

Sept. 29, 1942.

J. S. CARLSON

2,296,906

MACHINE FOR LINING THE BACKS OF BOOKS

Filed April 4, 1941

3 Sheets-Sheet 1

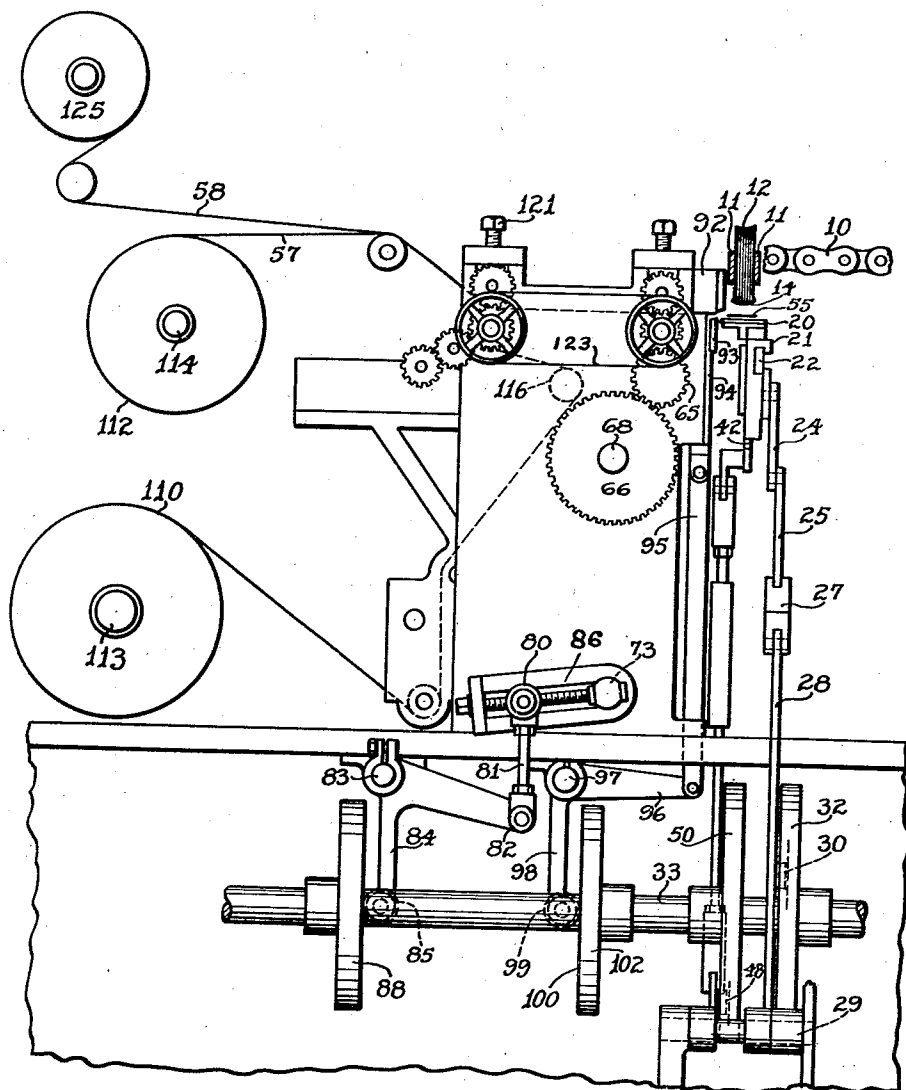


Fig. 1.

Witness
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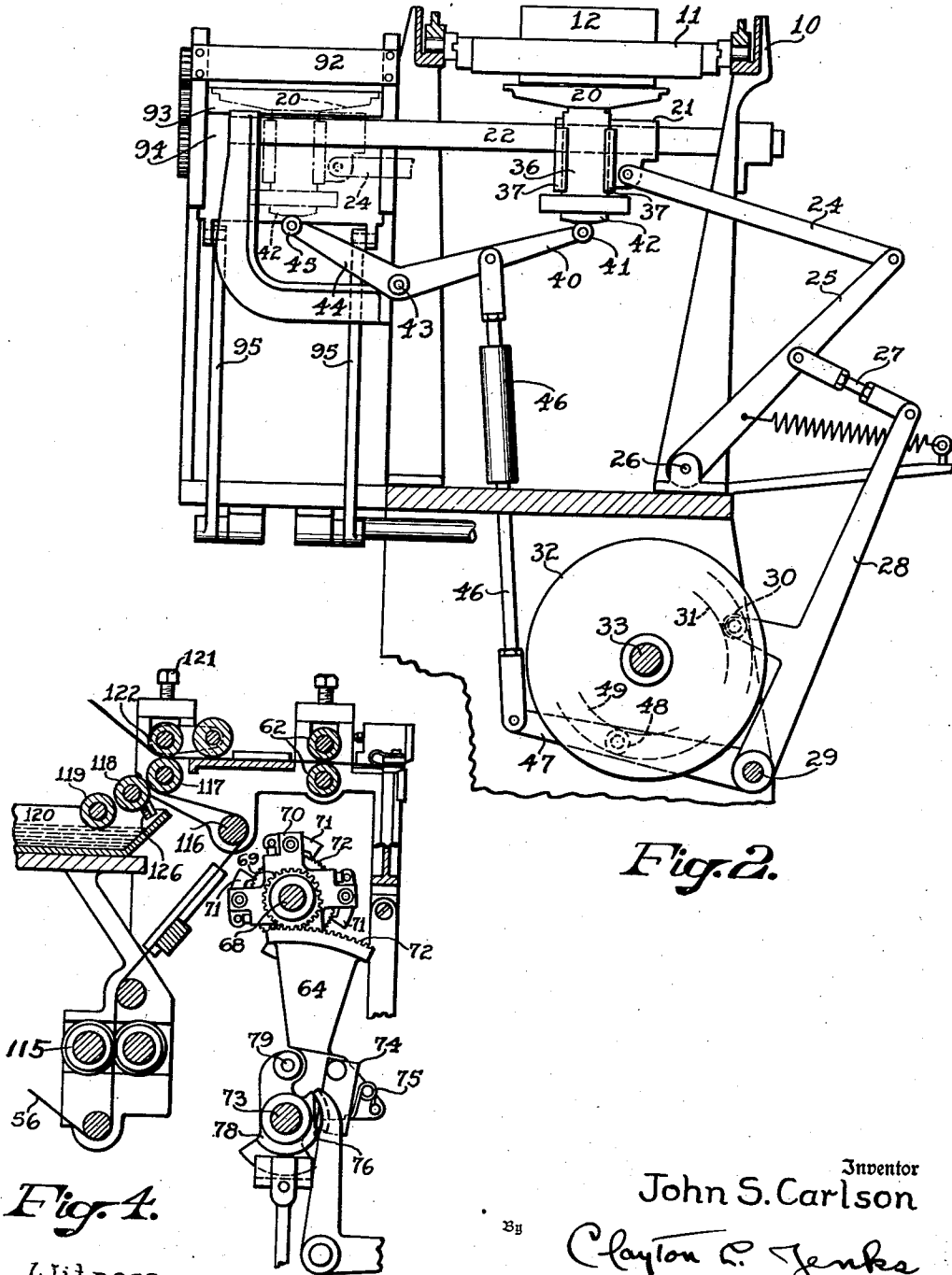


Fig. 2.

Fig. 4.

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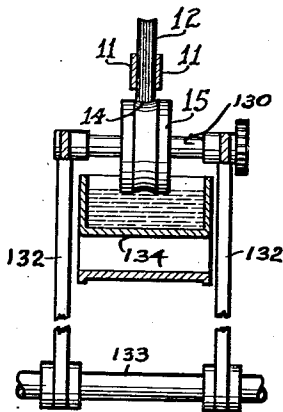


Fig. 7.

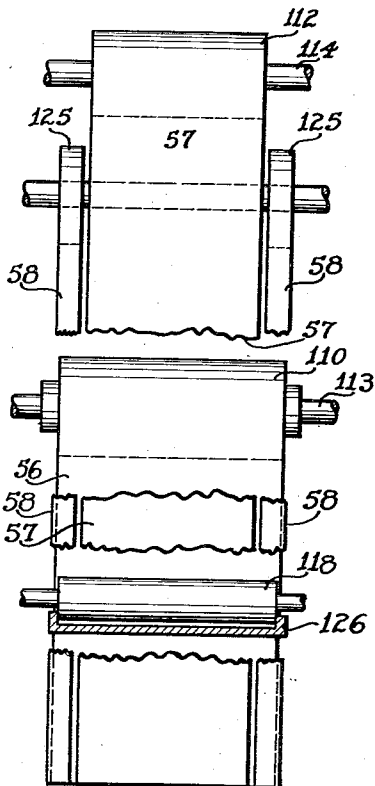


Fig. 3.

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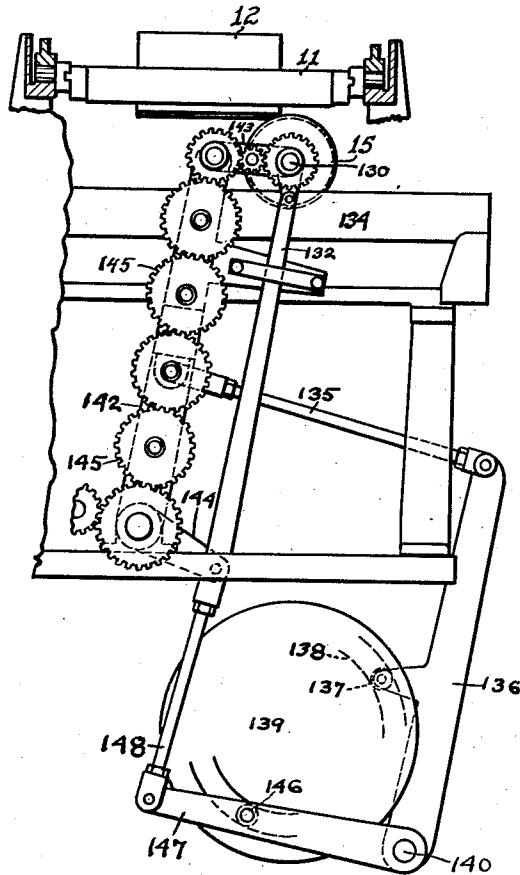


Fig. 6.

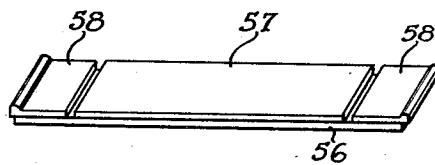


Fig. 5.

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UNITED STATES PATENT OFFICE

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MACHINE FOR LINING THE BACKS OF BOOKS

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Application April 4, 1941, Serial No. 386,908

3 Claims. (Cl. 11-1)

This invention relates to a machine for lining the backs of books and more particularly to a machine in which the assembled and stitched signatures are passed successively from station to station and strips of cloth and paper are glued on their backs for the purpose of attaching the covers thereto.

A standard machine in use for lining the back of a book prior to placing the cover thereon is shown in the U. S. patent to Schramm and Clark No. 1,824,506 of September 22, 1931. That machine is so constructed and arranged that the assembled and stitched book signatures, herein termed a book, are held in spring pressed clamps on an endless chain carrier and are transported intermittently from station to station where the various steps of applying glue, cloth, paper and head bands are carried on in a coordinated sequence. Each of these books is held with its back exposed downwardly for the application of adhesive thereto, after which a strip of crash or other suitable cloth is applied to the adhesive. A second strip of cloth may be similarly applied on top of the first. Thereafter further adhesive is applied to the exposed crash strip and a strip of paper back lining, which may have head bands applied thereto, is glued to the back of the book. The book is then transported to further stations where rollers rub the back lining into position; and ultimately this partially completed book is delivered to a conveyer at the exit end of the machine. This machine is capable of applying two strips of crash and one strip of paper.

It, however, is frequently necessary to apply a second strip of paper to the book back, and for this purpose the book, after removal from the lining machine, has to be handled manually for the application of glue and a paper strip, together with the necessary steps required for forcing the paper into position. It, in particular, is necessary that all of the back linings be applied to the book before the glue has set and while it is in a green stage. These manual operations have been laborious and slow and have involved a considerable expense at that stage of the book manufacture. Moreover, any attempt at rebuilding the machine to add another series of stations for applying this strip of paper would materially lengthen the machine and greatly increase its cost because of the several operations required for this purpose. These operations include not only the application of the glue and the paper but also the provision of intervals of time during which the previously applied adhesive may partially set before the next lining may be applied and before the lining may be rolled or pressed into position. This rolling step involves the use of several rollers which act successively. Of these, one is wet with water

so as to apply a little moisture to the back lining after which a dry roll is run over the back to complete the pressing operation. If two paper strips were applied in this manner, a considerable time interval would have to be provided between these two lining steps to allow the moisture to dry and the adhesive to set partially. It, therefore, has not been considered feasible to duplicate the paper lining operation in this type of machine.

The primary object of this invention is to overcome such difficulties and to provide a machine of the type shown in said patent in which two or more strips of paper lining may be applied to the back of the partially completed book.

A further object is to apply a plurality of paper strips to the book back at a single station of the machine.

A further object is to glue together two or more strips of paper, with or without head bands, and to apply a strip of the assembled parts to the back of a book at a single station so that the book parts may be then subjected to a single series of pressing operations for securing the assembled strips in place. Further objects will be apparent in the following disclosure.

In accordance with my invention, I have provided a branch line mechanism which may be employed in cooperation with the primary or main line mechanism of a back lining machine of the type shown in said patent and which is so constructed and arranged that the machine may be used to apply one lining as heretofore done or to apply a plurality of linings with or without the head bands. Reference is to be had to said patent for a full description of this machine, and the various constructional features and principles thereof may be employed in my machine except as modified in accordance with the following disclosure. This invention may, however, be incorporated in other types of machines to which it is applicable, as will be readily understood.

The drawings show the constructional features of the machine of said patent in the twelfth station where the paper lining is applied to the depending back of the book; and in these drawings:

Fig. 1 is a fragmentary side elevation of a portion of that station of the book lining machine which serves for the application of a paper lining to the book;

Fig. 2 is a transverse section through the same portion of the machine;

Fig. 3 is a somewhat diagrammatic view of the supports for the two paper strips, the head bands and their supply rolls;

Fig. 4 is a sectional view of the paper feeding rolls and their actuating mechanism;

Fig. 5 is a perspective view of the assembled

lining strip formed of two pieces of paper and two head bands;

Fig. 6 is a detail showing the mechanism for applying glue to the back of the book; and

Fig. 7 is a sectional view of the glue roller and associated parts.

In this machine, the primary mechanism comprises an intermittently moved chain conveyor 10 which has spring pressed clamping plates 11 arranged to grip the books when automatically presented thereto from an elevator mechanism. The clamping plates hold the books with their backs projecting downwardly below the plates and freely exposed for the successive operations of applying the linings thereto. Adhesive may be applied to the back 14 of each book by means of rollers 15 and suitable associated mechanism, such as shown in Fig. 7 and crash or other suitable cloth may be applied to the backs of the books. The present invention pertains primarily to that portion of the machine which is shown in Figs. 33 to 41 of the patent.

At the station with which the present invention is concerned, the paper back lining is applied by an applicator mechanism comprising a reciprocating and vertically movable table 20 (Figs. 1 and 2) supported on a body 21 having slideways which reciprocate on the stationary bar 22. This reciprocatory motion is effected by means of a link 24 pivotally connected to the table and in turn pivotally connected to a lever 25 which is pivoted at 26 on the base of the machine. An arm 27 of adjustable length connects an intermediate portion of the lever 25 to the upper end of a further lever 28 carried at its bottom on a fixed pivot pin 29. A cam roller 30 supported on an intermediate arm of the lever 28 rides in a cam slot 31 on the side of a positively rotated circular cam 32 suitably mounted on a shaft 33 carried in bearings on the machine. The cam groove 31 on the side of the cam wheel 32 is suitably shaped so as to reciprocate the head 20 from the position shown at the right in full lines (Fig. 2) to the position shown in dotted lines at the left side of the figure.

The table 20 is directly mounted on a vertically movable slide 36 carried in slideways 37 which are fixed to the base portion 21 which slides on the bar 22. Vertical movement of the slide 36 is effected by means of a rocking arm 40 having a roller 41 on its end which is arranged to engage periodically the bottom 42 of a plate secured to the slide 36. The rocking lever 40 is pivoted on a pin 43 fixed on the base. Fixed to the lever 40 is a further lever arm 44 forming a bell crank therewith, and on the outer arm 44 is a roller 45 adapted to engage the under surface 42 of the vertical slide 36 when the latter has been moved to the left. These two arms 40 and 44 with their respective rollers are adapted to move the table 20 vertically in its two end positions when located properly for the purpose. The bell crank 40, 44 is rocked by means of the adjustable link or rod 46 pivoted at its lower end to a lever 47 mounted also on the pin 29. A cam roller 48 carried on an intermediate portion of the lever 47 rides in a suitably shaped cam slot 49 on a cam wheel 50 mounted on the shaft 33, as shown in Fig. 1.

A multiple liner strip of paper or cloth 55 (Fig. 1), with or without tape head bands applied thereto, is suitably held on the traveling table 20, such as by means of air suction, and the strip is applied to the back portion of the book when the table 20 is vertically elevated at its right-

hand position by the above described cam mechanism, so that the strip contacts with the glue applied by the roller 15 to the back of the book. This multiple strip may comprise a bottom layer 56 (Fig. 5) carrying a top layer 57 and two cloth head bands 58. It is formed in a branch line mechanism by continuously gluing together two long strips and continuously gluing the head bands thereon and then cutting the moving pieces into desired lengths.

The compound paper strip is fed forward by a pair of feed rollers 62 (Fig. 4) which are rotated intermittently by the oscillating gear segment 64. The shafts of the feed rollers have gears intermeshing with gears 65 (Fig. 1) which engage the gear 66 fastened on the end of the shaft 68. Loose on this shaft 68 is a gear 69 (Fig. 4) to which is attached a plate 70 bearing pawls 71 that engage a ratchet wheel 72 fastened to the shaft 68. The gear segment 64 has teeth 72 engaging and intermittently turning the gear 69. The segment 64 is loosely mounted on a shaft 73. On the segment is a pawl 74 that is normally held by a spring 75 in engagement with a shoulder 76 on a plate 78 fastened to the shaft 73. This plate has a stud 79 that engages with one edge of the segment. When the shaft 73 is oscillated, the pawl swings the segment in one direction and the stud swings the segment in the opposite direction. The end of the shaft 73 has a rocker arm 86, (Fig. 1) and adjustably connected with this arm is a link 81 which is jointed to a rocker arm 82 on a shaft 83. The arm 82 forms a bell crank with another arm 84, and the latter is provided with a roll 85 which engages a cam on the face of the disk 88 on the cam shaft 33. These parts, as more fully described in the patent, serve to rotate the feed rolls 62 periodically and to feed the glued parts forward to a cutter mechanism.

The cutter mechanism comprises a stationary cutter 92 (Fig. 1) and a vertically movable cutter 93. The latter is suitably mounted on a slide rod 94 connected by a link 95 with an arm 96 that rocks on a shaft 97. The arm 96 is connected to a rocker arm 98 which carries a roll 99 engaging the cam face 100 on the cam disk 102 which is also mounted on and to revolve with the shaft 33. The cutter mechanism is coordinated with the other parts to cut off a strip of the paper when the table 20 is ready to receive it. The mechanism insofar as described may be utilized for applying a single paper strip to the back of the book, but the construction as shown in the drawings is so arranged as to apply a multiple paper strip, with or without the head bands as will be described.

In accordance with this invention, I may apply to the back of the book a multiple strip of paper, cloth or other suitable material, made up of two or more separate sheets or layers. These strips are pasted together in a branch line mechanism before they are presented for gluing to the book; hence it is feasible to apply this multiple strip to the book in a single operation at the twelfth station of the machine. It is necessary that the glue be in a green or in a non-set condition when the strip is applied to the book, hence it is not feasible to glue together two pieces of paper or cloth in a previous operation and then store the same for use in this machine. On the contrary I glue two or more strips together and feed them directly and without delay into the back lining machine. Also, if head bands are to be applied to the book, these are likewise glued to the back

lining just prior to the operation of cutting off the right width of strip and presenting it to the main line mechanism for mounting on the book.

Assuming that two paper strips are to be mounted on the back of the book, although a larger number or a different material may be employed if desired, two supply rolls of paper 110 and 112 (Figs. 1 and 3) are suitably mounted for free rotation on the shafts 113 and 114 respectively. If no head bands are to be employed, these paper strips may be of the same width; but if head bands are used, then in order to have the surfaces of the strip 57 and the head bands 58 lie in substantially the same plane, the strip 57 is made narrower than the strip 56, as shown in Figs. 3 and 5, so that the two head bands may be glued directly to the lower paper 56. If more than two paper strips are to be used, this will involve substantially duplicating the assembly here described.

Referring now to Figs. 1 and 4, the lower wide strip 56 from the roll 110 is led past trimming rolls 115, which may be omitted, arranged to insure a proper width of paper, and then it passes an idler roll 116 between a second roll 117 and a roll 118 arranged for applying glue thereto. The roll 118 may have a corrugated or knurled surface or other suitable shape for carrying the glue or other suitable adhesive, and this roll is arranged to contact with a supply roll 119 which dips into the pot 120 of heated glue. Various constructional arrangements may be utilized for applying the glue to the paper. As the strip 56 passes over the roll 117 it receives an application of glue from the roller 118. Immediately above the roll 117 and substantially in contact therewith is a further roll 122 between which the paper passes. These rolls 117 and 122 may be power driven by the same driving mechanism and gear segment 64 as above described, such as by a belt 123 connecting pulleys on their shafts, so that these will also aid in drawing the paper forward for the book lining operation. The upper roll 122 may be mounted on adjustable bearings which are adjusted by the set screw 121 or other suitable mechanism for the purpose of insuring that the paper fed therebetween is brought under suitable pressure.

The upper strip 57 coming from the feed roll 112 is suitably conducted to the pressure feed rolls 117 and 122 in position above and in contact with the lower strip 56 just after the glue has been applied thereto. Hence, this upper strip is now affixed to the central portion or the entire width of the lower strip by the glue therebetween, and the pressure of the rolls 117 and 122 and of the rolls 62 serves to force these strips into firm contact. If the head bands 58 are to be used, these are brought from the supply rolls 125 suitably shaped and arranged for the purpose. These head bands travel along with the narrower strip of paper 57 on each side thereof and are simultaneously brought into engagement with the glue on the lower strip 56. No glue is to be applied to the upper strip of paper 57, since the head bands are mounted directly on the lower paper strip. After the strips have been glued together, the assembled strip passes to the knives 92 and 93 where the short strip 55 is cut therefrom and deposited on the table 20 when the latter is in the left hand position of Fig. 2. Then the table moves to the right hand position and elevated into contact with the wet glue on the back of the book and to which the strip adheres. The gluing roll 118, as illustrated diagramma-

tically in Fig. 3, is slightly shorter than the width of the lower paper strip 56, so that the glue applied thereto will not extend to the full width of the paper but will be forced laterally by the pressure rolls and be brought to substantially the edge of the paper. This prevents the glue from lapping over the edge and thus getting onto the under side where it can cause considerable trouble owing to its gumming up the cutting knives and the rollers as well as creating a bad appearance on the back of the book. The scraper 126, shown diagrammatically in Fig. 3, is arranged to scrape off both the excess of glue on the periphery of the gumming roll and all glue on the sides of the roll. Various other features of the above mentioned patent may be employed for the purpose of making different widths and lengths of lining and applying the same to the back of the book.

The glue may be applied to the back of the book previous to the application of the assembled paper strip, by means of the mechanism described in said patent and illustrated in Figs. 6 and 7 of the drawings. In this structure, the glue roll 15 is mounted on a shaft 130 carried in a yoke formed on the ends of the two swinging lever arms 132 which are suitably mounted for rocking movement on the shaft 133. The two lever arms swing on opposite sides of the glue tank 134, which is arranged for applying glue to the shaped roll 15 as it reciprocates back and forth across the back of the book. The levers are moved by a link 135 connected to a rocking arm 136 carrying a cam roller 137 engaging a cam track 138 on the cam wheel 139 mounted on the cam shaft 33. The lever 136 is pivoted on a pin 140 suitably mounted on the machine. Another pair of levers 142 are arranged parallel with the levers 132 and connected thereto by two links 143 and 144 and they carry a train of gears 145 which are suitably power driven and arranged to rotate the roll 15 as it reciprocates. A second cam 146 on the cam wheel 139 is mounted on a lever 147 pivoted at 140 and connected by a link 148 with the arm 144. The link 135 is connected to the levers 142. These parts are so arranged that the glue roll 15 is caused to travel in a rectilinear path and to be rotated positively and to have glue applied thereto as it travels across the back of the book. Other mechanical details may be incorporated in this construction.

The operation of this machine will now be apparent in view of the above description. The two separate pieces of paper or other suitable strip material are fed over the roller 117 and the glue is applied only to the lower strip by means of roller 118, after which the upper strip and the head bands, if used, are pressed into position against the lower strip. Then this multiple strip passes between the cutting knives, and the narrow cut piece is deposited on the top of the table 20 and moved to a position beneath the freshly glued back of the book and pressed upwardly thereagainst. The glue roll 15 traverses the back of the book just before the strip arrives. After this multiple strip has been applied, the book passes through a series of pressure rollers which roll the strip into position and other operations may then be performed, as desired.

By this means, I have made it possible to reinforce the back of a book by one or more extra sheets of paper, cloth or other material and the adhesive located therebetween. This is done automatically while the book is traveling normally through the one station required for apply-

ing only one layer of paper thereto. This is done without interfering with any of the other steps or slowing down the operation of the machine or otherwise requiring changes therein. The mechanism employed is very simple in its operation but accomplishes a result heretofore unattained mechanically.

The same operative principles and mechanisms may be employed for gluing together two strips of cloth or pieces of cloth and paper and applying them to the back of the book at a single station, and the claims are to be interpreted accordingly. Although the strips 56 and 57 are of different widths when head bands are applied, it is to be appreciated that the strips are of substantially the same widths as the length of the book back and that the under strip 56 is reinforced throughout practically its whole extent by the upper strip 57; hence the term "multiple reinforced strip" is to be interpreted as applying to that type of construction whether or not the head bands are present. It is also to be understood that two strips of cloth may be glued together, and preferably with a strip of paper to hold the glue in place, or a single strip of cloth and one or more strips of paper, with or without the head bands, may be assembled, and this multiple strip may be applied to the back of the book at any suitable station in the machine. In fact, this construction as above described may be substituted for the mechanism of the patent which serves to apply the two strips of cloth to the book, so that the machine may now be shortened and made more economically.

It will now be appreciated that various modifications may be made in the constructional features above set forth, and that the drawings and description thereof are to be interpreted as illustrating the general principles of this invention and a preferred embodiment of construction and not as limiting to the claims appended hereto.

I claim:

1. A machine for lining the back of a book comprising a primary mechanism including a carrier for presenting books successively at a given station, means for applying a coating of adhesive on the back of each book, intermittently actuated applicator mechanism at said station for applying a strip to the adhesive coated surface and roller mechanism for subsequently pressing the strip into position, and a branch line mechanism coordinated with the primary mechanism for supplying intermittently a reinforced multiple strip to the applicator mechanism at said station comprising means providing supplies of continuous strips of different widths, one strip being substantially as wide as the length of the book back and a second strip being substantially as wide as the distance between the normal positions of head bands on the book, means for feeding the continuous strips forward into a superimposed contacting relationship with their center lines substantially in alignment and the wider strip provided with margins for head bands, means for feeding two head bands solely into contact with said margins and thereby forming a continuous multiple strip having a uniform number of layers throughout its width, means for applying a coating of adhesive so as to cause said continuous strips and bands to adhere when brought together, intermittently actuated cutter mechanism for severing the adhering continuous strips and

bands and forming a series of separate reinforced multiple strips of substantially the area of the book back, and means for intermittently presenting the reinforced strips to the applicator mechanism for application of each to the adhesive coating on a book before the adhesives have set.

2. A machine for lining the back of a book having a primary mechanism comprising a carrier for presenting books successively at a given station, means for applying a coating of adhesive on the back of each book, intermittently actuated applicator mechanism at said station for applying a strip to the adhesive coated surface and roller mechanism for subsequently pressing the strip into position, and a branch line mechanism coordinated with the primary mechanism for supplying intermittently a reinforced multiple strip to said applicator mechanism at said station comprising means providing supplies of continuous strips, one being a wide strip substantially as wide as the length of the book back and a second strip being at least as wide as the distance between the normal positions of head bands on the book, means for feeding the strips forward into a superimposed contacting relation with their center lines substantially in alignment, means for feeding two head bands into position adjacent to the edges of one of the strips, means for initially applying a coating of adhesive so as to cause said strips and bands to adhere throughout their contacting faces, a roller for pressing the strips centrally together to form a continuous multiple layer strip, intermittently actuated cutter mechanism for severing the adhering continuous strips and bands and forming a series of separate reinforced multiple strips of substantially the area of the book back, and means for successively presenting said reinforced strip to the applicator mechanism for application of each to the coating on a book before the adhesives have set.

3. A machine for lining the back of a book comprising a primary mechanism including a carrier for presenting books successively at two separate stations, mechanisms for applying a coating of adhesive on the back of each book prior to its arrival at each station, and intermittently actuated applicator mechanisms at said stations for applying strips to the adhesive coated book surface, and two branch line mechanisms coordinated with said applicator mechanisms for supplying intermittently to each a reinforced multiple strip, each branch line mechanism comprising means providing supplies of continuous strips, at least one of which is substantially as wide as the length of the book back, means for applying a coating of adhesive to one of said strips for engagement with the other, means for feeding the strips into a superimposed adhering relationship and thereby forming a continuous multiple strip, intermittently actuated cutter mechanism for severing the adhering continuous strips, and coordinated mechanism for intermittently presenting the severed reinforced strip to the associated applicator mechanism, whereby the book back is first coated with adhesive, a reinforced multiple strip is applied thereto and then a coating of adhesive is applied to the exposed face of said strip and a second reinforced multiple strip is applied to the coated surface of the first mentioned strip.

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