July 23, 1935. P. A. FRAZIER 2,009,172

BOOK SEWING MACHINE

Filed Oct. 12, 1931 7 Sheets-Sheet 1

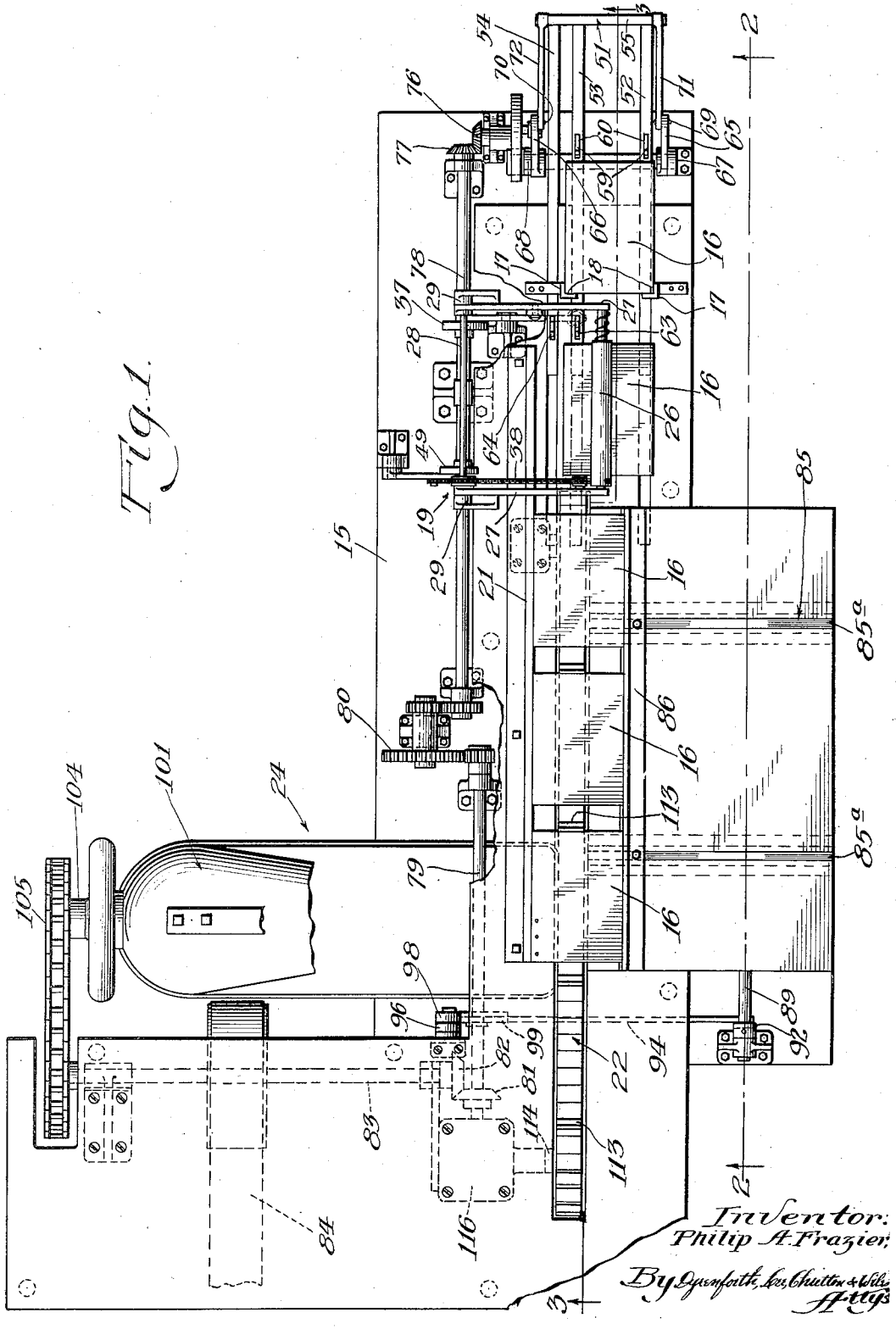


Fig. 1.

Inventor:
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By Dyrenforth, Lee, Chritton & Wilkinson
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BOOK SEWING MACHINE

Filed Oct. 12, 1931 7 Sheets-Sheet 2

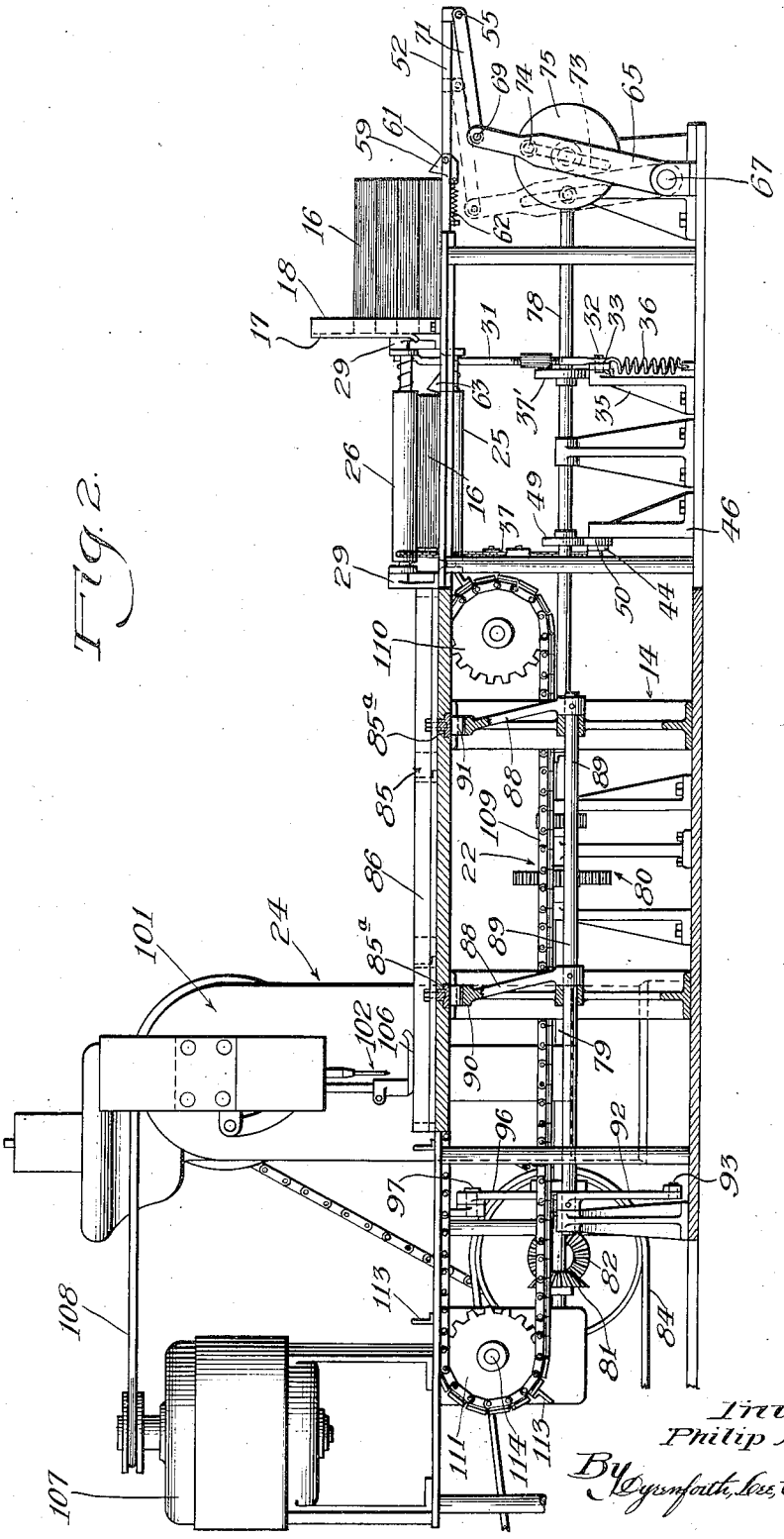


Fig. 2.

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July 23, 1935. P. A. FRAZIER 2,009,172

BOOK SEWING MACHINE

Filed Oct. 12, 1931 7 Sheets-Sheet 3

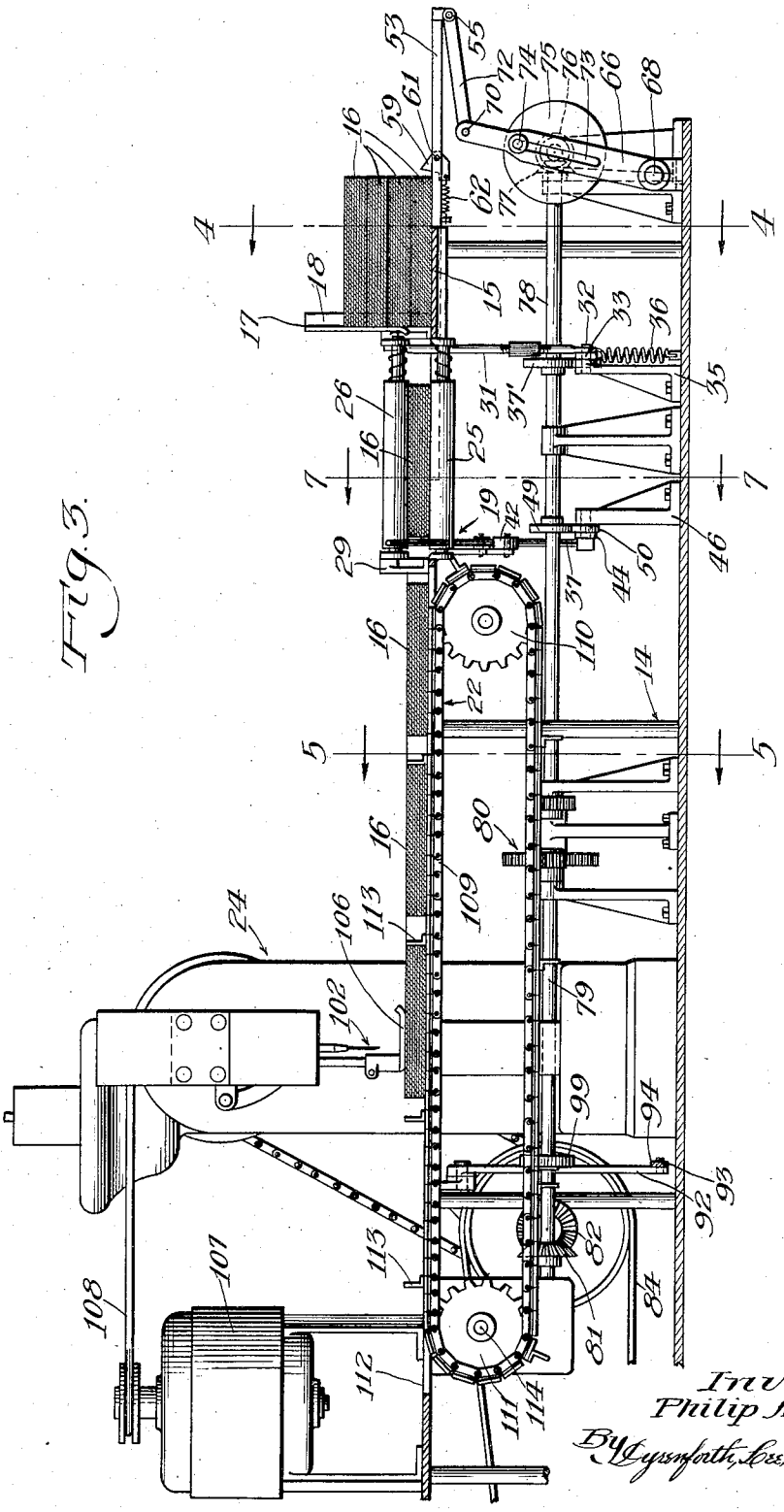


Fig. 3.

Inventor:
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July 23, 1935. P. A. FRAZIER 2,009,172

BOOK SEWING MACHINE

Filed Oct. 12, 1931 7 Sheets-Sheet 4

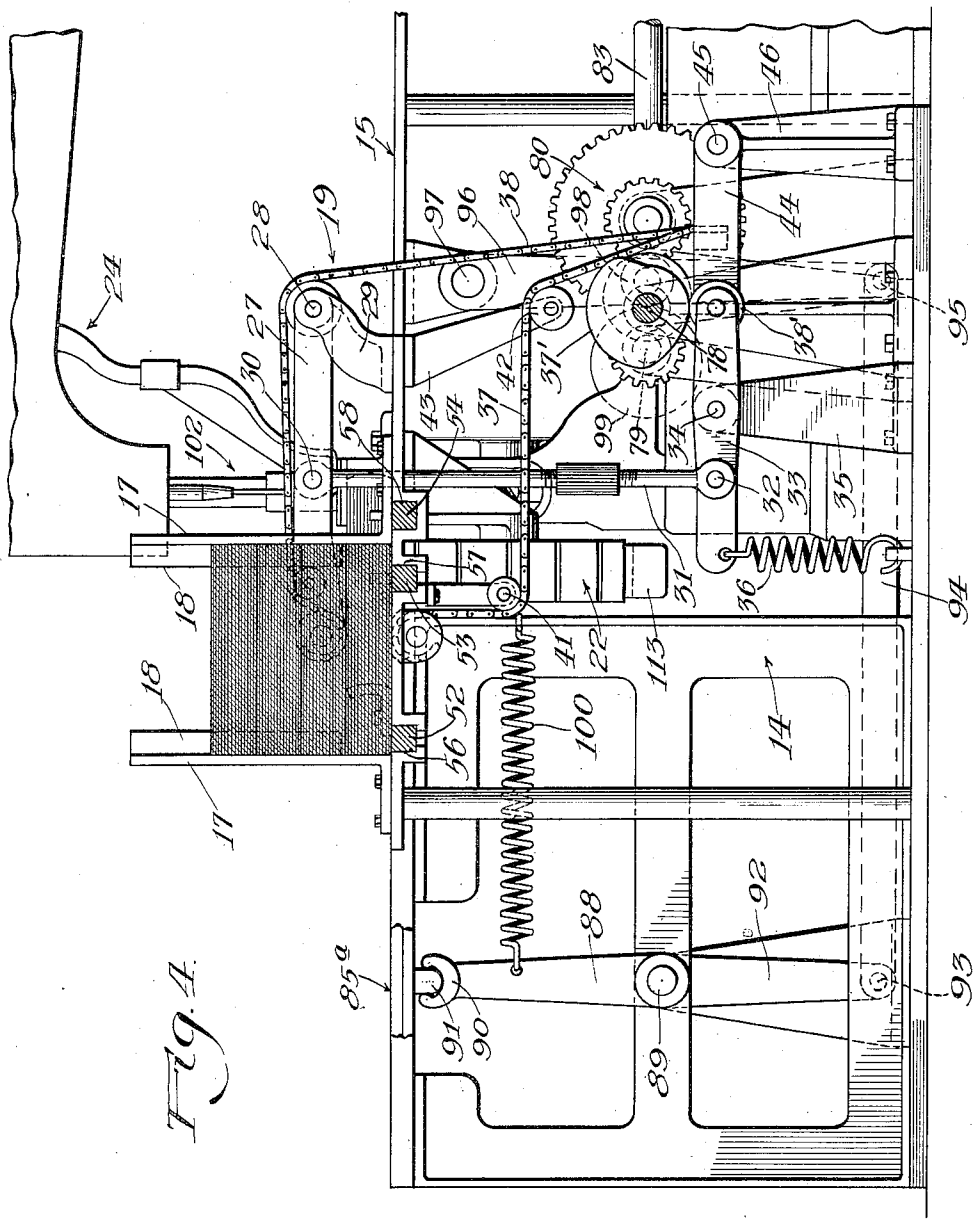


Fig. 4.

Inventor:
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July 23, 1935. P. A. FRAZIER 2,009,172

BOOK SEWING MACHINE

Filed Oct. 12, 1931 7 Sheets-Sheet 5

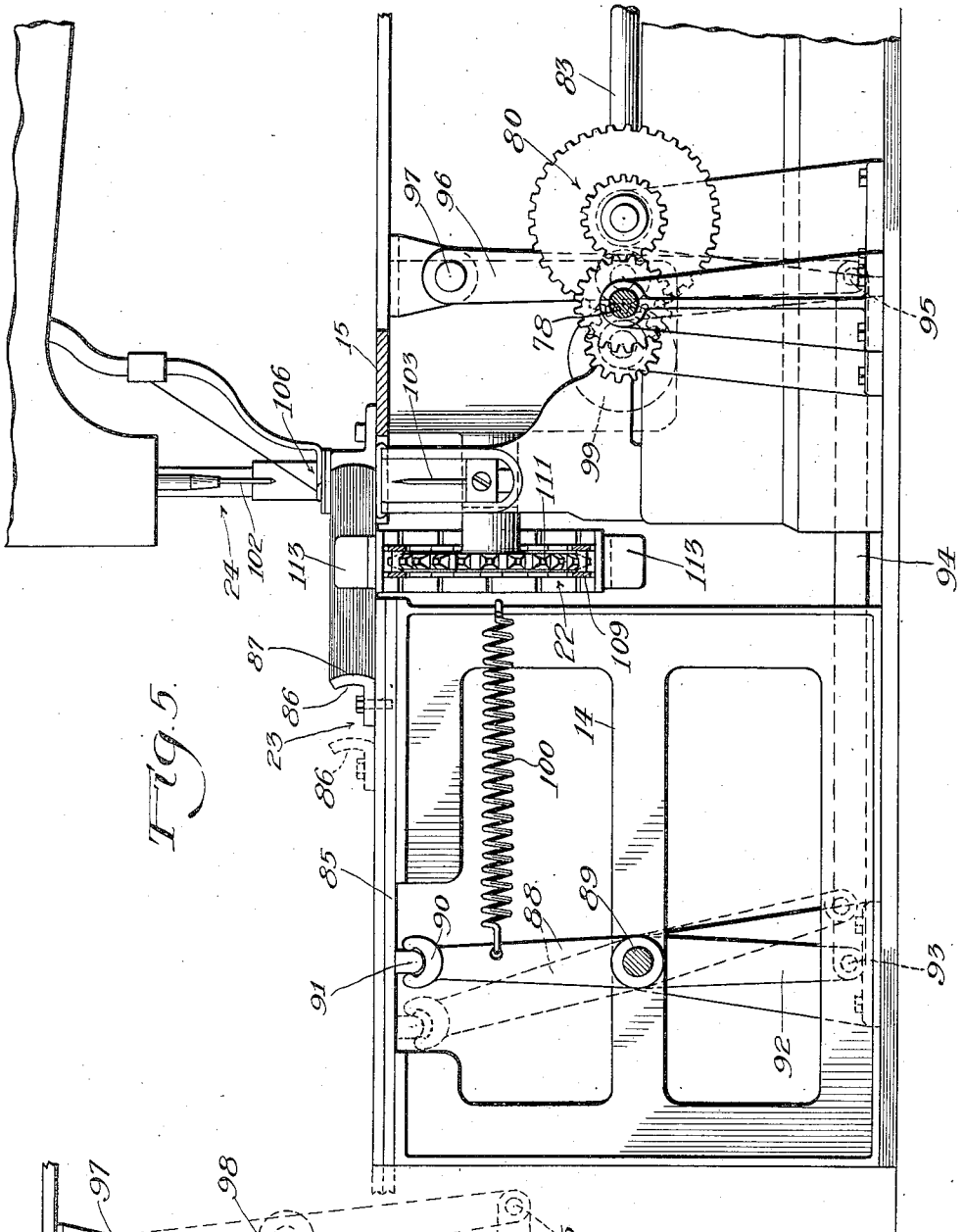


Fig. 5.

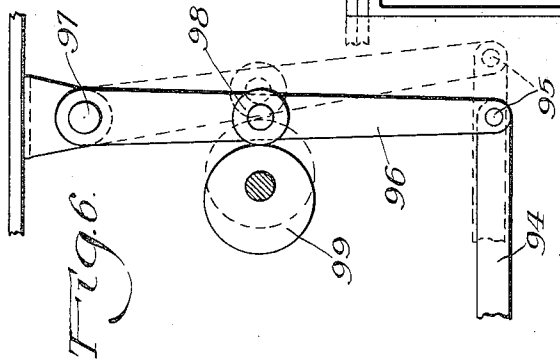


Fig. 6.

Inventor:
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July 23, 1935. P. A. FRAZIER 2,009,172

BOOK SEWING MACHINE

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Fig. 7.

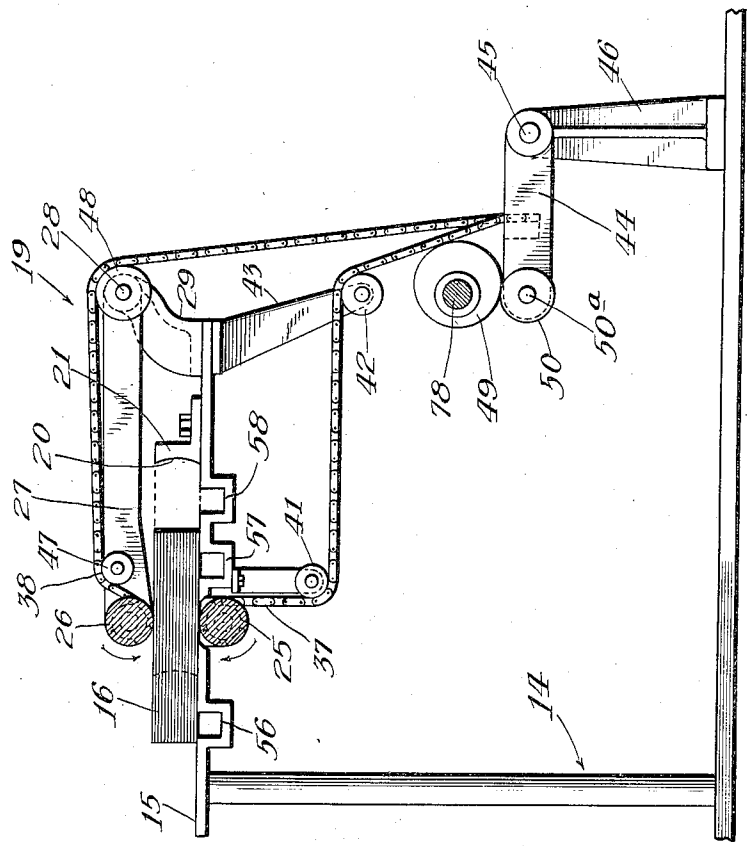


Fig. 8.

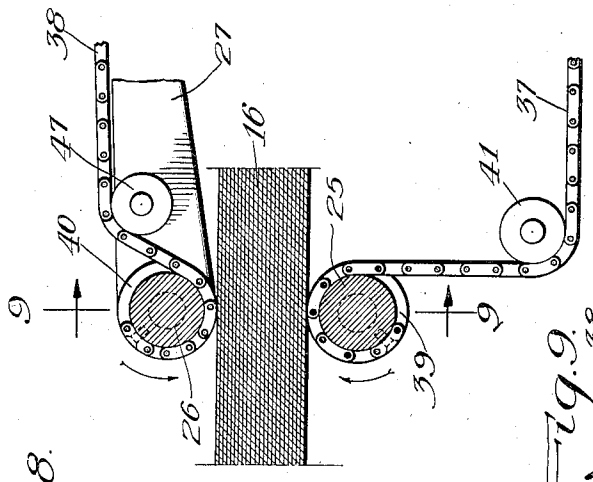
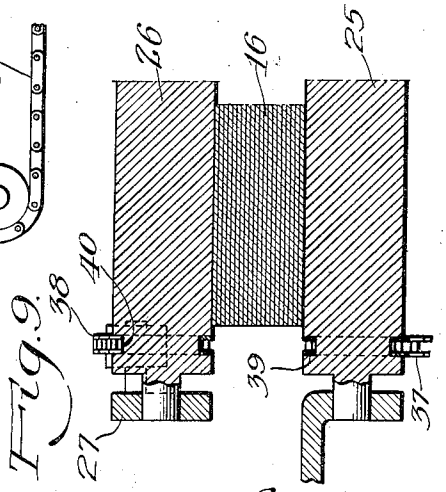


Fig. 9.



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July 23, 1935. P. A. FRAZIER 2,009,172

BOOK SEWING MACHINE

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Fig. 10.

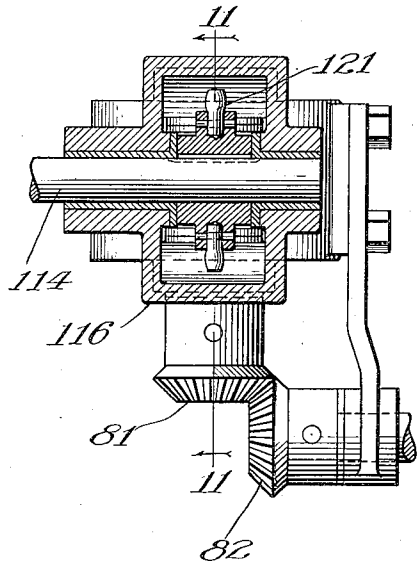


Fig. 11.

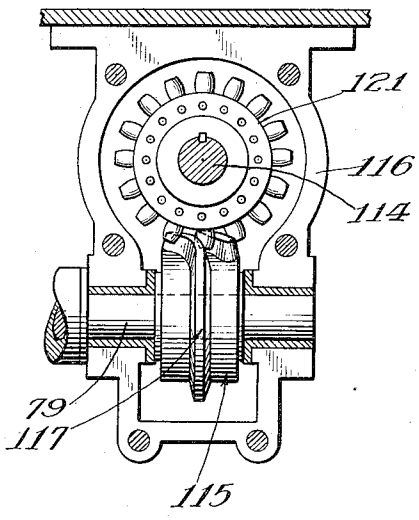


Fig. 12.

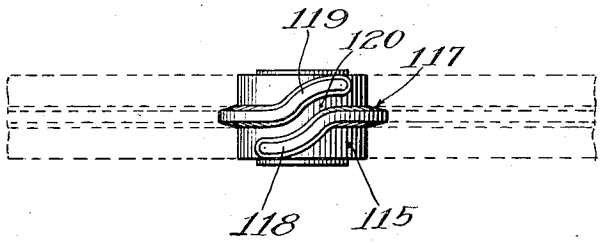
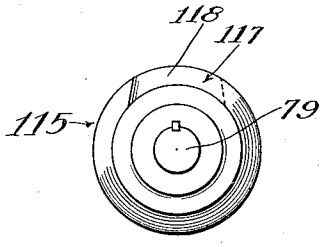


Fig. 13.



Inventor:
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Patented July 23, 1935 2,009,172

UNITED STATES PATENT OFFICE

2,009,172

BOOK SEWING MACHINE

Philip A. Frazier, Chicago, Ill., assignor to R. R. Donnelley & Sons Company, Chicago, Ill., a corporation of Illinois

Application October 12, 1931, Serial No. 568,433

30 Claims. (Cl. 112—21)

My invention relates to machines for sewing together the signatures from which books are to be made, and more especially for use in connection with the manufacture of so-called rounded (convexed) back books.

One of my objects is to provide for the manufacture of books of the type above referred to and to produce a book which will remain at all times in rounded back condition; and other objects as will be manifest from the following description.

Referring to the accompanying drawings:

Figure 1 is a plan view, with certain parts broken away, of a machine embodying my invention.

Figure 2 is a view in sectional elevation of the machine of Fig. 1, the section being taken at the line 2—2 on Fig. 1 and viewed in the direction of the arrows.

Figure 3 is a similar view of the machine, the section being taken at the irregular line 3—3 on Fig. 1 and viewed in the direction of the arrows.

Figure 4 is an enlarged sectional view taken at the line 4—4 on Fig. 3 and viewed in the direction of the arrows.

Figure 5 is an enlarged sectional view taken at the line 5—5 on Fig. 3 and viewed in the direction of the arrows, certain of the parts being partly broken away.

Figure 6 is a view in elevation of a detail of the portion of mechanism for jogging the signatures which are to form the book.

Figure 7 is an enlarged sectional view, taken at the line 7—7 on Fig. 3 and viewed in the direction of the arrows, of roller mechanism for forming the stack of signatures into rounded back condition.

Figure 8 is an enlarged detail view of a portion of the mechanism of Fig. 7.

Figure 9 is a section taken at the line 9—9 on Fig. 8 and viewed in the direction of the arrows.

Figure 10 is a plan sectional view of mechanism for intermittently actuating the conveyor by which the groups of signatures are fed to, and away from, the sewing mechanism.

Figure 11 is a section taken at the line 11—11 of Fig. 10 and viewed in the direction of the arrows.

Figure 12 is a plan view of one of the elements of the conveyor driving mechanism, the dotted lines together with the full lines representing the element by a developed view; and

Figure 13, an end view of the element of Fig. 12.

Referring to the particular illustrated construction, it comprises a frame represented generally at 14 and formed of a bed portion 15 which, at one end of the machine (the right-hand end in Fig. 3) forms a support for the books to be sewed and comprising a group of signatures, the books being represented at 16, and stacked in a vertical pile between uprights 17 rising from the bed 15, with the edges of the books to be stitched extending lengthwise of the bed and constituting the right-hand ends of the books in Fig. 4, the uprights having inwardly extending flanges 18 spaced at their lower edges from the bed 15 a distance slightly greater than the thickness of the books thereby providing a slot through which the lowermost books 16 may be fed in succession when engaged by feed mechanism as hereinafter described.

Located in front of the stack of books is mechanism, represented generally at 19, by which the books, in unbound condition, and fed thereto in succession are caused to assume rounded back condition as represented of the book shown in Fig. 5, the books in this operation being bodily moved to the right in Fig. 7 and against the concave face 20 of a bar 21 extending lengthwise along the bed of the machine, the concave face 20 being of the curvature desired of the back of the finished book.

The books thus operated on by the mechanism 19 and discharged therefrom as hereinafter described, are then fed intermittently to the left in Fig. 3 by conveyor mechanism represented generally at 22 into a position to be operated on by jogging mechanism represented generally at 23 which serves to insure the desired curvature to the back of the book during the operation of sewing which is performed by the mechanism represented generally at 24.

Referring to the mechanism 19 for rounding the backs of the books, it comprises a roller 25 journaled on the frame of the machine to extend lengthwise thereof and beneath the books as they are delivered from the stack thereof at the right-hand end of Fig. 3, and a second roller 26 also extending lengthwise of the machine directly above the roller 25 and between which roller and the roller 25 the books in succession are introduced. The roller 26 is journaled in the outer ends of levers 27 pivoted at 28 on brackets 29 rising from the bed 15 of the machine, one of these levers being pivotally connected at 30 with the upper end of a link 31 the lower end of which is pivotally connected at 32 with a rock lever 33 fulcrumed at 34 on an upright 35 rising from the bottom portion of the frame 14. A coil spring 36 connected with one end of the lever 33 and with

the frame of the machine yieldingly forces the roller 26 into engagement with the book therebelow and the latter against the roller 25, and a cam 37' operated, as hereinafter described, and bearing against a roller 38' on the opposite end of the lever 33 serves to intermittently rock the lever 27 upwardly to lift the roller 26 out of the path of movement of the books during the operation of inserting the latter between the rollers 25 and 26.

The rollers 25 and 26 are connected with the ends of chains 37 and 38, respectively, which are partially wound thereon at the grooved portions thereof represented at 39 and 40 (Fig. 8), the chain 37 passing beneath an idler roller 41 journaled on a fixed part of the frame 14 and thence over an idler roller 42 on a bracket 43 on the frame 14, the end of the chain 37 opposite that at which it connects with the roller 25 being connected with a lever 44 fulcrumed at one end, as represented at 45 on an upright 46 rising from the base of the frame 14. The other chain 38 passes over an idler pulley 47 journaled on the arm 27 and thence over an idler pulley 48 journaled on the pivot 28, the end of this chain opposite that at which it connects with the roller 26, being connected with the lever 44. The rollers 25 and 26 are rotated in the direction of the arrows in Figs. 7 and 8, by drawing on the chains 37 and 38, this being effected by rocking the lever 44 downwardly by the rotation of a cam 49, operated, as hereinafter described, against a roller 50 journaled at 50a on the outer end of the lever 44. The spring 36 operates to cause the rollers 25 and 26 to press firmly against the books from opposite sides thereof during the rotation of these rollers as described with the result of causing the signatures to be shifted to the right in Fig. 7 into a condition in which the right-hand, or back, edge of the book in this figure assumes convex form and becomes positioned against the concave face of the bar 21.

The mechanism for feeding the books in succession from the bottom of the stack at the right-hand end of the machine in Fig. 3, into a position to be acted on by the rollers 25 and 26 and from these rollers to the conveyor mechanism 22, comprises a horizontally slidable frame 51 shown as formed of three parallel bars 52, 53 and 54 connected at their outer ends with a cross bar 55 and slidable at their inner ends in grooves 56, 57 and 58 in the bed 15 and extending longitudinally of the machine. The bars 52 and 53 underlie the stack of books at the right-hand end of Figs. 1 and 3 and are each provided with a feeder dog 59 located in a slot 60 therein and pivotally supported as represented at 61. The feeder dogs 59 are normally maintained in the position shown of the one in Fig. 3 by a coil spring 62 in which position portions of the dogs extend above the bed 15 and into a position to engage the right-hand end of the book in Fig. 3, the dogs 59 being held against rotation in clockwise direction in Fig. 3 from the position therein shown by abutting at shoulders thereon against the bar carrying them, but being free to rock, against the action of the springs 62, in the opposite direction.

The bar 53 and the bar 54 at portions thereof between the vertical stack of books and the mechanism 19 are provided with dogs 63 and 64 located in slots in these bars and of the same construction as the dogs 59, the bars 53 and 54 being so positioned that they extend beneath the books following the operation of the mechanism 19 to round the backs thereof as above described.

It will thus be understood that in the movement of the frame 51 to the left in Fig. 1 the lowermost book of the vertical stack thereof will be moved, by the dogs 59, into a position in which it extends between the rollers 25 and 26, as shown of the book so disposed in Fig. 1, and that the dogs 63 and 64 (the book between the rollers 25 and 26 having been shifted by the mechanism 19 to the right in Fig. 7 to engage the bar 21) will feed this book from between the rollers 25 and 26 to the conveyor 22 in the feeding to the mechanism 19 of another book from the vertical stack thereof referred to. In other words, in each movement of the feeder mechanism 51 to the left the book manipulated into rounded back condition by the mechanism 19 is fed out of this mechanism and another book to be operated on is fed from the stack thereof into this mechanism.

The means shown for reciprocating the feeder mechanism 51 comprises links 65 and 66 pivoted at their lower ends to the base of the frame 14, as indicated at 67 and 68, their upper ends being pivotally connected at 69 and 70 with links 71 and 72, respectively, pivoted to the ends of the cross bars 51. The link 66 contains a longitudinally extending groove 73 into which a crank pin 74 on a disk 75 extends, and by which arrangement, the lever 66, and therefore the feed frame 51 is reciprocated when the disk 75 is rotated.

The mechanism for actuating the disk 75 comprises a bevel gear 76 secured to a shaft on which the disk 75 is mounted this gear meshing with a bevel gear 77 fixed on a shaft 78 extending lengthwise of the machine and journaled thereon, this shaft being driven from a shaft 79 through gear reduction mechanism 80, the shaft 79 being provided with a bevel pinion 81 meshing with a bevel pinion 82 on the drive shaft 83 of the machine, the shaft 83 being shown as driven from any suitable prime mover as through the medium of a belt 84.

The mechanism for raising the roller 26 to permit of the feeding of a book between this roller and the roller 25 comprises the cam 37' which is mounted on the shaft 78 and is so positioned that during the operation of the feeder mechanism 51 for feeding the books to and away from the rollers 25 and 26 as above described, the roller 26 will be lifted out of obstructing position.

The mechanism for rotating the rollers 25 and 26, by depressing the lever 44 comprises the cam 49 also mounted on the shaft 78 and so angularly positioned thereon that the rollers will be rotated as stated during the cycle when the feed mechanism 51 is at rest and while the book is gripped between the rollers 25 and 26.

Referring now to the jogging mechanism 23, it comprises a slide 85 formed of bars 85a guidingly mounted in parallel slots in the bed of the machine to reciprocate crosswise of the machine, the bars 85a being connected with a bar 86 slidable on the bed and presenting a convex face 87 which opposes the concave face 20 of the bar 21 and which is caused to engage the edge of the book opposite the back edge of the latter and by pressing the back edge of the book against the bar 21 insure the round-back condition of the book at the time of sewing.

The mechanism for reciprocating the slide 85 comprises arms 88 rigid on a shaft 89 rotatably mounted in the frame 14 of the machine, the upper ends of these arm being flexibly connected at 90 with lugs 91 depending from the bars 85a.

The shaft 89 is provided with a depending arm 92 the lower end of which is pivotally connected at 93 with one end of a link 94, the opposite end of which is pivotally connected at 95 with the lower end of a lever 96 fulcrumed at its upper end, as represented at 97, on the frame 14. The lever 96 is provided between its ends with a roller 98 journaled thereon which engages the periphery of a cam 99 fixed on the shaft 79. A coil spring 100 connected with one of the arms 88 and the frame of the machine operates, in conjunction with the cam 99, to cause the slide 85 to be reciprocated in the rotation of the cam 99 for the purpose above stated.

Referring now to the sewing mechanism indicated at 24 that shown being of the chain stitch sewing type and, except as to the features hereinafter described of the same construction as the commonly known wax thread type of sewing machine, it comprises generally stated, a depending reciprocable boring tool which, by way of example and as shown, may be an awl, arranged in vertical alinement with an upwardly extending reciprocable hook needle, the awl in descending, operating to penetrate the book and the needle operating through the hole made by the awl and by hooking over the thread at the upper side of the work in the lowering of the needle, drawing the thread in looped condition downwardly through the opening, the needle and awl operating in timed relation to perform the operation stated.

In machines of the wax thread type as commonly provided the needle is caused to operate not only as stated but also back and forth in the line of feed of the work while extending into the opening produced by the awl, to effect the feed of the work, but as the above referred to back and forth operation of the needle is not desirable in book sewing I dispense with the mechanism producing such movement of the needle, whereby the needle remains at all times in vertical alinement with the awl, and feed the work by the conveyor mechanism 22 above referred to and hereinafter described, the mechanism 22 being so constructed that it performs the feeding operations in alternation with the reciprocations of the awl and needle.

Furthermore, while I retain the mechanism which operates to reciprocate the awl this mechanism in the particular construction shown is supplemented by mechanism whereby the awl, while engaging the books, is caused to rotate therein to thereby reduce the amount of power required to drive the awl through the books.

In the machine shown the sewing machine proper is represented at 101, the reciprocating and rotating awl at 102, and the needle at 103. As the mechanism for reciprocating the awl and needle in properly timed relation to effect the bore and stitch forming operation is well known, description thereof appears to be unnecessary, it being sufficient to state that these parts are operated by the main drive shaft 104 of the sewing machine shown as driven by a sprocket chain 105, from the drive shaft 83, it being understood that during a portion of the cycle of operation of the sewing machine the awl 102 is raised above, and the needle 103 is lowered below, the upper surface of the bed 15 along which the books to be sewed are advanced beneath, and in engagement with, a vertically reciprocable presser foot 106 as shown in Fig. 5. The presser foot 106, in accordance with machines of the common form above referred to, is reciprocated in timed relation to the needle and awl, to engage the books during the operation of the needle and awl and be raised to permit of the feeding of the books when both the needle and awl are in withdrawn position.

The awl 102 is reciprocated and rotated in any suitable way as for example as disclosed in U. S. Letters Patent No. 1,788,968, granted January 13, 1931, to Raymond E. Ackley, it being sufficient to say that the device in the particular construction shown for rotating the awl is an electric motor represented at 107 having drive connection with the rotatable awl as through the medium of the belt 108.

The conveyor mechanism 22 by which the books, after discharge from the mechanism 19, are intermittently advanced into and through the sewing machine 101 and which operates in alternation with the sewing machine, whereby the books are at rest when operated on by the latter comprises an endless chain 109 extending lengthwise of the machine and engaging sprockets 110 and 111 journaled on the frame 14, the upper reach of the chain 109 extending into a longitudinal slot 112 in the bed of the machine, and the chain 109 being provided at intervals therealong with lugs 113 adapted to extend upwardly through the slot 112 and engage with the ends of the books to feed them along the machine.

The chain 109 is driven by power applied to a shaft 114 to which the sprocket 111 is connected, the desired intermittent actuation of the conveyor chain 109 being effected by the mechanism shown in Figs. 10, 11, 12 and 13 and comprising a worm wheel 115 on the shaft 79 and located in a housing 116 carried by the frame of the machine, the worm 115 being of the construction shown in Figs. 11, 12 and 13, namely, in the form of a mutilated worm comprising a rib 117 extending peripherally about the shaft 114 with its ends, represented at 118 and 119, deflected in opposite directions and spaced apart as represented at 120 to form a sectional spiral groove. The mutilated worm 115 meshes with a gear 121 rigidly secured to the shaft 114, the construction of this drive mechanism being such that for each rotation of the shaft 79 the gear 121 and shaft 114 are rotated a distance equal to the distance between adjacent teeth of this gear, the shaft 114 being thus moved throughout a portion only of a complete rotation of the shaft 79, thereby producing an intermittent movement of the conveyor 14.

The cam 99 for operating the jogging mechanism 23 is so angularly disposed on the shaft 79 that the jogging operation is effected during the periods that the needle and awl are withdrawn from the signatures.

As will be understood from the foregoing description, the books to be sewed are presented to the sewing machine in rounded-back-condition in which condition the stitching is made, the signatures thus being securedly held against relative slipping and preventing the book from becoming sway-backed.

While I have illustrated and described a particular construction embodying my invention, I do not wish to be understood as intending to limit it thereto as the same may be variously modified and altered without departing from the spirit of my invention; thus by way of example, while I have shown roller mechanism 19 and jogging mechanism 23 for effecting the delivery of the signatures to the sewing machine in the desired rounded-back condition, the invention is not lim-

ited to a machine in which both of these mechanisms are employed, as in some cases it may suffice to employ only one of such kinds of mechanisms.

What I claim as new, and desire to secure by Letters Patent, is:

1. In a machine for the purpose set forth, the combination of means for sewing together signatures to form a book, means operating on the signatures to cause them to extend in rounded-back-forming condition, and means for feeding the signatures in said condition to said first-named means.

2. In a machine for the purpose set forth, the combination of means for sewing together signatures to form a book, and means operating in alternation with the actuations of said first-named means for causing the signatures to extend in rounded-back-forming conditions, during the sewing operation.

3. In a machine for the purpose set forth, the combination of means for sewing together signatures to form a book, and jogging mechanism operating in alternation with the actuations of said first-named means for causing the signatures to extend in rounded-back-forming condition during the sewing operation.

4. In a machine for the purpose set forth, the combination of means for sewing together signatures to form a book, means operating in alternation with the actuations of said first-named means for causing the signatures to extend in rounded-back-forming condition, during the sewing operation, and means for feeding the signatures to said first and second named means.

5. In a machine for the purpose set forth, the combination of means for sewing together signatures to form a book, a member having a concave surface, and means operating in alternation with the actuations of said first-named means for projecting the signatures edgewise at the back of the book against said concave surface.

6. In a machine for the purpose set forth, the combination of means for sewing together signatures to form a book, a member having a concave surface, means operating in alternation with the actuations of said first-named means for projecting the signatures edgewise at the back of the book against said concave surface, and means for feeding the signatures to said first-named means and operating in alternation with the latter.

7. In a machine of the character set forth, the combination of roller means for operating on signatures to cause them to extend in rounded-back-forming condition, means for sewing together the signatures in said condition to form a book, and means operating in alternation with said second-named means for feeding the signatures to said last-referred-to means.

8. In a machine of the character set forth, the combination of roller means for operating on signatures to cause them to extend in rounded-back-forming condition, jogging means to which said signatures, after being operated on by said first-named means, are delivered, said jogging means operating to insure rounded-back-condition of said signatures, and means for sewing together the signatures in said condition to form a book.

9. In a machine of the character set forth, the combination of roller means for operating on signatures to cause them to extend in rounded-back-forming condition comprising rollers relatively movable toward and away from each other and between which the signatures are introduced, means controlling the spreading of said rollers, means for feeding signatures between said rollers, said second and third named means being so timed in their operation that said rollers are spread during the feeding of signatures thereto by said last-named means and thereafter become closer together for engaging opposite sides of the signatures, and means for rotating said rollers in opposite directions.

10. In a machine of the character set forth, the combination of roller means for operating on signatures to cause them to extend in rounded-back-forming condition, and means for feeding signatures into a position between said rollers and thereafter beyond said rollers comprising a reciprocatory member having signature-feeding elements thereon disposed in different positions along said member and operating, respectively, to feed the signatures to and away from said roller means.

11. In a machine of the character set forth, the combination of roller means for operating on signatures to cause them to extend in rounded-back-forming condition comprising rollers disposed lengthwise of the machine and between which the signatures are introduced, and means for feeding signatures to said rollers and thereafter beyond said rollers comprising a reciprocatory member having signature-feeding elements thereon disposed in different positions along said member and operating, respectively, to feed the signatures to and away from said roller means.

12. In a machine of the character set forth, the combination of roller means for operating on signatures to cause them to extend in rounded-back-forming condition comprising rollers disposed lengthwise of the machine and between which the signatures are introduced and by which the signatures are shifted crosswise of the machine, a member having a concave surface against which the signatures are projected by said rollers, and means for feeding signatures to said rollers and thereafter beyond said rollers comprising a reciprocatory member having signature-feeding elements thereon disposed in different positions along said member and operating, respectively, to feed the signatures to and away from said roller means.

13. In a machine of the character set forth, the combination of means for sewing together signatures to form a book, means for operating on the signatures to cause them to extend in rounded-back-forming condition, reciprocatory means for feeding signatures, in succession, to said second-named means and into a position beyond said second-named means, and intermittently operating means for feeding the signatures to said first-named means.

14. In a machine of the character set forth, the combination of means for sewing together signatures to form a book, means for operating on the signatures to cause them to extend in rounded-back-forming condition, intermittently operating means for feeding the signatures to said first and second named means, and means for feeding the signatures in succession to said third named means.

15. In a machine of the character set forth, the combination of means for sewing together signatures to form a book, means for operating on the signatures to cause them to extend in rounded-back-forming condition, jogging means adjacent said first named means for insuring the rounded-back-condition of the signatures

when operated on by said first-named means, reciprocatory means for feeding the signatures, in succession, to said second named means and beyond the latter, and intermittently operating means for feeding the signatures from said second-named means to said jogging means and said first-named means.

16. In a machine for the purpose set forth, the combination of means for holding gathered signatures in a shape in which the front edge of the assembly is concave and its back edge convex and means for stitching in straight lines from one side to the other of the assembly while in said concavo-convex shape.

17. In a machine for the purpose set forth, the combination of means for sewing together signatures to form a book, and curved guide means adapted to receive and guide the signatures in rounded-back-forming condition while they are being sewed.

18. In a machine for the purpose set forth, the combination of means for sewing together signatures to form a book, curved guide means adapted to receive and guide the signatures in rounded-back-forming condition while they are being sewed, and means for feeding the signatures through said guides and to said first named means.

19. In a machine for the purpose set forth, the combination of means for sewing together signatures to form a book, means for feeding the signatures to said first-named means and means whereby the signatures while being sewed are in a shape in which their front edges are concave and their back edges convex.

20. In a machine for the purpose set forth, the combination of means for sewing together signatures to form a book, means for causing the signatures to assume a rounded-back condition, means for feeding the signatures to said first-named means and means whereby the signatures are in rounded-back-forming condition while being sewed.

21. In a machine of the character set forth, the combination of means for causing signatures to extend in rounded-back-forming condition, means for sewing together the signatures in said condition to form a book and means operating to feed the signatures to said first-named means and thereafter to said second-named means.

22. In a machine of the character set forth, the combination of roller means for operating on signatures to cause them to extend in rounded-back-forming condition, and means for feeding the signatures to be operated on lengthwise of the rollers into position between the latter and thereafter beyond said rollers.

23. In a machine of the character set forth, the combination of roller means for operating on signatures to cause them to extend in rounded-back-forming condition, said rollers being relatively movable bodily toward and away from each other, means for producing said relative bodily movement of said rollers and means operating in alternation with said second-named means for feeding the signatures to said first-named means.

24. In a machine of the character set forth, the combination of roller means for operating on signatures to cause them to extend in rounded-back-forming condition, said rollers being relatively movable bodily toward and away from each other, means for producing said relative bodily movement of said rollers and means operating in alternation with said second-named means for feeding the signatures to be operated on lengthwise of the rollers into position between the latter.

25. In a machine of the character set forth, the combination of roller means for operating on signatures to cause them to extend in rounded-back-forming condition, means for sewing together the signatures in said condition to form a book, feed means for the signatures operative to feed the signatures to said roller means lengthwise of the latter, and means for intermittently feeding the signatures in rounded-back-forming condition through said sewing means.

26. In a machine for the purpose set forth, the combination of means for sewing together signatures to form a book, roller means operating on the signatures to cause them to extend in rounded-back-forming condition, and means for feeding the signatures in said condition to said first-named means and preserving said condition while being sewed.

27. In a machine of the character set forth, the combination of roller means for operating on signatures to cause them to extend in rounded-back-forming condition, and means for feeding signatures lengthwise of said roller means into a position between said rollers and thereafter beyond said rollers comprising a reciprocatory member having signature-feeding elements thereon disposed in different positions along said member and operating, respectively, to feed the signatures to and away from said roller means.

28. In a machine of the character set forth, the combination of roller means for operating on signatures to cause them to extend in rounded-back-forming condition comprising rollers disposed lengthwise of the machine and between which the signatures are introduced and by which the signatures are shifted crosswise of the machine, a member having a concave surface against which the signatures are projected by said rollers, and means for feeding signatures lengthwise of said roller means to said rollers and thereafter beyond said rollers comprising a reciprocatory member having signature-feeding elements thereon disposed in different positions along said member and operating, respectively, to feed the signatures to and away from said roller means.

29. In a machine for the purpose set forth, the combination of means for sewing together signatures to form a book, and concave and convex guides adapted to receive the signatures between them and guide the signatures at their back and front edges, respectively, in rounded-back condition while the signatures are being sewed.

30. In a machine of the character set forth, the combination of means for sewing together signatures to form a book, means for operating on the signatures to cause them to extend in rounded-back-forming condition, means for feeding the signatures in rounded-back forming condition from said second-named means, and intermittently operating means operating on the signatures after removal from said second-named means for feeding the signatures to said first-named means and preserving said condition while being sewed.

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