Nov. 22, 1932. H. SIEB 1,888,775

BOOK FEEDING DEVICE

Filed Aug. 11, 1931 4 Sheets-Sheet 1

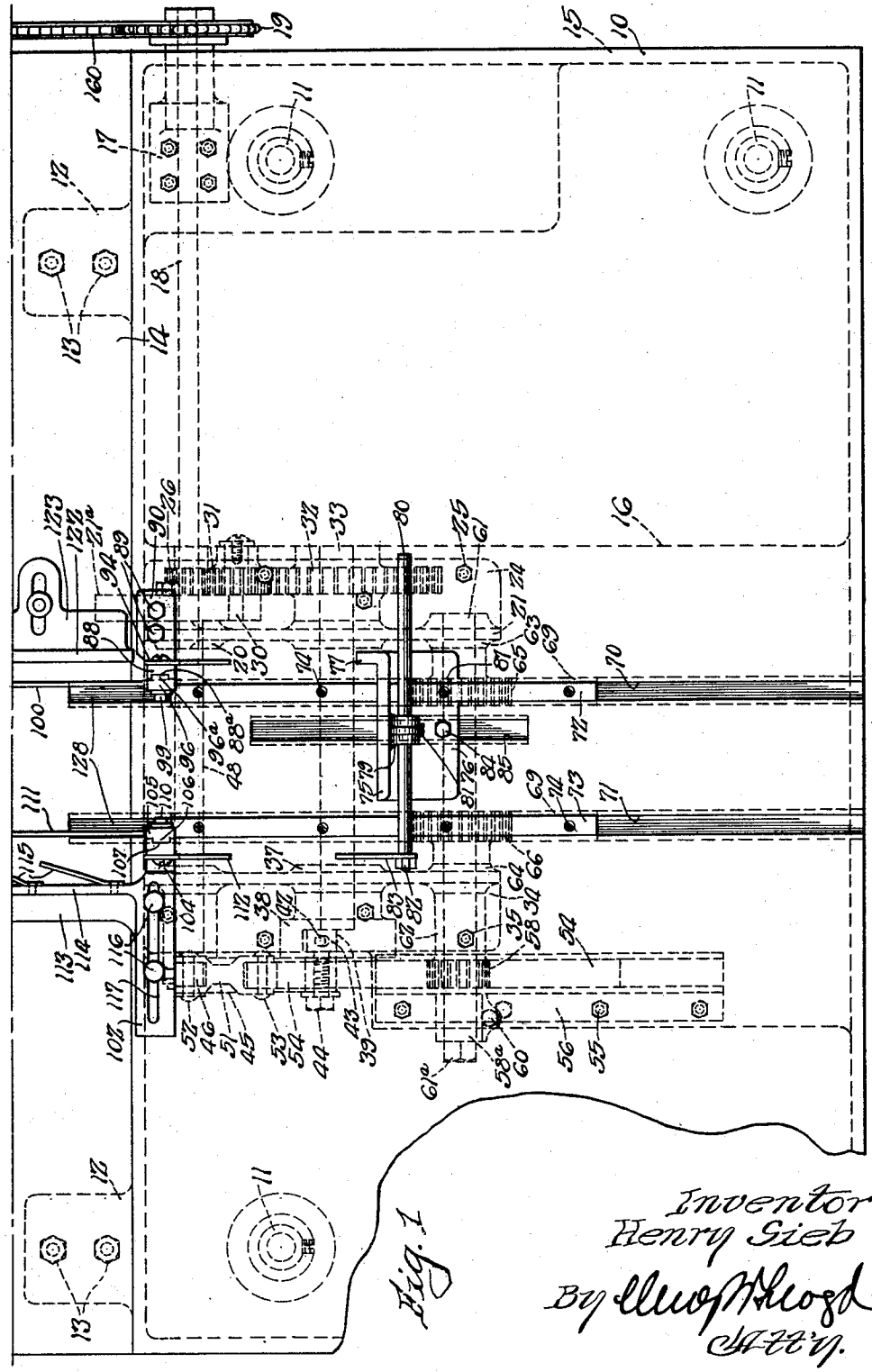


Fig. 1

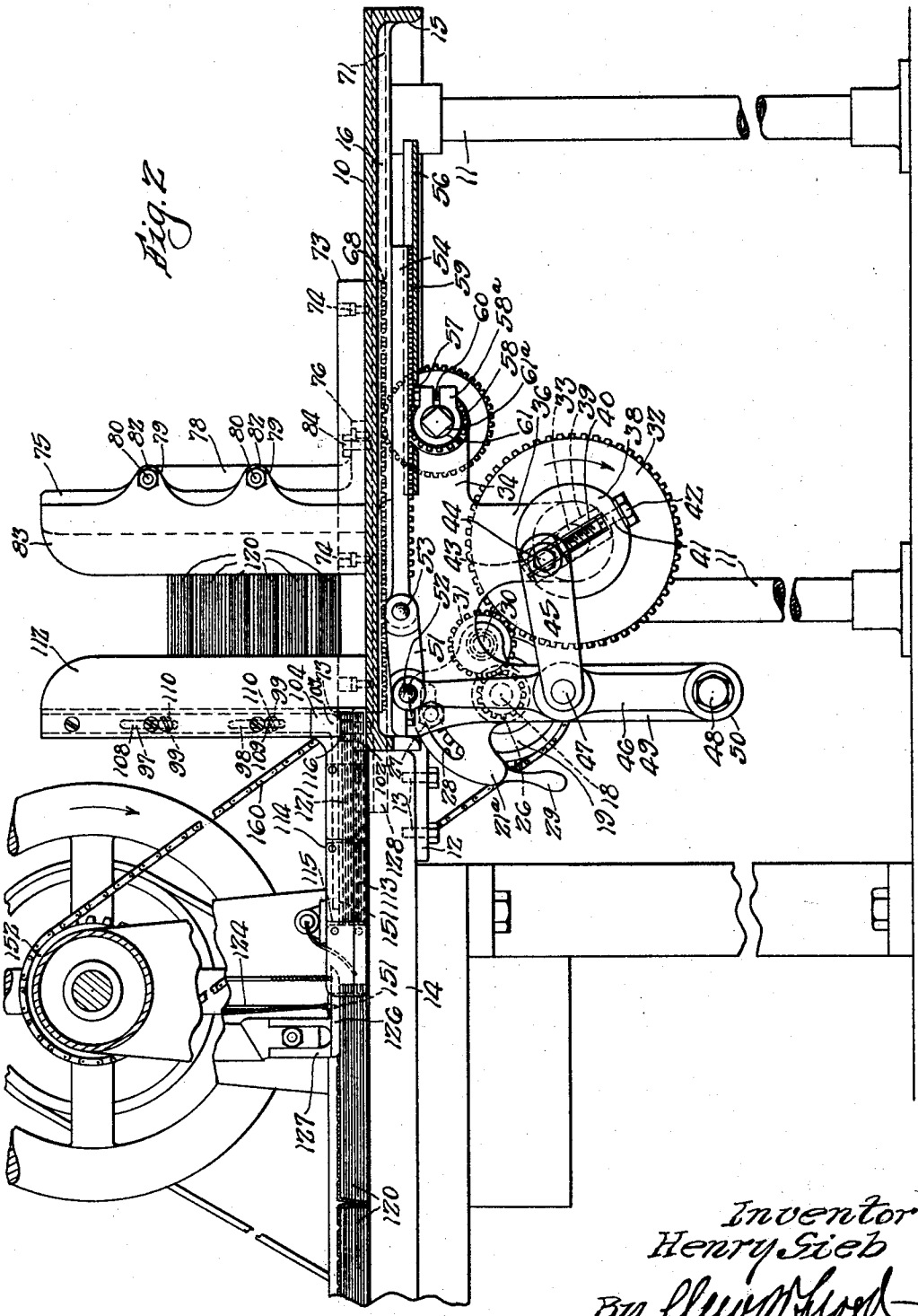
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BOOK FEEDING DEVICE

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Fig. 2



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BOOK FEEDING DEVICE

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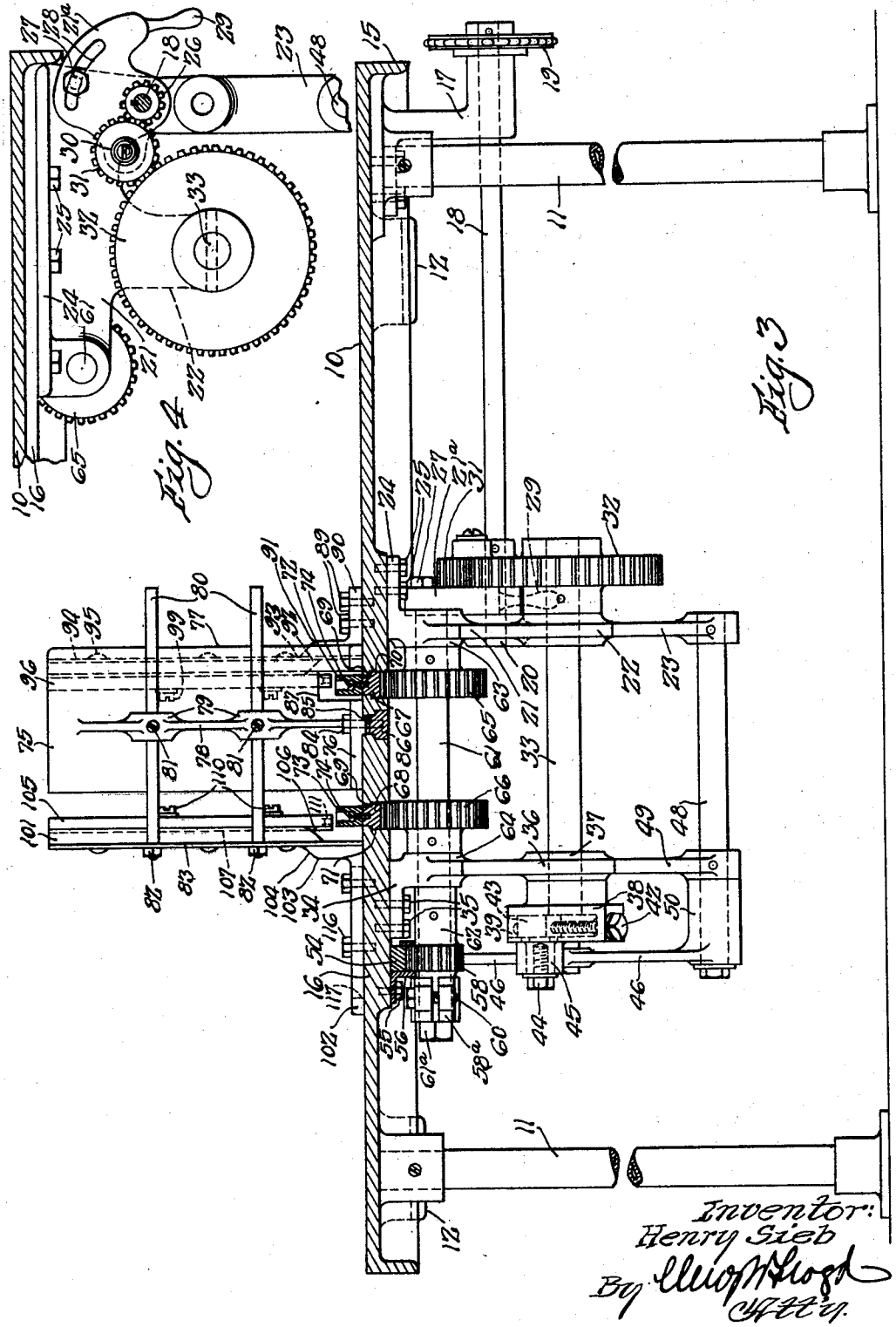


Fig. 4

Fig. 3

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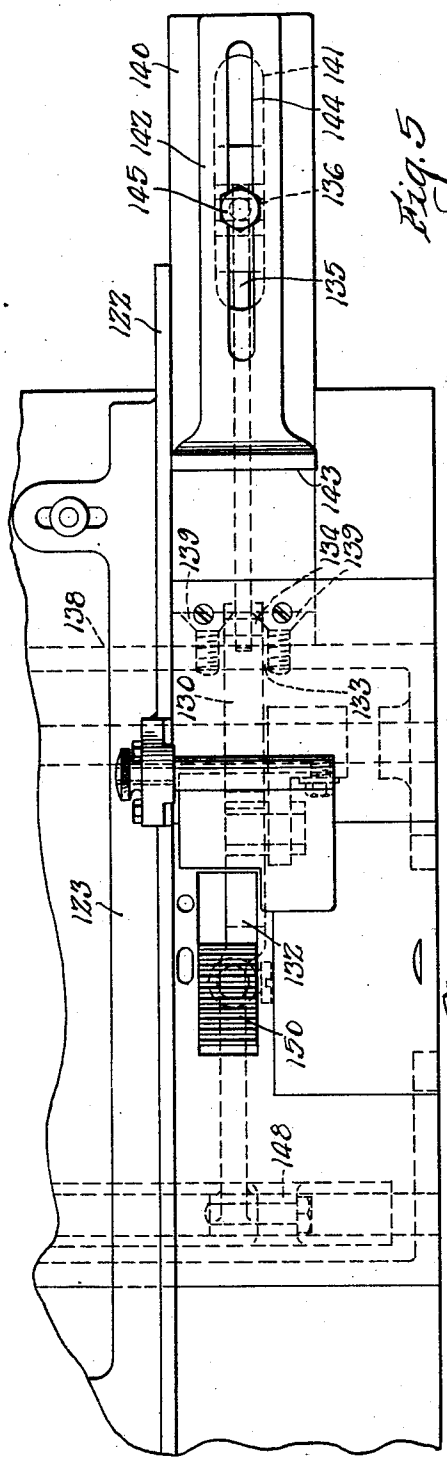


Fig. 5

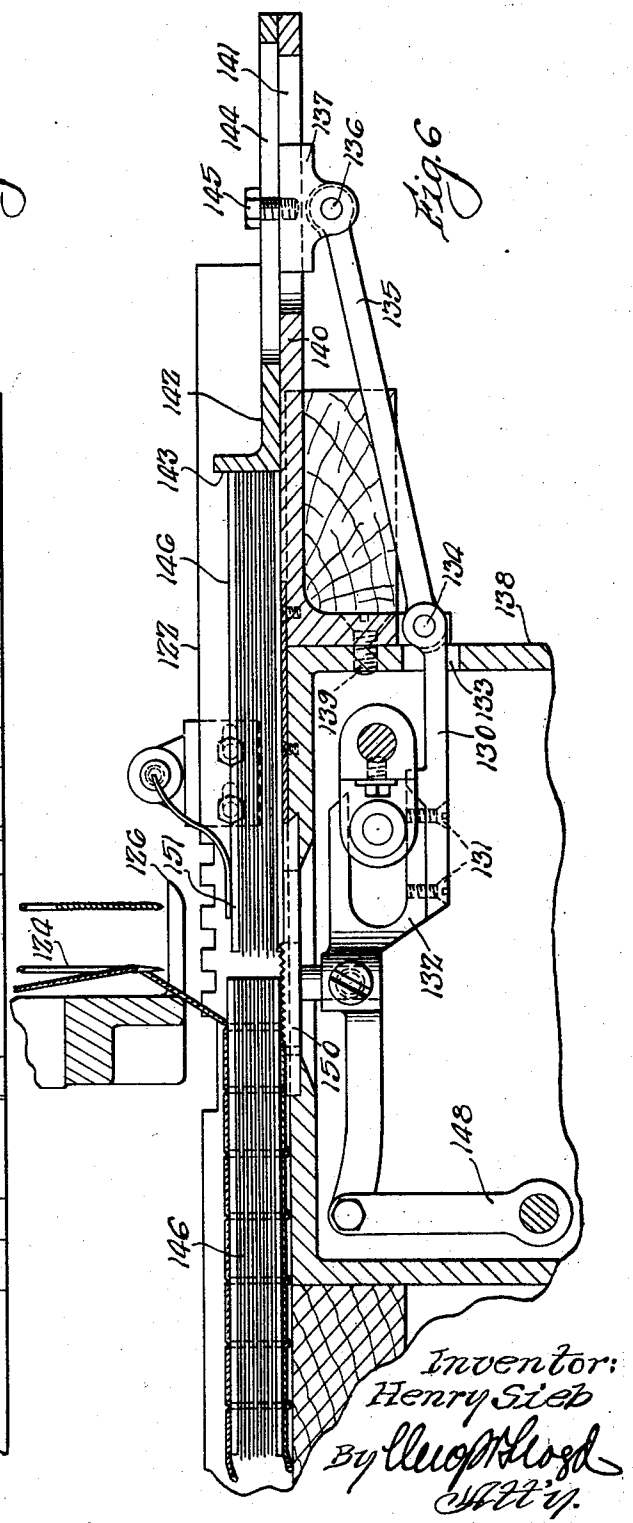


Fig. 6

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UNITED STATES PATENT OFFICE

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BOOK FEEDING DEVICE

Application filed August 11, 1931. Serial No. 556,456.

The present invention has to do with a machine for stitching books and more particularly with a device for feeding the books thereto.

Previous to this time, books, after having been stapled, have been fed or guided by hand to the needle of a sewing machine for stitching. Subsequent to the first operation of the stitching machine, the book is moved automatically to make the stitches therein equally spaced apart throughout the height of the book. After the first stitch is made, the positions of the stitches to follow are fixed. Hence a book must be presented to the needle in such a way that the first stitch will be at a proper distance from the edge of the book, that any stitches following will not register with the metal staples, and the last stitch will occur at the desired distance from the opposite edge of the book.

The above described task requires the entire time and concentrated attention of an operator to effect stitches which, at the best, only approximate the desired position. Frequently, due to an error on the part of the operator, a book is so positioned in the machine that the needle will come in contact with a staple in the book to be broken and to thus interrupt operations.

It is an object of the present invention to provide a device to feed books to the needle of a book stitching machine in a uniform and in a prearranged manner.

Another object of the present invention is to provide a device to feed books to the needle of a book stitching machine at a uniform speed equal to the capacity of the sewing machine.

Still another object of the device is to provide a device to feed books to a book stitching machine in such a manner that the needle on said machine will not come in contact with the staples in said book.

Another object of the present invention is to provide a device for feeding books to a book stitching machine in the manner of the above objects, and which is adapted to be actuated by said machine.

Another object of the present invention is to provide a device to feed books to a book stitching machine, and which can be procured in either a hand feed type or in combination with an automatic hopper.

With the above objects and other desirable objects referred to hereinafter in view, the invention resides in the novel construction and unique combination of parts as set forth in the following specification, and defined in the appended claims.

With reference to the accompanying drawings, hereby made a part of this specification, where two forms of the invention are illustrated and in which similar reference numerals designate the same parts throughout:

Figure 1 is an orthographic plan view of the first form of the device taken from the top;

Figure 2 is an orthographic view of the first form of the device as taken in elevation from the left side;

Figure 3 is an orthographic view of the first form of the device taken in elevation from the front;

Figure 4 is an auxiliary side elevation of a standard in the device;

Figure 5 is a fragmentary orthographic plan view of a second form of the device as taken from the top, and attached to the machine; and

Figure 6 is a fragmentary orthographic view in elevation of a second form of the device as taken from the left side.

Attention is first directed to Figure 1 of the accompanying drawing where it will be observed that the device is constructed and supported about a flat metal base 10. Base 10 rests upon legs 11 and projecting outwardly from the lower edge of the back side are lugs 12 which coact with studs 13 to rigidly secure the base 10 to the top 14 of the stitching machine.

A downwardly directed flange 15 is circumferentially coextensive with top 10 and flanks at either end a thickened web 16 extending the width of top 10. Legs 11 are of a length to place the top of the base 10 flush with the top face of the top 14 of the stitching machine.

At the extreme right end of the base 10 (Figure 1) and extending from the lower

side is a bracket 17 providing a bearing to carry driving shaft 18, to the end of which is keyed sprocket wheel 19. The opposite end of driving shaft 18 is supported in a bearing 20 in standard 21. Standard 21 is a peculiarly shaped member, resembling a plate, with two lobular arms, 22 and 23, projecting downwardly, and a flat top flange 24 articulated to receive studs 25 to secure it to the under side of web 16 to lie in a vertical plane normal to driving shaft 18 (see Figure 4).

Keyed to shaft 18 and to the right of standard 21 is spur gear 26. Intermediate gear 26 and standard 21 is a crank lever 21*a* carried rotatively upon driving shaft 18. It is fixedly adapted to occupy a given rotated position by means of a bolt 27 anchored to standard 21 to project through an arcuate aperture 28. The back side of lever 21*a* terminates in a convenient operating handle 29. In the front of the lever 21*a* is a stud shaft 30 on which is disposed idler gear 31 in alinement and position to mesh with gears 26 and 32, the latter being keyed to a shaft 33.

Congruent to standard 21 is a second standard 34 oppositely disposed and mounted to the under side of web 16 by studs 35. Lobular arm 36 of standard 34 contains a bearing 37 to coact with the bearing in arm 22 to carry shaft 33.

To the left of arm 36 and on the end of shaft 33 and keyed to turn therewith is a circular crank block 38, comprising a diametric channel 39, which is communicative to the exposed face through a narrow and centerly located parallel aperture 40. One end of the channel is obstructed by a boss 41 which contains, to extend into the channel, a crank bolt 42, the latter being mounted to rotate freely within the boss, but prevented from having longitudinal movement. The threaded end of crank bolt 42 engages with a gib 43 contained within channel 39, and by turning said crank bolt, the gib is effected to transverse the channel.

Protruding laterally from gib 43 and through the aperture 40 is a wrist pin 44 to engage and operate link 45 which, in turn, is operatively connected to a rocker arm 46 by means of a pin 47. Rocker arm 46 oscillates about its lower end, which is suitably secured to the left end of pin 48 carried by arms 23 and 49 of standards 21 and 34 respectively. Offset shank 50 of rocker arm 46 serves to present said rocker arm in juxtaposition to link 45.

A second link 51 (Figure 2) connects one end to the upper and free end of rocker arm 46 by means of a common pin 52, and the opposite end to a pin 53 in the backmost end of a rack 54. Secured to the under side of web 16 by studs 55 is a gutter bracket 56 designed to carry rack 54 with its uppermost side contiguous to web 16. A cutaway section in the bottom of gutter bracket 56 provides an opening 57, whereby the teeth on a pinion 58 may engage the teeth 59 on the lower face of the rack 54.

Pinion 58 comprises on its side an expansion flange 58*a* employing a bolt 60 whereby the flange is contracted on the shaft 61 to make the pinion non-rotative thereto. Collar 62 also mounted on shaft 61 measurably positions pinion 58 from standard 34 to aline it with rack 54.

Contiguous to the inner face of either standard 21 and 34 which have bearings 63 and 64 respectively therein to support shaft 61, are pinions 65 and 66 of similar diameter disposed securely upon said shaft 61. Racks 67 and 68, immediately above have teeth on their lower face engaging with pinions 65 and 66, and may be displaced horizontally thereby. Upward displacement of racks 67 and 68 is prevented by flanges on either side which operate against shoulders 69 of the grooves 70 and 71 in the web 16, and in which they are seated as illustrated in Figures 1 and 3. Racks 67 and 68 are supported vertically by pinions 65 and 66, and the top faces thereof are flush with the top of the base plate 10. To the top face of racks 67 and 68 are pusher bars 72 and 73 fastened by means of machine screws 74. The pusher bars are interchangeable for ones of different heights to be explained more in detail later.

From the base 10 and above web 16 is a hopper to contain books stacked flatly one upon the other, and so adjustable that books of a different height and width may be accommodated from time to time. The front of this hopper includes a vertical plate 75 articulated ninety degrees at the bottom to form a base 76, and having a flange 77 coextensive with the height of the right side to form a corner, in which corner the books will nest (Figure 1).

A vertical rib 78 is integral the front or outside of hopper plate 75 and contains journal boxes 79 drilled to receive adjustable rods 80, and hold them in place by set screws 81. The left end of rods 80 is drilled and tapped to receive bolts 82 which hold a flat plate 83 at the end of the rods (see Figures 1 and 3). The base contains a bolt 84 projecting through a slot 85 in web 16 to there engage threads in a gib 86 confined in said slot. This gib-bolt arrangement provides that the front portion of the hopper is solidly attachable to the web 16 at any given distance from the rear portion thereof within the limits of slot 85. Base 76 and vertical plate 75 are traversed by a slot 87 to allow the movement of pusher bar 72 therein.

Standard 88 is the necleus of the right and back corner of the hopper and is bolted to web 10 by studs 89 extending through an offset base 90 thereof. The vertical member of standard 88 is articulated at 91 to rise angularly and to the left to form an offset section

92, to be articulated again at 93, and there to continue upward in a vertical manner. To the outer and right face of standard 88 is secured a flat metal guide plate 94. Screws 95 are the fastening means and hold the inner face of the plate 94 in alinement with the inner face of flange 77 on vertical plate 75. The opposite and inner face of standard 88 has a bar 96 including vertical slots 97 and 98 therein to facilitate insertion of screws 99, whereby said bar may be secured to standard 88 at variable heights limited by the length of said slots. A tongue 96*a* along the face of bar 96 conforms to the groove 88*a* of standard 88.

The numeral 100 indicates a rod somewhat resilient and either integral with bar 96 as shown, or secured to the extreme lower end thereof to extend in a backward direction, and to be inclined slightly downward from the horizontal.

A standard 101 forming the back and left corner of the hopper, rises from a base 102. It has an upturned section 103 and offset section 104 (Figure 3). To the right face of bracket 101 is a bar 105 with a tongue 106 conforming to groove 107 on said bracket. Bar 105 contains longitudinal slots 108 and 109 to provide openings for screws 110, whereby the height of the bar may be adjusted as limited by the length of said slots. A rod 111, similar to rod 100, is secured to the lower end of bar 105 in a like manner as rod 100 is secured to bar 96. To the outer and left face of bracket 101 is fastened a flat metal plate 112 in the same vertical plane as plate 83.

Normal and integral to the horizontal base 102 of standard 101 is a member comprising a race bar 113 and with an upturned flange 114 coextensive with its right edge. Flat leaf springs 115 are distributed at intervals along the inner edge of bar 113. Base 102 is anchored to web 16 by means of studs 116 within slot 117 to thus provide its displacement to bracket 88 variable.

The operation of the device will now be reviewed. A roller chain 160 transmits the driving power to the device from a sprocket 152 on the stitching machine. Sprocket wheel 121 completes one revolution while needle 124 completes the cycle of producing a stitch. Power is received by the sprocket wheel 19 at the right of the device, said sprocket engages said chain 160. Sprocket 19 turns the main driving shaft 18 which in turn drives spur gear 26.

Crank lever 21*a* is for the purpose of shifting the position of idler gear 31 attached thereto that it may concurrently engage with gear 26, and gears 32; the latter being interchangeable to a plurality of diameters. It is by changing this gear 32 to another of a different diameter that shaft 33 is effected to rotate at a different speed relative to that of the stitching machine, to thereby obtain a correspondingly different phase relation of the feeding device and the stitching machine.

Gear 32 rotates shaft 33 to thereby rotate block 38, and to propel wrist pin 44 about the extended axis of shaft 33. A reciprocatory motion is given to link 45 by wrist pin 44 and hence to rocker arm 46. The extent or limits of this reciprocatory motion may be modified by turning crank bolt 42 to shift the radial position of gib 43 and wrist pin 44 to axis of crank block 38.

The upper end of rocker arm 46 propels rack 54 to reciprocate in a horizontal plane through the function of link 51. Rack 54 rotates shaft 61 first in one direction and then in the opposite in accordance with its forward or backward movement and by means of its teeth 59 engaging with those of pinion 58. By such rotative movement shaft 61 rotates pinions 65 and 66 in a like manner, to drive racks 67 and 68 and hence the respective pusher bars 72 and 73 to reciprocate in a forward and backward direction.

As before described pusher bars 72 and 73 have an unobstructed path which they follow to traverse the bottom of the hopper exposing side members or plates 83, and 112 in Figure 2. Books 120 that are stapled but not stitched are contained within the hopper. It will be noted at this time that books 120 as presented to this device in this stage of manufacture are in a rough form, and with only the top edge of the book "squared-up." These books are placed in the hopper with the squared top edge to the front side, (contiguous to plate 75), and with the back edge thereof to the right side and against the inner face of flange 77 and plate 94. Base 102 and rods 80 are adjusted until side plates 112 and 83 contact the front edge of the books. Plate 75 is moved backward until the bottom edge of the books abut the front face of bars 96 and 105 when bolt 84 is tightened.

With the books 120 so arranged in the hopper, and with the back end of the pusher bars 72 and 73 flush with the back face of plate 75 and in contact to the top edge of the lowermost book, said bars on the backward stroke discharge said book from the back side of the hopper. Bars 96 and 105 are positioned at a height that the bottoms thereof and rods 100 and 111 attached thereto will allow the lower book to pass beneath, but will prevent any backward movement of the above books contained within the hopper. This book (Figure 2) is held contiguous to upturned flange 122 of guide plate 123 (Figure 1) by the effort of springs 115, and held flatly against the upper face of top 14 of the stitching machine by the impingment of resilient bars 100 and 111. Flange 122 is properly

offset to needle 124 of the stitching machine to guide the stitching line near the back of the book in direct alignment to said needle upon further movement of pusher bars 72 and 73.

As book 121 is pushed backward by the pusher bars 72 and 73, it is necessary that the book be delivered exactly to a predetermined position, and at the end of the backward stroke of said bars. Concurrently, foot 126 of the stitching machine is lowered to insure the fixed placement of book 121 until a second foot 127 and pawl plate 150 both of the stitching machine (see Figures 2 and 6) move forward to coengage the book 121 to advance it a fixed distance, when the needle registers a stitch in said book at a predetermined desired point 151. This point is located with reference to the top or following end of the book 121, since that is the squared edge, and from which edge the steel staples are uniformly spaced, and the finished book itself is measurably laid out. Once the book 120 is engaged by foot 126, it is subsequently advanced by the pawl plate 150 and foot 127, and under the needle 124 which places uniformly spaced stitches in it.

Point 151, where the first insertion of the needle is made, is so chosen that the margin from said point to the lower edge of the finished book as laid out will be equal to the margin from the last insertion or stitch near the top of the book to the top edge of said finished book. The steel staples previously placed in the book are so spaced that they will not coincide with stitches laid out as above described.

The device is set for a run of books of a given size in the following manner. It will be noted that needle 124 completes a stitching cycle for each revolution of the sprocket 152 of the stitching machine. The feeding device performs a complete cycle for each revolution of gear wheel 32. The needle 124 makes one cycle between each preceding and succeeding book to penetrate neither book. It is then conceivable that when the number of stitches to be placed in each book of a given uniform run has been determined, a gear wheel 32 must be selected of a diameter to complete one revolution concurrent to that number of stitches plus one. For example, if each book of a run was to receive eight stitches, the turning ratio of gear 32 to sprocket 152 must be nine to one.

The racks 67 and 68 and pusher bars 72 and 73 are next adjusted for the height of the books. The book feeding device is operated until said racks are in the extreme front position, when pusher bars 72 and 73 are attached thereto in a manner that the rear ends of said pusher bars will be forward to the back face of plate 75 to not obstruct a book 120 to drop down into place. The device is operated again and through a half cycle until the pusher bars are in the rearmost position and book 120 has been transported to position 121.

At this time it may be found that point 151 on book 121 is not at the desired point of advancement, and, if not, nut 60 associated with gear wheel 58 is loosened to thereby free shaft 61 from gear 58 and the preceding linkage. A wrench is now applied to the conforming end 61*a* of shaft 61 to rotate said shaft, and gears 65 and 66, until pusher bars 72 and 73 are positioned to deliver book 121 so that point 151 is at the proper advanced position. Nut 60 is then tightened to connect shaft 61 again in the linkage of the device.

When books of a greater height are to be handled by the device, nut 84 is loosened so that plate 75 may be moved forward to suitably enlarge the hopper. Similarly, for books of a greater width, set screws 81 are loosened to allow the extension of rods 80 and plate 83, and plate 112 is shifted to the left by the disengagement of studs 116.

Another flexibility of the device is provided in crank block 38. Here nut 42 is turned to displace wrist pin 44 to increase or decrease the effective crank arm, and to thereby respectively increase or decrease the confined limits transversed by the pusher bars 72 and 73. Blind channels 128 are provided in the top 114 of the stitching machine to receive the ends of racks 67 and 68, and, in case the pusher bars are ever set forward on the racks, to necessitate a further backward movement of said racks to deliver a book 121 to the desired position.

Pusher bars 72 and 73 are of sufficient length that when in the back position to deliver a book, the front portion thereof will remain under books 120 and to prevent the lower one from dropping down to obstruct the return forward movement of the bars. These pusher bars are provided in different heights or with shims whereby adjustment will be made so that the distance from the upper face of the base to the top face of said bars will be slightly less than the thickness of a book 120 to insure the engagement of the lower book only when discharging it from the hopper.

Besides insuring the book 120 to be contiguous to guiding flange 122, leaf springs 115 serve a dual purpose of retarding further progress of said book after it has been delivered to the desired position by the pusher bars.

It is the function of this book feeding device to deliver a book 120 to needle 124 in such a position that the first stitch will be properly located as to place the subsequent stitches where desired. Also to deliver books 120 at such intervals that only one operation of the needle will intervene while no book is under said needle. While the book 120 is being

stitched in the machine, the pusher bars 72 and 73 are being moved forward. When, at the end of this forward movement, the back ends of said pusher bars are beyond the back side of plate 75, a second book 120 immediately drops down to the rear of the pusher bars to be engaged and pushed rearward on the following stroke. Thus the cycle is again started whereby a second book 120 will be delivered to and engaged by feet 126 and 127 to be carried under the needle.

A second embodiment of the invention which comprises a feeding device which delivers a book to the feet of the machine in a similar manner to the above described machine, but which is fed by hand rather than automatically from a hopper, will now be described.

In Figure 6 a bar 130 is shown attached by set screws 131 to a reciprocating member 132 contained within the stitching machine. The forward end of bar 130 protrudes through an opening 133 provided in the front wall of the stitching machine, and there is bifurcated and drilled to contain a pin 134. Pin 134 engages a link 135, the other end of said link 135 terminating in a joint 136 and in the lower portion of a gib 137.

Secured to the front wall 138 of the stitching machine by means of machine screws 139, is a plate in the form of a bracket 140, the top of which is flush with the top of the stitching machine. The plate 140 extends to the front and contains therein a longitudinal slot 141, in the latter of which is contained gib 137. Lying flatly upon the upper face of bracket 140 is a member comprising a pusher bar 142 with a broadened and flat face 143. Pusher plate or bar 142 has within it a slot 144 parallel and in juxtaposition to slot 141. Transversing normally slots 141 and 144 to engage gib 137 is a bolt 145.

When bar 130, hence pusher plate 142, is in its most forward position, a book 146 is placed and with its "squared" top adjacent face 143 and with its back against guiding flange 122 of plate 123 (see Figures 1 and 6). On the backward motion of crank 148, bar 130, and face 143; the bottom edge of said book is brought to the position as shown in Figure 6 where point 151 is as desired, and to be left in that position by the pusher plate 142 as it returns on the subsequent forward stroke. The book 146 is operated upon when delivered to this forward position in the same manner as described in the previous embodiment of the invention. As the face 143 again reaches its forward position, another book 146 is placed against such said face in a similar manner to be carried backward, and the cycle is again accomplished.

For books of a different height, plate 142 is adjusted in either a forward, or a backward position relative to gib 137. For example, when the face 143 is in its backmost position, if a book 146 of a great height is being prodded thereby, the face 143 must be necessarily further forward, that the bottom of the book will not extend beyond the needle. Also, with a book of lesser height on the extreme rear position of the stroke, face 143 must be nearer the needle.

What is claimed to be new and it is desired to be secured by Letters Patent in these United States, is:

1. A book feeding device adapted to be connected to and operate conjointly with a book stitching machine having means for advancing a group of signatures by a predetermined intermittent motion, and comprising a pusher bar, means for moving said pusher bar at the same speed as said advancing means, and means for retracting said pusher bar to permit of one stitch being taken intermediate succeeding books advanced to said stitching machine.

2. The combination with a book stitching machine having means for advancing a group of signatures associated together therethrough step by step in synchronism with the stitching mechanism of said machine, of a feeding device for said machine and comprising a pusher bar adapted to receive a group of signatures having matched edges, means for advancing said pusher bar at the same speed and in synchronism with the advancing means in said stitching machine, said pusher bar being adapted to remove said associated groups of signatures from said magazine one at a time, means for predetermining the position of the first stitch in each succeeding group of signatures relative to said pusher bar, and means for retracting said pusher bar to cause said stitching machine to make one stitch intermediate the advance of succeeding books to said stitching machine.

3. Means for feeding books to a sewing machine to provide for the continuous useful operation thereof comprising the association with such sewing machine, of a feeding device having a guide member for engaging a selected end of an incomplete book, means for advancing said guide member in synchronism and in step with the stitching operations of said sewing machine, and means for retracting said guide plate to engage a second incomplete book so that incomplete books are fed into said sewing machine in substantially continuous order.

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