Sept. 14, 1965 W. C. BOYLE 3,206,226

METHOD OF MAKING BOOK COVERS

Original Filed April 13, 1960 4 Sheets-Sheet 1

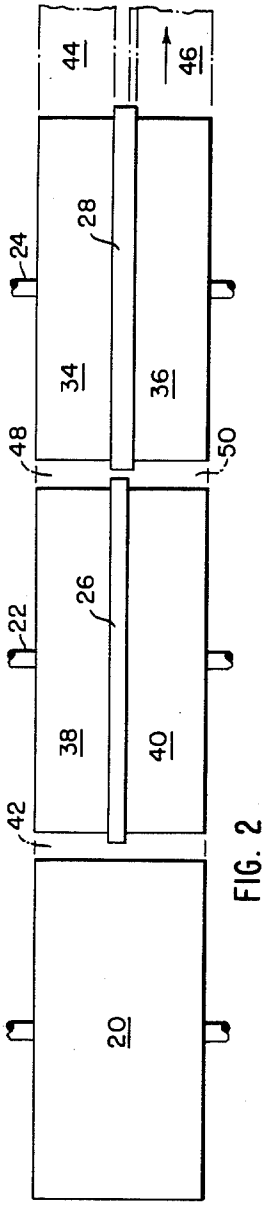


FIG. 2

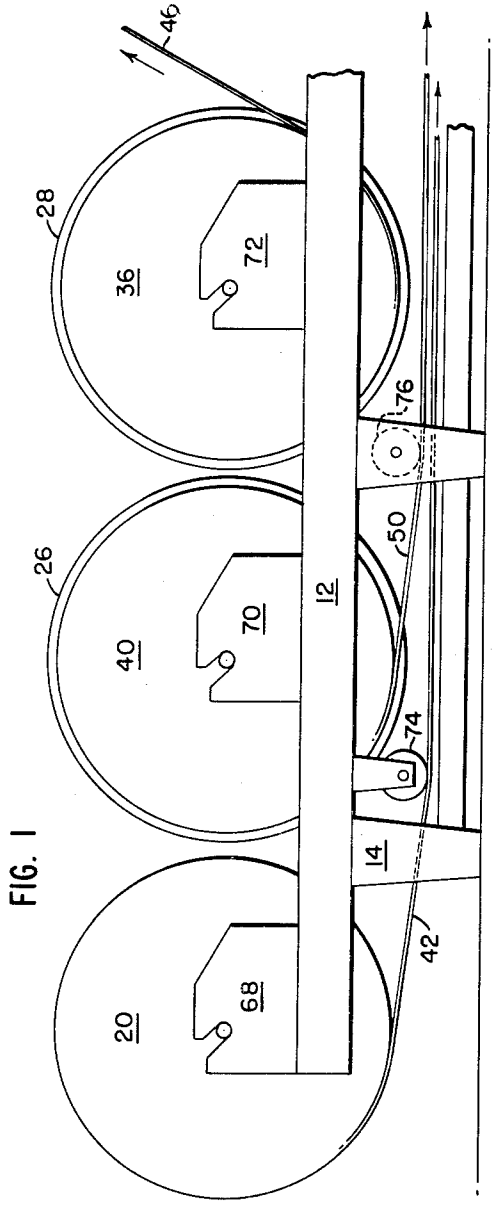


FIG. 1

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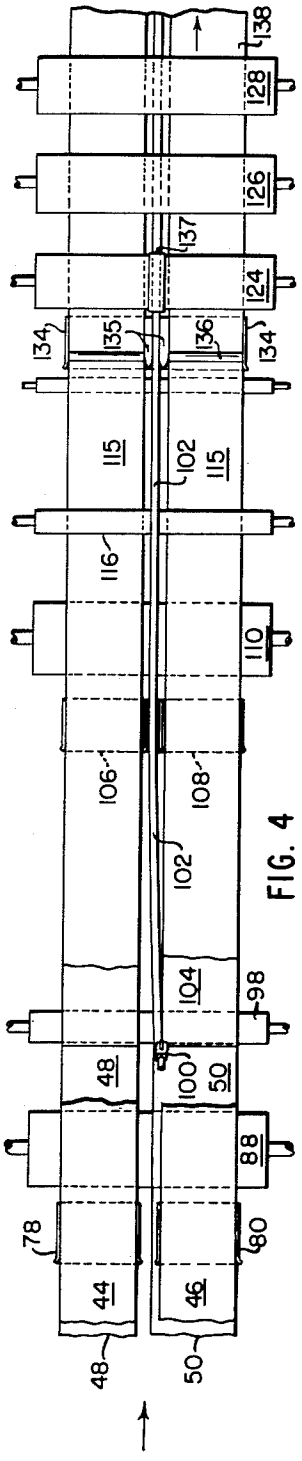


FIG. 4

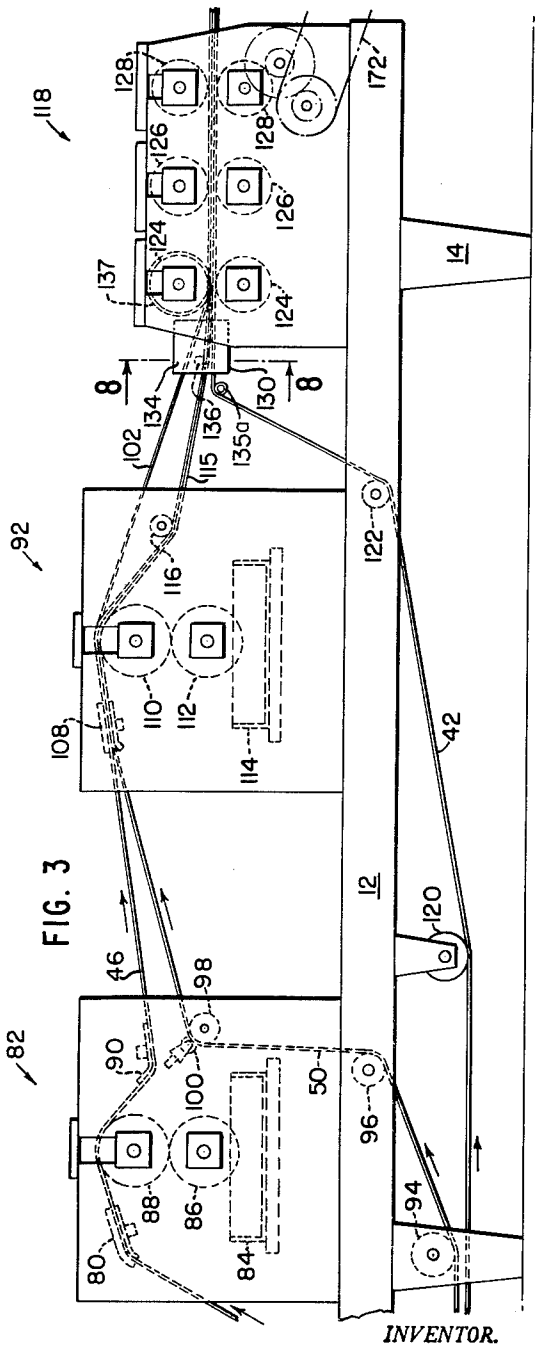


FIG. 3

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METHOD OF MAKING BOOK COVERS

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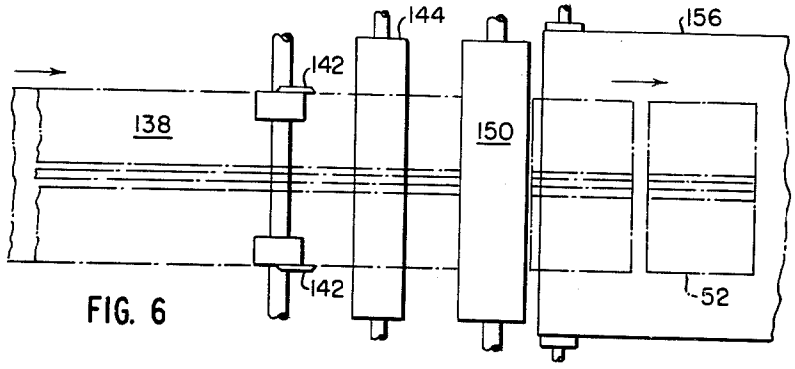
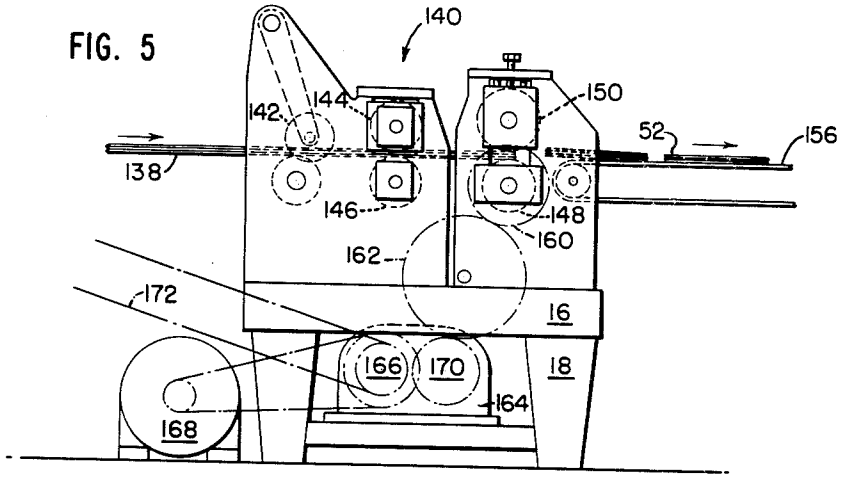


FIG. 6

FIG. 5



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METHOD OF MAKING BOOK COVERS

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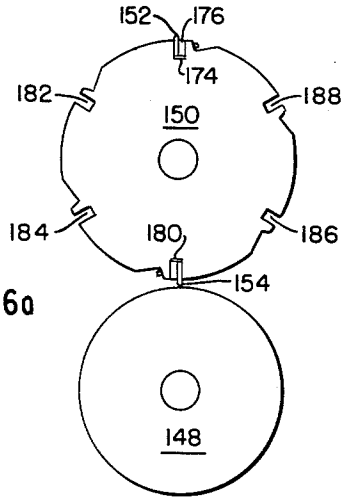


FIG. 6a

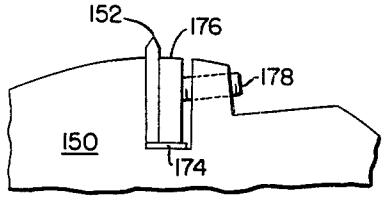
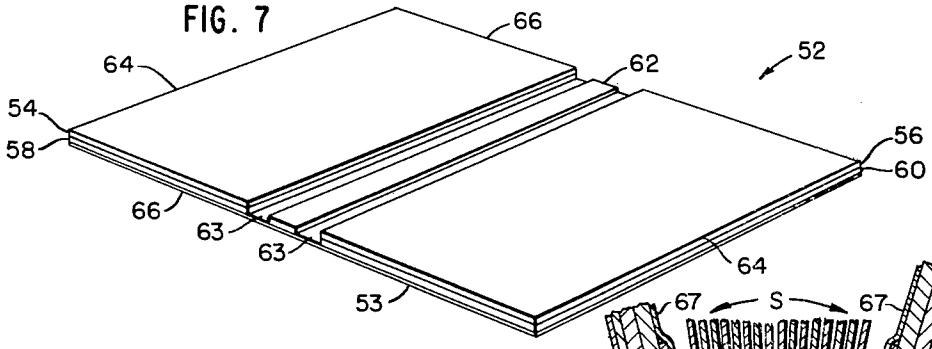


FIG. 6b

FIG. 7



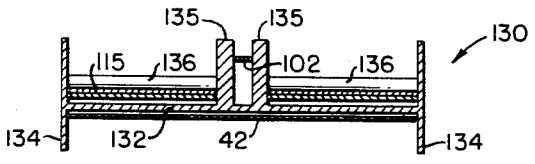
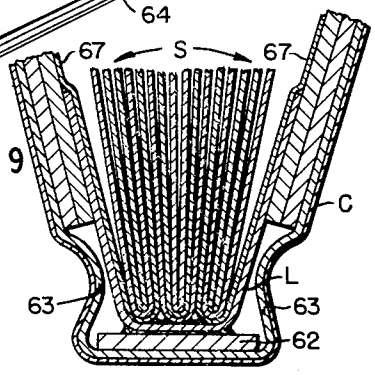


FIG. 8

FIG. 9



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3,206,226

METHOD OF MAKING BOOK COVERS

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Continuation of application Ser. No. 22,050, Apr. 13, 1960. This application Apr. 13, 1965, Ser. No. 447,644
2 Claims. (Cl. 281—29)

The present invention relates generally to the manufacture of book covers, and more particularly to a novel method for making covers of the type having relatively stiff spines. This application is a continuation of my copending application Serial No. 22,050, filed April 13, 1960.

In my Patent No. 2,922,172 there is described a machine for making a book casing or cover consisting of a cover layer of cardboard which forms a part of both cover boards and extends across the book back, and a pair of cardboards which are laminated to this layer to form relatively stiff cover boards. This type of casing may be finished with a printed cover or wrapper which binds the edges. Inexpensive books including children's editions make wide use of such casings. The sections or signatures may be sewn or bound by any of the usual methods and a lining of fabric, tape or paper is ordinarily glued or otherwise adhered to the back or spine and to adjacent margins of the end papers. The end papers and the lining are in turn glued to the casing.

In certain editions it is desired to provide a cover having a flat, stiff spine which does not flex appreciably in use and which will bear printing such as the title, author and publisher. It is a principal object of this invention to provide such a cover while retaining economies of manufacture associated with the method of the above patent.

Another object related to the first is to provide flexible crease margins between the relatively stiff cover boards and the spine of the cover, whereby the opening and closing of the book is accommodated substantially entirely by flexure of the creases, as in more expensive editions. This makes it possible in many cases to strengthen the attachment of the cover by means of glue between the spine of the book and the spine of the cover.

With the foregoing and other objects in view, the features of this invention include certain improvements in the method of manufacture including the provision of web slitting means for slitting a spine stiffener web from a wider web forming a leaf stiffener lamina. The spine stiffener web has glue applied thereto and is guided on to the cover web in accurately spaced relationship to the leaf stiffener laminae on both of the cover leaves.

Another feature of the invention resides in the possibility of providing a different thickness for the spine of the cover than for the cover leaves which are ordinarily subjected to greater abuse and wear.

The combining of the stiffener webs with the cover web is carried out by a pressure roll which is built up radially with a suitable sleeve opposed to the spine stiffener web, whereby the pressure of said roll is substantially uniform upon the spine and leaf stiffener webs as they are combined with the cover web.

Other features of the invention reside in certain details of construction of the machine and in certain modes of operation that will become more evident from the following description of a preferred embodiment thereof, having reference to the appended drawings in which

FIG. 1 is a side elevation of the feed rolls;

FIG. 2 is a plan view of the feed rolls corresponding to FIG. 1;

FIG. 3 is a side elevation of the gluing and combining section of the machine including the spine slitting, guiding, gluing and combining apparatus according to this invention;

FIG. 4 is a plan view corresponding to FIG. 3;

FIG. 5 is a side elevation of the cut-off section of the machine;

FIG. 6 is a plan view corresponding to FIG. 5;

FIG. 6*a* is an end elevation of the cut-off roll **150** and the anvil roll **148** shown in FIG. 5;

FIG. 6*b* is a fragmentary detail view showing the assembly of the cut-off knives on the cut-off roll **150**;

FIG. 7 is a view in perspective of a book cover produced according to the invention;

FIG. 8 is an elevation in section taken on line **8—8** in FIG. 3; and

FIG. 9 is a fragmentary elevation in section of a typical book bound with a cover produced according to the invention.

Referring to the drawings, the machine is arranged for convenience in three sections, a feed section shown in FIGS. 1 and 2, a gluing and combining section shown in FIGS. 3 and 4 and a trimming and cut-off section shown in FIGS. 5 and 6. The feed and gluing and combining sections are assembled for convenience on a common stationary bed **12** supported on legs **14**. The trimming and cut-off section is supported on a separate stationary bed **16** spaced from the bed **12** and similarly supported on legs **18**. It will be understood that the particular means employed in this latter section are largely a matter of choice and typical means have been shown in the interest of completeness.

The bed **12** is provided with three pairs of roll supports of which the front pair receives a cover roll **20** equal in width to the sum of the widths of the crease margins, the cover boards and the cover spine. The other supports receive shafts **22** and **24** having circular spacer plates **26** and **28**. It will be understood that the spacer plates may be eliminated in instances where the webs are adequately guided without them. The shaft **24** receives two mill rolls **34** and **36** of equal width. The shaft **22** receives a mill roll **38** equal in width to the rolls **34** and **36** and a mill roll **40** which is wider than the rolls **34**, **36** and **38** by a width equal to that of the desired spine stiffener strip hereinafter more fully described with reference to FIG. 7. A cover web **42** is drawn from the roll **20** toward the gluing and combining section illustrated in FIGS. 3 and 4. Four stiffener webs **44**, **46**, **48** and **50** are fed respectively from the rolls **34**, **36**, **38** and **40** to the gluing and combining section. The rolls **34** and **36** are preferably spaced by a distance equal to the sum of the widths of the crease margins plus the cover spine. The roll **38** is preferably aligned with the roll **34** and the roll **40** is spaced from the roll **38** by a distance equal to the sum of the widths of the crease margins.

The machine hereinafter more fully described slits, glues, combines, trims and severs the foregoing webs to form book covers such as the cover **52** illustrated in FIG. 7. This cover is of laminated construction comprising an outer cover **53**, leaf stiffener laminae **54**, **56**, **58** and **60** derived respectively from the webs **44**, **46**, **48** and **50** and a spine stiffener strip **62** derived from the widest stiffener web **50** in the manner hereinafter more fully described. Crease margins **63** separate the cover boards and the spine. The book cover **52** is of unitary finished appearance. Side edges **64** are precisely aligned and parallel. The top and bottom edges **66** are also precisely aligned and perpendicular to the edges **64**. If desired, the visible surfaces of the cover or laminae may be decorated by printing, or a thin cover paper or wrapping C may be applied in such a manner as to leave the stiffener strip and laminae exposed except at the visible edges, as shown in the sectional view, FIG. 9.

The book cover 52 may be glued to a book as shown in FIG. 9. End papers 67 glued to the cover boards may be pages of the first and last signatures S as shown, or may be attached on a tipping machine in a conventional manner. A tear-resistant cloth, paper or tape lining L is attached to the end papers and to the spine of the book, and glued to the cover boards and the cover spine stiffener strip 62. The margins 63 are creased in the usual manner.

Turning next to a description in detail of the manufacture of the book covers, the mill rolls 20, 34, 36, 38 and 40 are supported in a conventional manner on blocks 68, 70 and 72 (FIG. 1). These rolls may be provided with the usual tension adjustment means, for example the means shown in said patent (not illustrated herein). The webs 42, 48 and 50 pass under idler rolls 74 and 76 beneath the bed 12, while the webs 44 and 46 are inclined upwardly and pass over fixed guide plates 78 and 80 (FIGS. 3 and 4) supported in a first gluing section designated generally at 82. This latter section has a glue tank 84, a glue pick-up roll 86 and a glue spreader roll 88, all of conventional form, by which glue is applied to the under side of the webs 44 and 46. These webs then pass under a decurling plate 90 to a combining and gluing section designated generally at 92.

The webs 48 and 50 pass under idler rolls 94 and 96 (FIG. 3), and are drawn upwardly over a roll 98 supported in the section 82. Associated with the roll 98 is a knife-edged slitting wheel 100 constructed and supported in a conventional manner and arranged to slit the web 50 to form a spine portion 102 (FIG. 4) and a "remaining" portion 104 equal in width to the web 48.

The webs 44 and 48 pass over a guiding and combining plate 106 (FIG. 4) where they are joined. Similarly a plate 108 guides and combines the web 46 with the "remaining" portion 104 of the web 50. The guides 106 and 108 have upwardly extending surfaces adapted to deflect laterally and guide the spine portion 102 to a position equally spaced laterally of the combined leaf stiffener webs on each side.

The webs then pass over a glue spreader roll 110 replenished by a glue pick-up roll 112 from a glue tank 114. Here glue is applied to the webs 48 and 50, including both the "remaining" portion 104 and the spine portion 102 of the web 50. The two combined stiffener webs designated 115 pass under a decurling roll 116.

The webs then pass to a final combining section 118. The cover web 42 reaches this section after passing under idler rolls 120 and 122. This section is provided with three pairs of pressure rolls 124, 126 and 128 which apply pressure to bond the combined webs securely together.

At the front end of the section 118 the webs enter a guide member 130 (FIG. 8) formed of a horizontal plate 132, vertical edge plate 134 and a pair of spaced vertical dividers 135. The spine portion 102 is guided between the dividers 135 to the bite of the rolls 124. The cover web 42 passes over an idler roll 135*a* and under the plate 132 to the bite of the rolls 124. The combined webs 115 pass under bars 136 to the bite of the rolls 124. The upper roll of the pair of rolls 124 is provided with a sleeve 137 substantially equal in thickness to one of the webs 44 or 46 whereby the pressure of the bite of the rolls 124 on the spine portion 102 is equal to the corresponding pressure on the combined webs 115. It will be understood, however, that the thickness of the sleeve 137 may be varied to obtain greater or less pressure on the spine portion 102 if desired.

A single combined web 138 passes from the section 118 to a trimming and cut-off section 140 illustrated in FIGS. 5 and 6. A pair of accurately spaced circular knife-edged slitters 142 trim the edges of the web to the precise overall dimension required. These slitters may be eliminated if the stock in use has been pre-cut to accurate width and is precisely guided. The web is then passed through feed rolls 144 and 146.

From the rolls 144 and 146 the web 138 is fed over a

continuous, smooth, hard steel anvil roll 148 which cooperates with a cut-off roll 150 having knives 152 and 154 (FIG. 6*a*) and delivers the book covers to a moving belt 156. The rolls 148 and 150 are driven at equal peripheral speed, taking the speed of the roll 150 as the peripheral velocity of the edges of its cut-off knives. The rolls 144, 146, 148 and 150 are driven by a gear 160 (FIG. 5) through conventional intermediate spur gear mechanisms, not shown. The gear 160 is driven by a gear 162 which in turn is rotated by a variable speed drive mechanism 164 of conventional form. The mechanism 164 is powered by a constant speed shaft 166 driven by a motor 168 and is adjustable to deliver variable speed to a gear 170 in mesh with the gear 162. A belt 172 is driven from the motor 168 at constant speed and extends to the section 118 where it is connected by conventional spur gear mechanism (not shown) for driving the pressure rolls 124, 126 and 128. It will be understood that similar connections are provided from the motor to the gluing rolls in the sections 82 and 92 to drive the latter rolls at constant speed.

The side trimming and cut-off section 140 may be constructed as described in said patent. Details of the mounting of a cut-off knife are shown in FIG. 6*b*. The knife 152, for example, is a straight blade with a sharp tapered edge held in position against the side of a transverse recess 174 in the roll 150 by a clamp bar 176 tightly clamped against the blade 152 by a number of spaced set screws 178. As shown in FIG. 6*a*, there are two such blades 152 and 154 in diametrically opposed recesses 174 and 180, but other recesses 182, 184, 186 and 188 are also provided and may be used for additional knives, if required. It will be understood that the number of knives and the adjustment of the variable speed drive 164 determine the top-to-bottom dimension, that is, the height of the book covers. Also, the peripheral velocity of the knives should exceed that of the web to obtain a clean cut. For example, if the length of the book cover from top to bottom is desired to be 12 inches, experience demonstrates that the peripheral speed of the knives should be about 14 inches per cover to obtain a clean cut. The cutting action is simultaneous at all points along the cut and hence resembles a chopping action.

To obtain other lengths of book covers, the adjustment of the variable speed drive 164 may be changed within certain limits for the illustrated case of two knives; or one, three or six knives may be used, each set of knives providing a different range of possible lengths of cover within a corresponding range of adjustment provided by the drive 164.

The cut-off unit may be replaced, if desired, with any other equivalent means for severing the web, such as a vertically-reciprocating knife.

It will be seen that the machine for making book covers according to this invention is of relatively simple and straight-forward construction, and that the finished book covers are accurately dimensioned and are provided with smooth edges on all sides. These covers are of superior quality in that they have stiff laminated cover boards and a cover spine of neat appearance. Thus the wrinkled appearance so often associated with "paper-back" books has been effectively eliminated at no substantial increase in the cost of manufacture over the methods described in said patent.

It will be understood that while the invention has been described with reference to a specific and preferred embodiment thereof, various modifications and adaptations of the parts will occur to one skilled in this art with respect to known techniques, and that these may be performed without departing from the spirit or scope of this invention.

Having thus described the invention, I claim:

1. The method of making book covers, which includes the steps of feeding first and second webs of equal width of cover reinforcing material in substantially coplanar,

laterally spaced relationship, feeding third and fourth webs of cover reinforcing material in substantially coplanar, laterally spaced relationship and opposed to the first and second webs, respectively, the fourth web being equal in width to the first and second webs and the third web being wider, slitting a spine reinforcing web from the third web to leave a remaining web equal in width to the first, second and fourth webs, guiding the spine reinforcing web laterally to an intermediate position between the fourth and remaining webs, adhesively combining the second web with the fourth web and the first web with the remaining web with the edges of the combined webs aligned, feeding a fifth web in opposed relationship to the webs so combined and the spine reinforcing web, adhesively combining the fifth web with the webs so combined and with the spine reinforcing web, and severing the resulting web at longitudinally spaced intervals.

2. The method according to claim 1, including the step of edge trimming the web after the final combining step and before severeing the web.

References Cited by the Examiner

UNITED STATES PATENTS

444,821	1/91	Feister	156—517
2,166,038	7/39	Chambon	11—2 X
2,554,298	5/51	Ferguson et al.	83—107 X
2,772,427	12/56	Rankin	11—2
2,922,172	1/60	Boyle	11—2 X
3,145,033	8/64	Caddoo	11—2 X

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