April 7, 1953 L. J. B. R. FRENCH 2,633,582

BOOKBINDING

Filed Dec. 15, 1949 2 SHEETS—SHEET 1

FIG. 1.

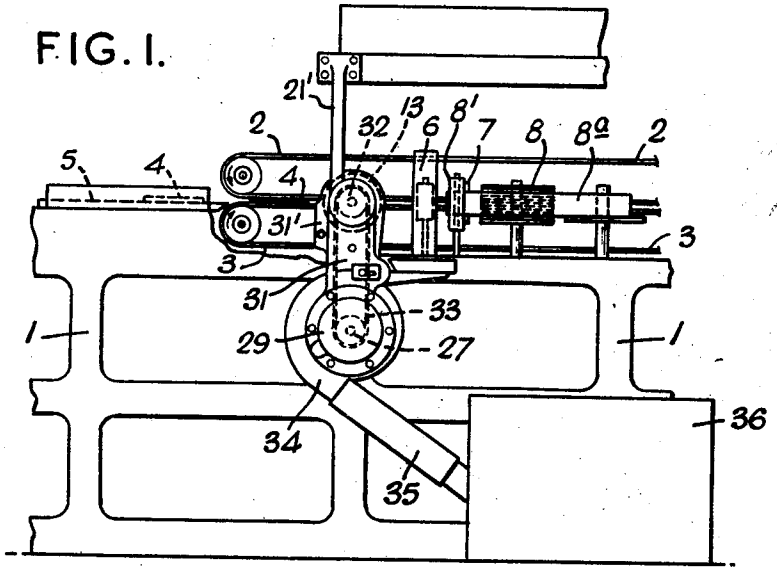


FIG. 2.

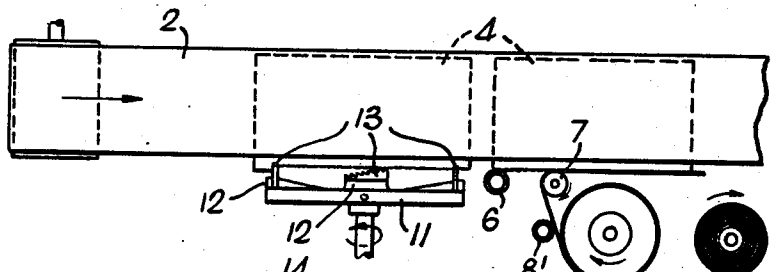
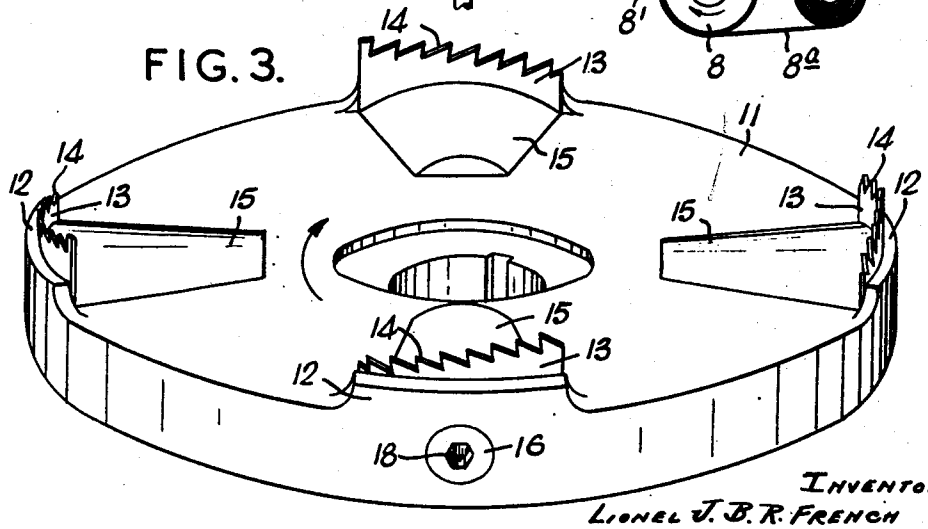


FIG. 3.



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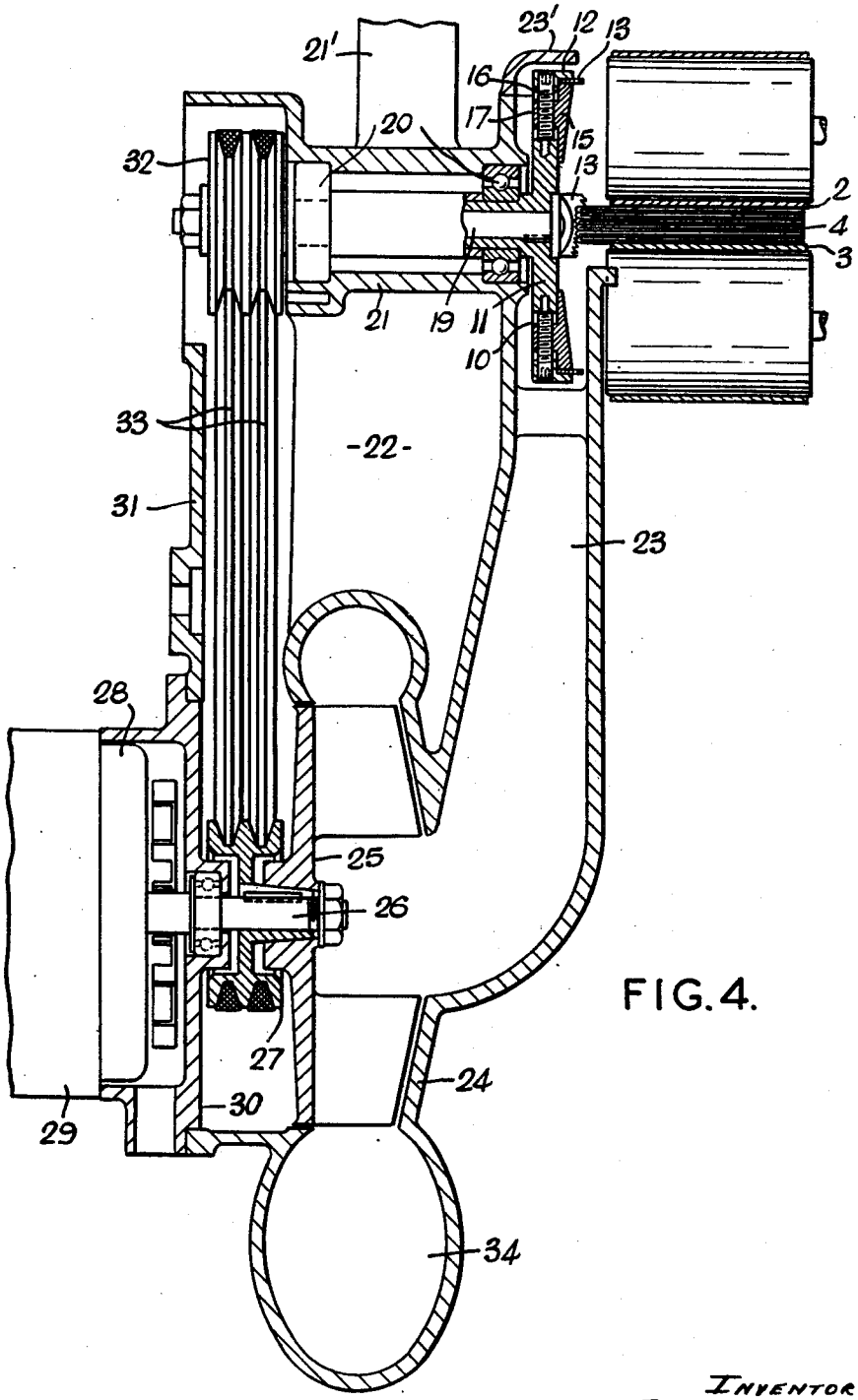


FIG. 4.

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2,633,582

BOOK BINDING

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2 Claims. (Cl. 11—1)

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This invention relates to the binding of unsewn books, e. g. paper-wrappered novels and like book productions of the cheaper type. One object of the present invention is to ensure that the glue which is applied to the back of the assembly of sheets to comprise the book very intimately amalgamates with the back edges of the paper to obtain a firm attachment of every page in the finished book without unsightly extrusion of the glue over exposed marginal portions of the sheets adjacent the back edge, and also without noticeable irregular binding together of sheets at such marginal parts. Another object of the present invention is to provide an attachment for ready adaptation to existing machines used in book-binding, one particular form of machine to which the present invention is conveniently adaptable being a well known form of book-binding machine usually applied to sewn books. Hence, by means of the present invention it is possible to make use of existing machinery with very little adaptation, and thereby effect considerable economy in maintenance and actual work and equipment. A still further object of the present invention is to provide a compact and easily manufactured means for appropriately trimming the back edges of the book and which can be operated at very low power consumption and readily attached to and removed from an existing book-binding machine.

As is well known the usual type of cased book consists of a number of sections folded together, and each sewn through with two or more loops of thread which serve to hold the inner sheets of each section together when the folded edges are trimmed off in the final operation. As the sewing of the sections is a somewhat slow and costly process, it has been the custom with cheap books to omit the sewing and prepare the back suitably for a coat of glue which will hold the sheets firmly enough to provide a short life expected from this type of book.

The method of producing unsewn bound books according to the present invention comprises feeding the unbound work translatively to a back gluing stage and subjecting the back edge of each piece of work during its movement of translation to said stage to a rapid succession of material-biting-away actions to remove the material to a depth sufficient to completely destroy back folds, and progressively increasing the depth of bite of each biting away action to completely fibrillate the back edge of the work.

By means of the present invention the back

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edge of each book is fibrillated as distinct from being clean-cut or clean cut and then slightly roughened, and then the books are coated on their back edges with glue and the back lining then applied.

This fibrillating of the back edges of the book prior to glueing ensures a very intimate application of the glue to the back edges and a consequent finish to the book which obviates the necessity of nipping or smashing of the dried glue.

The means for preparing the backs of the books for glueing, according to the present invention, comprises a rotor, a plurality of spaced apart sets of saw teeth carried by and projecting forwardly from said rotor to traverse the back edges of the work substantially diametrically relative to the rotor in a plane beyond which the teeth project from the rotor, the teeth of each set progressively increasing from the leading tooth to the rearmost or trailing end tooth for the amount they project forwardly from said rotor beyond said plane.

In order that the invention may be clearly understood and readily carried into effect, drawings are appended hereto illustrating an embodiment thereof, and wherein,

Figure 1 is a somewhat diagrammatic broken front elevation view showing the invention adapted to an existing well known book-binding machine.

Figure 2 is a somewhat diagrammatic broken plan view showing the action of the saw-toothed cutting means on the back of the work.

Figure 3 is a detail perspective view to a larger scale showing a suitable form of saw-toothed cutter, and

Figure 4 is a sectional elevation looking endwise of the work and showing details of the back cutting or trimming unit suitable for adaptation to an existing book-binding machine.

Referring to the drawings, in Figure 1 the frame of an existing book-binding machine intended normally for use in the binding of sewn books is indicated by the reference numeral 1, and a part of this machine is a pair of endless conveyors 2 and 3 between the opposite tracks of which are conveyed the successive assemblies of sections forming the books to be bound, each complete set of sections being indicated by the reference numeral 4, the work being fed to the conveyors along any suitable existing guiding means 5.

The books 4 are conveyed by the conveyor belt 2 and 3 past a known form of back gluer indi-

cated diagrammatically by the reference numeral 6 and comprising a sprayer and a rotary brush, and then carried into engagement with means, indicated diagrammatically at 7 which glues and attaches the lining strips to the work, in which a thin paper strip 8a can be applied to the backs of the work and turned slightly over on to the endpapers of the work. This lining can be pleated along its length by the known form of pleating mechansim indicated generally by the reference numeral 8. A glue spray 8' is provided to coat the strip 8a. This pleating if adopted, would normally be effected prior to turning the lining over the endpapers. Following this operation the book can be trimmed leaving the lining flush with the head tail of the work, a subsequent stage in the operation being the rounding and backing of the work.

An important feature of the present invention is that, instead of the work being sewn through its sections prior to receiving the glue at the stage 6, its back edge is fibrillated simultaneously with the removal of the necessary depth of the folds at the back of the work to expose as free edges all of the pages of each book, the work thereupon being passed over the glueing device 6, at which stage the paper at the back edge of the book is fibrillated as to ensure adequate penetration of the glue to key the loose sheets together.

The means for removing to the necessary depth the material from the folds of the work 4 before the work enters the glueing stage comprises the assembly shown more in detail in Figure 4 and which is readily adapted for attachment to the machine frame 1, the distinctive feature of this unit being the form of rotary cutter indicated generally by the reference numeral 10, a suitable construction of this cutter being shown in Figure 3. The cutter 10 comprises a disc 11 formed with four or other convenient number of equi-angularly spaced relatively shallow segmental or arcuate webs 12 which act as abutments for a number of strips of saw toothed elements 13 each having saw teeth 14 which, as shown in Figure 3, are progressively stepped upwards from the leading end of each strip, the arrow shown in Figures 2 and 3 indicating the direction of rotation of the disc 11 to give an indication as to which is the leading end of each strip. Each saw toothed element 13 is firmly gripped in position between the appropriate arcuate abutments 12 and the arcuate outer end of one of a number of segmental grippers 15 fitted flush against the appropriate face of the disc 11 and urged against the relevant strips 13 by feed screws 16 (see Figure 4) threaded through nuts in the form of lugs 17 integral with and projecting from the grippers 15. The feed screws 16 can be operated by a tool inserted in hexagonal recesses 18 in the exposed outer ends of the screws which are substantially flush with the periphery of the disc 11.

The disc 11 is fixed on a shaft 19 carried in suitable bearings 20 in a sleeve 21 formed integral with a web 22 and a substantially vertical duct 23 which is flared or progressively increased in diameter downwardly where it joins a housing 24 receiving a fan 25 to induce a draught in the duct 23 sufficient to remove from the operative zone of the rotary cutter the fibres removed from the work 4, it being seen that the upper or mouth end of this duct 23 is shaped to partly accommodate the lower portions of the

disc 11, and carrying a shroud 23' to screen the rotor 10.

The fan 25 is mounted on a shaft 26 carrying a grooved pulley 27 and driven by a fractional horse power electric motor 28 accommodated in a housing 29 fixed to an annular cap 30 fixed in an opening formed in the lower part of a front wall 31 which is shaped at its upper end to enclose a pulley 32 fixed to the shaft 19, a pair of V belts 33 being passed over the V grooved pulleys 27 and 32.

A bracket 21' is extended upwards from the sleeve 21 to secure the unit containing the cutter to an overhead part of the machine, and a lateral bracket 31' is formed in the wall 31 to secure the unit to a lower frame of the machine.

The rotary cutter 10 is driven at a very high speed and by arranging the saw toothed members 13 in substantially the manner shown in Figure 3 and causing the work 4 to be fed by the belt 2 and 3 so that the backs are in a vertical plane substantially co-planar with the plane of rotation of the leading ends of the saw toothed members 13, it will be apparent that not only is the back of the work cut away due to the substantially relatively perpendicular displacement of the work to the individual blades 13 but it is fibrillated due to the progressively changing bite of the teeth 14 into the back of the work. That is to say the folded edges of the section of each book are in effect clawed or bitten away by the downwardly and upwardly moving saw toothed members 13, this reverse operation of the members 13 counteracting any tendency of the pages of the work being deflected uni-laterally relative to the body of the book.

It will be appreciated that the action of the saw toothed members 13 is to remove material from the back of the book to a depth corresponding to the complete overhang of the deeper end of each saw tooth member 13 relative to the work, the bite of the teeth into the back edge of the book in a direction substantially perpendicular to such edge serving to uniformly roughen the back so that it is in a proper condition for the intimate reception of the glue which is applied as the work leaves the cutter 10 by the back gluer 6.

The fibres removed by the cutter are extracted along the duct 23 by the action of the fan 25 and conveyed along an outlet 34 and duct 35 to a receptacle 36.

I claim:

1. In a book binding machine a pair of substantially horizontal endless conveyors with opposed tracks between which the work is gripped and conveyed through the machine from a feed in end to a discharge end, a glue applicator which applies glue to the exposed back edges of the work gripped between the said opposed tracks, a rotor between the feed-in end and the glue applicator, a horizontal shaft carrying the rotor and with its axis normal to the plane of the back edges of the work, a shroud surrounding the periphery of the rotor, a plurality of spaced apart distinctive sets of teeth projecting in directions substantially parallel with said axis from one face of the rotor near its periphery to operate upon the work, the teeth of each set progressively increasing in their depth of projection from the rotor from the leading tooth to the trailing tooth of each set up to a maximum depth of penetration into the work at least equal to that required to destroy completely back folds,

an opening in the side of the shroud opposed to the conveyors partly exposing the rotor, and a suction conduit extending to and joining said shroud so that the suction inlet is the said opening in the said shroud.

2. In a book binding machine a pair of substantially horizontal endless conveyors with opposed tracks between which the work is gripped and conveyed through the machine from a feed in end to a discharge end, a glue applicator which applies glue to the exposed back edges of the work gripped between the said opposed tracks, a rotor between the feed-in end and the glue applicator, a horizontal shaft carrying the rotor and with its axis normal to the plane of the back edges of the work, a shroud surrounding the periphery of the rotor, a plurality of spaced apart distinctive sets of teeth projecting in directions substantially parallel with said axis from one face of the rotor near its periphery to operate upon the work, the teeth of each set including a first tooth which is of lesser depth of projection from

the rotor than the remainder of the teeth, the greatest depth of projection of a tooth from the rotor being sufficient to provide a depth of penetration into the work at least equal to that required to destroy completely back folds, an opening in the side of the shroud opposed to the conveyors partly exposing the rotor, and a suction conduit extending to and joining said shroud so that the suction inlet is the said opening in the said shroud.

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RUSHENT FRENCH.

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