Jan. 26, 1960 W. C. BOYLE 2,922,172

MACHINE FOR MAKING BOOK COVERS

Filed July 5, 1957 4 Sheets-Sheet 1

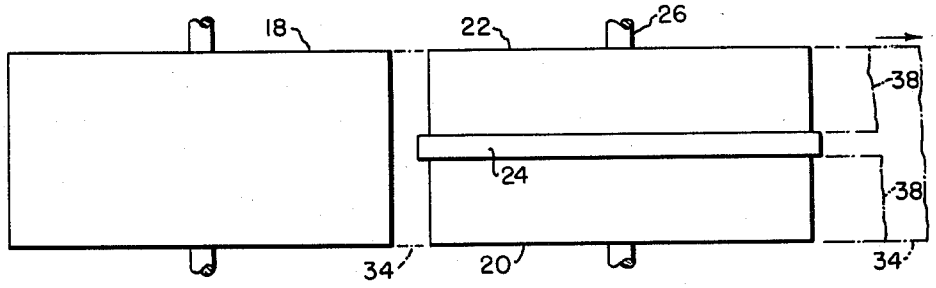


Fig. 2

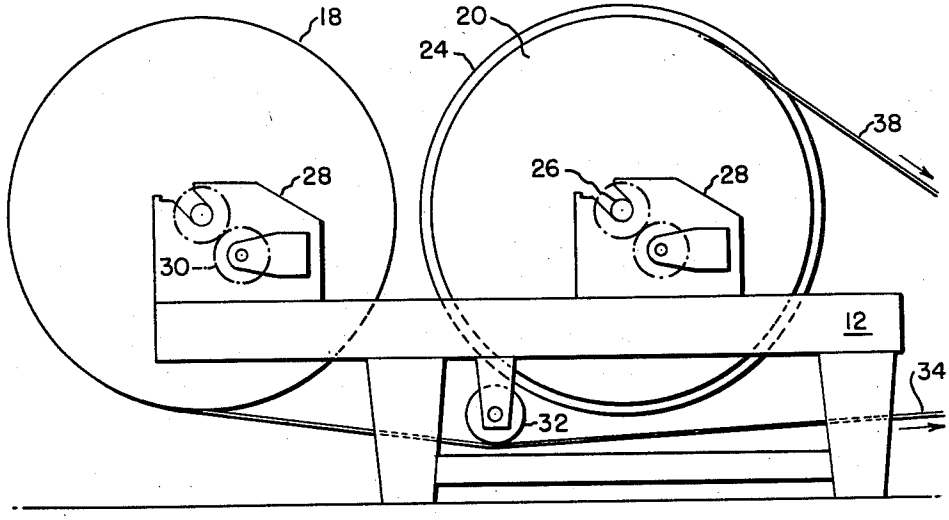


Fig. 1

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Filed July 5, 1957 4 Sheets-Sheet 2

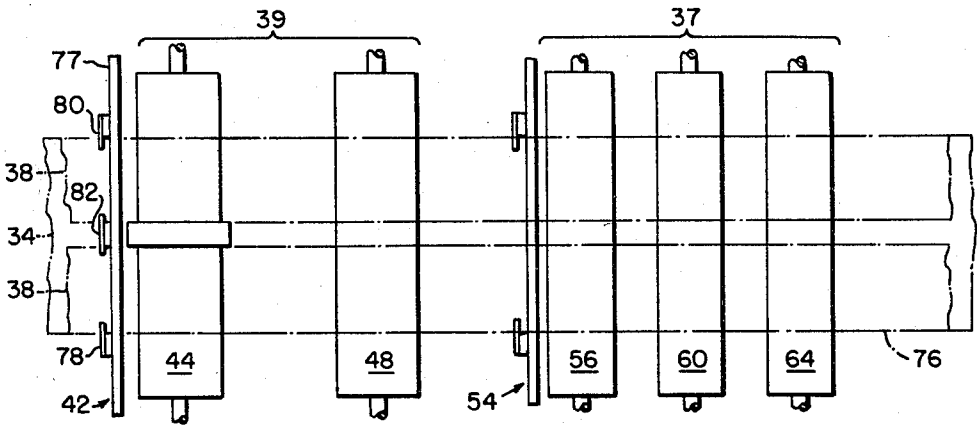


Fig. 4

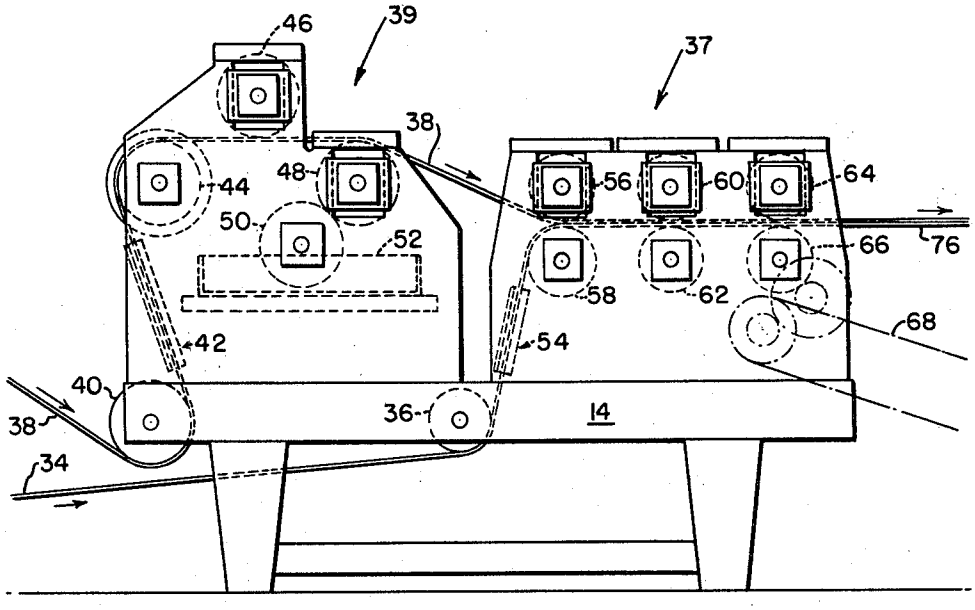


Fig. 3

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MACHINE FOR MAKING BOOK COVERS

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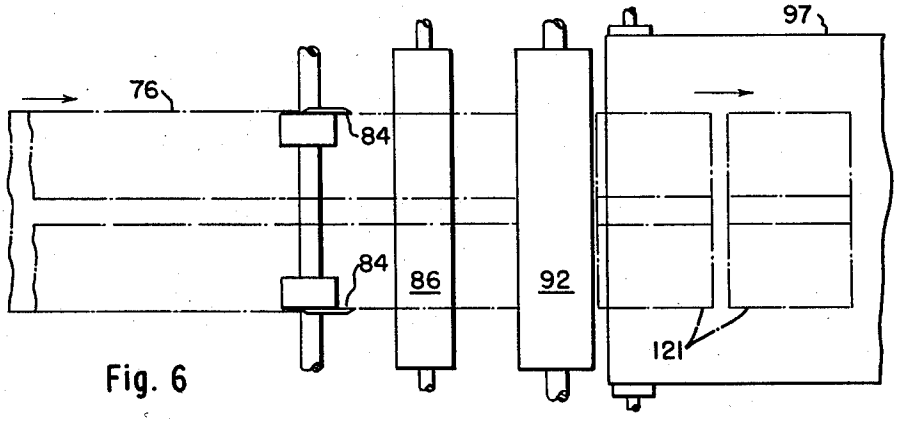


Fig. 6

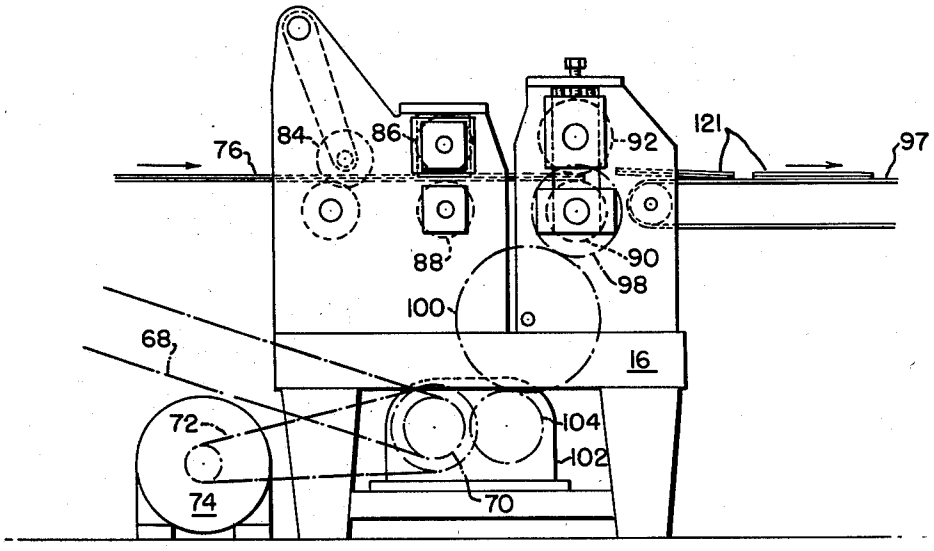


Fig. 5

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MACHINE FOR MAKING BOOK COVERS

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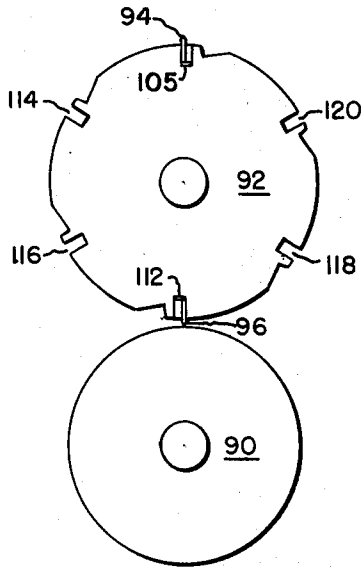


Fig. 6a

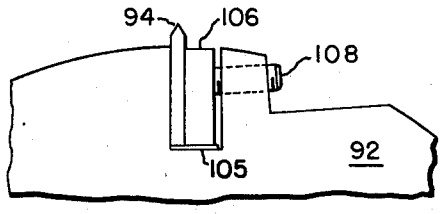
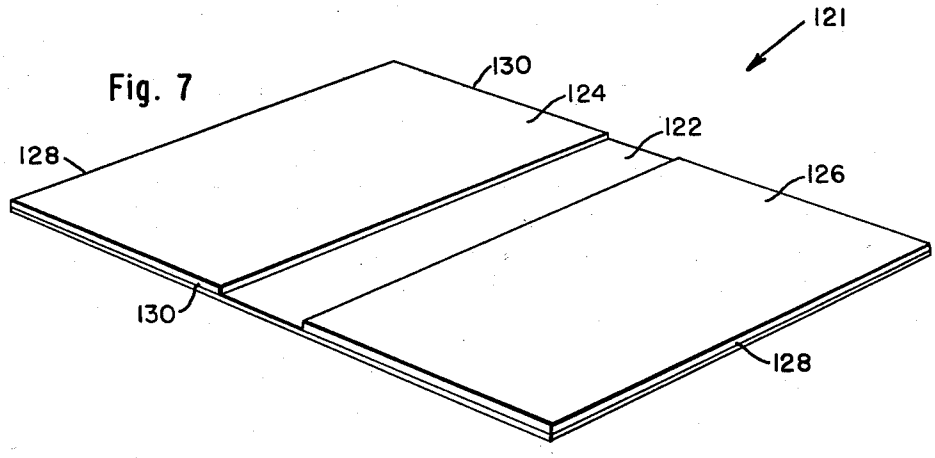


Fig. 6b

Fig. 7



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2,922,172

MACHINE FOR MAKING BOOK COVERS

William C. Boyle, Melrose, Mass., assignor to General Box Company, Waycross, Ga., a corporation of Florida

Application July 5, 1957, Serial No. 669,991

1 Claim. (Cl. 11—2)

The present invention relates generally to the art of manufacture of book covers, and more particularly to a high speed web-fed machine for the production of substantially finished laminated cardboard reinforced book covers, and to the book cover made by such machine.

The techniques of book cover manufacture are dictated by the available materials and methods and by trade acceptance and custom. In the case of large editions of medium price the so-called buckram covers have been prevalent, these often having a foundation of laminated cardboard or paper and cardboard over which a covering and reinforcement of suitable cloth is glued. Ordinarily, this cloth, or a cloth attached to it and forming an extension from cover leaf to cover leaf, forms the hinge-piece and thus becomes an important structural component of the cover, with the cardboard performing only the function of stiffening the cover leaves. In some forms the cardboard cover leaf reinforcements are laminated with a paper sheet which is continuous from cover leaf to cover leaf so as to stiffen the cloth hinge-piece covering the backbone.

The relatively cheap, so-called "paper-back" editions which have been popular in recent years are provided with coated paper covers which are continuous from cover leaf to cover leaf and are glued directly to the backbone, frequently over a loosely woven cotton gauze reinforcement member or the like. While this arrangement does perform some of the functions of a cover, the cover leaves are not stiff and the handling properties and durability are markedly inferior to those of cloth-bound books. This is due largely to the inability of a paper sheet of uniform thickness to satisfy, on the one hand, the requirement for a sufficiently flexible cover to remain glued to the backbone despite repeated flexing, and on the other hand, the requirement for stiff, durable cover leaves.

One of the objects of this invention is to provide a cardboard cover suitable for gluing to the backbone as in "paper-back" editions, yet having stiff, durable, cover leaves.

Another object is to provide a machine for the manufacture of such a book cover, adapted to accommodate the cost limitations identified with mass-produced "paper-back" editions, while at the same time providing a book cover having some of the improved characteristics associated with cloth bound editions.

With the foregoing and other objects in view, the features of the invention include a cover of improved qualities produced by the provision of continuous web-fed apparatus including means for simultaneously feeding, gluing and laminating a cover board with a pair of reinforcing leaf boards, these boards being registered with precision when entering the gluer, and including side trimming slitters to insure clean-cut edges and a cut-off roll synchronized with the moving glued and laminated combined web to produce substantially finished covers

of unitary appearance and precisely uniform dimensions at the delivery end of the machine.

It is therefore a feature of this machine that the operation is entirely continuous, producing finished covers at a high speed. It will be understood that the precise side trimming and cut-off operations insure a finished, unitary edge appearance which is ordinarily neither obtained nor desired in conventional cardboard-reinforced covers having cloth or coated paper coverings glued thereover. This is due to the fact that the covering cloth or paper when used according to the prior art ordinarily hides slight deviations in registration of the edges of laminae. In contrast, the finished covers according to the present invention necessarily have substantially perfect registration between the laminae at all visible edges, whereby the cover is immediately ready for gluing to the backbone of the binding upon leaving the machine.

Other features of the invention reside in certain features of construction and in certain arrangements of the parts and modes of operation which will become clear from the following description of a preferred embodiment thereof, having reference to the appended drawing, wherein Fig. 1 is a side elevation of the feed rolls for the machine according to the present invention;

Fig. 2 is a plan view corresponding to Fig. 1;

Fig. 3 is a side elevation of the gluing section of the machine;

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

Fig. 5 is a side elevation of the slitting and cut-off section of the machine at the delivery end thereof;

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

Fig. 6*a* is an end elevation of the cut-off roll **92** and anvil roll **90**;

Fig. 6*b* is a detail view showing the assembly of the cut-off knives on the cut-off roll; and

Fig. 7 is a view in perspective of a finished book cover produced by the invention.

Referring to the drawings, the machine is arranged for convenience in three sections, a feed section, a gluing and combining section and a slitting and cut-off section supported respectively on stationary beds **12**, **14** and **16**. The bed **12** supports three mill rolls including a cover board roll **18** equal in width to slightly more than the sum of the cover leaf widths plus the width of the hinge section, and two leaf board rolls **20** and **22** accurately separated by a spacer plate **24** received over their common shaft **26**. Preferably, the separator **24** is accurately dimensioned to space the rolls **20** and **22** according to the desired width of the hinge section of the finished cover.

The three mill rolls are supported in a conventional manner on trunnion blocks **28** provided with tension adjustment means, as for example a roll **30** adapted to apply restraining force by friction to the shaft of a mill roll. The leaf board rolls **20** and **22** are fed from their tops to the gluing section, while the cover board roll **18** is fed under the bed **12** and around an idler roll **32**.

It will be understood that the cover and leaf rolls may be provided with suitable lateral adjustment means if desired, in accordance with conventional practice. The wider cover board stock may, of course, be of a different type and gage from that of the leaf board stock. Thus in the case of the leaf boards stiffness is the prime requisite, whereas the cover board should have a pleasing appearance, scuff resistance and good flexibility. These properties may be enhanced by suitable coatings and impregnants known to those skilled in this art.

The three webs are fed to the gluing and combining section illustrated in Figs. 3 and 4. The cover board web **34** passes under the bed **14** and over an idler roll **36** to a combining subsection **37**. The leaf board webs **38** go to a gluing sub-section **39**, passing around a decurling

idler roll **40**, over a guide **42** described more fully below, and over a roll **44**. They then pass beneath a roll **46** having a vertically adjustable axis to a glue applicator roll **48**. This latter roll is a conventional gluer which is driven by conventional means, not shown, in contact with a glue pick-up roll **50** partially immersed in a glue pot **52**. The webs **38** leave the gluing subsection **39** to enter the combining subsection **37** at a slightly downwardly-inclined angle. Thus it is seen that the roll **46** provides means for adjusting the contact pressure of the webs **38** upon the glue applicator roll **48**.

The cover board web **34** passes over a guide **54** similar to the guide **42** and is combined with the leaf board webs **38** between driven pressure rolls **56** and **58**. The application of combining pressure is applied again as the web progresses between pressure rolls **60** and **62** and again between similar pressure rolls **64** and **66**. The rolls **56—66** are driven at constant speed by a belt **68** passing over a constant speed shaft **70** (Fig. 5) driven by a belt **72** from a constant speed motor **74**.

The continuous laminated web **76** leaving the gluing and combining section is characterized by the accurate spacing of the cover board webs according to the desired width of the backbone. This spacing is the same as the width of the separator **24**, and is accurately maintained by the guide **42**. This latter guide consists of a flat board **77**, edge restraining members **78** and **80**, and a center member **82** whereby the outer edges of the webs **38** are restrained and the member **82** maintains the proper spacing of the inner edges according to the width of the hinge section of the finished book.

The cover board guide **54** is similar in construction to the guide **42**. It is provided with edge restraining members similar to the members **78** and **80**, but without a center member or separator similar to the member **82**. It will be understood that close control over the registration of the laminae is thus provided.

The combined, glued web **76** is fed to the trimming and cut-off section illustrated in Figs. 5 and 6. A pair of accurately spaced circular knife-edged slitters **84** trim the edges of the web to the precise overall dimension required, or in other words, to twice the width of the book leaves plus the width of the hinge section. The web is then passed through feed rolls **86** and **88**.

From the rolls **86** and **88** the web **76** is fed over a continuous, smooth, hard steel anvil roll **90** which cooperates with a cut-off roll **92** having knives **94** and **96** (Fig. 6*a*) and delivers the finished book covers upon a moving belt **97**. The rolls **90** and **92** are driven at equal peripheral speed if the speed of the roll **92** is taken as the peripheral velocity of the edges of its cut-off knives. The rolls are driven by a gear **98** through conventional intermediate gear mechanism, not shown. The gear **98** is driven by a gear **100** which in turn is rotated by a variable drive mechanism **102** of conventional form. The mechanism **102** is powered by the constant speed shaft **70** driven by the motor **74** and is adjustable to deliver variable speed to a gear **104** in mesh with the gear **100**.

Details of the mounting of the cut-off knives are shown in Fig. 6*b*. The knife **94**, for example, is a straight blade with a sharp tapered edge held in position against the side of a transverse recess **105** in the roll **92** by a clamp bar **106** tightly clamped against the blade **94** by means of a plurality of spaced set screws **108**. As shown in

Fig. 6*a*, there are two blades **94** and **96** in diametrically opposed recesses **105** and **112**, but other recesses **114**, **116**, **118** and **120** 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 **102** 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 **102** 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 heights of cover within a corresponding range of adjustment provided by the drive **102**.

The resulting book cover **121** is of unitary appearance as illustrated in Fig. 7, and consists of a cover board **122** and two accurately spaced leaf boards **124** and **126**. The leaf boards **124** and **126** are thoroughly glued to the cover board **122** since the glue applicator roll **48** applies glue over the entire surfaces of the webs **38**. The side edges **128** of the laminae are precisely aligned because they are cut simultaneously in a single operation by the slitters **84**. The top and bottom edges **130** are also precisely aligned because they are cut simultaneously by the cut-off knives **94** and **96**. If desired, the cover board and leaf board rolls **18**, **20** and **22** may be provided with decorative or other printing, or, printing may be applied subsequently to the manufacture of the book covers according to this invention.

A book cover manufactured as described above may be glued directly to the backbone of a binding by any of a variety of conventional methods commonly employed with "paper-back" editions, as described above.

Having thus described the invention, I claim:

A machine for making book covers comprising, in combination, supports for a cover board roll and two separate leaf board rolls, means to feed a cover board web and two leaf board webs continuously and simultaneously and with the leaf board webs in mutually spaced relationship opposed to the cover board web, gluing means associated with the leaf board webs to apply glue thereto on the entirety of the surfaces opposed to the cover board web, means to combine the glued leaf board webs with the cover board web with pressure while maintaining the leaf board webs in accurately spaced relationship, slitting means to cut the side edges of the combined web to an accurate dimension, and a cut-off roll operative in timed relation to the speed of the slitted combined web to sever it transversely at uniformly spaced intervals.

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