Dec. 17, 1935. H. C. ALGER 2,024,959

BOOKBINDING MACHINE

Filed June 24, 1932 3 Sheets-Sheet 1

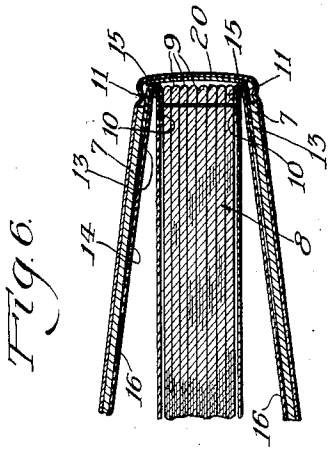

Fig. 6.

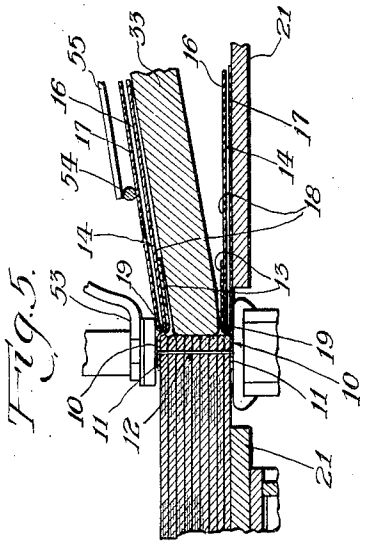

Fig. 5.

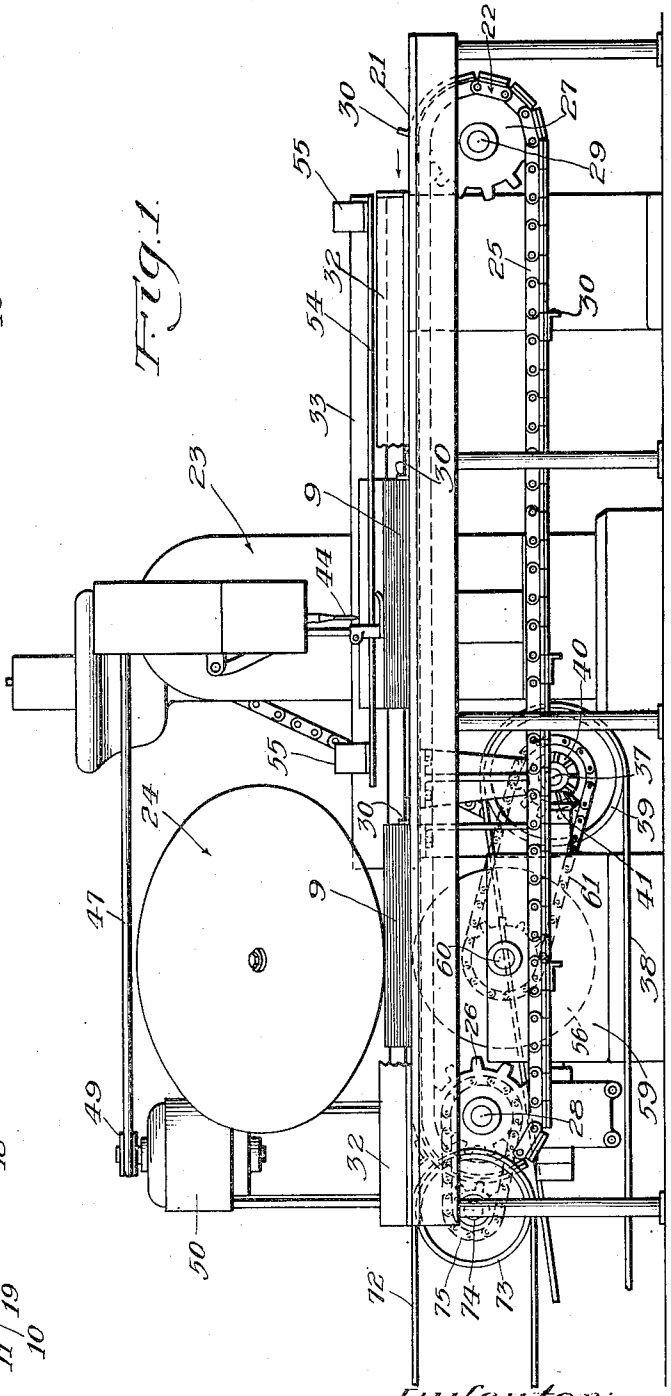

Fig. 1.

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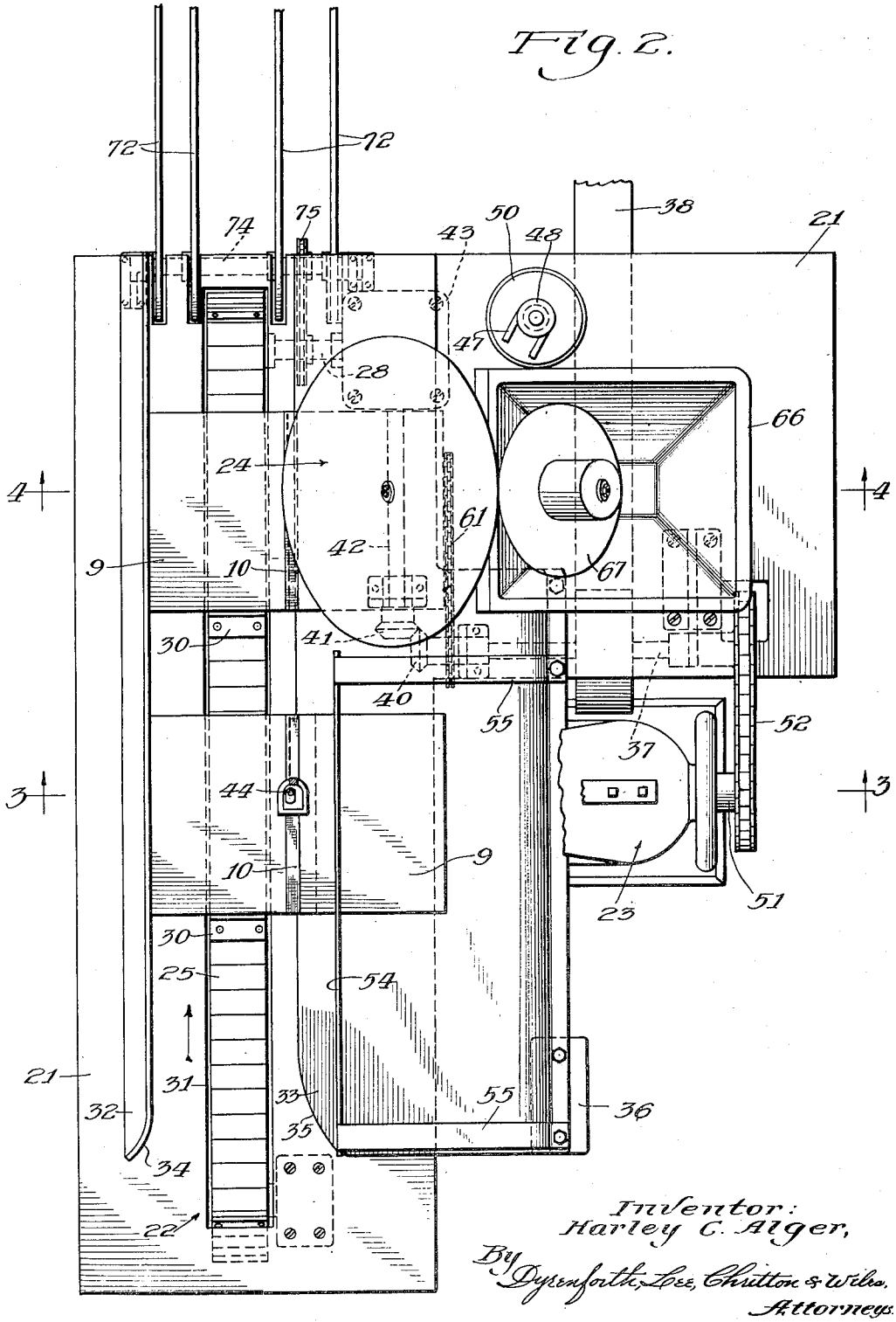
Fig. 2.



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BOOKBINDING MACHINE

Filed June 24, 1932 3 Sheets-Sheet 3

Fig. 3.

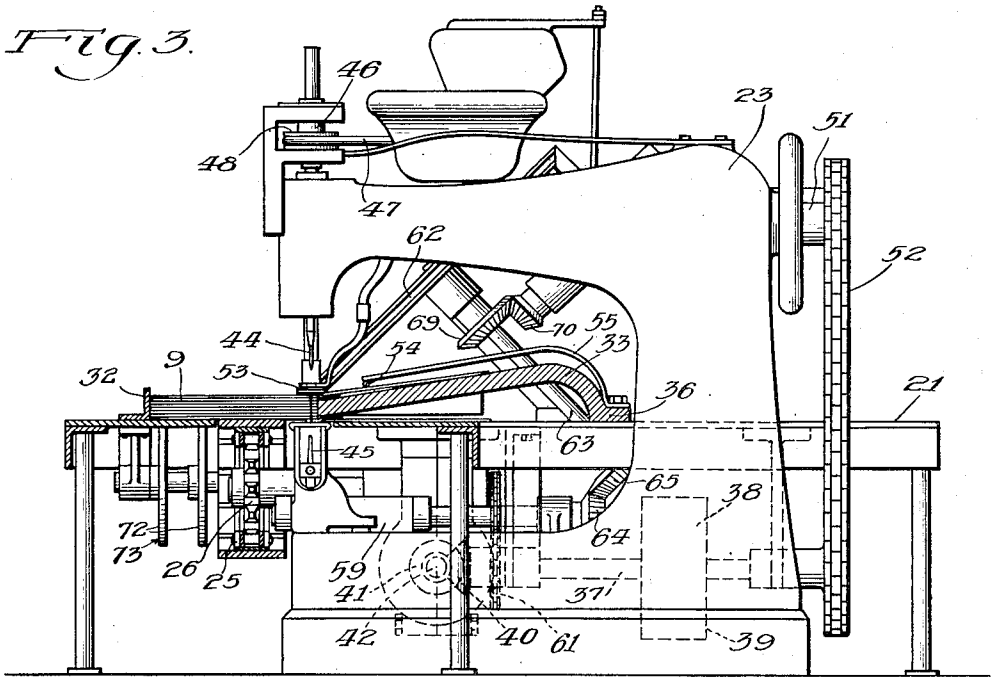
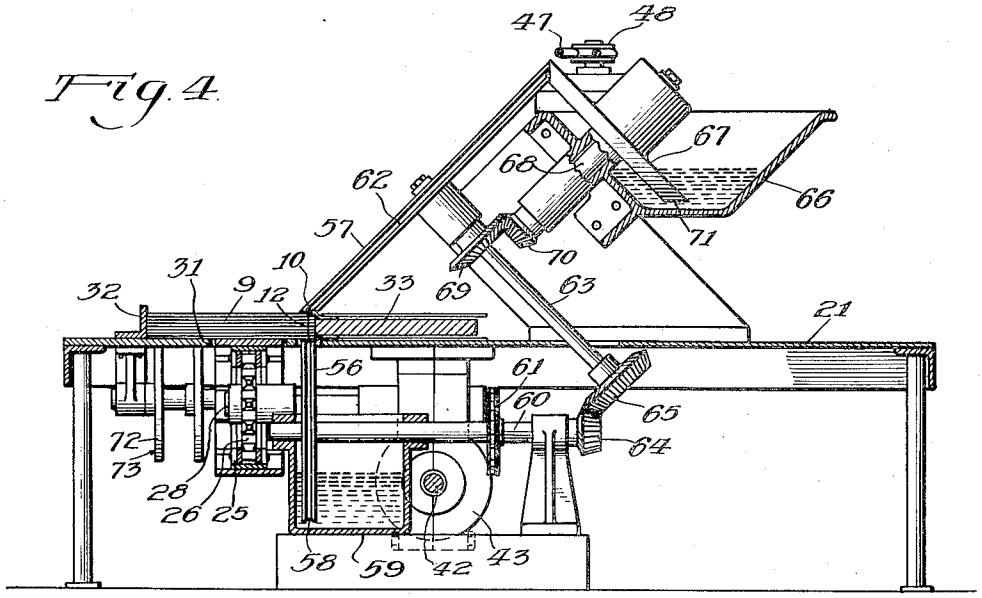


Fig. 4.



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Patented Dec. 17, 1935 2,024,959

UNITED STATES PATENT OFFICE

2,024,959

BOOKBINDING MACHINE

Harley C. Alger, Chicago, Ill., assignor to R. R. Donnelley & Sons Co., Chicago, Ill., a corporation of Illinois

Application June 24, 1932, Serial No. 619,148

6 Claims. (Cl. 112—21)

My invention relates, more particularly, to improvements in machines for use in the binding of books of the type known as "side-sewed" books.

One of my objects is to provide improvements in machines of the character above stated to the end that the books may be "side-sewed" and adhesive applied to the binding stitches.

Another object is to provide improvements in machines of the character stated to the end of permitting of the side sewing, by machinery, of books having reinforcing strips, as for example of cloth, for securing the covers to the body of the book, flatwise opposing the faces of the body of the book adjacent its back edge with projecting flap portions which, in the straightened condition of the reinforcing strips, extend outwardly beyond the back edge of the book and especially, though not exclusively, where the flap portions referred to are previously connected with end sheets to form portions of the book; and other objects as will be manifest from the following description.

Referring to the accompanying drawings:

Figure 1 is a view in side elevation of a machine embodying my invention.

Figure 2 is a plan view of the machine.

Figure 3 is a section taken at the line 3—3 on Fig. 2 and viewed in the direction of the arrows.

Figure 4 is a section taken at the line 4—4 on Fig. 2 and viewed in the direction of the arrows.

Figure 5 is a fragmentary enlarged sectional view of a portion of the machine of the preceding figures showing the relative positioning of the body of the book and the end sheets thereof in the operation of stitching the book; and

Figure 6, a broken sectional view showing the completed book.

As an example of a kind of book to be bound by my improved machine reference is made to the book shown in Fig. 6 wherein the securing of the cover sections, represented at 7, to the body of the book and represented at 8 (the sheets of which are preferably provided in the form of signatures 9) is by means of reinforcing strips 10, as for example and preferably of fabric, which are secured along their inner edge portions 11 in flatwise position to the body portion 8 adjacent the back edge thereof to extend substantially the full length of the body portion, as by the stitching represented at 12, and along their outer edge portions, flap portions, 13 which extend beyond the back edge of the body 8 of the book, to the covers 7. In other words, the strips 10 are disposed in such a position relative to the body 8 and covers 7 that, considering the covers 7 as folded outwardly into open condition as shown of the end sheets in Fig. 5 and represented at 14, the portions 13 of the strips 10 extend outwardly beyond the back edge of the body 8, as represented of these strips in Fig. 5, so that the lines of flexure of the strips 10 and at which the hinge joints between the covers 7 and the body 8 of the book are formed, are adjacent the back edge of the body 8 as represented at 15.

The particular book shown also comprises, in addition to the signatures 9 and covers 7, the end sheets 14 above referred to which are each in the form of a double sheet presenting a portion 16 which in the finished book is pasted to the inside surface of the adjacent cover 7 to form a lining therefor, and a portion 17 which forms a double page free sheet.

In the binding of such a book, and preliminary to the grouping of the signatures 9 to form the body 8 thereof, the strips 10 are glued along one edge to the back edges of the signatures 9 in position thereon as above stated, and at their other edge to the faces 18 of the portions 16 of the double end sheets 14 at the folded portions 19 thereof as shown in Fig. 5; and preliminary to the stitching of the book the folded end sheets 14 are turned outwardly to the position shown in Fig. 5 to permit of the stitching through the signatures 9 and the portions 11 only of the strips 10 which are applied flatwise thereto.

After stitching, the book is united with a case comprising the covers 7 connected together by the flexible back-edge-forming portion 20 as commonly provided, and the portions 13 of the strips 10 glued to the inside surfaces of the covers 7 and the sheet portions 16 adhered to these surfaces, as for example by pasting, as represented in Fig. 6.

Referring now to the machine shown and provided for stitching the books as above referred to and applying glue to the portions 11 of the strips 10 for adhering them to the sheet portions 17, the machine comprises generally stated a bed 21 along which the books are fed by conveyor mechanism 22, to stitching mechanism 23 from which the stitched books are fed to mechanism 24 for gluing the outer surfaces of the portions 11 of the strips 10 and the exposed stitching.

The conveyor means shown and which operate to feed the books by an intermittent movement, comprise an endless chain 25 supported, and driven, by sprockets 26 and 27 provided on shafts 28 and 29 on the frame of the machine. The chain 25 extends lengthwise of the machine and is provided at intervals with book-feeding lugs 30, shown as in the form of angle irons which project upwardly through a slot 31 in the bed 21, the lugs

30 operating to move the books supplied to the chain between these lugs, through the stitching mechanism 23 and the gluing mechanism 24. At opposite sides of the upper reach of the conveyor chain 25 are stationary guide bars 32 and 33 for the books which extend lengthwise of the chain 25 and are so shaped at their forward ends as shown at 34 and 35, respectively, as to insure the proper guidance of the books into the space between these bars, the edge of the bar 33 against which the back edge of the book bears being spaced from the bed 21 beneath it as by securing this bar to the bed 21 of the machine at a point remote from this edge as represented at 36.

The conveyor chain 25 is driven by power applied to the shaft 28 as from a continuously operating shaft 37 shown as driven by a belt 38 engaging a pulley 39 on the shaft 37. The shaft 37 is provided with a bevel gear 40 meshing with a bevel gear 41 on a shaft 42 which, through the medium of any suitable mechanism contained in the casing 43, produces the desired intermittent rotary motion of the shaft 28. By way of example, the mechanism such as that shown in U. S. Patent No. 1,788,968, granted to R. E. Ackley January 13, 1931, and provided for producing intermittent actuation of an endless book-conveyor element, may be employed for effecting the intermittent drive of the shaft 28 from the shaft 42.

The particular illustrated construction of stitching mechanisms 23 is of the chain stitch sewing machine type which, except as to the features hereinafter described, is of the same construction as the commonly known wax thread type of sewing machine, the mechanism shown comprising, generally stated, a depending reciprocating boring tool 44 which, by way of example and as shown, may be an awl, arranged in vertical alinement with an upwardly extending hook needle 45, the awl in descending, operating to penetrate the work and the needle working 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 the particular construction shown the mechanism for reciprocating the awl 44 is supplemented by mechanism as in the case of the construction shown in said patent whereby the awl, while engaging the books, is caused to rotate therein to thereby reduce the amount of force required to drive the awl through the books. This awl-rotating mechanism being shown in detail in said patent it will be sufficient to state that the rotary member which rotates the awl 44 is represented at 46 and is driven by a belt 47 engaging a pulley 48 on the member 46 and a pulley 49 on the rotor of a motor 50.

As the mechanism for reciprocating the awl and needle in properly timed relation to effect the boring and stitch forming operations is well known, description thereof appears to be unnecessary, it being sufficient to state that these parts are operated by the main drive shaft 51 of the sewing machine shown as driven by a sprocket chain 52 from the drive shaft 37, it being understood that during a portion of the cycle of operation of the stitching machine the awl 44 is raised above, and the needle 45 is lowered below, the upper surface of the bed 21 along which the books to be stitched are advanced beneath, and in engagement with, a vertically reciprocable presser foot 53, as shown in Fig. 3, the presser foot 53, in accordance with machines of the common form above referred to, being reciprocated in timed relation to the needle and awl to engage the books during the operation of the awl and while the needle is moving into the book and be raised to permit of the feed of the books by the conveyor 25 when the awl is in withdrawn position.

The intermittent drive mechanism above referred to for the conveyor 25 is so constructed and timed relative to the operation of the stitching machine proper that the conveyor chain 25 operates to feed the books only during those periods when the awl is in withdrawn position relative to the books and the presser foot 53 is raised.

It may be here stated that in applying the books to the conveyor chain for movement thereby to the stitching mechanism, the end sheets 14 and flap portions 13 are swung outwardly on the grouped signatures 9 into substantially the position shown in Fig. 5, these sheets, with the flap portions 13, lying, respectively, beneath and above the guide bar 33 for the back edge of the grouped signatures the upper end sheet being held down in the position stated by a wire 54 supported by brackets 55 secured to a stationary part of the machine. The end sheets and the portions 13 of the strips 10 secured thereto thus extend to one side of the stitching mechanism to avoid stitching therethrough in the movement of the book through the stitching mechanism.

The gluing mechanism 23 comprises a lower glue-applying rotatable disk 56 and an upper rotatable glue-applying disk 57 disposed at opposite faces of the book adjacent its back edge in the plane of the stitching 12.

The lower disk 56, peripherally grooved at 58, extends into the glue in a pot 59 and is fixed on a shaft 60 rotated by a sprocket chain 61 driven by the shaft 37.

The upper disk 57, also peripherally grooved at 62 and having a chamfered peripheral edge at which it opposes the book, is fixed on a shaft 63 journaled on the frame of the machine in inclined position, as shown, the shaft 63 being driven by the shaft 60 through the medium of meshing bevel gears 64 and 65. The glue is fed to the periphery of the disk 57 from a pot 66 by means of a disk 67 extending into the pot and fixed on a shaft 68 driven by the shaft 63 through bevel gears 69 and 70, the disk 67 being disposed at an angle to the disk 57 and extending at its periphery, chamfered, as indicated at 71, sufficiently close to the periphery of the disk 57 to continuously deliver glue to the latter in the rotation of these disks.

The books stitched and glued as stated, are delivered by the conveyor chain 25 to endless conveyor belts 72 mounted on pulleys those at only one end thereof being shown at 73, the pulleys 73 being fixed on a shaft 74 shown as driven by a sprocket chain 75 mounted on sprockets on the shafts 28 and 74.

After the books have been stitched and glued as stated the end-sheets 14 are swung forwardly to overlie the opposite faces of the book and adhere the portions 17 of the end sheets to the glue on the portions 11 of the strips 10, pressure to effect the proper adherence being applied in any suitable way, and the books then united with the case, comprising the covers 7, as above referred to.

While I have illustrated and described a particular construction of machine involving my invention and a particular construction of book to be bound thereby, I do not wish to be understood as intending to limit the invention thereto, as the

machine shown may be variously modified and altered and be used in the binding of books of other constructions without departing from the spirit of my invention.

As illustrative of variations in the construction of books which may be bound by my improved machine, the end sheets 14 may be provided as single sheets either to form free sheets or liners only for the covers, or end sheets omitted entirely.

Furthermore the covers, if desired, may be secured to the flap portions 13 of the strips 10, whether or not end sheets are used, either before or after assembling of the strips with the body portion of the book preliminary to stitching. While I have shown the stitching means as in the form of a sewing machine, I do not wish to be understood as intending to so limit the invention as other kinds of stitching may be provided, as for example in the form of staples, to apply which any desirable construction of machine may be employed.

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

1. A book-stitching machine comprising a support for the book to be stitched, a positioning member for engagement by the back edge of the book, said positioning member having a forward portion spaced from said support to permit passage of a member of said book extending rearwardly from the back edge of the book, and means for stitching the book.

2. A book-stitching machine comprising a support for the book to be stitched, a positioning member for engagement by the back edge of the book, said positioning member having a forward portion spaced from said support to permit passage of a member of said book extending rearwardly from the back edge of the book, means for stitching the book, and means for feeding the book along said member to said first-named means.

3. A book-stitching machine comprising a support for the book to be stitched, a positioning member for engagement by the back edge of the book, said positioning member having a forward portion spaced from said support to permit passage, at opposite sides of said positioning member, of members of said book extending rearwardly, respectively, from the opposite margins of the back edge of the book, and means for stitching the book.

4. A book-stitching machine comprising a support for the book to be stitched, a positioning member for engagement by the back edge of the book, said positioning member having a forward portion spaced from said support to permit passage of a member of said book extending rearwardly from the back edge of the book, means for stitching the book, and means for applying an adhesive to a face of the book at the stitching, said positioning member extending substantially continuously between the stitching and adhesive-applying means.

5. A book-stitching machine comprising a support for the book to be stitched, a positioning member for engagement by the back edge of the book, said positioning member having a forward portion spaced from said support to permit passage of a member of said book extending rearwardly from the back edge of the book, means for stitching the book, means for applying an adhesive to a face of the book at the stitching, and means for feeding the book successively to said first and second named means, said positioning member extending substantially continuously between the stitching and adhesive-applying means.

6. A book-stitching machine comprising a support for the book to be stitched, a positioning member for engagement by the back edge of the book, said positioning member having a forward portion spaced from said support to permit passage of a member of said book extending rearwardly from the back edge of the book, means for forming holes in the book, means for stitching through said holes, and means for applying adhesive to a face of the book at the stitching to anchor the stitching, said positioning member extending substantially continuously between the stitching and adhesive-applying means.

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