April 21, 1925. 1,534,696

H. C. ELDREDGE ET AL

BOOK COVER BACK SHAPING APPARATUS

Filed March 24, 1922 4 Sheets-Sheet 1

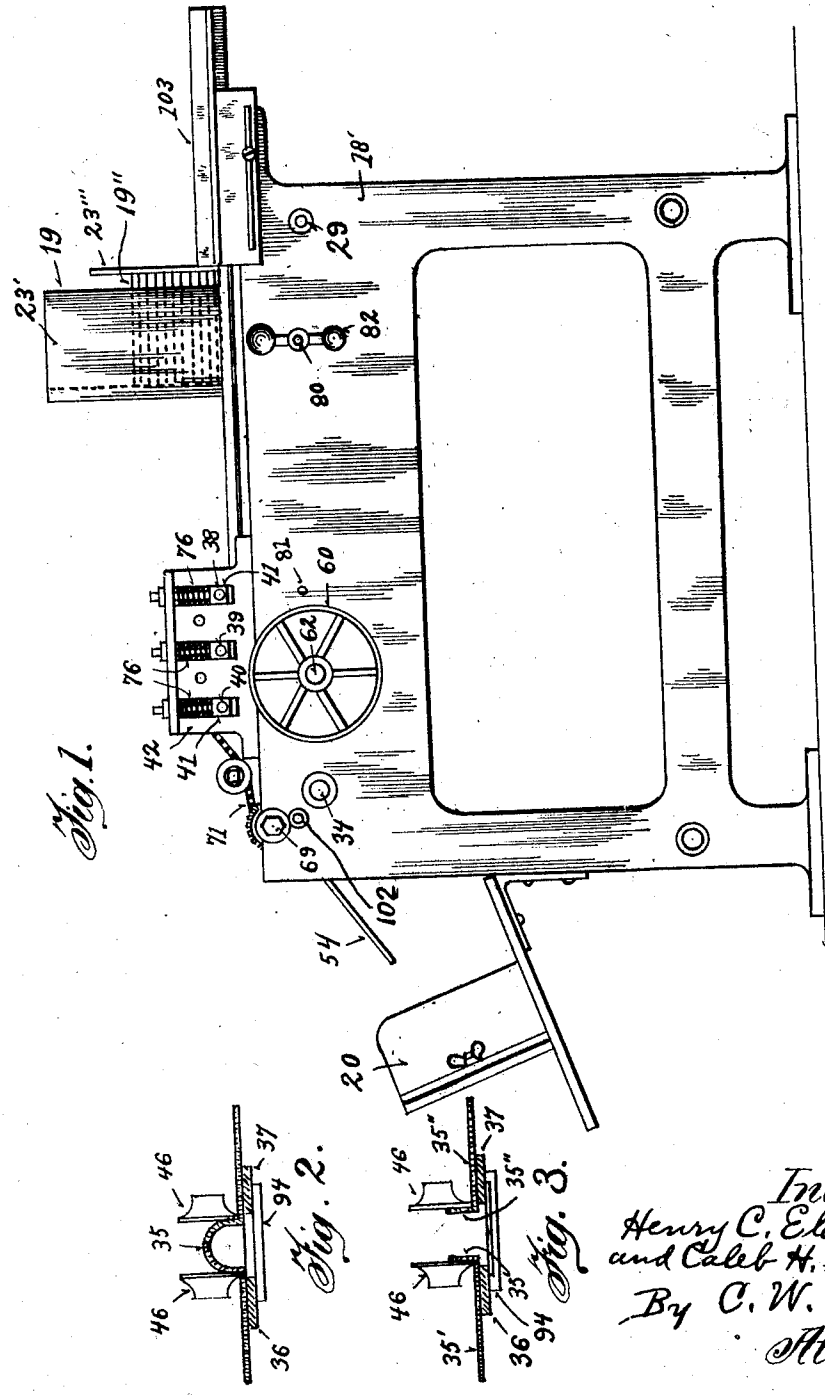


Fig. 1.

Fig. 2.

Fig. 3.

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BOOK COVER BACK SHAPING APPARATUS

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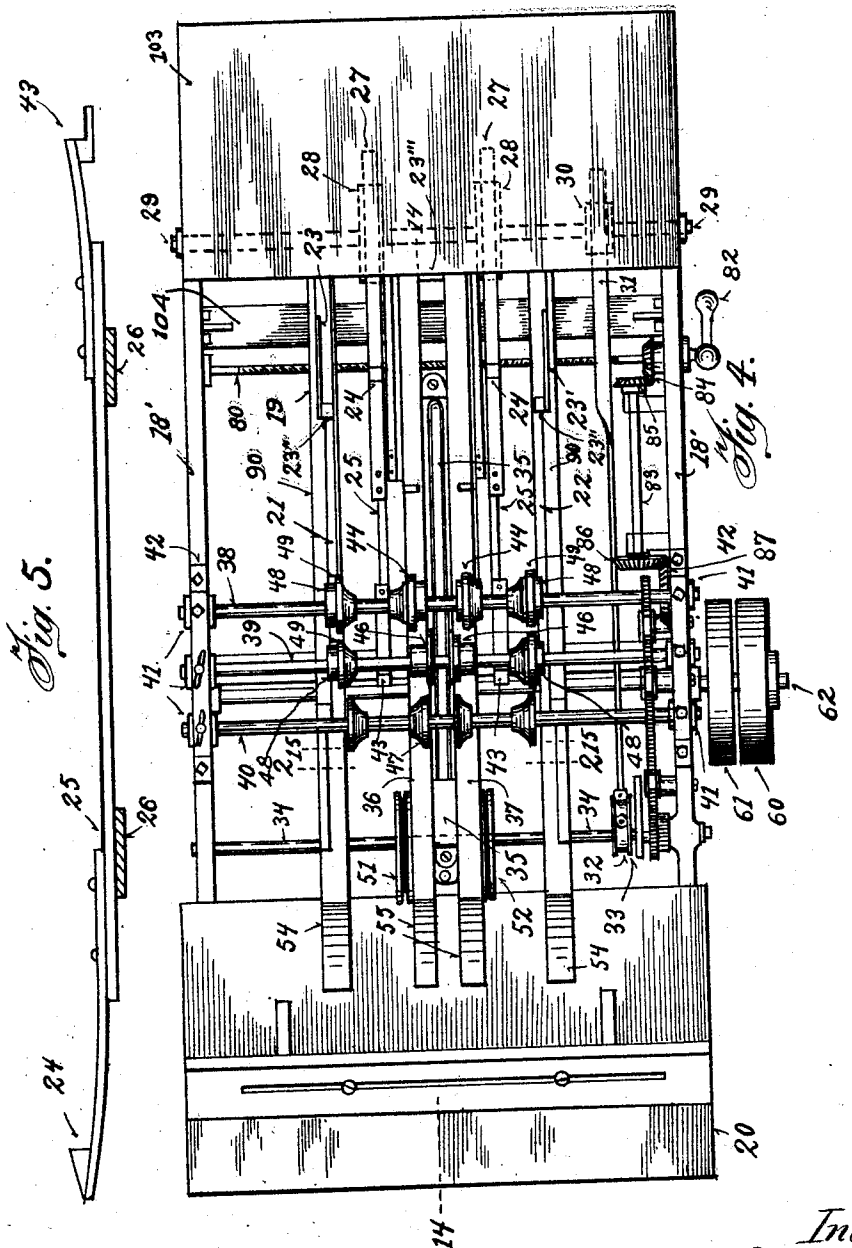


Fig. 4.

Fig. 5.

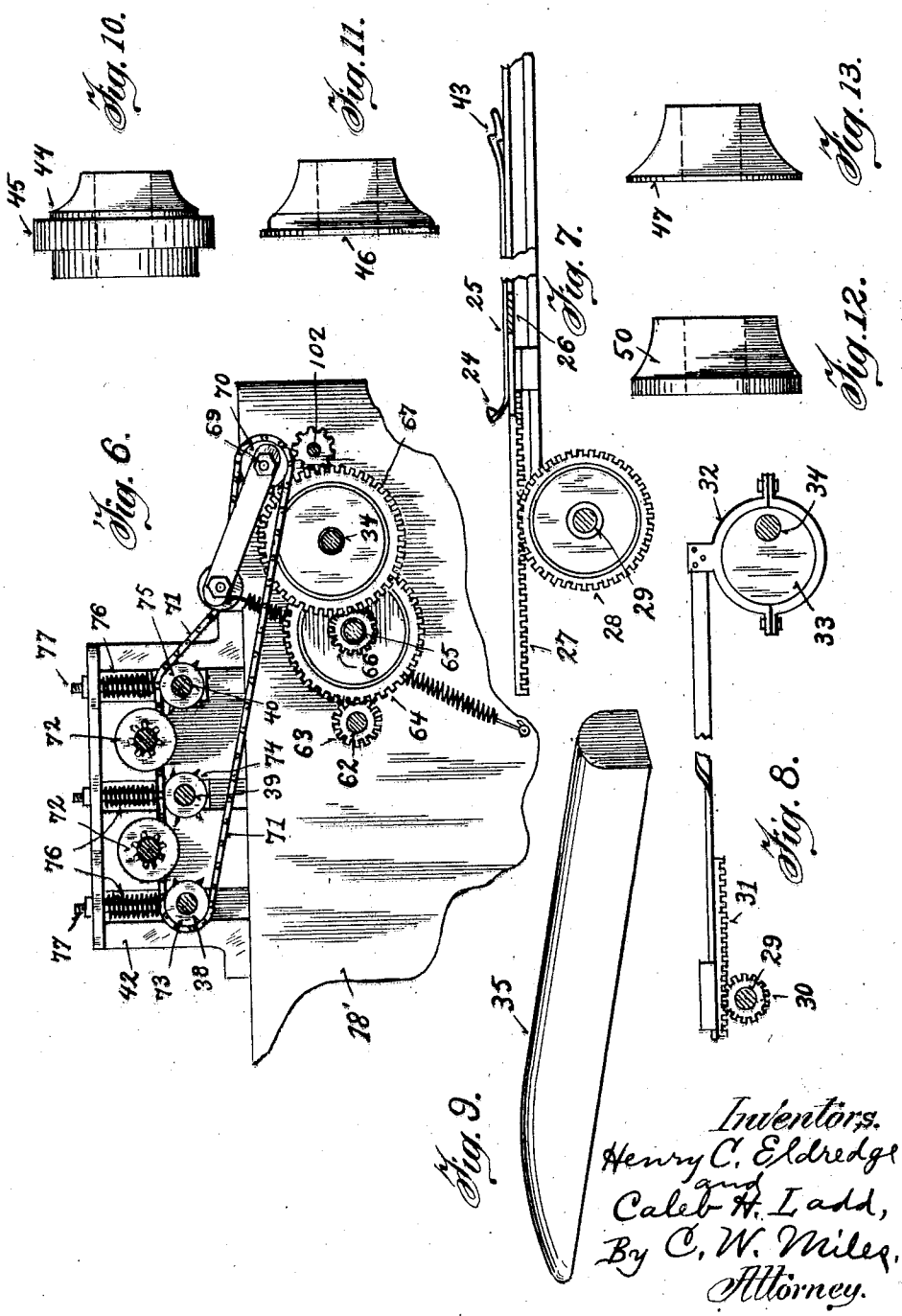
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BOOK COVER BACK SHAPING APPARATUS

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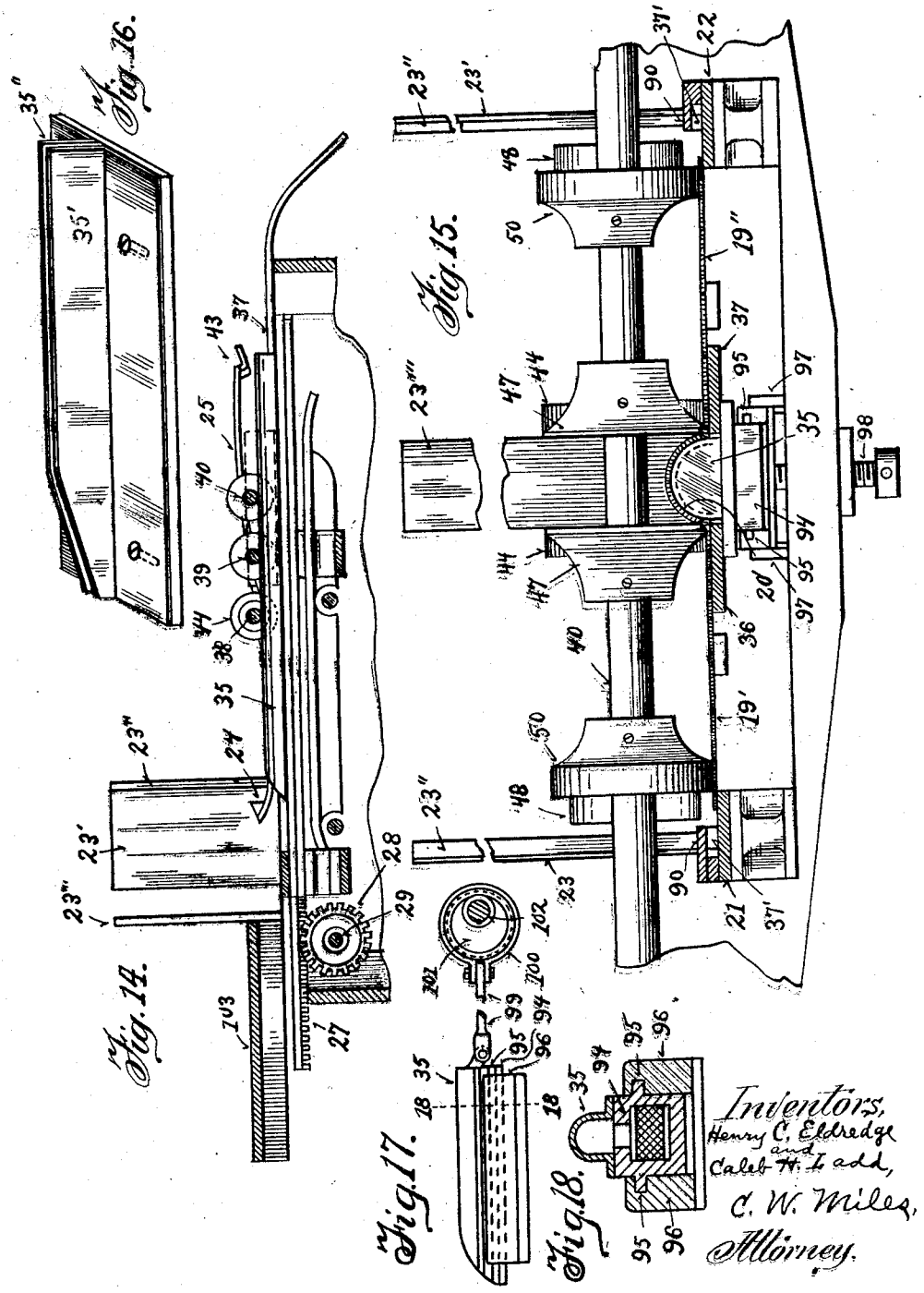
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BOOK COVER BACK SHAPING APPARATUS

Filed March 24, 1922 4 Sheets-Sheet 4



Patented Apr. 21, 1925. 1,534,696

UNITED STATES PATENT OFFICE.

HENRY C. ELDREDGE, OF ST. BERNARD, OHIO, AND CALEB H. LADD, OF NEWPORT, KENTUCKY.

BOOK-COVER BACK-SHAPING APPARATUS.

Application filed March 24, 1922. Serial No. 546,484.

To all whom it may concern:

Be it known that we, HENRY C. ELDREDGE and CALEB H. LADD, citizens of the United States, residing, respectively, at St. Bernard, Hamilton County, State of Ohio, and Newport, in the county of Campbell and State of Kentucky, have invented certain new and useful Improvements in Book-Cover Back-Shaping Apparatus, of which the following is a specification.

Our invention relates to improvements in book-cover shaping apparatus. One of its objects is to provide improved apparatus to feed book-covers and to shape the backs thereof preparatory to applying the book-covers to the books. Another object is to provide improved apparatus to automatically feed the book-covers from a supply hopper to apparatus by means of which the backs of the book-covers may be shaped. Another object is to provide improved apparatus to automatically feed book-covers through or in contact with means to shape the backs thereof, and to insure a uniform feed of the respective book covers and to avoid straining or distorting the book covers and backs thereof during the feeding and shaping operation. Another object is to provide improved means to feed the book covers away from the back shaping apparatus into a suitable receiving hopper. Another object is to provide improved reciprocatory means to feed book covers from a supply hopper. Another object is to provide improved driving mechanism to drive the book cover feeding apparatus. Another object is to provide improved reciprocating heated back-shaping apparatus. Another object is to provide improved means to feed the book-back and heated shaping member into operative relation. Another object is to provide improved means whereby each book-back is allowed to dwell for a limited period in contact with the heated shaping member. Our invention also comprises certain details of form, combination and arrangement, all of which will be fully set forth in the description of the accompanying drawings in which:

Fig. 1, is a side elevation of our improved apparatus.

Fig. 2, is a diagrammatic sectional detail taken on line 2—2 of Fig. 4, of feeding and shaping apparatus employed to give the back of the book cover a rounded cross sectional pattern.

Fig. 3, is a view similar to Fig. 2, showing apparatus to give the back of the book a rectangular cross sectional pattern.

Fig. 4, is a plan of the apparatus shown in Fig. 1.

Fig. 5, is a detail of one of the reciprocatory feeding members employed to successively feed book covers from a supply hopper to the back shaping apparatus.

Fig. 6, is a diagrammatic sectional detail of a portion of the feed driving mechanism.

Fig. 7, is a diagrammatic detail of a portion of the reciprocatory feed mechanism.

Fig. 8, is a diagrammatic detail of another portion of the reciprocatory feed mechanism.

Fig. 9 is a perspective view of a heating and shaping member detached.

Figs. 10, 11, 12, and 13 are side elevations of different types of rollers mounted upon the respective book-cover feed-shafts.

Fig. 14, is a diagrammatic sectional detail through a portion of the feeding and shaping apparatus taken on line 14—14 of Fig. 4.

Fig. 15, is an enlarged diagrammatic sectional detail taken on line 15—15 of Fig. 4.

Fig. 16, is a perspective view of a modification of the heated back-shaping member detached.

Fig. 17, is a diagrammatic detail of the heated back-shaping member and the means preferably employed to slidably mount and reciprocatorily actuate said heated member.

Fig. 18, is a sectional detail taken on line 18—18 of Fig. 17.

The accompanying drawings illustrate the preferred embodiment of our invention in which 18′ represents the main frame of the apparatus on which is mounted a supply hopper 19 into which book-covers are to be periodically stacked from above, and from which said book covers are to be successively fed from the bottom of the hopper to the back shaping apparatus and after the backs have been shaped fed on to a receiving hopper 20 from which the book covers are pe-

riodically removed. In feeding the book covers from the supply hopper it is important to feed them uniformly in such manner that one cover section 19′ is not advanced beyond the other cover section 19″ so that wrinkles or creases are not formed in the back portion 20′ of the covers, and so that the cover sections 19′ and 19″ may move toward each other at or previously to the operation of shaping the back portion 20′ without distorting the book cover or causing wrinkles or creases in the backs, or interference with or from the feeding apparatus.

The book covers are fed one after another from the supply hopper 19 by a reciprocatorily actuated feed apparatus, which delivers the successive covers in proper alignment free from the hopper 19, after which said book covers are successively engaged by rotarily actuated feed apparatus which feeds the book covers forward while in contact with means to shape the backs thereof, and later delivers the book covers with their backs shaped onto inclined guides which carry the book covers into the receiving hopper 20 where the covers accumulate in a stack until they are periodically removed from the hopper 20. Provision is also made to adjust the hopper members, guides, and feed mechanism to adapt them to the feeding and shaping of book-backs of relatively different sizes.

The hopper 19 comprises end plates 23 and 23′ having front ledges 23″ and a rear upright 23‴ which are mounted upon or above feeding or guide rails 21 and 22 and 36 and 37, said hopper being provided with a gate or slot 37′ at its lower end to enable the book covers to be fed one after another from the bottom of a stack thereof forward upon the rails 21 and 22, and into a position to be engaged by and fed forward by the feeding rolls mounted above said rails. In order to start or feed the book covers successively forward from the supply hopper 19 and in such alignment as to insure their being properly grasped by the feed rolls and fed in straight alignment along the rails and over the shaping apparatus, I provide a plurality of fingers or pawls 24 at one end of the spring bars 25. The spring bars 25 are reciprocated forward and backward beneath the supply hopper 19, and the pawls 24 engage one edge of a book cover at the end of each backward movement, and feed the book cover forward from the hopper 19 at each forward movement of the spring bars 25. The spring bars 25 are attached to one or more cross-bars 26 which are provided with rack-bars 27 which engage the teeth of spur-gears 28 mounted upon a shaft 29. The shaft 29 is reciprocated or rocked backward and forward in its bearings by means of a spur gear 30 on the shaft 29, preferably of less diameter than the spur-gears 28, to secure the desired length of feed for the spring bars 25. Rack bars 31 engage and reciprocally drive the gears 30 and shaft 29 and said rack bars are in turn attached to eccentric strap 32 carried by the eccentrics 33 mounted upon the shaft 34.

Forward of the supply hopper 19 is a book-back shaping member 35 preferably a relatively long narrow heated bar of the cross-sectional pattern desired in the book-back. The bar 35 is detachably mounted between two supporting rails 36 and 37 above the upper face of which rails the bar 35 is raised. A plurality of bars 35 of different sizes and cross sectional patterns are designed to be interchangeably employed, depending upon the sizes and styles of the book covers and backs to be produced.

In Figs. 2 and 9 is shown one type of member 35 on which to form rounded backs. In Figs. 3 and 16 is shown another type of heating member 35 adjustable to produce backs of different widths and of rectangular outline, and in which the two side or angle plates 35′ and 35″ are adjustable to and from each other depending upon the thickness of the book to be produced.

As illustrated in Figs. 17 and 18 the member 35 is detachably mounted upon a heater member 94 as for instance an electrically heated member, which is provided with guide ways 95 by means of which said heating members 94 and 35 may be reciprocated endwise relative to a carriage member 96 located between or below the guide rails 36 and 37 and vertically adjustable in vertical ways 97 by means of an adjusting screw 98, see Fig. 15. A connecting rod 99 pivotally connected to the members 35 and 94 at one end and to an eccentric strap 100 at its opposite end serves to reciprocate the members 35 and 94 endwise relative to the guides 36 and 37 and machine frame 18′. The eccentric strap 100 is mounted upon an eccentric 101, which is mounted upon a shaft 102, see Fig. 17, especially provided and driven for that purpose. The shaft 102 is not specifically shown in Fig. 4, but is located adjacent to and driven from shaft 34 as shown in Fig. 6. If desired eccentric 101 may be mounted directly upon either one of the shafts 62 or 34, in substantially the same manner that members 32 and 33 are shown to be mounted upon the shaft 34 in Figs. 4 and 8.

The reciprocation of the member 35 assists in introducing the book cover backs and heated member, 35 into operative relation, and avoids the formation of creases or wrinkles, by thrusting the nose of the member 35 repeatedly under the back as the book cover is advanced thereto. This recip-

rocatory movement of member 35 relative to the back of the cover tends to prevent adhesion of the backs to member 35, and to more quickly and more effectively and permanently shape the cover backs than where a stationarily mounted member 35 is employed.

A plurality of positively driven feed shafts 38, 39 and 40 are mounted in journal bearings 41 adjustably mounted in vertical ways in pillow-blocks 42 located at opposite sides of the main frame. After a book cover has been withdrawn from the supply hopper 19 by the pawls 24 it is engaged by the first set of feed rolls on the shaft 38 which take up and continue the forward feed of the book covers and back until the back of the book cover is fully and entirely in operative relation with the heated member 35, at which point the book cover passes out of engagement with the rubber tread rollers of the shafts 38 and 39 and is only engaged by the steel tread rollers of the shaft 40, which causes the book cover feed to be ordinarily momentarily arrested and the back to dwell in contact with the heated member 35 until the fingers 24 and 43 have been retracted and commence another forward feed, whereupon the fingers 43 engage the rear edge of the arrested book cover and start it to feed again whereupon the book cover is fed past the member 35 and onward to the receiving hopper 20.

The feeding of the back of the book cover over the raised bar 35 results in also shifting or drawing the two side sections of the book cover toward each other. The rolls 44 are preferably provided with broad heavy rubber treads 45, see Fig. 10, which engage the side sections of the book cover as soon as the side sections have moved toward each other sufficiently to provide the slack in the back of the cover necessary to fit over the raised bar 35, and continue the feed of the book cover along and over the bar 35 by which it is shaped and heated so as to retain its shape.

The fingers 43 engage each book cover in the event that the feed rolls on the shafts 38, 39 and 40 fail to keep the cover continuously feeding forward, and insure a positive feed of each book cover out of engagement with the heated member 35, and forward to the receiving hopper to make way for the next book cover to take its place relative to the heated member 35.

A pair of rollers 46, see Fig. 11, preferably metal faced, are mounted upon the feed shaft 39 and serve to press the back of the book-cover against the sides of the bar 35 and to draw or shape the back over said heated bar 35, and hold the back in contact with the sides of said bar 35. A pair of rollers 47 see Fig. 13, preferably metal faced, mounted upon the feed shaft 40 and serve to form narrow grooves or channels along the edges of the back where the back is attached to the stiff cardboard sides of the book-cover. The feed rolls 48 similar to roll 44 shown in Fig. 10, are mounted upon the feed shafts 38 and 39 and are preferably provided with rubber treads 49 to engage and positively feed the book covers forward on the ways 21 and 22. The feed rollers 50, see Fig. 12, are preferably steel faced and serve to feed the covers forward toward the receiving hopper after the backs have been shaped. A pair of feed rollers 51 and 52 engage the under face of the book-covers and assist in feeding the book covers forward away from the shaping bar 35 and into the receiving hopper 20. The ends 54 and 55 of the rails 21 and 22 and 36 and 37 are inclined to direct the book covers by gravity to the hopper 20 where they are stacked one above another.

The feed shafts 38, 39 and 40 are driven preferably by means of a belt not shown on the tight and loose pulleys 60 and 61 mounted on the shaft 62. The shaft 62 carries a spur gear 63 meshing with a pinion 64 on an idler shaft 65 which shaft carries a spur gear 66, which in turn meshes with a pinion 67 on the shaft 34 to drive the shaft 34 at a slow speed relative to the shaft 62. The gear 67 also drives a pinion on the stud shaft 69, and said pinion drives a sprocket wheel 70 which drives a sprocket chain 71 which in turn engages with a series of idler sprocket wheels 72, and with sprocket wheels 73, 74 and 75 respectively on the feed shafts 38, 39 and 40 to drive said several shafts at relatively uniform speeds and in the same direction. The shaft 34 also carries and drives the eccentrics 33. The shafts 38, 39 and 40 and their feed rolls are preferably held yieldingly in contact with the book cover and guide ways by means of adjustable tensioning springs 76, the tension to which is adapted to be adjusted by means of the adjusting screws 77.

The rails 21 and 22 are adjustable transversely of the main frame by means of screw rods 80 and 81, actuated in unison through a hand lever 82 to turn the screw rod 80, and through a shaft 83 driven by a pair of beveled gears 84 and 85 from the screw rod 80, which in turn drives the screw rod 81, located vertically beneath the feed shaft 38, by means of a pair of beveled gears 86 and 87. The rails 36 and 37 do not require to be adjusted transversely as frequently as do the rails 21 and 22 since the variation in the width of the back is not as great as the variation in the width of the book-covers. The rails 36 and 37 may be variously supported, but are preferably supported upon the screw rods 80 and 81. They are also preferably slidably supported near one end upon a cross-bar 104 of the main frame, and slid-

ably supported near their opposite ends upon the shaft 34. The rails 36 and 37 are adjustable by hand transversely when required. The bars 35 may be heated by gas jets, but are preferably heated electrically and may be of any desired cross sectional pattern of which a plurality of patterns have been shown in the drawings. The feed rollers on the shafts 38, 39, and 40 are speeded so as to feed the book covers at somewhat higher speed than the reciprocating fingers 24 and 43 so as to take the book covers away from said reciprocating feeding members, and the feed rollers 51 and 52 are speeded so as to feed the book covers forward at a somewhat higher rate of speed than the feed rollers on the shafts 38, 39, and 40. Top plates 90 are preferably attached to the guide rails 21 and 22 over a portion of the lengths, and of less width than the guide rails 21 and 22 to provide channel guides at top and bottom for the outer edges of the book-covers until after said book-covers have moved inwardly and adjusted themselves on their guides and relative to the bar 35.

We are thus enabled to rapidly positively and reliably feed the book-covers forward and shape the backs thereof without liability to mar the edges or faces of the book-covers or to crease the backs of the book covers.

The apparatus herein shown and described is capable of considerable modification without departing from the spirit of our invention.

What we claim is:

1. A book-cover shaping apparatus comprising guide rails over which the book covers are to be successively fed, a member over which book-cover backs are to be shaped, feed shafts transversely of said guide rails provided with feed rolls to engage the book-covers and feed said book covers along said guide rails and over said back shaping members, and rollers to engage the book-covers back upon opposite sides of said shaping members to force the book-covers back into contact with the sides of said back shaping member.

2. A book-cover shaping apparatus comprising guide rails over which the book covers are to be successively fed, a member over which the book-cover backs are to be shaped, feed shafts transversely of said guide rails provided with feed rolls to engage the book-covers and feed said book-covers along said guide rails and over said back shaping member, means to engage the book-cover back to hold it in contact with the sides of said back shaping member, and rollers at opposite sides of said back shaping member to form creases in the book-cover back.

3. A book-cover shaping apparatus comprising guide rails over which the book-covers are to be successively fed, a member over which the book-cover backs are to be shaped, feed shafts transversely of said guide rails provided with feed rolls to engage the book-covers and feed said book-covers along said guide rails and over said back shaping member and to permit the book covers to move laterally toward said back shaping member to provide slack in the book cover back to receive said shaping member and means to strain the book-cover back over the top and sides of said back shaping member.

4. A book-cover shaping apparatus comprising a raised book-cover shaping member, plane guide rails at opposite sides of and close to said shaping members to support the book covers adjacent to the book-cover back, channel shaped guides to engage and guide the outer edges of the book-covers, a feed shaft mounted transversely to said guide rails, and feed rollers mounted upon said feed shaft to engage the respective book covers at their inner edges and at their outer edges at opposite sides of said back shaping member to positively feed the book-covers and book cover back relative to said back shaping member, and to permit the back covers to move toward each other as the book-cover back is shaped over the back shaping member.

5. A book-cover shaping apparatus comprising guide rails over which the book-covers are to be fed, a supply hopper in which the book-covers are stacked above said guide rails, means to intermittently feed the book-covers from said hopper forward along said rails, continuously driven feeding rolls to receive the book covers from said hopper and to feed them forward, and a book-cover back shaping member over which the back of the book-cover is shaped as the book-cover is fed forward by said feed rolls.

6. A book-cover shaping apparatus comprising a supply hopper, a reciprocatorily actuated feed member to feed the book-covers successively forward from said supply hopper, feed rollers to take up the forward feed of the book-covers, a book-cover back shaping member located in the line of feed of said book covers, and over which the book-cover backs are strained as the book-covers are fed forward.

7. A book-cover shaping apparatus comprising a supply hopper, a reciprocatorily actuated feed member to feed the book-covers successively forward from said supply hopper, feed rollers to take up the forward feed of the book-covers, a book cover back shaping member located in the line of feed of said book covers, and on which the book-cover backs are strained as the book-covers are fed forward, and means to press

the book-cover backs into contact with the sides of said back shaping member.

8. A book-cover shaping apparatus comprising a supply hopper, a reciprocatorily actuated feed member to feed the book-covers successively forward from said supply hopper, feed rollers to take up the forward feed of the book-covers, a book-cover back shaping member located in the line of feed of said book covers, and over which the book-cover backs are strained as the book-covers are fed forward, means to press the book cover backs into contact with the sides of said back shaping member, and means to crease the book-cover backs at opposite sides of said back shaping member.

9. A book-cover shaping apparatus comprising a supply hopper, a reciprocatorily actuated feed member to feed the book-covers successively forward from said supply hopper, feed rollers to take up the forward feed of the book-covers, a book-cover back shaping member located in the line of feed of said book covers, and over which the book-cover backs are strained as the book-covers are fed forward, roller means to press the book cover backs into contact with the sides of said back shaping member.

10. A book-cover shaping apparatus comprising a supply hopper, a reciprocatorily actuated feed member to feed the book-covers successively forward from said supply hopper, feed rollers to take up the forward feed of the book-covers, a book-cover back shaping member located in the line of feed of said covers, and over which the book-cover backs are strained as the book-covers are fed forward, roller means to press the book-cover backs into contact with the sides of said back shaping member, and roller means to crease the book-cover backs at opposite sides of said back shaping member.

11. A book-cover shaping apparatus comprising guide rails over which the book-covers are to be fed, a supply hopper in which the book-covers are stacked above said guide rails, a reciprocatorily actuated feed member to successively feed book covers from said hopper forward upon said guide rails, a book-cover back shaping member in the line of feed of said book cover feed rolls to receive the book-covers from said reciprocating feed member and to feed said book covers forward over and away from said back shaping member, and means to press the book-cover back in contact with the sides of said back shaping member.

12. A book-cover shaping apparatus comprising guide rails over which the book-covers are to be fed, a supply hopper in which the book-covers are stacked above said guide rails, a reciprocatorily actuated feed member to successively feed book covers from said hopper forward upon said guide rails, a book-cover back shaping member in the line of feed of said book-covers, feed rolls to receive the book-covers from said reciprocating feed member and to feed said book covers forward over and away from said back shaping member, and means to crease the backs of said book-covers at opposite sides of said back shaping member.

13. A book cover shaping apparatus comprising a heated book-cover back shaping member, means to reciprocate said heated shaping member endwise of and in contact with a book cover back, means to hold the book cover back in contact with the face of said reciprocating heated member, and means to feed book covers successively to and from said reciprocating heated shaping member.

14. A book cover shaping apparatus comprising a heating member mounted in guides and adapted to be reciprocated endwise relative to said guides, a book cover back shaping member detachably mounted upon and heated from said movable heating members, means to hold the book-cover backs in contact with the face of said back shaping member, and means to feed book covers successively to and from said back shaping member.

15. A book-cover shaping apparatus comprising a supply hopper, a heated book cover back shaping member, a reciprocatorily actuated feed member to feed a series of book covers successively from said receiving hopper into partial engagement with said back shaping member, feed rollers to take up the forward feed of the book covers and a second reciprocatorily actuated feeding member to successively engage the book covers and insure feeding the book-covers out of engagement with said back shapidng member.

16. A book-cover shaping apparatus comprising a heated book cover back shaping member, a reciprocatorily actuated feed member to successively feed book covers into operative relation to said back shaping member, means to press the book-cover backs into contact with said shaping member, and a second reciprocatorily actuated member to take up the feed of said book covers after an interval of time to feed the book covers out of engagement with said book-cover back shaping member.

17. A book-cover shaping apparatus comprising a heated reciprocatorily actuated book-cover back shaping member, a reciprocatorily actuated feed member to successively feed book covers into operative relation to said back shaping member, means to press the book-cover backs into contact with said shaping member, and a second reciprocatorily actuated member to take up the feed of said book covers after an interval of time to feed the book-covers out of engagement with said book-cover back shaping member.

18. A book cover shaping apparatus comprising a heated book-cover back shaping member, feeding members to intermittently feed a series of book covers in a plurality of stages into and out of operative relation with said back shaping member, and means to hold the book cover backs in engagement with said back shaping member during the time interval between said forward feeds.

In testimony whereof we have affixed our signatures.

HENRY C. ELDREDGE.
CALEB H. LADD.