May 22, 1956 H. SIEB 2,746,879

BOOK GLUING METHOD AND MEANS

Filed Aug. 25, 1953 3 Sheets-Sheet 1

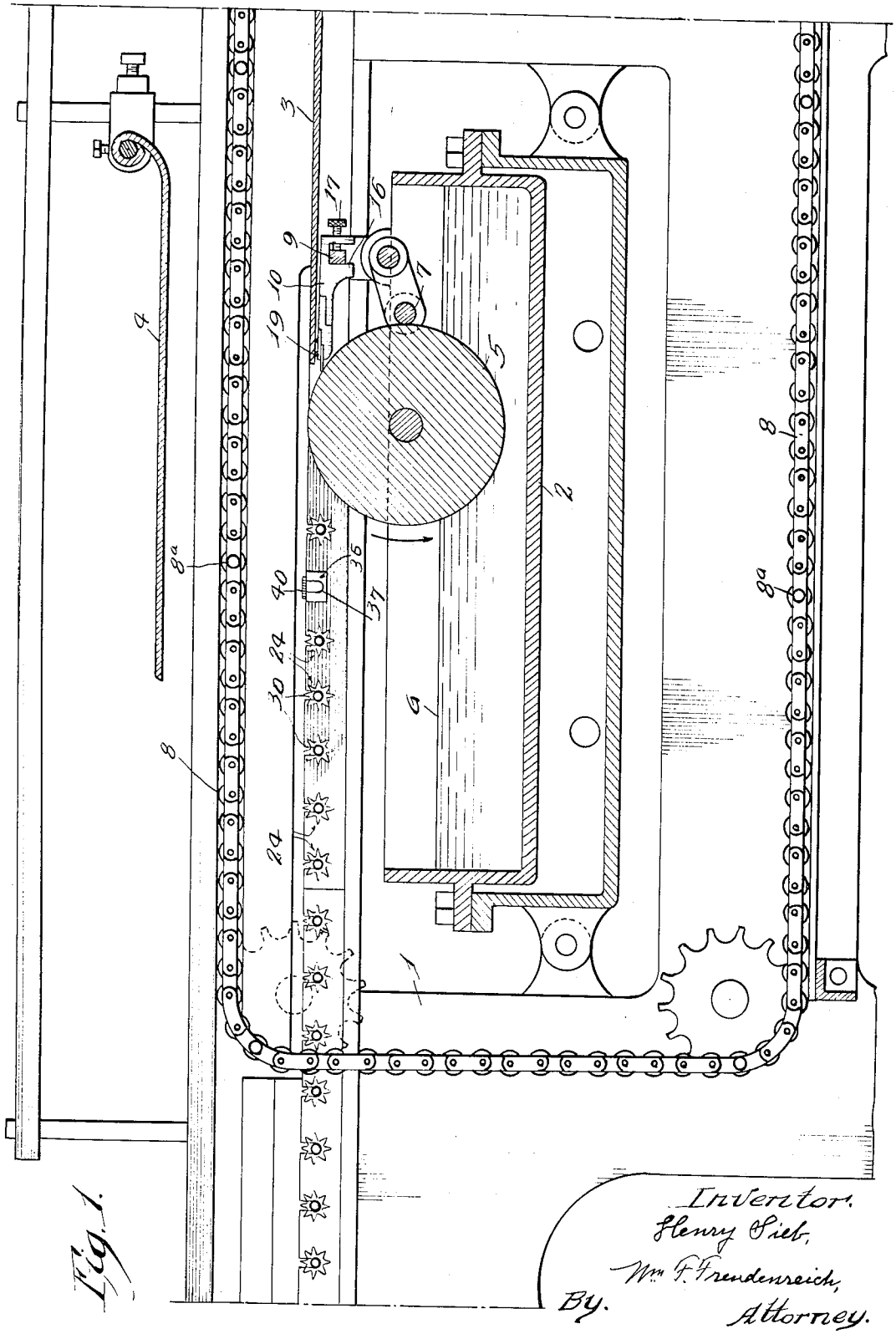


Fig. 1.

Inventor.
Henry Sieb,
Wm F. Frendenreich,
By. Attorney.

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BOOK GLUING METHOD AND MEANS

Filed Aug. 25, 1953 3 Sheets-Sheet 2

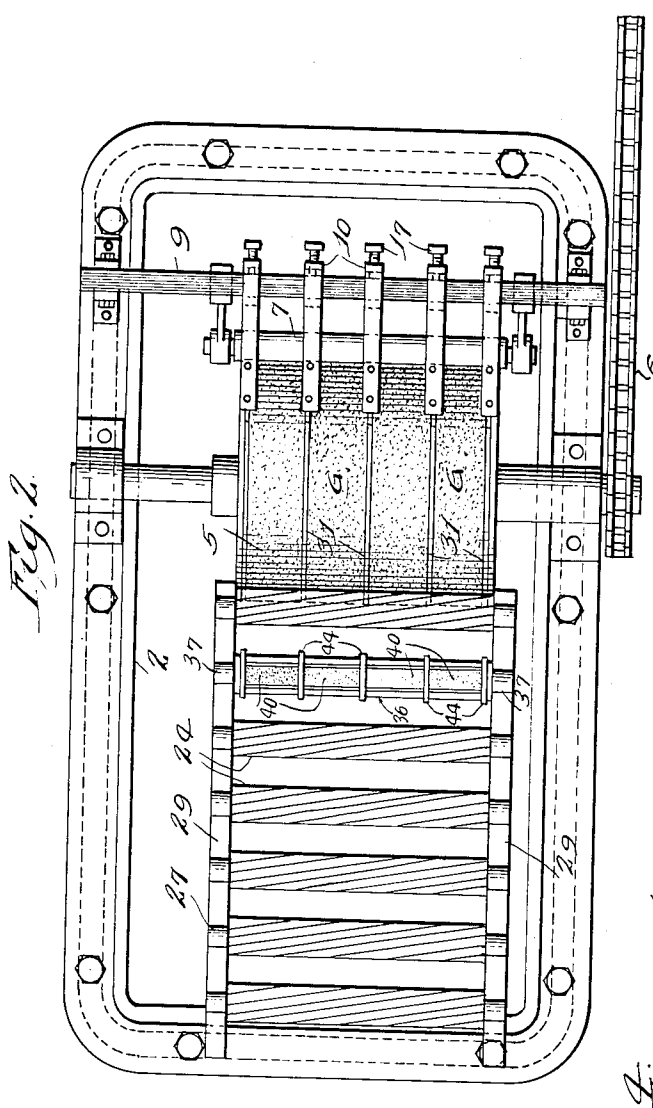


Fig. 2.

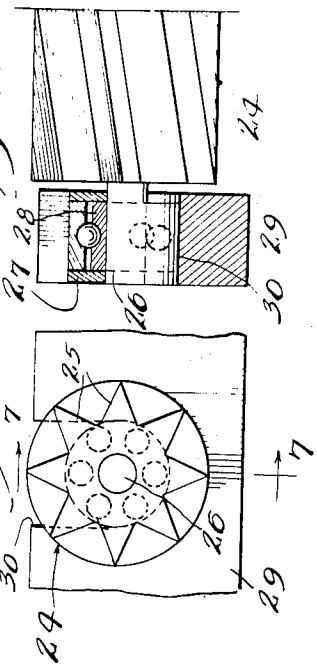


Fig. 7.

Fig. 6.

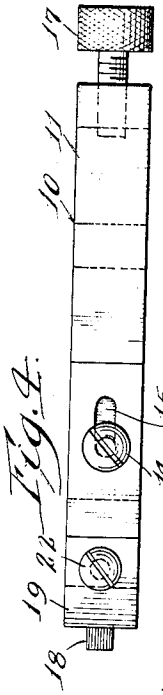


Fig. 4.

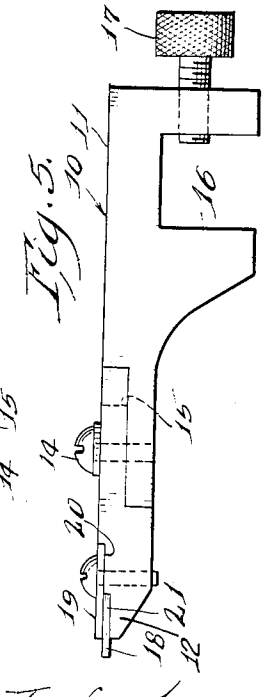


Fig. 5.

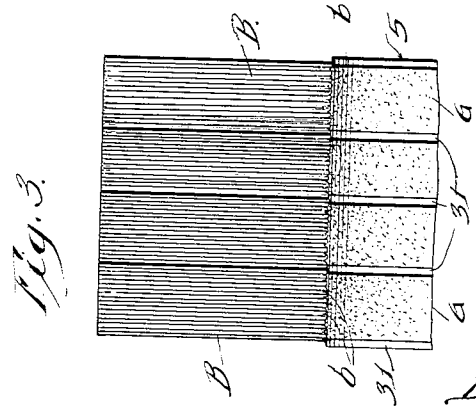


Fig. 3.

Inventor.
Henry Sieb,
By Wm. F. Freudenreich,
Attorney.

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BOOK GLUING METHOD AND MEANS

Filed Aug. 25, 1953 3 Sheets-Sheet 3

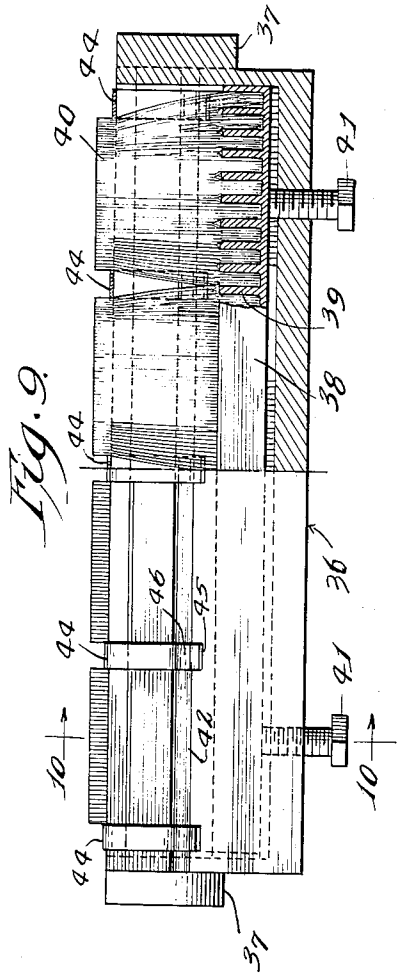


Fig. 9.

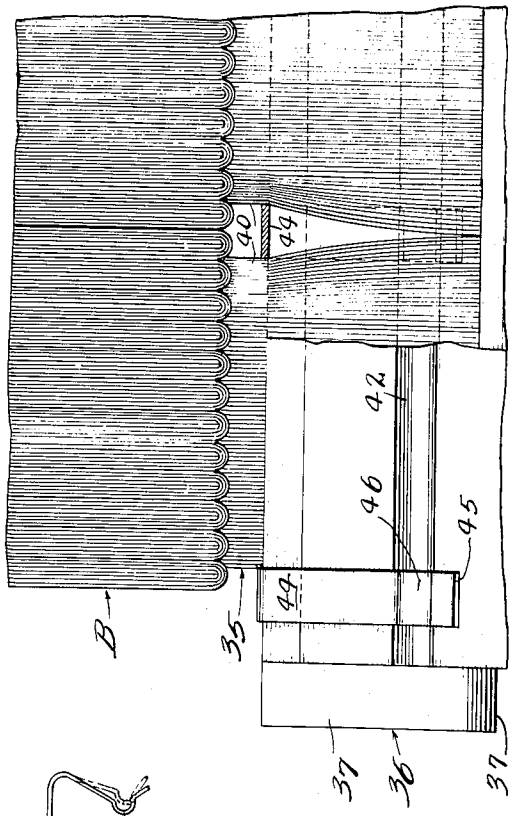


Fig. 12.

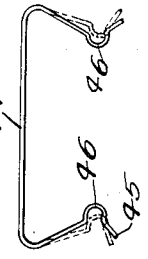


Fig. 11.

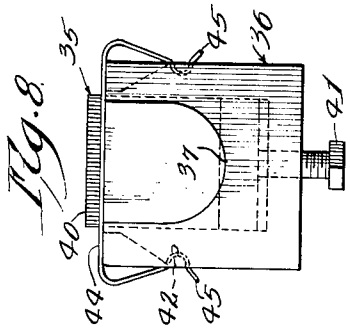


Fig. 8.

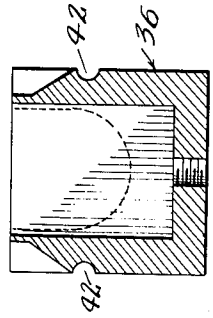


Fig. 10.

Inventor.
Henry Sieb,
By. Wm F. Freudenreich,
Attorney.

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2,746,879

BOOK GLUING METHOD AND MEANS

Henry Sieb, Hammond, Ind.

Application August 25, 1953, Serial No. 376,367

17 Claims. (Cl. 117—44)

In the manufacture of books having hard covers, glue must be applied to the back edges of the books and be allowed to dry before the covers are added. The conventional book is composed of a plurality of sections stitched together, giving the rear edge a corduroy effect. Furthermore, each conventional book contains blank sheets at opposite sides, known as "end sheets"; these being glued to the inner sides of the covers in the process of completing the book.

Books may receive their glue coatings one at a time, but the more efficient and less costly way is to place the glue on a group of books at the same time; the number in each group depending mainly on the thickness of the books and the usable length of the roller which transfers the glue to the books.

When books are treated in groups serious difficulties are encountered. Books are stacked to allow the glue to dry. Where a group of books, standing on edge and arranged side by side, travel over a glue-coated roller, the gluing effect is the same as though the group constituted a single thick book. Namely, glue enters not only the valleys in the ribbed rear edge of each book but also enters the valleys registering with the planes of contact between the books. Therefore, unless the books in each group are separated before the glue is permitted to dry, they will remain glued together after the glue has become dry.

Books that remain glued to each other must be torn apart before covers can be applied. This not only involves costly labor but, when the bond between two books is anything but a light one, the "end sheets" are torn in the separating process.

Heretofore the only alternative to the separating process just described, has been to employ men or women to take each group of books as it leaves the glue-applying machine and reform it into one wherein glue coated edges alternate with bare edges; this being done by stacking the books one at a time in alternately reversed positions, so as to separate all glued edges from each other by means of intervening bare edges. This manual "reversing" of the books is a costly procedure.

Another problem in book gluing is that of preserving the integrity of the glue coatings after the books pass beyond the glue-applying roller. To this end the books have sometimes been allowed to travel over a bed of light, idle rollers on their way to the discharge point. This practice has the fault that, as such rollers have heretofore been constructed, they remove more or less glue from the book edges and soon become ineffective.

The present invention has for its objects to solve the aforesaid problems in a simple manner, to effect a great saving in labor costs, avoid all danger of damage to end sheets, and to ensure that books, when dried, will have thereon, in proper condition, the glue originally applied thereto.

In carrying out my invention I may use any conventional glue-applying roller but, after a glue coating has been created on the roller, I scrape off the glue in those

regions which thereafter register with the valleys between adjacent books in a group passing over the roller. By scraping in this manner, just before the books contact the scraped surface, the glue does not have time to flow into the cleared space from opposite sides, before contact is made with the books.

In order to avoid disturbance of the glue coating on the books as they travel beyond the glue-applying roller, I employ little book supporting rollers that are star shaped in cross section, so that only sharp edges contact the books. And, in addition, these small rollers are mounted in such a manner that they may easily be driven, without slippage, by books moving across the same; the mounting also permitting the rollers themselves to be removed and replaced quickly and without effort.

It is often desirable to apply an excessive amount of glue to books. In such cases considerable glue drips from the books while they are moving to the discharge point. Enough glue may run down on the aforesaid improved supporting rollers to cause some flow along the rollers and into the areas that were intentionally left without any glue coating.

A further object of the present invention is to permit the practice of excessive glue application to be followed without encountering the difficulties just mentioned as being inherent in that practice.

In carrying out this feature of my invention I make use of a unique type of brush which forces the glue up between the sections of each book and wipes off excess glue, without causing any glue to enter between adjacent books.

The various features of novelty whereby the present invention is characterized will hereinafter be pointed out with particularity in the claims, but, for a full understanding of the invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawings, wherein:

Figure 1 is a vertical, longitudinal section through a machine similar to that disclosed in my Patent No. 2,169,114, modified in accordance with the present invention;

Fig. 2 is a top plan view of the glue applying means and the adjacent idle rollers that receive books from the glue applying rollers;

Fig. 3 is a view showing fragments of the glue applying roller and four books receiving glue from the latter;

Fig. 4 is a top plan view, on an enlarged scale, of one of the scrapers for scraping circumferential, narrow bands of glue from the glue applying roller;

Fig. 5 is a side view of the scraper shown in Fig. 4;

Fig. 6 is an end view, also on an enlarged scale, of one of the small book supporting rollers, together with a fragment of one of the rails in which the ends of these rollers are mounted;

Fig. 7 is a section on line 7—7 of Fig. 6, with the roller proper shown in elevation;

Fig. 8 is an end view of the brush for removing surplus glue from books, mounted in the holder therefor;

Fig. 9 is a side elevation of the brush and its holder, parts being broken away to show in section portions of both the brush and the holder;

Fig. 10 is a section on line 10—10 of Fig. 9, showing only the holder;

Fig. 11 is an edge view of one of the spring clips for creating gaps in the brush, the broken lines indicating the partially spread condition when engaged with the brush holder; and

Fig. 12 is a view showing, on a larger scale, a portion of the brush and its holder in contact with books that are passing beyond the glue applying roller.

The present invention is adapted for use in both

small hand operated machines and in large automatic power driven machines. The present invention is not concerned with the general structure of such machines; but, by way of example, there is illustrated in Fig. 1 the gluing and discharge end of the machine disclosed in the aforesaid patent, modified in accordance with the present invention. In this machine there is a main frame structure **1**, in which is mounted a glue pot **2**. The frame structure is open at the top, a horizontal bed or table **3** serving to support a group of books until they reach the glue pot. Above the bed or table is a long resilient member **4** adapted to rest on top of a group of books while on the table and for at least a part of their journey across the glue pot. In the glue pot is a large transverse roller **5** that dips into glue G in the pot. The top of this roller is in the plane of the upper surface of the bed or table **4** which extends well over the roller, so that books may slide off the bed or table onto the roller without being raised or lowered. Roller **5** is provided with a sprocket and chain drive **6**, shown only in Fig. 2, so as to rotate in the counterclockwise direction as viewed in Fig. 1. Engaged with the rising face of roller **5**, at a level no higher than the axis of the latter, is a scraping roller **7**, of small diameter, to determine the thickness of the layer or coating of glue carried up by the main roller. Groups of books, standing on edge and side by side, are moved along the table and across and beyond the glue pot by an endless ladderlike conveyor **8**; the rungs **8a** of the ladder extending crosswise of the machine and engaging the books at a level higher than the table and lower than member **4**.

The first feature of the present invention constitutes an addition to the old apparatus just decribed.

The present application is a continuation in part of my prior application bearing the same title, Ser. No. 361,895, and filed June 16, 1953, now abandoned.

It will be seen (Figs. 1 and 2) that there is supported, not far from the under side of table **3**, a stationary square cross bar **9**. On this bar are detachably mounted a plurality of finger-like holders **10** for small scraper elements. Each holder is shown as being composed of two main sections, **11** and **12**, slidably connected for adjusting the length of the holder. The two sections may be locked against relative movements by a screw **14** that extends into section **11** through a slot **15** in section **12**. Section **11** has at its free end an open jaw **16** that embraces bar **9** on three sides. A set screw **17**, extending through one arm of the jaw, is adapted to engage this bar to fix the holder to the latter.

At the tip of section **12** of each holder is a second, smaller jaw in which is gripped a small scraping element **18**. This second jaw is shown as being simply a two step configuration on the upper side of the holder, together with a clamping plate **19** resting on the upper step **20** and overlying the scraping element resting on the lower step **21**. Plate **19** is held down by a screw **22** passing through the same into section **12**.

Scraping element **18** should be of softer material than that of which the glue applying roller **5** is made, so as not to mar the surface of the roller. Ordinarily, scraping elements that are somewhat flexible and resilient (rubber, for example, is quite satisfactory) are preferable to devices that are rigid. The width of the free end of the scraper should be about as great or slightly greater than the distance between the points of contact of two book sections and roller **5**; each book B in Fig. 3 being shown as containing five sections *b*. A width of about three sixteenths of an inch will ordinarily suffice.

The holders are so positioned that the scraping elements touch the glue-applying roller near the top of the latter, only a short distance from the line along which books engage with the roller.

In my aforesaid patent the books pass onto a series of little transverse idle rollers to the discharge point. Although these rollers are knurled so as not to wipe too much glue off the books, they are not wholly satisfactory and quickly cover themselves with glue. The second feature of my invention provides means to overcome the defects in the functioning of these supporting rollers and makes it easy to maintain them in perfect working condition with very little effort.

I still use book supporting idle rollers but the new rollers **24** are provided with high ribs **25** on their peripheries to create deep valleys between the same. These ribs are arranged spirally of the rollers, in the manner of multiple screw threads; whereby all jarring action on the books passing over them is avoided. The number of ribs may be varied, eight ribs being shown on each roller to give the latter, in cross section, the configuration of an eight-pointed star. The ribs have sharp ridges and are about one quarter of an inch high. On the ends of the rollers are trunnions **26**. On these trunnions are cylindrical ball bearing assemblies **27**, the inner rotatable sleeve elements **28** of which are lightly held in place on the trunnions by friction.

The rollers are supported by rails **29** extending lengthwise of the machine, the bearing units or assemblies being simply set into open bearings **30** in the upper edges of these rails. Only a light touch is needed to turn the rollers, thereby insuring that the rollers offer no appreciable resistance to rotation as the books pass over them; but rotate freely without tending to scrape glue off the books.

Because of the spiral disposition of the ribs the support for the books is as even as though the rollers were plain cylinders while, at the same time, line contact along sharp ridges is maintained.

To prepare the machine for operation, the scraper holders **10** are adjusted on the supporting bar **9** so that the spacing between longitudinal axes conforms to the spacings of the planes of contact between the books in a group which is to be handled as a unit; and the holders are locked in these adjusted positions. There should be one more scraper than there are books. In Fig. 3, for example, there are four books, and so five scrapers should be used, as in Fig. 2, to create the five bands **31** shown in Fig. 3.

With the holders adjusted so that the little scraping tabs or lips **18** bear properly against the glue-applying roller **5**, and the machine in motion: roller **5** picks up a glue coating G^1 in the usual way, and as it revolves, scrapers **18** clear off the glue in a manner to leave bare narrow bands **31** extending circumferentially around the roller. These bands register with the planes of contact between the books and with the corresponding planes containing the outermost sides of the books in each group. Therefore no glue is applied to any book at what may be termed a joint between two books in side contact with each other, whether they be part of one of the aforesaid groups or be contacting books between two such groups placed in stack for, for example.

Because the scraping off the glue takes place only a short distance from the line of contact between roller **5** and the books resting on the same, no opportunity is given the glue to flow onto the bared surface of the roller from opposite sides of the bands. Consequently there is no danger of any glue reaching surfaces on the books that could cause the books to become bonded to each other.

No change in the condition of the books occurs as they pass out of the glue-receiving zone and to the delivery point, provided that the glue coating is very thin. This is due to the fact that there can be no smearing of the glue on the books by the little supporting rollers **24**; the books having only line contact with the sharp edges of the ribs on these rollers, and the only movements of these rollers being caused by the books. These rollers offer no appreciable resistance to rotation and therefore,

as soon as one of the sharp edges of a rib contacts a book, it travels along with the book until, finally, it swings down and away from the book. Thus the books reach the discharge point with their glue coatings in a virgin state and with the areas that were left uncoated remaining uncoated.

When glue is applied so thickly that dripping of glue from the books occurs as the books move on, it is customary to use a brush to wipe off the xcess glue. However, the conventional brush would destroy the advantage resulting from scraping the glue from the glue roller in band-like, circumferential areas, since the brush would spread the glue over the areas that had been left uncoated.

In accordance with the present invention I make it possible to brush off excess glue without spreading any into the cusps or crevices between meeting books.

The preferred construction is one wherein a long brush **35** is set detachably into a trough-like holder **36** having at its ends bosses **37** adapted to fit into the seats **30** in the roller-supporting rails **29**. In the arrangement shown, one of the group of rollers **24**, namely the second roller from the glue roller is omitted and the brush holder is substituted therefor.

The brush comprises a thick, slab-like back **38** containing holes **39** in which the lower ends of clusters of long bristles **40** are seated and anchored in any conventional or suitable way. The back of the brush may rest on the bottom wall of the holder or on screws **41** extending up through such wall for the purpose of adjusting the brush in the vertical direction. The bristles project only a short distance above the top of the holder so as to act in the stiff manner of short bristles, although they are actually long and flexible. When the free standing portions of the bristles are an inch long, for example, they need not project more than an eighth of an inch above the holder.

It will be seen that holder **36** has on the long vertical sides, near their upper edges, grooves **42** that extend throughout the length of the holder. These grooves serve to interlock with the holder bristle spreading devices for creating in the brush gaps aligned with the scrapers on the opposite side of the glue roller. These bristle spreading devices are conveniently clips **44**, composed of flat strips of spring metal or other suitable material, bent into U shapes; the arms of the U converging toward their free ends and then being bent to create outwardly-projecting finger pieces **45** united with the main portions of the arms by little inwardly facing lugs **46**. The grooves **42** are shown as being semi-cylindrical in cross section and the lugs as being semicircular so as to fit nicely into the grooves.

Just as the scrapers can be adjusted relative to each other lengthwise of the glue roller, so can also the bristle spreaders. In other words, the brush proper presents a face of uniform texture, without the presence of the clips. However, a clip may be inserted crosswise of the brush between any two transverse rows of bristle clusters or clumps. The clip forms a gap between two such rows and, since it has a frictional grip on the holder, this gap may be maintained indefinitely. Should the gap thus formed be out of line with a scraper with which it is to be aligned, the clip need only be shifted along the holder until the proper setting is achieved. Because the clips engage the long, flexible bristles near their upper ends, they offer little resistance to such shifting of the clip and do not endanger the security of the grip of the clip on the holder. In other words, a clip need not be inserted at the precise point which it is to occupy, but only near such point, after which the final, close adjustment may be made.

As many clips as there are scrapers are applied to the brush in the manner just described, each being aligned with one of the scrapers. Then, when the machine is in operation, the brush engages only the glue coated areas

of the books, without in any way affecting the areas to which no glue was applied by the glue roller.

The brush may be lifted out of its holder and the holder may be lifted from the seats in the supporting rails for cleaning, replacement and repairs.

Similarly the rollers **24** may be lifted out, along with their roller bearings and, if it be desired to wash these rollers, they may be dropped into a bath after the roller bearing units have been slipped off.

I claim:

1. The improvement in the method of applying glue to the back edges of books by passing a group of them, standing on edge and arranged side by side, over a rotating roller that carries a transferable glue coating, which consists in scraping the surface of the roller clear of glue along narrow circumferential bands, registering with the planes of contact between the books, before the books contact the roller.

2. The improvement in the method of applying glue to the back edges of books by passing a group of them, standing on edge and arranged side by side, over a rotating roller, which consists in coating the roller with liquid glue, then scraping the surface of the roller clear of glue along narrow circumferential bands with spacing between them slightly less than the thickness of a book, and then passing the group of books over and in contact with the roller with the planes of contact between books registering with said bands.

3. The improvement in the method of applying glue to the back edges of books by passing a group of them, standing on edge and arranged side by side, over a rotating roller, which consists in coating the roller with liquid glue, scraping the surface of the roller, as the latter revolves, clear of glue along narrow circumferential bands with spacing between them slightly less than the thickness of a book, and passing the successive groups of books over and in contact with the roller while the sides of the individual books lie in planes that register with said bands.

4. The improvement in the method of applying glue to the back edges of books by passing a group of them, standing on edge and arranged side by side, over a rotating roller that carries a transferable glue coating, which consists in scraping the surface of the roller clear of glue along narrow circumferential bands, registering with the planes of contact between the books, before the books contact the roller and, immediately after the glue has been applied to the books, brushing the glue into only the crevices in the glue coated areas of the books and at the same time brushing off excess glue.

5. In a machine for applying glue to the back edges of books, a rotary roller for applying glue to such edges of a group of books standing on edge and side by side, means to keep the surface of the roller clear of glue along the line of contact between the roller and the books throughout narrow circumferential bands positioned to register with the planes in which the sides of the individual books travel, and means to move such group of books positively across and in contact with the rollers, with said bands and planes in registration as aforesaid.

6. In a machine for applying glue to the back edges of books, a rotary glue applying roller for transferring glue to such edges in a group of books moved across the same while standing on edge and side by side, means positively to move a group of books, standing on edge and side by side, crosswise of the axis of the roller and in contact with the top of the latter, means progressively to scrape the roller clear of glue along narrow circumferential bands so located as to register with the planes in which the sides of the individual books travel, said means being so located that no portion of any such band makes contact with the books until it has been scraped clean, and brush means in position to engage only the glue coated areas on the books, upon leaving the roller, to brush the glue into crevices in the individual books that lie within said areas and brush off excess glue.

7. In a machine for applying glue to the back edges of books, a rotary roller for applying glue to such edges of a group of books standing on edge and side by side, means to keep the surface of the roller clear of glue along the line of contact between the roller and the books throughout narrow circumferential bands positioned to register with the planes in which the sides of the individual books travel, and a support, comprising a series of small parallel rollers, to receive the glued books, the last mentioned rollers being star-shaped in cross section and being mounted on ball bearings.

8. A book gluing machine having glue pot, a rotatable glue applying roller in said pot, means to regulate the thickness of a uniform coating of glue carried upward on the rising side of the roller, a series of scrapers distributed along the roller above said means in position to scrape the glue off the roller along narrow bands extending around the roller, and a brush in position to engage the glued book edges after they leave the roller, such brush containing gaps aligned with the scrapers.

9. A support for books standing on edge, moving lengthwise and having wet glue on the edges in contact with the support: that includes parallel rails having open-top seats in the upper edges, and roller devices spanning the distance between said rails and resting at their ends in said seats; each roller device consisting of a roller, spirally ribbed and star-shaped in cross section and having a trunnion at each end, together with roller bearing assemblies surrounding the trunnions and each having at the center a sleeve that is rotatable relatively to the exterior part of the assembly and is lightly held on the corresponding trunnion by friction.

10. In a machine for applying glue to the back edges of books, a rotary glue applying roller for transferring glue to such edges in a group of books moved across the same while standing on edge and side by side: the improvement which consists in means progressively to scrape the roller clear of glue along narrow circumferential bands so located as to register with the planes in which the sides of the individual books travel, said means being so located that no portion of any such band makes contact with the books until it has been scraped clean, a brush in position to engage the glue-coated edges of the books as they leave the roller, together with means to form gaps in the brush where said planes intersect the same.

11. In a book gluing machine, a glue pot, a rotatable glue applying roller in said pot, means to regulate the thickness of a uniform layer of glue carried upward on the rising side of the roller, means above the aforesaid means to scrape the glue from the roller along narrow circumferential bands spaced at any desired distance apart, a brush extending lengthwise of the roller on the opposite side thereof in position to engage the under edges of books leaving the roller, the brush comprising a mass of upright bristles, and detachable bristle spreaders adapted to be pressed into the brush to form gaps in the same in registration with said bands.

12. In a book gluing machine, a glue pot, a rotatable glue applying roller in said pot, means to regulate the thickness of a uniform layer of glue carried upward on the rising side of the roller, means above the aforesaid means to scrape the glue from the roller along narrow circumferential bands, and a brush on the opposite side of and parallel to the roller to engage the glue coated book edges; said brush containing gaps registering with said bands on the roller.

13. A glue spreading device for use in a machine for applying glue to the back edges of groups of books, consisting of a brush sufficiently long to engage the back edges of all the books in a group, the brush comprising a mass of bristles, a holder in which the brush is seated and above which the bristles project, said holder having an exterior shoulder on and extending lengthwise of each of the two opposed long sides thereof, and bristle-spreaders adapted to be pressed between the bristles transversely of the length of the holder to divide the protruding part of the brush into a plurality of sections distributed lengthwise of the holder in spaced relation to each other, said bristle spreaders being spring clips each having elements adapted to snap into interlocking engagement with said shoulders, to hold the clips in place while permitting them to be shifted short distances lengthwise of the shoulders.

14. A glue spreading device for use in a machine for applying glue to the back edges of all the books in a group, comprising a deep trough-shaped holder, a brush composed of a stiff back set loosely in the bottom of the holder and a mass of bristles anchored at their lower ends in said back, the parts being so proportioned that about one eighth of the length of the free standing portions of the bristles extend above the top of the holder, spring clips in the form of an inverted U adapted to be pressed down through the bristles, while arranged crosswise of the holder to rest on and grip the holder, the holder having on the exterior of each long side a groove extending lengthwise thereof, and the clips having lugs thereon that enter and are slidable along the grooves.

15. A glue spreading device for use in a machine for applying glue to the back edges of all the books in a group, comprising a deep, trough-shaped holder, a brush composed of a stiff back loosely set in the bottom of the holder and a mass of bristles anchored at their lower ends in said back, the parts being so proportioned that about one eighth of the length of the free standing portions of the bristles extend above the top of the holder, spring clips in the form of an inverted U adapted to be pressed down through the bristles, while arranged crosswise of the holder, to rest on and grip the holder, and screws extending up through the bottom of the holder to adjust the brush in the vertical direction.

16. The improvement in the method of applying glue to the back edges of books by passing them, standing on edge, over a rotating roller, which consists in coating the roller with liquid glue, scraping the roller, as the latter revolves, clear of glue along narrow circumferential bands with the spacing between them slightly less than the thickness of one of the books, passing the books over and in contact with the roller while the sides of the books lie in planes that register with said bands, and brushing the books in only those areas that bear glue, to force the glue into the crevices between the sections of each book.

17. In a book gluing machine, a glue pot, a rotatable glue applying roller in said pot, means to regulate the thickness of a uniform layer of glue carried by the rising side of the roller, means above the aforesaid means to scrape the glue from the roller along narrow circumferential bands spaced at any desired distance apart, means to move books standing on edge over said roller with the sides in planes registering with said bands, and means on the side of the roller opposite that on which the scraper means is located to brush only the glue coated area of each book as it leaves the roller.

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2,161,187	Mueller	June 6, 1939
2,169,114	Sieb	June 6, 1939
2,209,045	Witte	July 23, 1940
2,614,523	Havemann et al.	Oct. 21, 1952