March 16, 1954 W. R. STEIN ET AL 2,671,912

BOOKBINDING

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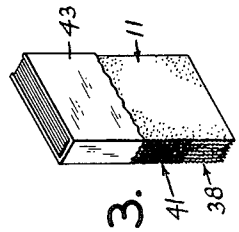


FIG. 3.

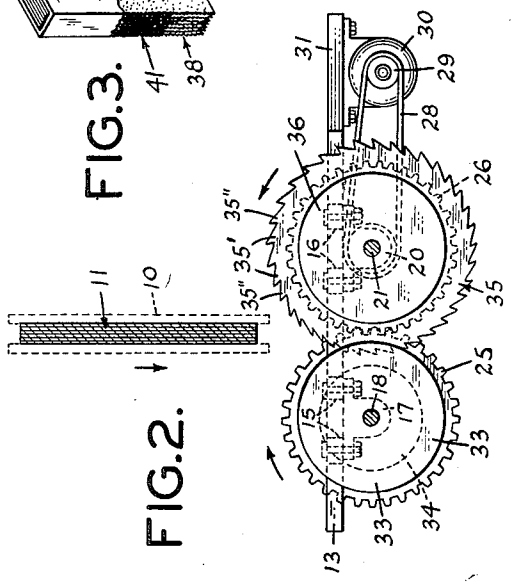


FIG. 2.

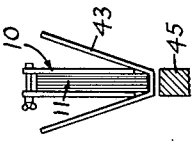


FIG. 8.

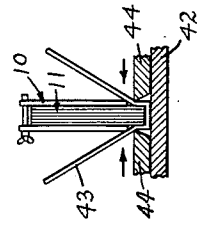


FIG. 7.

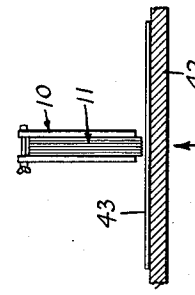


FIG. 6.

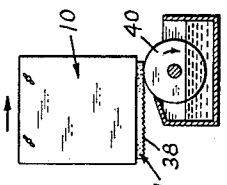


FIG. 5.

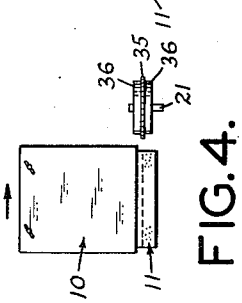


FIG. 4.

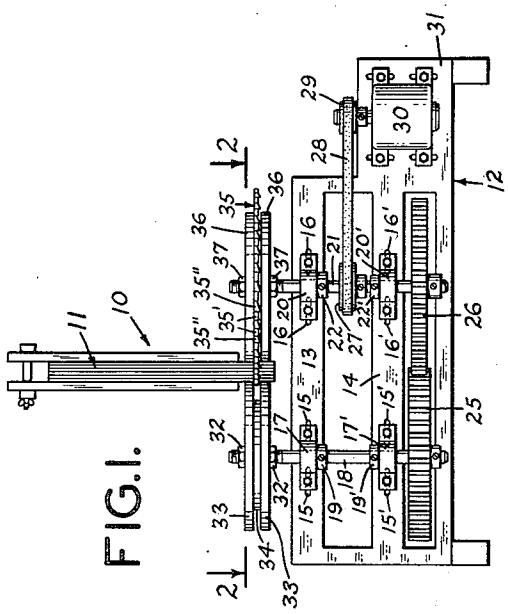


FIG. 1.

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BOOKBINDING

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3 Claims. (Cl. 11—1)

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This invention relates to the art of binding books or similar publications, and its principal object is to provide an improved method of manufacturing to accomplish a strong, square bind without the aid of stitches, slits, backings, etc.

Other objects of the invention as well as the advantages thereof, will appear from the following description when read in connection with the accompanying drawings, in which Fig. 1 is an elevational view of the means for preparing the pages of the book to be secured together; Fig. 2 is a plan view of the parts shown in Fig. 1; Fig. 3 is a perspective view of a book made in accordance with the invention and partly in section to show its construction more clearly, and Figs. 4 to 8 are schematic views illustrating the several process steps of the invention; Fig. 4 indicating the station at which the mechanism of Figs. 1 and 2 is located; Fig. 5 indicating the gluing step; Fig. 6 illustrating the attachment of the cover to the glued sheets of the book; Fig. 7 illustrating the manner in which the cover is clamped to the book and Fig. 8 illustrating the maner in which the bound edge of the book is squared.

In the drawings, the numeral 10 designates generally, one of a series of clamps of the usual construction provided on a horizontal conveyor for continuously moving books along a predetermined path on a bookbinding machine. The book 11 supported by the clamp 10 consists of any number of signatures or sheets which are to be bound together. As is shown in Fig. 1 of the drawings, the book 11 is adjustably positioned in the clamp 10 so that the side thereof to be bound projects or depends a predetermined distance below the bottom edges of the two plates of the clamp. In the case of folios or signatures, the binding edges of the same will so project below the clamp. In the travel of the conveyor, each clamp with a book so supported thereby, moves in a successive fashion over mechanism (see Fig. 4) for preparing the books for the gluing step (Fig. 5). As is shown more clearly in Figs. 1 and 2 of the drawings, such mechanism includes a bracket 12 which is secured in any suitable manner to the frame of the binding machine, so that it extends transversely below the path of movement or travel of the clamps 10 and the books 11 supported thereby. The bracket 12 is formed to provide two horizontal vertically-spaced bracket arms 13 and 14 having pairs of horizontally disposed elongated slots designated 15, 15', 16 and 16'; the pair of slots 15 in arm 13 being vertically aligned with respect to the pair of slots 15' in arm 14 and the pair of slots 16 in arm 13 being vertically aligned with respect to the pair of slots 16' in arm 14. Adjustably secured to the arms 13 and 14 through slots 15 and 15', as by bolts, are a pair of aligned bearing straps or hangers 17, 17' which rotatably receive a vertical shaft 18. The shaft 18 is rotatably and adjustably supported on the hangers 17, 17' through collars 19, 19' which are adjustably secured to shaft 18 intermediate such hangers. In a similar fashion, a pair of hangers or bearing straps 20, 20' are adjustably secured to the bracket arms 13 and 14 through slots 16, 16', and such straps serve as bearing supports for the vertical shaft 21 which is supported thereon through the collars 22, 22' adjustably secured to shaft 21. Connected to the lower end of shaft 18 is a gear wheel 25 which is in mesh with a gear wheel 26 provided on the lower end of shaft 21. Secured to shaft 21 intermediate the collars 22, 22' is a pulley 27 which supports one end of a drive belt 23 connected at its other end to a pulley 29 provided on the drive shaft of a motor 30. The motor 30 is adjustably mounted on an extension 31 of bracket 12.

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It will be understood from the foregoing that the vertical shafts 18 and 21 are rotatably mounted on bracket 12 so that they may be adjusted in either a vertical or horizontal direction; the teeth of gears 25 and 26 being formed so that a slight horizontal adjustment of such shafts may be obtained without disrupting their driving connection. The shafts 18 and 19 are continuously driven through the gears 25, 26, shaft 21, pulley 27, belt 28, pulley 29 and motor 30 during the operation of the machine; the arrangement being such that shaft 18 is driven in a clockwise direction and shaft 21 in a counterclockwise direction, as viewed in Fig. 2 of the drawings.

Adjustably secured to the upper threaded end of shaft 18 as by locknuts 32, 32, are two spaced discs 33, 33, which are maintained in spaced relation on shaft 18 by an intermediate disc 34 of lesser diameter. The discs 33, 33 may be from 1/8" to 1/4" thick or any other desirable thickness. The intermediate disc or spacer 34 which has a diameter of approximately one inch less than the diameter of discs 33, 33 has a thickness which is slightly greater than the thickness of the outer peripheral edge of a blade 35 which projects into the space formed by the three discs 33, 33 and 34 as is shown more clearly in Fig. 1 of the drawings. Spacer 34 may be varied depending upon the thickness of the size of blade 35 used in processing any particular thickness of

book and the three discs if desired, may be bolted firmly together to make a rigid, unitary female for the peripheral edge of the blade. The blade **35** is mounted on the upper end of shaft **21** between a pair of discs **36, 36**; the blade and discs being adjustably secured to the threaded end of such shaft by suitable locknuts **37, 37**. The discs **36, 36** are preferably of the same thickness as the discs **33, 33** and are aligned with the latter, so that they will cooperate to keep the book steady during the cutting action of the blade **35**. The circular blade **35** has straight teeth **35'** contained in the plane of the blade and alternately arranged with teeth **35''** which are set to one side only, so that they incline downwardly and outwardly when the blade is positioned on shaft **21**, as viewed in Fig. 1. The teeth are roughly sharpened so that they do not cut through a stack of sheets with a clean cut.

The above described parts are adjusted for the thickness of the books to be bound so that the spacing between the peripheral edges of discs **33, 33** and discs **36, 36** is approximately the same as the thickness of such books, but slightly less than the latter so that such edges are just snug against the sides of the books as the books are moved therebetween by the conveyor. Thus, the discs will exert a slight steadying pressure on the sides of the portion of the book projecting below its supporting clamp during the cutting operation. As the conveyor successively moves the books **11** of signatures or sheets supported by the clamps **10** between the discs **33, 33** and **36, 36**, the teeth of blade **35** which move in the direction of feed of the books will cut or trim off the lower ends of such books. The cut may be varied so as to cut off from $\frac{1}{16}$ of an inch, or greater from the books. As a result of the cutting action of blade **35**, the binding edges of the folios or signatures will be cut open and the individual sheets will be roughened in a haphazard manner to provide loose fibers and jagged portions so that the cut end of the book presents a frayed appearance, such as shown in the portion of the book designated generally by the numeral **38** in Fig. 3 of the drawings. The fibers and jagged portions thus produced on the closely superimposed sheets under pressure, are not all individualized, but are in major portion intertangled and hooked together.

The clamps **10** pass from the above described mechanism directly to a gluing device to move the cut books without disturbing the sheets thereof over a glue roller **40** (note Fig. 5), which applies a coating of suitable binding glue to such roughened cut edges of the book. The glue is heated so that it is free flowing and readily penetrates into the spaces between the loosened fibers and jagged portions to enclose the same. As a result of this step, the fuzzy fibers and jagged portions will be embedded in glue and such glue will reach but not go substantially beyond the solid parts of the sheets. The appearance of the frayed fibers and pieces of the sheets when embedded in glue is shown in the book portion designated generally by the numeral **41** in Fig. 3 of the drawings.

From the glue roller, the clamps **10** in their travel, bring the glued books successively over a vertically movable plate **42** upon which the book covers **43** are fed (note Fig. 6 of the drawings, which figure as well as Figs. 7 and 8 show the parts transverse to the line of travel of the clamps for the sake of clearness). As a book moves into proper position over plate **42**, the latter is actuated upwardly to press the central portion of the cover blank **43** into engagement with the glued binding edge of the book. At the next station of the machine, two plates **44, 44** are moved in as shown in Fig. 7 of the drawings to fold and clamp the sides of the cover to the book. Finally, a plate **45** is moved upwardly to square the bound edge of the book. At the end of these operations the finished book is discharged from its supporting clamp **10**.

While we have hereinabove described and illustrated a preferred form of the invention, it will be apparent to those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or the scope of the appended claims.

We claim:

1. A bookbinding machine comprising movable means for clamping a book of sheets so as to leave exposed in depending relation the edge portion thereof to be bound, a vertically disposed shaft arranged on each side of the path of travel of such exposed edge portion, a circular blade secured to one of said shafts and extending across said path of travel between the lower edge of such edge portion and said clamping means, said blade having alternately offset, roughly sharpened teeth capable of forming a cut edge on such edge portion having separated fibers and jagged portions interentangled and hooked together to an extent as to fasten the cut edges of such sheets together, discs mounted on said shaft above and below said blade and cooperating to rigidify the latter, disc-shaped female means mounted on said other vertical shaft and having an annular groove into which the peripheral edge of said blade extends, the annular peripheral sides of said means above and below said groove being in alignment with the peripheral edge portions of said discs and said sides and edge portions coacting to apply a holding pressure on the edge portion passing therebetween, means for rotating said blade shaft in the same direction as the direction of travel of said book clamps, and means for applying sufficient glue to embed the interlocked fibers and jagged portions and to reach but not extend substantially beyond the solid portions of the sheets.

2. A bookbinding machine comprising movable means for clamping a book of sheets so as to leave exposed a substantial part of the edge portion thereof to be bound and movable along a predetermined path, a circular blade having an axis of rotation offset from such path so that the peripheral edge portion of such blade extends transversely across the path of travel of such exposed book part and located between the outer edge of said book part and said clamping means, said blade having alternately offset, roughly-sharpened teeth capable of forming a cut edge on such book part having separated fibers and jagged paper portions inter-entangled and hooked together to an extent as to fasten the cut edges of such sheets together, means for rotating said circular blade in the same direction as the travel of said clamping means, coacting means progressively engaging both sides of such exposed book part and on at least the side of said blade adjacent said clamping means in the travel of such book part and coacting to maintain the sheets thereof in consolidated condition during the cutting action of said blade, and means for applying sufficient glue to embed the interlocked fibers and jagged portions and

to reach, but not extend substantially, beyond the solid portions of the sheets.

3. A bookbinding machine comprising movable means for clamping a book of sheets so as to leave exposed a substantial part of the edge portion thereof to be bound and movable along a predetermined path, a saw blade constructed and arranged to have its toothed edge portion extend across the path of travel of such exposed book part and located between the outer edge of such book part and said clamping means, said blade having teeth capable of forming a cut edge on such book part having separated fibers and jagged paper portions interentangled and hooked together to an extent as to fasten the cut edges of such sheets together, means for moving said blade so that in its cutting action the teeth thereof are moving in substantially the same direction as the direction of movement of said clamping means, coacting means progressively engaging both sides of such exposed book part

and on at least the side of said saw blade adjacent said clamping means in the travel of such book part and coacting to maintain the sheets thereof in consolidated condition during the cutting action of said blade, and means for applying sufficient glue to embed the interlocked fibers and jagged portions and to reach, but not extend, substantially beyond the solid portions of the sheets.

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