mechanism for taking a folded sheet from the exit end of a chain conveyor and moving it along a

saddle to a work position spaced from the exit end of the conveyor in the general direction of movement of the sheet by the conveyor, the sheet having an inverted V fold therein and straddling the chain conveyor and saddle with the leaves thereof disposed on the opposite sides of the saddle and conveyor, said mechanism comprising a pair of stationary elongated members extending from the exit end of said conveyor in the general direction of movement of the sheet by the conveyor, means supporting said elongated members with their end portions adjacent the chain conveyor on opposite sides of the path of one leaf of the sheet as it approaches the exit end of the conveyor, whereby the leaf is received therebetween, and one is disposed on the inner side of the leaf and the other on the outer side thereof, first and second tubes slidably disposed about respective ones of said elongataed members, a plurality of gripping means carried by one of said tubes comprising a finger movable toward and away from engagement with the other tube to clamp or release a leaf disposed therebetween, means for reciprocating said tubes along said members to move said gripping means between a position adjacent the exit end of said conveyor and a position wherein a signature gripped thereby is disposed at said work station, and means for rocking said one of said tubes relative to its associated elongated member to actuate said fingers in timed relationship to the reciprocatory movement of said carriage.

6. A mechanism for taking a sheet having an inverted V-shaped fold to provide leaves on the opposite side of the fold from a first position and delivering it to a second position comprising a saddle for supporting the sheet with leaves thereof on opposite sides of the saddle and guiding the movement of said sheet from the first position to the second position, a carriage disposed on one side of the saddle and having first and second spaced parallel tubes disposed to receive therebetween the leaf of said sheet extending on said one side of the saddle with said first tube being disposed immediately adjacent the inner side of said leaf on said one side of said saddle and the second tube on the outer side of the leaf, gripping means carried by said second tube and actuatable toward and from engagement with said first tube to effect a clamping and release respectively of a leaf disposed between said tubes, a pair of stationary support and guide rods each received by and extending through a respective one of said tubes and supporting the latter for linear reciprocating movement, and means for rocking said second tube relative to its associated stationary rod.

7. A mechanism for moving a signature having an inverted V-shape along a saddle which the signature straddles so as to have a leaf thereof extending on each side of the saddle, said saddle being comprised of a pair of downwardly and outwardly diverging saddle members, first and second elongated members disposed in laterally spaced relationship and parallel to said saddle on one side thereof and disposed to receive the signature leaf therebetween, stationary means supporting said members for axial movement, said first elongated member being disposed adjacent the lower edge of the saddle member on said one side and said second elongated member being disposed outwardly of said one side from said first member, gripping means comprising a finger on said second elongated member actuatable toward and from engagement with said first elongated member to clamp a signature leaf disposed between said elongated members against said first elongated member, drive means for reciprocating said members in unison, said second elongated member being rockable about its axis and said finger being connected thereto for rocking movement therewith toward and from said first elongated member to effect a clamping or release of the signature leaf disposed between said elongated members, and means for rocking said second elongated member relative to said stationary means in relationship to the reciprocation of said elongated members, the last said means comprising a lever connected to said second elongated member for effecting rocking of same in opposite directions at the opposite ends of the path of reciprocation of said elongated members and a connection connecting said lever to said second elongated member and permitting axial movement of said second elongated member with respect to said lever.

8. The mechanism as defined in claim 7 wherein said connection comprises a bar member extending parallel to said elongated members, a U-shaped member receiving said bar, and means connecting one of said bar and U-shaped members to said second elongated member for movement therewith and the other of said bar and U-shaped members to said lever.

9. In a signature collating and stitching apparatus including an endless conveyor chain having spaced signature conveyor means thereon and movable past a plurality of signature depositing stations to gather individual signatures at each station and deliver a book of signatures at the exist end of said conveyor chain, a saddle forming an extension of said conveyor chain and disposed to receive the book therefrom with the book straddling the saddle, said saddle extending to said stitcher and being adapted to support a book of signatures in position to be stitched thereby, a rotatable first drive shaft, a sprocket fixed to the first drive shaft for driving said chain, said sprocket having a circumference equal to the distance between said spaced signature conveying means whereby a book of signatures is delivered from said conveyor chain for each revolution of said sprocket, a reciprocable carriage movable along said saddle between the exit end of said conveyor chain and said stitcher, gripping means on said carriage for gripping a book of signatures at the exit end of said conveyor chain to cause the signatures to move along said saddle with the carriage to said stitcher, drive mechanism for effecting reciprocation of said carriage comprising a crank arm connected to be driven from said first drive shaft a revolution for each revolution of said sprocket, means for actuating said gripping means in relationship to the reciprocation of said carriage, said carriage comprising a pair of elongated members extending parallel to said saddle and supported in laterally spaced relationship on one side of said saddle and disposed to receive therebetween leaves of the book of signatures on said one side of said saddle with one of said elongated members being immediately adjacent the inner one of the leaves, said gripping means being on the other elongated member and said other elongated member being rockable on its axis to actuate said gripping means toward and away from engagement with said one elongated member to effect a clamping and release of the leaves disposed therebetween, means supporting said elongated members for reciprocation, said mechanism for reciprocating said carriage being operatively connected to reciprocate said elongated members in unison, and means for rocking said other elongated member including a second drive shaft driven from said first drive shaft so that the second drive shaft makes one revolution for a revolution of the first drive shaft, a cam secured to the second drive shaft for rotation therewith, and means operatively connected between said cam and said other elongated member.

10. In a signature collating and stitching apparatus including an endless conveyor chain having spaced signature conveyor means thereon and movable past a plurality of signature depositing stations to gather individual signatures at each station and deliver a book of signatures at the exit end of said conveyor chain, a saddle forming an extension of said conveyor chain and disposed to receive the book therefrom with the book straddling the saddle, said saddle extending to said stitcher and being adapted to support a book of signatures in position to be stitched thereby, a rotatable first drive shaft, a sprocket fixed to the first drive shaft for driving said chain, said sprocket having a circumference equal to the distance be-

tween said spaced signature conveying means whereby a book of signatures is delivered from said conveyor chain for each revolution of said sprocket, a reciprocable carriage movable along said saddle between the exit end of said conveyor chain and said stitcher, gripping means on said carriage for gripping a book of signatures at the exit end of said conveyor chain to cause the signatures to move along said saddle with the carriage to said stitcher, drive mechanism for effecting reciprocation of said carriage comprising a crank arm connected to be driven from said first drive shaft a revolution for each revolution of said sprocket, means for actuating said gripping means in relationship to the reciprocation of said carriage, said carriage comprising a pair of elongated members extending parallel to said saddle and supported in laterally spaced relationship on one side of said saddle and disposed to receive therebetween leaves of the book of signatures on said one side of said saddle with one of said elongated members being immediately adjacent the inner one of the leaves, said gripping means being on the

other elongated member and said other elongated member being rockable on its axis to actuate said gripping means toward and away from engagement with said one elongated member to effect a clamping and release of the leaves disposed therebetween, stationary means supporting said elongated members for reciprocation, said mechanism for reciprocating said carriage being operatively connected to reciprocate said elongated members in unison, and means for rocking said other elongated member relative to said stationary means including a second drive shaft driven from said first drive shaft so that the second drive shaft makes one revolution for a revolution of the first drive shaft, a cam secured to the second drive shaft for rotation therewith, and means operatively connected between said cam and said other elongated member.

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