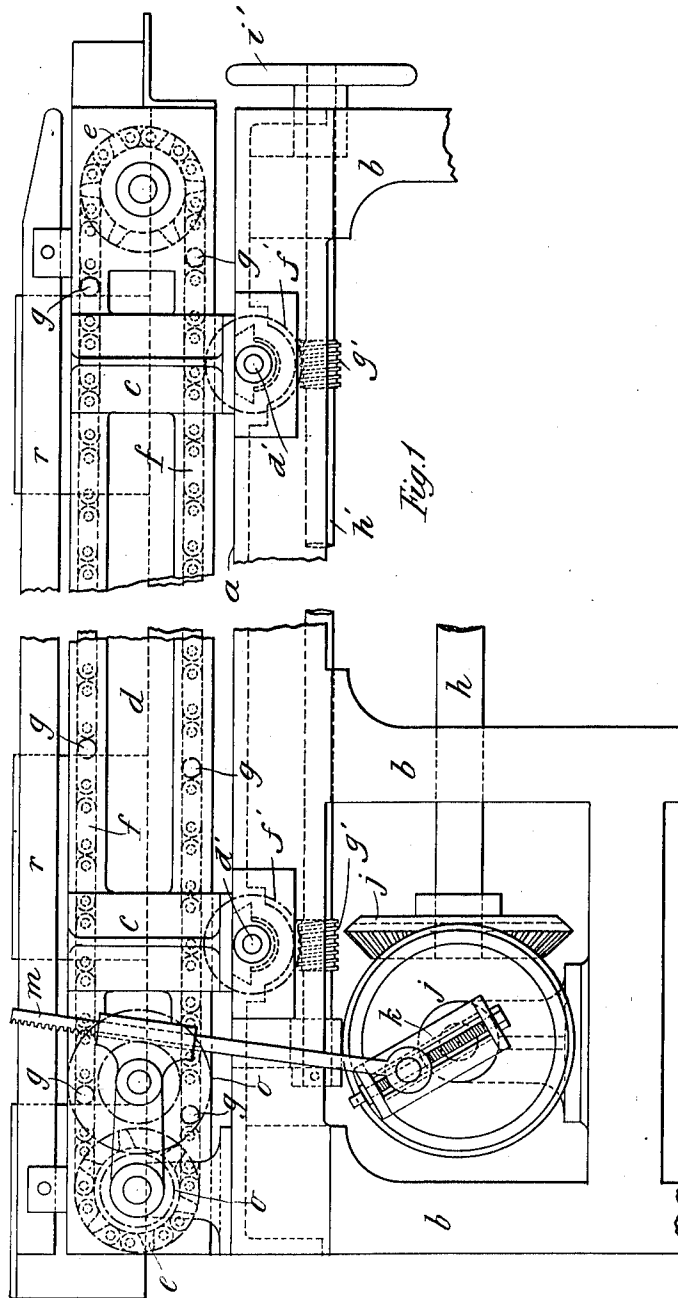


J. MURRAY.
BOOKBINDING MACHINE.
APPLICATION FILED AUG. 29, 1908.

982,438.

Patented Jan. 24, 1911.

6 SHEETS—SHEET 1.



Witnesses:-
Henry Thine.
J. George Barry.

Inventor:-
John Murray
by attorneys
Brown & Luard

982,438.

6 SHEETS—SHEET 2.

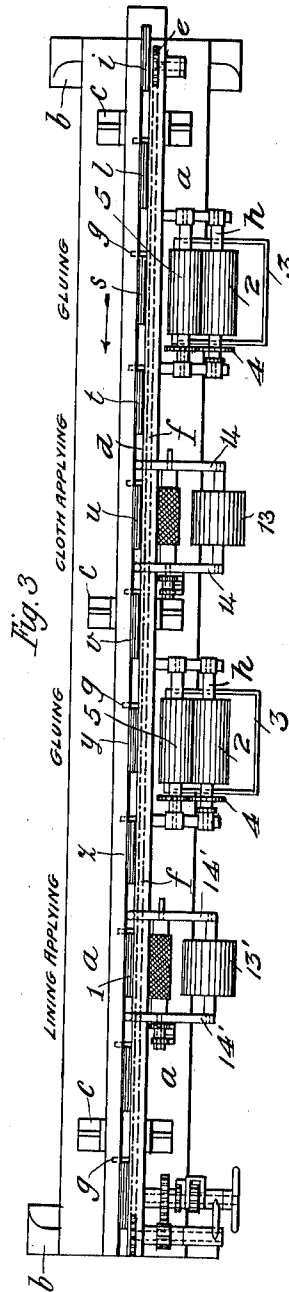


Fig. 4

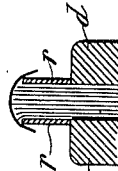


Fig. 5

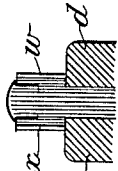
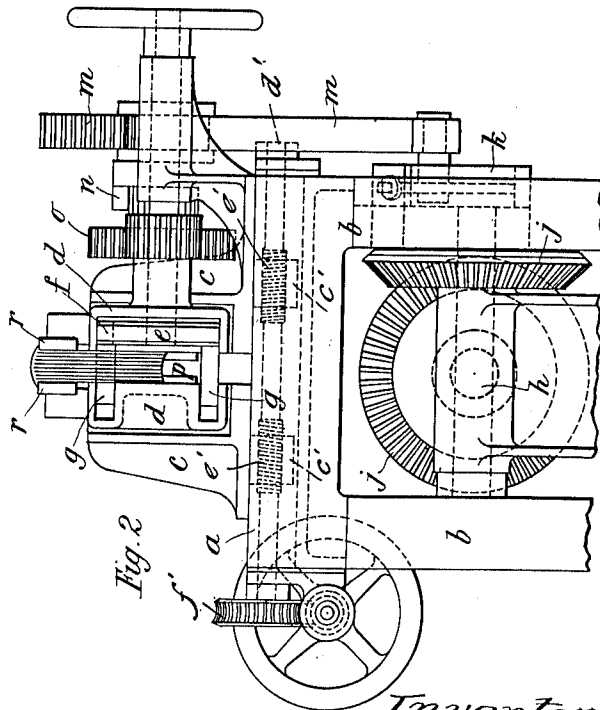
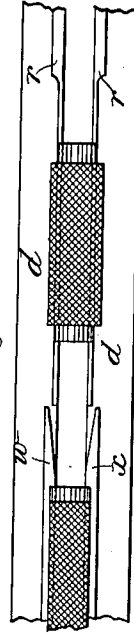


Fig. 6



Witnesses:-
Henry Thine.
J. George Barry.

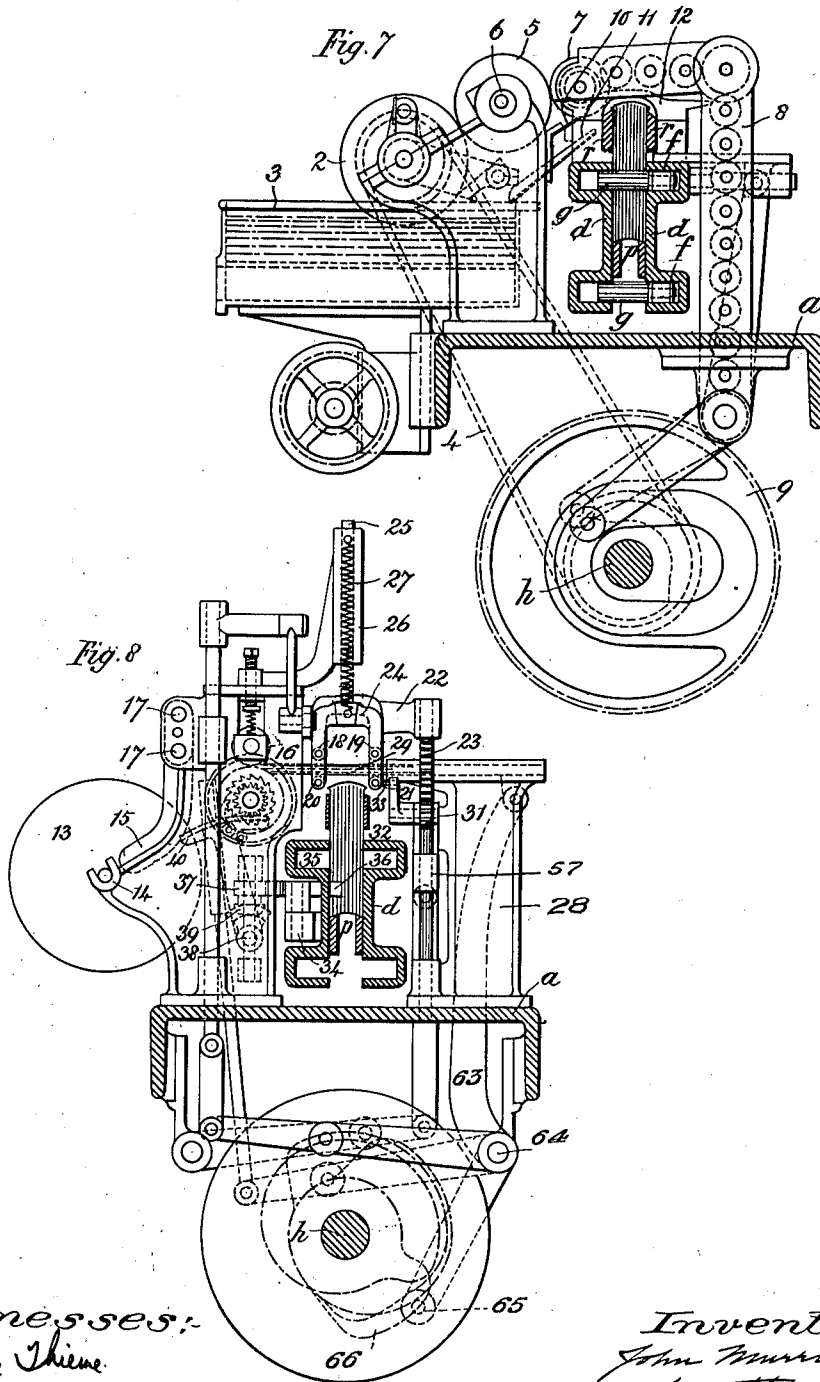
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6 SHEETS—SHEET 3.



Witnesses:
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6 SHEETS—SHEET 4.

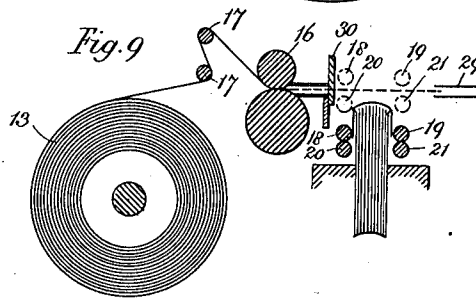
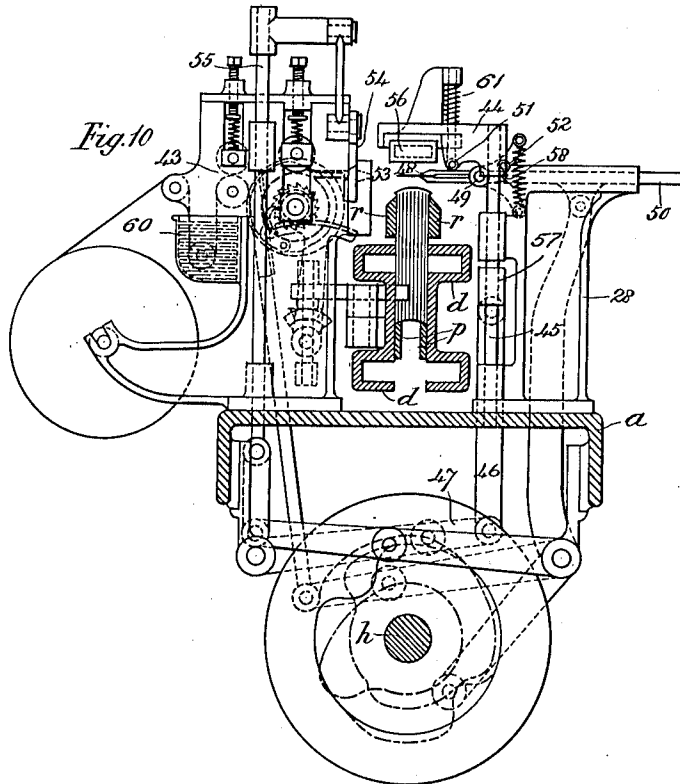
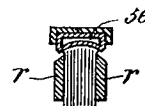


Fig. 12



Witnesses:
Henry Thime,
J. George Barry.

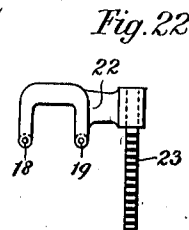
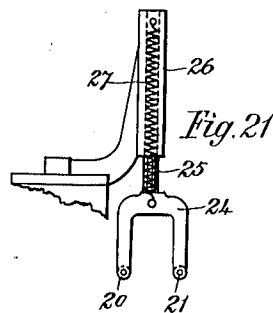
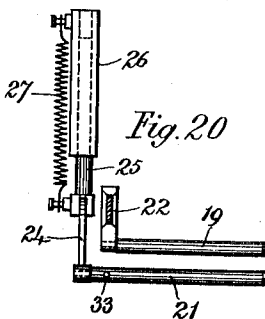
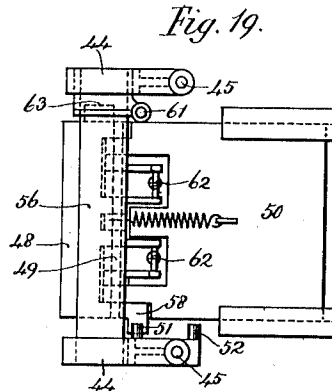
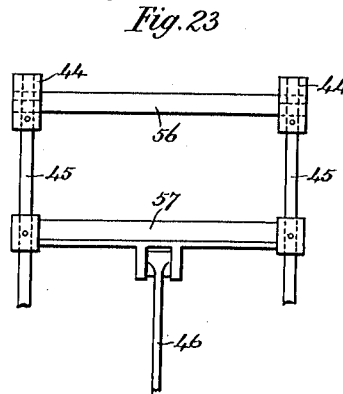
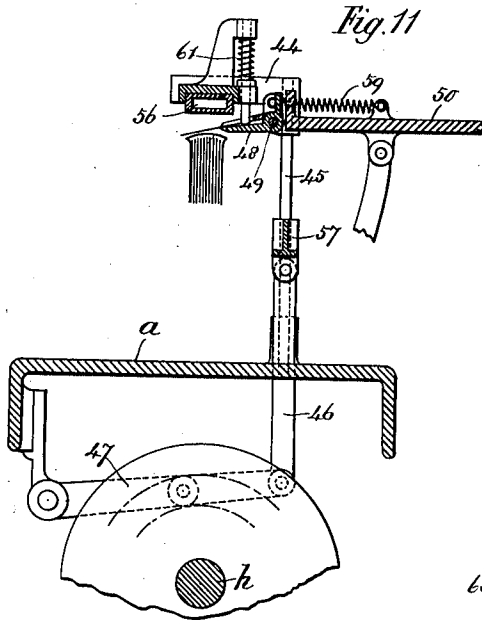
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BOOKBINDING MACHINE.
APPLICATION FILED AUG. 29, 1908.

982,438.

Patented Jan. 24, 1911.

6 SHEETS—SHEET 5.



Witnesses:-
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J. George Barry.

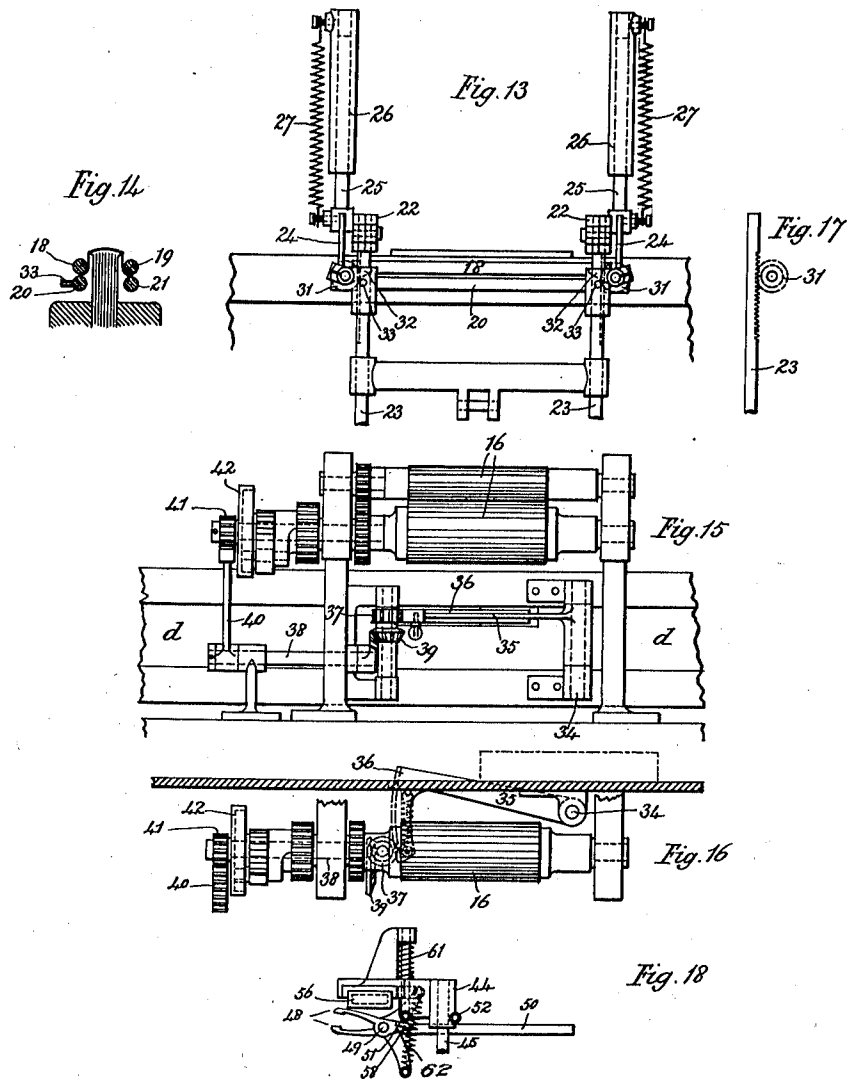
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982,438.

Patented Jan. 24, 1911.

6 SHEETS—SHEET 6.



Witnesses:
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UNITED STATES PATENT OFFICE.

JOHN MURRAY, OF EDINBURGH, SCOTLAND.

BOOKBINDING-MACHINE.

982,438.

Specification of Letters Patent.

Patented Jan. 24, 1911.

Application filed August 29, 1908. Serial No. 450,836.

To all whom it may concern:

Be it known that I, JOHN MURRAY, a subject of the King of Great Britain, and resident of Parkside Works, Dalkeith Road, Edinburgh, Scotland, engineer, have invented new and useful Improvements in Bookbinding-Machines, of which the following is a specification.

The present invention has for its object a novel construction of machine for carrying out the operation known as "lining" in the trade of book-binding.

The machine is designed to be used in conjunction with a rounding and backing machine and will preferably be driven from the shaft of the latter but it is also capable of being used independently.

The operation termed "lining" in the trade of book-binding consists in the application of a coating of glue or similar adhesive to the back of the book, which unites the sections of the book and provides an adhesive surface to which the reinforcing or lining material, such as scrim or paper, is applied, so that the back of the book has the cohesion necessary to resist the strain of frequent opening and closing.

The invention consists mainly in an improved means for holding and applying the lining material to the glued backs of the books and for severing the same from the roll at the proper moment.

The invention comprises also means for controlling the operation of the lining mechanism so as to render them inoperative in case of accidental stoppage of the feed of books into the machine.

In the accompanying drawings the lining machine which forms the subject of the present invention is illustrated.

Figure 1 is a partial side elevation, Fig. 2 is an end elevation of the machine looking from the left of Fig. 1, Fig. 3 is a plan view showing the course of the books, in the direction of the arrow, through the several stages, Figs. 4 and 5 show in end view a book with the lining in two stages of application, Fig. 6 shows in plan view on the same scale as Figs. 4 and 5, a portion of the book guide with two books in the condition of those shown in Figs. 4 and 5 illustrated therein, Fig. 7 is a cross section of the machine through the gluing device, Fig. 8 is a cross section at the point where the scrim is attached, Fig. 9 is also a cross section to illustrate in greater detail and on

a larger scale than in Fig. 3, the operations on the scrim, Fig. 10 is a cross section illustrating in detail the device used for attaching the paper lining, Figs. 11 and 12 are cross sections of details of Fig. 10. Fig. 13 is an elevation of the scrim applying device taken at right angles to Fig. 8, Fig. 14 is a cross section of a portion of the same, Fig. 15 is an elevation of the scrim feeding device, Fig. 16 is a plan view thereof with the top feed roll removed, Fig. 17 is a detail view of a rack and pinion hereinafter referred to, Fig. 18 is an end view of the paper gripper, Fig. 19 is a plan view of the same, Figs. 20, 21, 22 are detail views showing the mounting of the rods for applying the scrim to the back of the books, and Fig. 23 is a front view of a portion of Fig. 11.

Similar letters refer to like parts in the several figures.

a is a horizontal table supported on suitable standards such as *b*. Supported by table *a*, on brackets *c*, are a pair of parallel horizontal guide rails *d d*. Fitted in a recess at each end of one rail *d*, are chain or sprocket wheels *e* which drive the chain *f* along grooves in the face of said rail. Attached to the chain *f* and extending across the space between the rails, which is variable, into a corresponding groove in the rail opposite, are pins *g*. An intermittent motion is transmitted to one of the chain wheels *e* from the cam shaft *h* through bevel wheels *j*, crank *k*, rack *m*, ratchet *n* and gear wheels *o*. When the chain with its pins is at rest, a book is inserted between the rails *d d* where it is supported on its fore-edge on rails *p* or suspended by its joints on rails *r*. The next forward movement of the pins will cause the book to move forward and present its back successively to the mechanical devices hereinafter to be described. The space between the rails is made variable as follows. Referring to Figs. 1 and 2, the brackets *c* which carry the rails *d* have beneath them lugs *c' c'* through which shafts *d' d'* pass provided with right and left handed screws *e' e'*. The shafts are furnished with worm wheels *f' f'* and engaging with these worm wheels are worms *g' g'*, carried on a shaft *h'* extending the whole length of the machine. If this shaft be turned by means of the hand wheel *i'* shown, the bracket *c* and the rails *d* carried thereby may be moved in and out and the space between the rails adjusted

to any desired width. Referring to Fig. 3, a book is inserted at *i* and the next movement of the chain and pins conveys it to *l* and then to *s*, where the back of the book is coated with glue. *t* is the drying position. At *u* the scrim is cut from an endless web and attached to the now adhesive back of the book, as shown in Fig. 4. During the movements between positions *u* and *v*, the pendent ends of the scrim are folded closely into the sides of the book as shown in Figs. 5 and 6, by the inclined bars *w* and *x*. At *y*, the book is again coated with glue and moved through the position *z* to *l*, where the paper lining is also cut from an endless web and attached to the book and pressed firmly so that complete contact is assured. The operations are now complete and the book is discharged from the machine.

The mechanism for gluing the book and applying the lining will now be more fully described.

Fig. 7 is a cross section of the machine through position *s* of Fig. 3. 2 is a gluing cylinder revolved in the glue tank 3 by chain gear 4 which is driven from the cam shaft *h*. 5 is an intermediate glue roll adjustable in relation to the gluing cylinder 2, by means of eccentric bearing 6. The quantity of glue transferred to the vibrating roll 7 is thus regulated. The vibrating roll 7 which transfers the glue to the back of the book is carried on a pair of jointed vibrating arms 8 rocked by the cam 9 and has a motion of rotation transmitted by a train of small gears on the said vibrating arms 8 driven by teeth on the periphery of the said cam 9. The roll 7 during its vibration, transfers a portion of the glue on its surface to the back of the book. The remainder of the glue which will be slightly chilled, is removed by scraper 10 and returned to the glue tank by the inclined guide 11. The glue roll 7 is supported during its movement, on the cam-shaped guides 12.

Fig. 8 which is a cross section of the machine through position *u*, shows the means by which the attachment of the scrim is accomplished. Figs. 9, 13 and 14 also illustrate the operations on the scrim. 13 is a roll of scrim supported in bearings 14, (see Fig. 8), and controlled by friction sides 15. The web is led into the feed rolls 16 over guide rods 17. From the feed rolls the scrim is drawn on to the back of the book by rods 18, 19, 20 and 21, see Figs. 8, 9, 13 and 14, without any of the working parts coming into contact with the adhesive. This is very desirable as it enables the machine to continue its work without stoppage for cleaning as would be otherwise necessary. The rods 18 and 19 are supported at their ends by inverted U-shaped brackets 22, supported on and actuated by rods 23, see Figs.

8 and 13. The said rods 23 are connected together by a cross head clearly seen in Fig. 13, which cross head is moved up and down by a link mechanism operated by a roll bearing on a cam on the shaft *h*, (see Fig. 8). The rods 20, 21, are supported by U-shaped brackets 24 and their stems 25 are guided in brackets 26 and maintained by their springs 27 in their full-up position. The supports of the rods 20 and 21 have no positive motion of their own but are movable in a downward direction by the pressure of the rods 18 and 19 and in the opposite direction by means of the springs 27. Further, sliding in brackets 28, is a hollow sheet metal guide 29 which has a to and fro motion imparted to it by the lever 63 which rocks on a fulcrum 64 on the framing *a* and carries a roll 65 working in a suitably grooved cam 66 on the shaft *h*. The cycle of the movements in the operation is as follows: The rods 18, 19, retire to their full-up position but the rods 20 and 21 cannot follow under the influence of their springs, because they are stopped by shoulders on their stems 25 before 18 and 19 have reached their full-up position. The pairs of rods are thus separated as shown in Fig. 8, thus leaving sufficient space between them so that the guide 29 can pass through. As the scrim is very flimsy, it would not with certainty support itself across the space between the two pairs of rods and to insure positive working the guide 29 advances with its open mouth between the rods right up to the opening through which the scrim is ejected by the feed rolls 16. The scrim is thus passed into guide 29 which then retires, leaving the scrim safely between the rods. The rods 18 and 19 now descend and grip the scrim, and as it is thus securely held it is cut from the web by the shear blades 30. By a positive downward movement of the rods 18, 19, pressing on the rods 20, 21, the scrim which is now held between them is drawn down onto the adhesive on the back of the book. As it would be difficult to insure a simultaneous release of the ends of the scrim if the rods were permitted to draw clear off and as a failure of simultaneous release might cause the scrim to be displaced to one side or the other, means are provided for separating the rods before the scrim has slipped from between them. Teeth are cut on the sides of the rods 23 which mesh with pinions 31, see Figs. 8 and 13 and the detached view Fig. 17. The downward movement of rods 23 will thus rotate the small overhung arms 32 at each side of the scrim device (see Fig. 13). Projecting across the path of the arms 32 are pins 33 fixed in the side of rods 20, 21. As the rods 18, 19, 20 and 21 approach the end of their stroke and before either end of the scrim is released, the arms 32 will act on the pins 33

and depress the rods 20 and 21 to the position of Fig. 14 and release both ends of the scrim simultaneously. As the operator might miss feeding a book, means are provided to automatically prevent the feeding of scrim or paper lining material if a book is not present to receive it. Swinging on the vertical shaft 34, see Figs. 15 and 16, is an arm 35 the end 36 of which projects through a slot in one of the guide rails *d*. On the end of the arm 35, sector teeth are formed gearing with a pinion 37 which transmits the motion of the arm 35 to the shaft 38 through segmental bevel wheels 39. Attached to the shaft 38 is an arm 40 carrying teeth which engage with pinion 41 concentric with the feed roll 16 and fixed to a disk 42 with a cam shaped lip which trips the pawl of the feeding mechanism if no book is in the machine against the arm 40. As the book enters positions *u* and *z* it presses back the end of the arm 35 and thus by means of the combination just described, releases the feed pawl so that it engages the ratchet wheel and allows the feeding of the scrim or paper to proceed. As the book moves away, the arm 40 is returned to its idle position by a spring and its return again puts the feeding mechanism out of action.

The device for feeding and attaching the paper lining is shown at Fig. 10 and is very similar to that for feeding the scrim and similar symbols of reference are used when applicable in both cases, but to assure a close union between the book back and the paper lining, the paper is damped by causing it to pass through a water duct 60, the surplus water being removed by causing the web to pass between absorbent rollers 43 of felt or other material. In Fig. 3, the roll of lining paper is indicated by 13' and the bearings which support it by 14', 14'. Further, as the paper has no overhanging ends like the scrim, the paper is conveyed to the back of the book by a gripper as shown in Figs. 11, 18 and 19. Suspended from a pair of brackets 44, see Figs. 11 and 23, is a hollow compression pad 56 of india rubber. The said brackets are carried on a pair of slide rods 45 see Figs. 10 and 11 attached to cross head 57 and moved in a vertical direction by connecting rod 46 and lever 47 in a manner similar to the construction shown in Fig. 13 in connection with another part of the machine. The gripper 48 is supported by shaft 49 attached to the sliding plate 50 which is moved in a horizontal direction by means clearly shown in the drawing, (see Fig. 10.) Attached to bracket 44 are studs 51 and 52 which operate the gripper in the following manner: The gripper advances to the slit 53 through which the feeding mechanism will eject the end of the paper. The gripper is opened to receive the paper by stud 51, see

Fig. 19, acting on arm 58 on the upper jaw of the gripper 48 by a downward movement of rod 45. The paper is fed out, the outer end of the strip being delivered into the gripper. Rod 45 then rises and the gripper being released by the overlying stud 51 is closed by the springs 62. The paper is now cut by the shear knives 54 actuated by rod 55. The gripper then retires to position shown in Fig. 10, where another downward movement of rod 45 causes stud 61 to press on the projection 63 on the lower jaw of the gripper thereby rotating the gripper into the position as shown in Fig. 11. The paper is now laid in position on the back of the book when rod 45 again moves down and opens the gripper by means of the stud 52 acting on the arm 58 of the upper jaw of the gripper. The gripper retires to its full back position and is brought back to the horizontal position by means of spring 59. The rod 45 now brings down the hollow pad 56 and presses the paper firmly on to the book as shown in Fig. 12. It may be remarked that where the paper lining is not used the machine may be constructed without the paper lining appliances above described.

What I claim is:—

1. A book-binding machine comprising in combination a book guide, an endless chain arranged parallel to the said guide, pins carried by the chain projecting into the said guide to engage the books placed therein; means for advancing the chain intermittently to move the books, means for applying glue to the backs of the books, means for supporting a roll of lining material, means for drawing the lining material from the roll, means for severing a portion of the lining material, and means for gripping the severed portion on opposite sides of the book and pressing the same down on the back of the latter.

2. A book-binding machine comprising in combination a book guide, an endless chain arranged parallel to the said guide, pins carried by the chain projecting into the said guide to engage the books placed therein, means for advancing the chain and the books, means for applying glue and lining material to the backs of the books, mechanism for operating the gluing and lining means, a feed-arresting device arranged in the path of the books in position to be displaced by the advance of the latter and means for throwing the gluing and lining means out of operation when there is an interruption in the procession of books.

3. A book-binding machine comprising in combination means for guiding and feeding books in succession along a prescribed path, gluing means, means for supplying lining material, and a gripping device which takes a piece of lining material and presses it on to the back of the book, the said gripping de-

vice consisting of rods operating on opposite sides of the books, and means for closing them upon the lining material, depressing them when the material is gripped and opening them to release the material after the application thereof.

4. A book-binding machine comprising in combination means for guiding and feeding books in succession along a prescribed path, and a device for applying lining material to the backs of the books consisting of feeding rolls, pairs of gripping rods operating on opposite sides of the books, means for separating the gripping rods and closing them

upon the lining material advanced by the feeding rolls, a guide for the lining material, means for advancing and retiring the same between the gripping rods when the latter are opened and means for severing the lining material, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN MURRAY.

Witnesses:

GEORGE HUTTON,
JAMES BOYES.