E. R. KAST.

SIGNATURE HANDLING MECHANISM.

APPLICATION FILED MAR. 10, 1913.

1,206,227.

Patented Nov. 28, 1916.

4 SHEETS—SHEET 1.

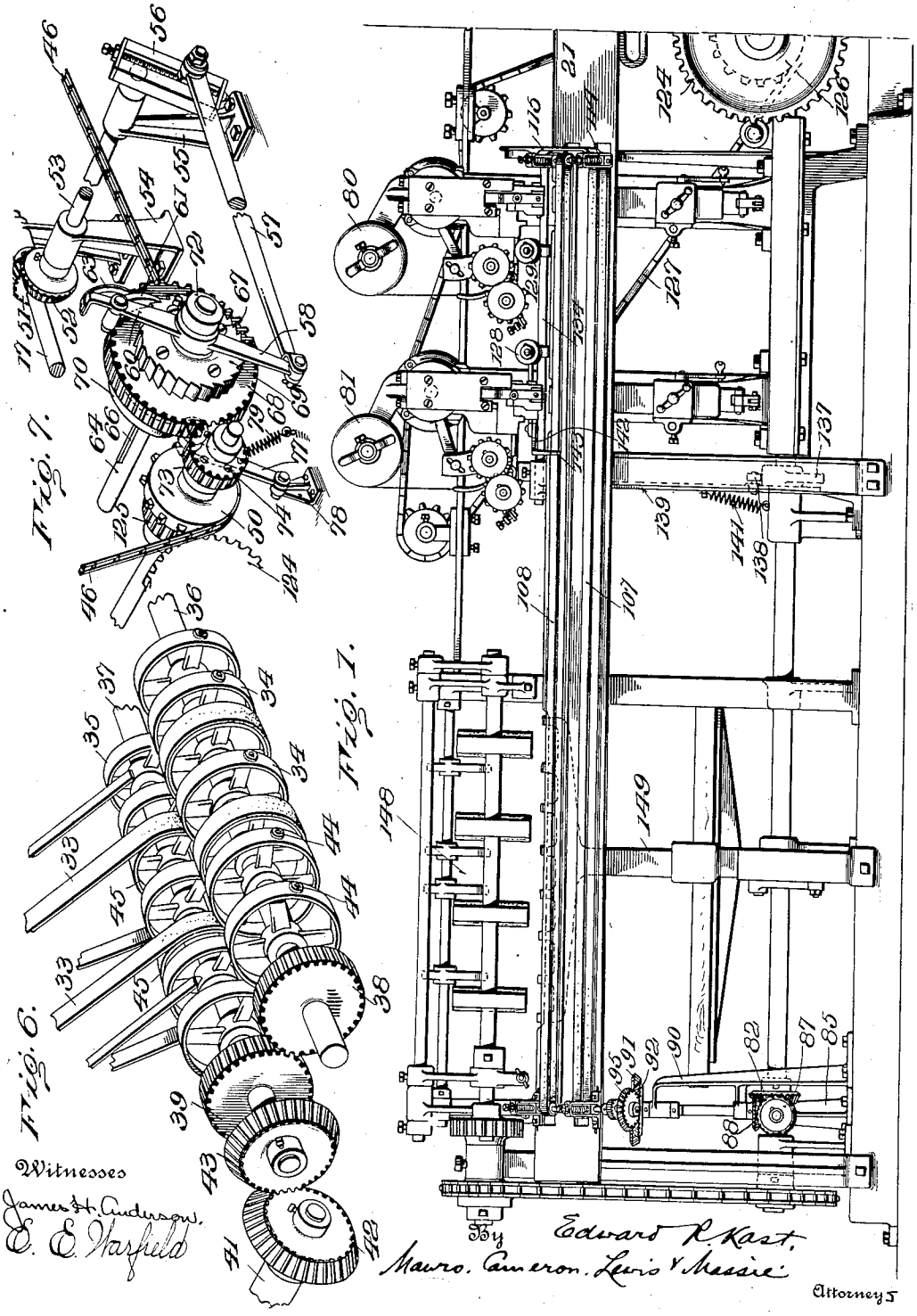


Fig. 7.

Fig. 6.

Witnesses

James H. Anderson.

E. E. Warfield

By Edward R. Kast.

Mauro, Cameron, Lewis & Messie

Attorneys

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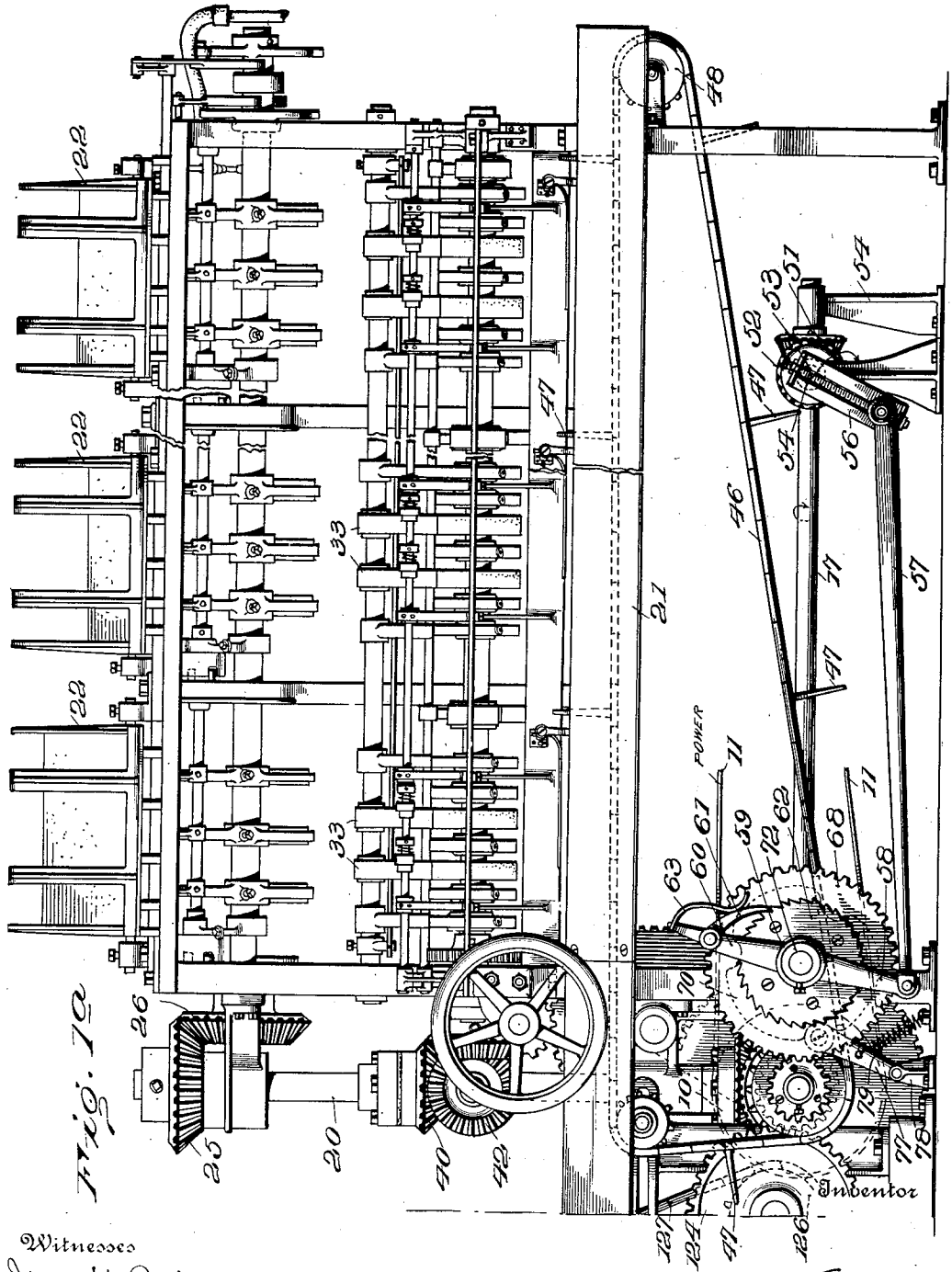


FIG. 1a

Witnesses

James St. Anderson,

E. E. Warfield

By Edward R. Kast.

Mauro, Cameron, Lewis & Massie

Attorneys

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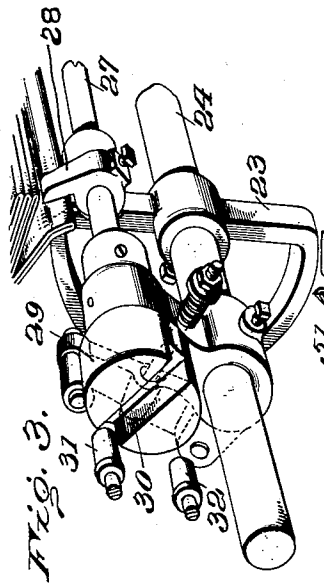


Fig. 3.

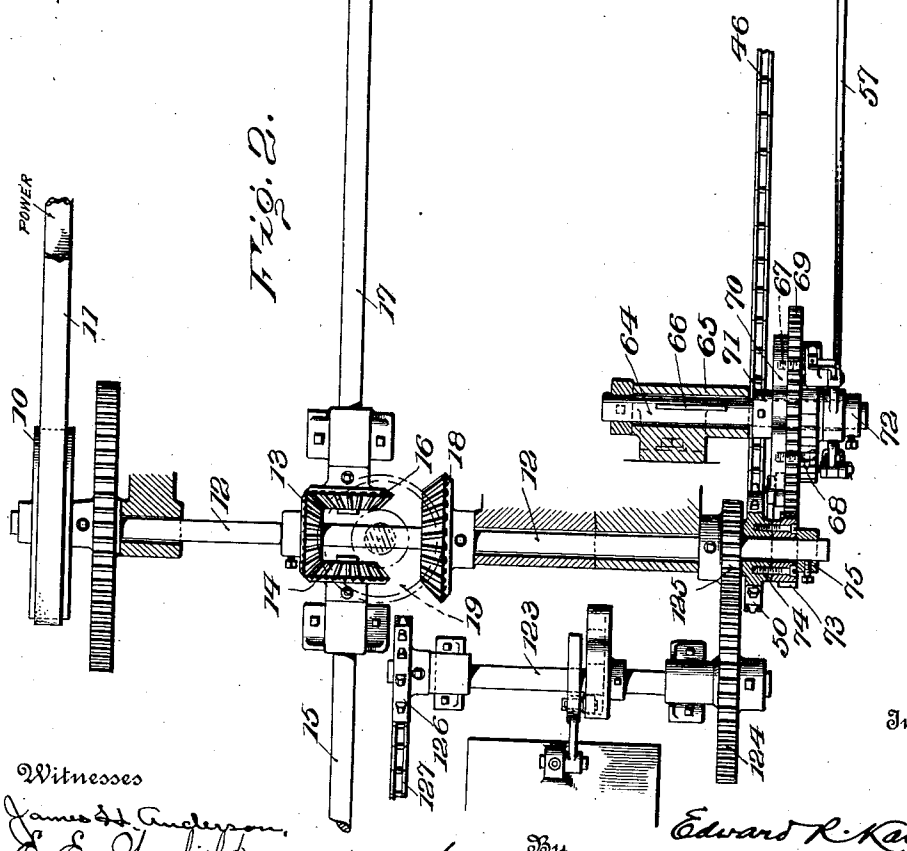


Fig. 2.

Witnesses

James H. Anderson.

E. E. Warfield

Inventor

Edward R. Kast.

By Mauro. Cameron. Lewis & Massie

Attorneys

E. R. KAST.

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4 SHEETS—SHEET 4.

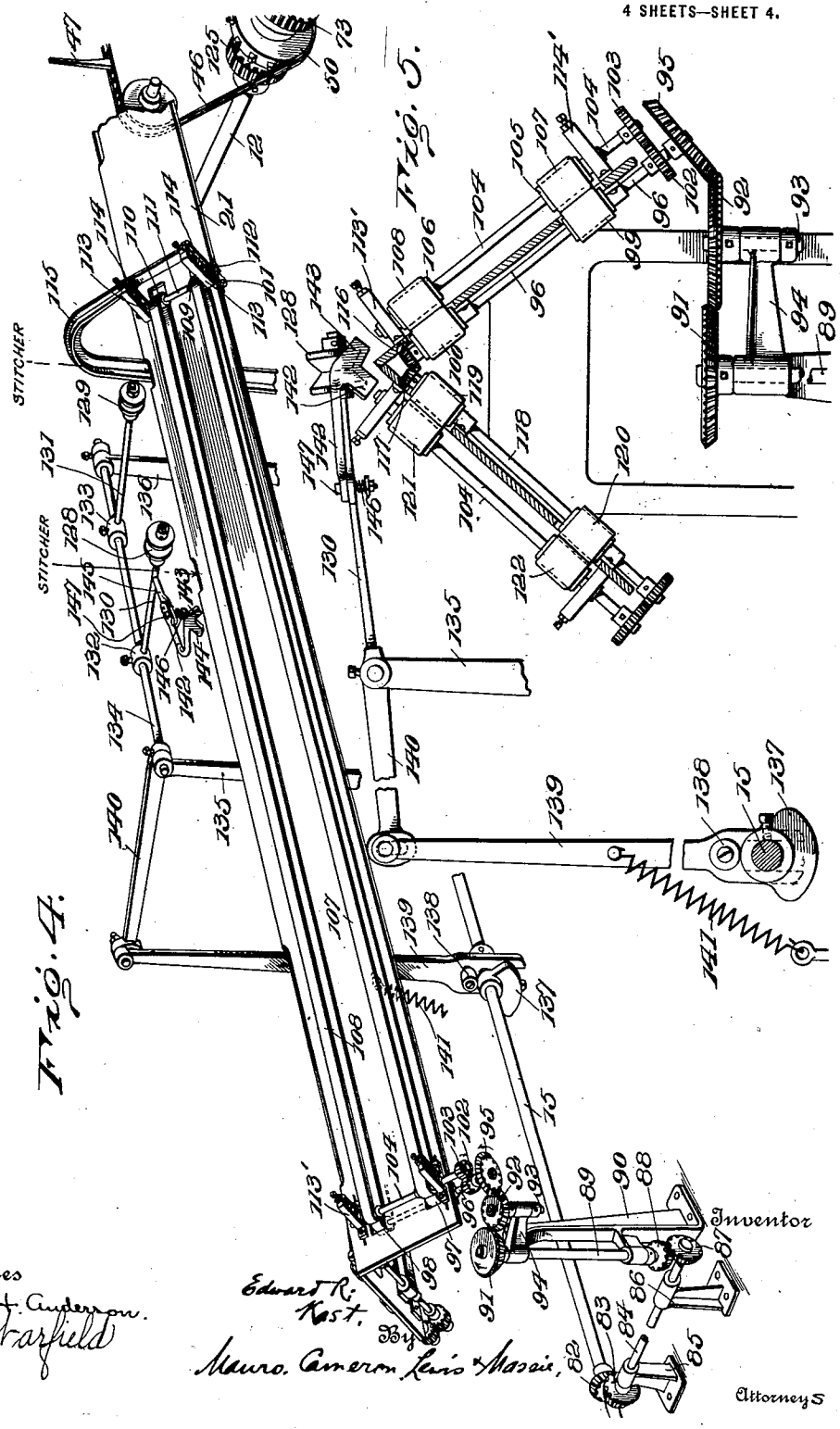


Fig. 4.

Fig. 5.

Witnesses

James H. Anderson.

E. E. Warfield

Inventor

Edward R. Kast.

By

Mauro, Cameron, Lewis & Massie,

Attorneys

UNITED STATES PATENT OFFICE.

EDWARD R. KAST, OF BALTIMORE, MARYLAND, ASSIGNOR TO KAST INSETTING & GATHERING MACHINE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

SIGNATURE-HANDLING MECHANISM.

1,206,227. Specification of Letters Patent. Patented Nov. 28, 1916.

Application filed March 10, 1913. Serial No. 753,363.

To all whom it may concern:

Be it known that I, EDWARD R. KAST, of Baltimore, Maryland, have invented a new and useful Improvement in Signature-Handling Mechanism, which invention is fully set forth in the following specification.

The present invention relates to mechanism for handling signatures, and more particularly is an improvement in means for feeding groups of signatures along a support on which they are deposited by suitable mechanism.

In the insetting machine described and claimed in my application Serial No. 508,160, and in insetting machines as heretofore built by me, signatures have been deposited on a support or saddle from a series of signature-opening mechanisms, an endless conveyer or chain moving the groups of signatures along said saddle under the signature-opening means, so that the signatures deposited by the first signature-opening mechanism will be conveyed along said saddle and inset within the signatures deposited by the next signature-opening mechanism, the two inset signatures being moved along said saddle and inset within the signatures deposited by the third signature-opening mechanism—and so on until the book or magazine is completed. This endless conveyer has been heretofore provided with signature-engaging means in the form of pins arranged equidistantly on said conveyer, one engaging the edge of the first signature deposited by the first signature-opening mechanism and conveying said signature, and the others that are deposited thereon, through the insetting machine.

While this construction is generally efficient in assembling signatures, I have experienced that at times signatures, instead of being deposited by the signature-opening means on the saddle in front of the pins carried by said conveyer or chain, will be deposited on top of the pins that are rapidly moving along the saddle, with the result that a signature or signatures are knocked off the saddle onto the floor, and defective books are produced, or one or more signatures so deposited become entangled in the mechanism, necessitating the stopping of the machine, with consequent loss of time and increase of labor.

The object of the present invention is to obviate these disadvantages that inhere in the employment of a continuously-moving endless conveyer provided with signature-engaging means, and this object is accomplished by a construction in which the pins for engaging the edges of the groups of signatures are so moved along the saddle as to be out of the path of the signatures when they are deposited on the saddle; so that the signatures do not fall on the points of the pins, and hence the chances of the signatures being knocked off of the saddle or entangled with the mechanism are minimized.

One embodiment of the inventive idea consists in mounting the means that engage the signatures carried by the support on a continuous conveyer or chain to which discontinuous movement is applied, and while this expression of the inventive idea finds a peculiar application in connection with means for mechanically opening and depositing signatures on a support or saddle, it may also be used to advantage where the assembled books or signatures are deposited by hand on the support or saddle, it being desirable, as well in this connection as where signatures are mechanically opened and deposited, that the signature-engaging means should be in such a position as to minimize the chances of having the signatures deposited on top, rather than in front, of said means.

The invention further consists in certain details of construction, and combination and arrangement of parts to be more fully described and then pointed out in the claims. The inventive idea is capable of being embodied in a variety of mechanical constructions, one of which is shown in the drawings forming a part of this specification.

The invention will be better understood by reference to the accompanying drawings, wherein—

Figures 1 and 1ª constitute a side elevation of a machine embodying my invention; Fig. 2 is a plan view showing the power connection and the means for discontinuously driving the conveyer that moves the signatures along the support or sadlde to the stitching mechanism; Fig. 3 is a detailed perspective of the mechanism for withdrawing the signatures from the hoppers; Fig. 4 is a perspective of the delivery end of the saddle, with some of the parts removed for the sake of clearness, and show-

ing the continuous conveyers for moving the books or pamphlets through the stitching mechanism and to the delivery; Fig. 5 is an end elevation looking toward the right of Fig. 4; Fig. 6 is a detailed perspective illustrating mechanism for opening the signatures; and Fig. 7 is a detailed perspective of the means for discontinuously driving the conveyer that carries the signatures along the support or saddle to the stitching mechanism.

Referring to the drawings, wherein like reference numerals indicate like parts, 10 is a pulley which is driven in any suitable manner by a belt 11, said pulley being mounted on a shaft 12, to which is keyed a beveled gear 13. This gear 13 meshes with a beveled gear 14 mounted on shaft 15, from which latter shaft power is transmitted to the delivery end of the machine. Beveled gear 13 also meshes with a beveled gear 16 mounted on a shaft 17 from which power is transmitted to the means for discontinuously driving the conveyer that moves the groups of signatures along the support or saddle to the stitching mechanism, as will be hereinafter more fully described.

Mounted on shaft 12 is a second beveled gear 18, which meshes with a beveled gear 19 (shown in dotted lines in Fig. 2) keyed to the lower end of vertical shaft 20.

As here shown, the signatures are mechanically deposited on a support or saddle 21, though it is to be understood that the signatures may be manually placed on said support or saddle. If means are employed for effecting this result, I preferably use one or more of the devices illustrated, described and claimed in my applications Serial Nos. 508,160, 712,315, 718,062, 718,063 and 745,973. As herein illustrated, the means for depositing the signatures on the support or saddle are those described and claimed in my application Serial No. 508,160. Inasmuch as these specific means form no part of the present invention, only brief reference will be made thereto. Hoppers 22, in which the signatures are stacked, are mounted on the frame of the machine, and suitable suction means (not shown) are provided for drawing downwardly the lowermost signature in a position to be gripped by the mechanism for withdrawing the same (see Fig. 3). The signature-withdrawing mechanism associated with each hopper comprises a series of sector members 23 mounted on shaft 24, which is driven from vertical shaft 20 through beveled gears 25 and 26 (Fig. 1a). Carried by these sectors 23 is a shaft 27, on which are keyed fingers 28, one finger being associated with each sector. On the end of shaft 27 is mounted a tumbler 29, which is provided with a slot 30, which engages a pin 31 mounted on the frame of the machine. The engagement of slot 30 with pin 31 acts to rock the fingers 28 to grip the folded edge of the lowermost signature between said fingers and said sectors 23. The fingers 28 are rocked to release the withdrawn signature at an appropriate time by the engagement of slot 30 with a pin 32 also mounted on the frame of the machine.

From the withdrawing mechanism just described, the signatures are deposited onto belts 33 (Figs. 1a and 6), by which they are delivered, open edges foremost, to suitable signature-opening mechanism. As here shown, this mechanism consists of a plurality of members 34 and 35, the former being mounted on a hollow shaft 36, and the latter on a hollow shaft 37. These members are rotated in opposite directions by means of intermeshing gears 38 and 39, and are driven from vertical shaft 20 through beveled gear 40, which meshes with a similar beveled gear (not shown) on a stub shaft 41 (Fig. 6), a second beveled gear 42 on said stub shaft meshing with a beveled gear 43, which is mounted on hollow shaft 37. The rotary members 34 and 35 are provided with suction mouths 44, and intermediate the members 35 on hollow shaft 37 are pulleys 45, around which pass the belts 33. The suction mouths 44 are in communication with hollow shafts 36 and 37, which shafts are in turn connected to a suitable source of suction (not shown). As the signatures pass, open edges foremost, between the rotary suction members 34 and 35, one leaf of the signature is engaged by the suction mouths on rotary member 34, and the other leaf is engaged by the suction mouths on the rotary member 35. Inasmuch as these members rotate in opposite directions, the signatures will be opened, as said members rotate, and any suitable means are employed for separating said open signatures from the rotary members 34 and 35, when said signatures are deposited on the support or saddle 21.

In my applications above referred to, and in insetting machines as heretofore constructed by me, I have employed, in association with the support or saddle 21, a continuously driven conveyer provided with signature-engaging means in the form of pins, for moving the signatures deposited on the support or saddle to the stitching mechanism. I have, however, experienced that sometimes the signatures, instead of being deposited on said support or saddle in front of the pins carried by the continuously driven conveyer, are deposited on top of said rapidly moving pins, with the result that the signatures are either knocked off of the saddle, and defective books result, or what is possibly worse, one or more signatures will fall on the tops of said pins and become entangled in the mechanism, necessitating the stopping of the machine, this

involving considerable loss of time and some labor.

In order to obviate this disadvantageous result, I have provided means by which the signature-engaging means are discontinuously (and in the form of the invention hereinafter described, intermittently) operated, with the result that the signature-engaging means or pins are not moving along the saddle at the time the signatures are being deposited thereon. In the particular embodiment of the inventive idea herein illustrated and described, the signature-engaging means are in the form of pins carried by a continuous conveyer, herein shown as a chain, and appropriate means are provided for intermittently moving said chain so that the signatures will be conveyed to the stitching mechanism, each forward movement of the chain being of such extent that the pins, during the periods of rest, will not be under the means for depositing the signatures on the support or saddle.

The conveyer or chain is indicated by the reference numeral 46, and 47 indicates the signature-engaging means or pins carried thereby. Said chain 46 engages sprocket wheels 48 and 49 mounted on the frame of the machine, and said chain is discontinuously, and as here shown intermittently, driven through sprocket-wheel 50, loosely mounted on shaft 12. Power is applied to said sprocket-wheel from shaft 17, on which is mounted a beveled gear 51, which meshes with a beveled gear 52 keyed to shaft 53, which has bearings in suitable standards 54 and 55. On the end of said shaft 53 is mounted an adjustable crank member 56, which is connected to one end of a pitman 57, the other end of said pitman being secured to one arm 58 of a two-armed lever 59, the other arm 60 of said lever being provided with a pawl 61, which is held in engagement with a ratchet wheel 62, by means of a spring 63. This ratchet wheel 62 is loosely mounted on a shaft 64, which is prevented from rotating in bearings 65 by a key 66. Secured to said ratchet wheel by pins 67 and 68 (Fig. 2), and also loosely mounted on shaft 64, is a gear 69 and a cam stop 70, sleeves 71 and 72 maintaining said parts in their proper position. The gear 69 meshes with a pinion 73 loose on shaft 12, said pinion being connected to sprocket wheel 50 by means of pins 74, and being held in place on shaft 12 by a collar 75.

As here shown, the cam stop 70 is provided with three elevations and three depressions (see Fig. 1[a]), and a roller 76 engages the depressions in said stop to prevent the conveyer chain 46 and the pins 47 carried thereby from advancing too far upon each forward movement of the same. The roller 76 is mounted on the free end of an arm 77, which is pivoted to a standard 78, and said arm 77 is connected to one end of a spring 79, the other end of which is secured to the frame of the machine, said spring acting to hold the roller 76 in engagement with the cam stop 70, to the end that the feed of the conveyer chain 46 may be certain and invariable.

It will be understood from the foregoing that when pawl 61 moves in a clock-wise direction, it will rotate the ratchet wheel 62, and, through gear 69 and pinion 73, drive sprocket-wheel 50, which causes conveyer chain 46 to advance along the saddle, the extent of movement of the chain upon each rotation of the crank 56 being sufficient to advance the signatures deposited by one set of signature-opening means under the next set of signature-opening means, and to insure that the pins 47 will not be in a position where signatures can be deposited on the points thereof.

The conveyer 46 moves the signatures along the saddle to the stitching mechanism, where the signatures are received by other conveying means, which move them along the saddle past the stitching mechanism to the delivery, where the stitched books or pamphlets are automatically removed from the saddle and delivered from the machine. Referring particularly to Figs. 1, 4 and 5, 80 and 81 indicate two wire stitchers of any suitable or well-known construction, which act to stitch or staple the groups of signatures while they are supported by the saddle 21. As here shown, continuously driven means are provided for conveying the groups of signatures past the stitchers on to the delivery, and these means are driven from shaft 15, on which is mounted a beveled gear 82. This beveled gear meshes with a beveled gear 83 keyed to one end of a shaft 84, having bearings in standards 85 and 86, a beveled gear 87 being mounted on the other end of said shaft 84 and meshing with a beveled gear 88, keyed to the lower end of shaft 89 having bearings in a standard 90. On the upper end of said shaft 89 is secured a beveled gear 91 which meshes with a beveled gear 92, keyed to a stub shaft 93, carried by an arm 94, said beveled gear 92 meshing with a beveled gear 95 secured on the end of a shaft 96 mounted in suitable brackets secured to the under side of one face of the saddle 21. This shaft is provided with two pulleys 97 and 98, an endless belt 99 passing around the former, and an endless belt 100 passing around the latter. These belts pass around two idler pulleys carried by a shaft 101 (Fig. 4), said shaft being arranged at that end of the conveying means where the group of signatures is first engaged.

On shaft 96 is keyed a gear 102, which meshes with a gear 103 secured to a shaft 104, on which are mounted driving pulleys

105 and 106, endless belts 107 and 108 passing around said pulleys and around idler rollers 109 and 110 carried by a shaft 111, which shaft is arranged in a vertical plane above shaft 101. The ends of said shaft 111 have bearings in blocks 112 carried by casings 113, and said blocks are pressed downwardly by springs 114. The ends of shaft 104 are similarly mounted, with the result that belts 107 and 108 are held in yielding engagement with the groups of signatures. The casings 113 at the right-hand end of Fig. 4 are carried by standard 115, and the casings 113′ at the left-hand end of Fig. 4 are preferably adjustable along the saddle 21, so that the belts 107 and 108 may be maintained at the desired tension.

Identical driving mechanism is provided in association with the other face of saddle 21, a beveled gear 116 mounted on the end of shaft 96 meshing with a beveled gear 117 mounted on the upper end of a shaft 118, which carries driving pulleys around which pass endless belts 119 and 120, similar in all respects to endless belts 99 and 100. Endless belts 121 and 122 correspond to endless belts 107 and 108.

Only two stitchers 80 and 81 have been herein illustrated, but it will be understood that any desired number may be employed. The stitchers are operated in any suitable or well-known manner, as here shown power being derived from countershaft 123, which is driven from shaft 12 through gear 124 and pinion 125. A sprocket wheel 126 is engaged by a sprocket-chain 127, which meshes with sprocket-wheels carried by the main shafts of the stitchers.

As soon as each group of signatures is engaged by the endless belts or conveyers heretofore described, it would be rapidly conveyed past the stitchers, unless means were provided for stopping the same while the staples were being applied. Any suitable means to this end may be employed. Preferably, however, there are provided between the two stitchers two vertically movable rollers 128 and 129, which engage the fold of the outer signature. Roller 128 is mounted on the end of arm 130, and roller 129 on the end of arm 131, which arms are keyed by means of collars 132 and 133 to a rod 134 having bearings in standards 135 and 136. A cam 137 mounted on shaft 15 engages a roller 138 mounted on the lower end of a fork 139, the upper end of this fork having a pin and slot connection with an arm 140 keyed to rod 134. Fork 139 has connected thereto one end of a spring 141, the other end of which spring is connected to the frame of the machine. When roller 138 is in engagement with the cut-away portion of cam 137, rollers 128 and 129 are out of engagement with the book or pamphlet, but when roller 138 is in engagement with the unbroken surface of cam 137, rollers 128 and 129 engage the signatures.

In order to insure that all of the groups of signatures will be stopped at the same place, so that the staples or stitches will be uniformly applied, I have provided suitable means which are movable into and out of the path of the groups of signatures as they are progressed along the saddle 21. As here shown, these means consist of a bent arm 142, the end of which is forked or bifurcated, so that one bifurcation 143 engages one face of the saddle 21, and the other bifurcation 144 engages the other face of the saddle. Preferably, this arm 142 is connected to a projection 145 connected to arm 130, and the forks 143 and 144 are held in yielding engagement with the apex of the saddle by means of a coiled spring 146 carried by a pin 147 that secures the arm 142 to the projection 145. The connection between these two parts is preferably a pin and slot connection, so that the arm 142 can be adjusted longitudinally of the saddle 21. The forked extremities of arm 142 are adapted to engage the apex of the saddle momentarily before the rollers 128 and 129 engage the group of signatures, and this mechanism accordingly stops the various groups of signatures always in the same place, and insures the accurate and uniform stitching or stapling of the same.

After the books or pamphlets have been stitched, they are conveyed along the saddle 21 by the several endless conveyers until they reach the delivery, which is of any suitable or well-known type, and which I have herein indicated generally by the reference numeral 148. It may be stated that I prefer a form of delivery employing a vertically reciprocating member 149, which engages the books or pamphlets through an opening in the saddle 21, and elevates them into engagement with the delivery mechanism 148.

While, for the purpose of clearness, one embodiment of the inventive idea has been herein described and illustrated in detail, it is apparent that the invention is not restricted to the particular structural embodiment which is illustrated and described, but that it is susceptible of embodiments conforming to the definition of the invention given in the claims which follow; and it is particularly pointed out that, instead of using continuous conveyers to progress the groups of signatures past the stitchers, I may employ any other suitable mechanism for this purpose, such as that described and claimed in my application Serial No. 745,973, filed Feb. 3d, 1913.

What I claim is:—

1. In a book-making machine, the combination of an inverted V-shaped saddle on which open signatures are supported to be operated on by stitching mechanism, a belt

mounted on the under side of each face of the saddle, a belt mounted on the upper side of each face of the saddle, and gearing connections between said belts so arranged that they are all positively driven to feed the signatures past said stitching mechanism.

2. In a book-making machine, the combination of an inverted V-shaped saddle on which open signatures are supported to be operated on by stitching mechanism, a pair of belts mounted on the under side of each face of the saddle, a pair of belts mounted on the upper side of each face of the saddle, and gearing connections between said belts so arranged that they are all positively driven to feed the signatures past said stitching mechanism.

3. In a book-making machine, the combination of an inverted V-shaped saddle on which open signatures are supported to be operated on by stitching mechanism, a pair of belts mounted on the under side of each face of the saddle, a pair of belts mounted on the upper side of each face of the saddle, the belts on the upper faces of said saddle being opposite those on the under faces, and means for feeding signatures to said belts.

4. In a book-making machine, the combination of an inverted V-shaped saddle on which open signatures are supported to be operated on by stitching mechanism, a shaft mounted on each side of each face of said saddle on each side of said stitching mechanism, a belt passing around each shaft, and gearing connections between the shafts on one side of said stitching mechanism whereby the belts are positively driven to feed the signatures past said stitching mechanism, and means feeding signatures to said belts.

5. In a book-making machine, the combination of an inverted V-shaped saddle on which open signatures are supported to be operated on by stitching mechanism, a shaft mounted on each side of each face of said saddle on each side of said stitching mechanism, a pair of belts passing around each shaft, and gearing connections between the shafts on one side of said stitching mechanism whereby the belts are positively driven to feed the signatures past said stitching mechanism, and means feeding signatures to said belts.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EDWARD R. KAST.

Witnesses:
JOHN W. HEWES,
M. E. WELLENER.