United States Patent [19]

Abildgaard et al.

[11] **3,744,821**

[45] ***July 10, 1973**

[54] **BOOK AND METHOD OF FORMING SAME**

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[73] Assignee: **Abildgaard Laboratories, Inc.,** Sunnyvale, Calif.

[*] Notice: The portion of the term of this patent subsequent to Aug. 3, 1988, has been disclaimed.

[22] Filed: **Sept. 23, 1971**

[21] Appl. No.: **183,038**

[52] **U.S. Cl.** **281/21,** 11/1

[51] **Int. Cl.** **B42d 1/06**

[58] **Field of Search** ..... 11/1 R; 281/25, 21, 281/29, 36, 37

[56] **References Cited**

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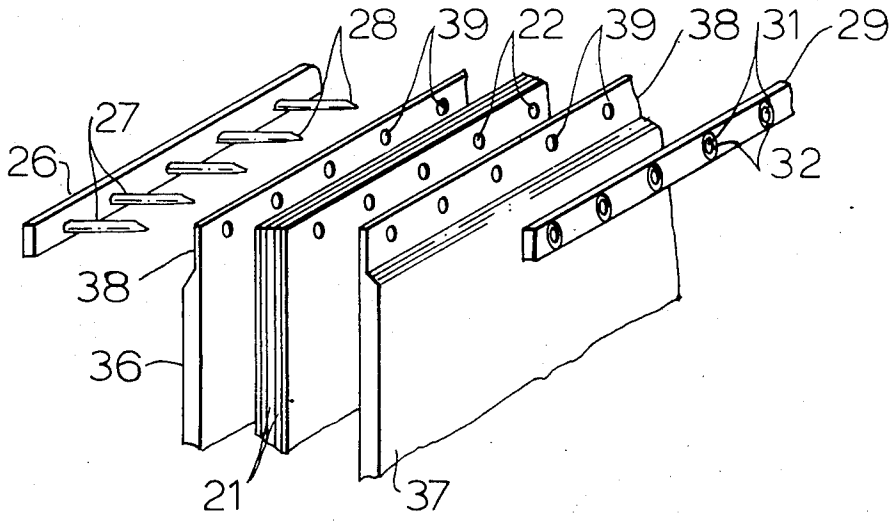
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Primary Examiner—Lawrence Charles
Attorney—Julian Caplan

[57] **ABSTRACT**

Book covers are attached to the sheets comprising the book by means of spaced plastic studs which pass through aligned holes in the covers and sheets. The studs project from a first plastic strip, which strip is positioned on one side of the book adjacent the spine edge. A second strip having holes spaced complementary to the studs is positioned on the opposite side of the book. The strips are pressed toward each other, the excess stud lengths are cut off near the outside of the second strip, and heads are formed on the severed ends of the strips, holding the strips, case, and sheets bound together. The case consists of two covers each formed with a flexible region just to sides of the strips opposite the spine which makes it possible to open the book to expose areas close to the spine.

17 Claims, 14 Drawing Figures



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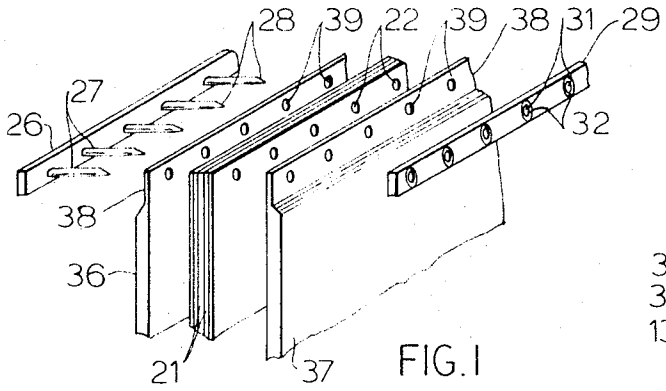


FIG. 1

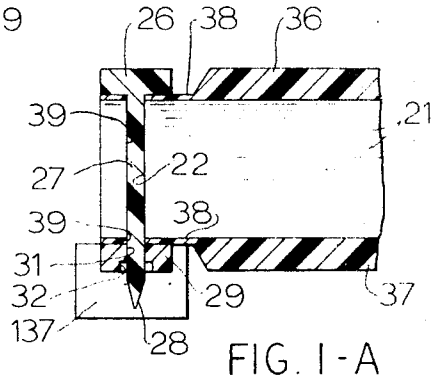


FIG. 1-A

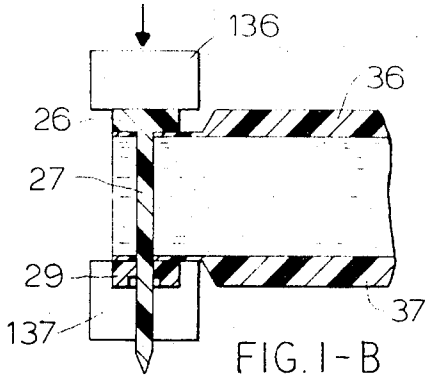


FIG. 1-B

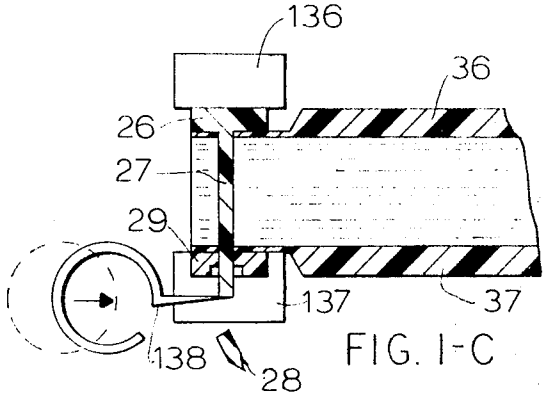


FIG. 1-C

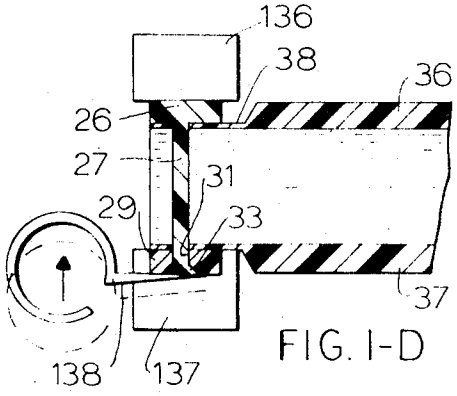


FIG. 1-D

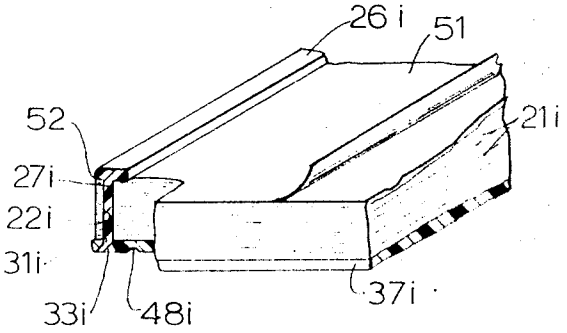


FIG. 7

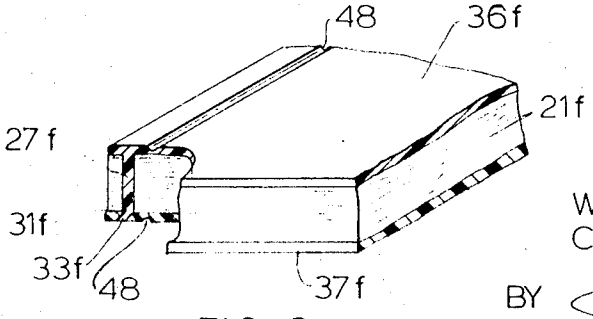


FIG. 6

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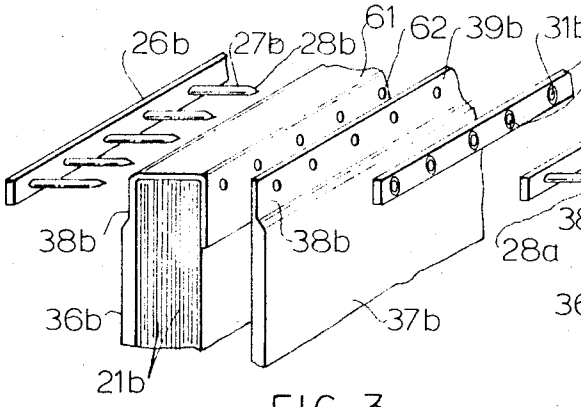


FIG. 3

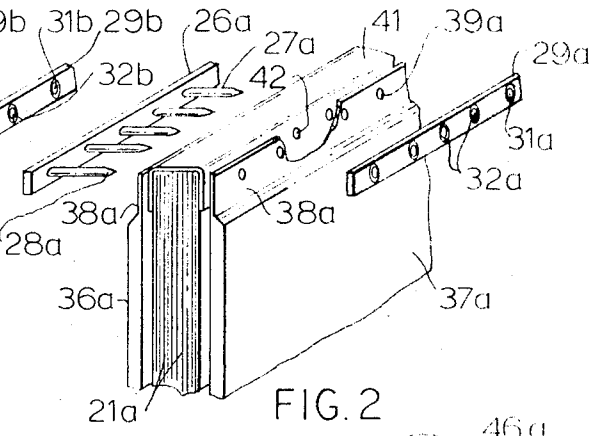


FIG. 2

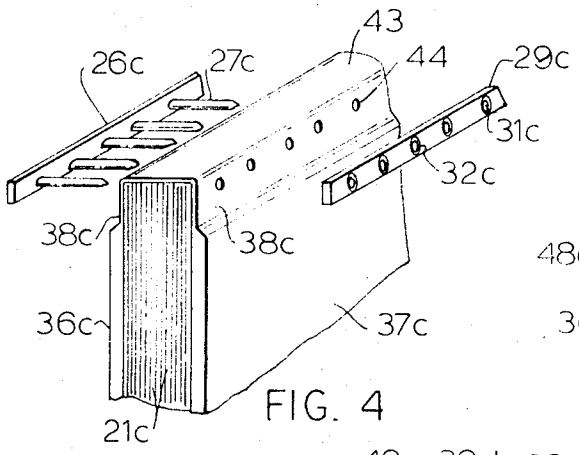


FIG. 4

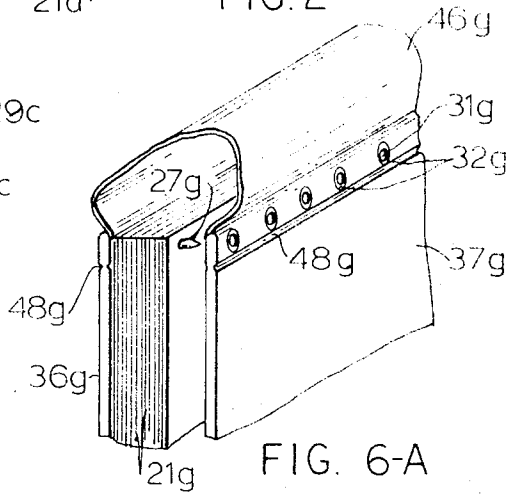


FIG. 6-A

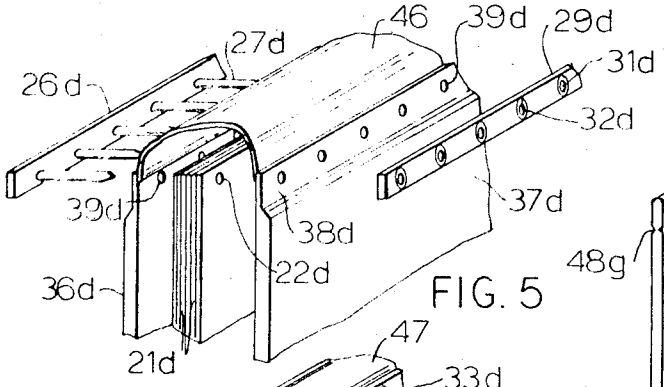


FIG. 5

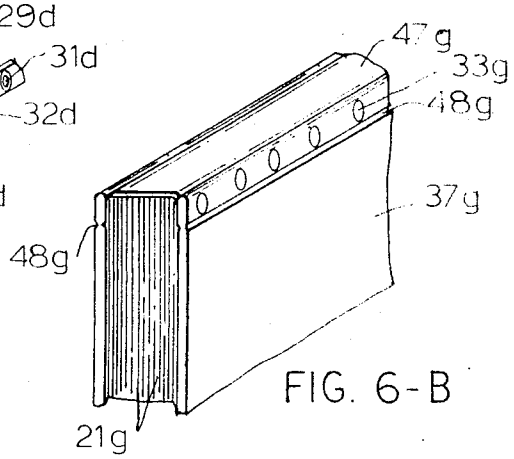


FIG. 6-B

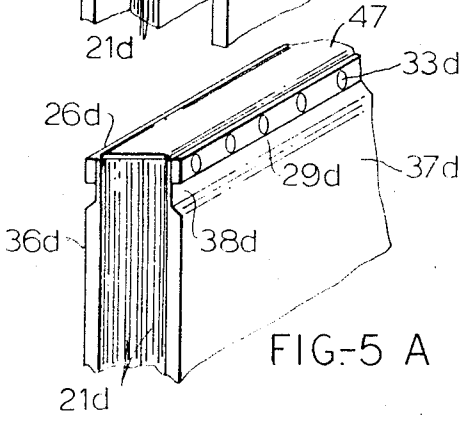


FIG-5 A

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BOOK AND METHOD OF FORMING SAME

Reference is made to co-pending application, Ser. No. 833,382, now U.S. Pat. No. 3,608,116

This invention relates to a new and improved book and method of forming the same. More particularly, the invention relates to a book having front and back covers and sheets there-between, all bound together by means of longitudinally spaced studs. The studs may be part of binding strips or of the covers. The studs are received in holes spaced to receive the studs, which may be in second strips or second covers. The spacing of the holes is matched by holes in the sheets to be bound. The covers are made quite flexible adjacent the studs to permit the book to be opened to expose the area adjacent the spine.

In one practice of the method of the invention herein described, the sheets are positioned between the covers with the holes therein aligned, a male strip is positioned outside one of the covers with the studs passing through the holes in the covers and sheets and also through the holes in the companion strip. The strips are compressed toward each other, the excess lengths of the studs are cut off, and heads are formed on the severed ends of the studs, thereby securely binding the covers and sheets together.

In other forms of the invention as hereinafter described, the studs are formed integral with one of the covers. Likewise in some of the modifications hereinafter described, the opposite cover may be formed with holes and the female plastic strip eliminated.

A principal feature of the invention is the fact that the covers are formed flexible adjacent the locations of the studs so that the covers may be conveniently opened and printed or graphic material adjacent the "gutter" of the book may be observed. The flexibility of the cover may be created in some of the forms of the invention described by fabricating the cover thinner adjacent the spine.

In other forms of the invention hereinafter described, grooves or structural weaknesses extend longitudinally of the covers adjacent the spine spaced outward of the studs. Regardless of how the flexibility of the cover is created, the book may be securely bound in accordance with the present invention.

A further feature of certain forms of the invention hereinafter described is the fact that the spine edge of the book is covered by a thin plastic material. Various indicia and decorative matter may be applied to the spine covering to finish off the spine of the book in a manner similar to hard covered books.

In one form of the invention hereinafter described, the spine covering is formed of a material which shrinks under heat so that after the cover is assembled to the underlying sheets, the spine covering may be shrunk to fit the thickness of the material bound.

In accompanying patent applications of the inventors of the present invention the numerous advantages of binding books using the plastic strips and the method of assembling the book are described. The present invention has most of the advantages of such prior applications but also provides suitable hard covers made flexible as hereinafter appears.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a schematic, fragmentary exploded perspective view of one form of the present invention prior to assembly of the parts thereof.

FIGS. 1A–1D inclusive are schematic, fragmentary sectional views showing steps in the practice of the method of forming the book from the parts shown in FIG. 1, the completed book being shown in FIG. 1D.

FIGS. 2, 3, 4, 5 and 5A are views similar to FIG. 1 of modifications.

FIG. 6 is a fragmentary perspective view of a further modified book.

FIGS. 6A and 6B are views similar to FIGS. 5 and 5A of a further modification.

FIG. 7 is a view similar to FIG. 1 of still another modification.

The present invention is used for the purpose of binding into a book a plurality of sheets 21 formed with holes 22 adjacent the spine edge of the book to be formed, said holes being spaced apart at intervals. Used in the final assembly in the form of the invention shown in FIG. 1 is a male strip 26 formed of polyvinyl chloride or other suitable material. The strip is approximately ¼ inch in width and 1/16 inch in thickness and is of a length equal to the length of the sheets 21. At approximately 1 inch intervals, spaced along the length of strip 26 and indented somewhat from the ends are studs 27 approximately 3/32 inch in diameter and formed with tapered points 28 at their outer ends. Female strips 29 are also provided, formed of similar material with holes 31 at intervals corresponding to the spacing of studs 27 and of a size to accept said studs. Holes 31 are formed with counterbores 32 on one surface. As hereinafter explained, the excess length of studs 27 are cut off and the protruding ends of the studs are deformed to fill the counterbores 32 and to form heads 33 similar to rivet heads.

In the form of the invention shown in FIG. 1, a front cover and a back cover 36, 37 respectively are provided. Each cover has a thin, flexible area 38 adjacent the spine edge thereof formed with holes 39 corresponding in spacing to the holes 22. Preferably the difference in thickness in the major areas of cover 36 and the reduced thickness area 38 is approximately equal to the thickness of strips 26 or 29. Flexible area 38 may be created in several ways. Among these are laminating the covers 36, 37 with fewer laminations at areas 38, pressing thermoplastic covers to form thinner areas, extruding the covers, or cutting the covers away by milling or the like.

In the assembly of the book in accordance with FIG. 1, strip 29 with counterbore 32 downmost, is positioned on support 137, the said support 137 being recessed to receive strip 29 and also being apertured immediately below the holes 31. Cover 37 is placed on support 137 with portion 38 overlying the said support and the holes 39 aligned with the apertures in the support 137. Thereupon, sheets 21 are positioned on cover 37 with their holes 22 aligned with holes 39. Finally, the reduced thickness area 38 of front cover 36 is placed on top of the uppermost sheet 21 with its holes 39 similarly aligned. Thereupon, the male strip 26 is applied from the top of the pile by inserting the points 28 through holes 39 in cover 36, holes 22, holes 39 in cover 37 and thence through holes 31. The points 28 extend below the strip 29 a distance depending upon the thickness of sheets 21, and hence subject to consid-

erable variation. (See FIG. 1A). Thereupon a pressure bar **136** is pressed against strip **26**, compressing the sheets **21** and covers **36, 37** between the two strips **26** and **29**. (See FIG. 1B). Heated knife blades **138** are moved from left to right as viewed in FIG. 1C to cut off studs **27** at a distance slightly below the bottom of strip **29**. The apertures in support **137** permit the inward movement of the blades **138**. Thereupon the blades **138** are raised, melting and deforming the material on the ends of studs **27** so that the counterbore **32** is filled by the material forced therein by the upward movement of the blades **138** (FIG. 1D). Other instruments may be used to supplement blades **138** in creating and finishing the heads **33**. The blades **138** are retracted and pressure bar **136** is maintained in place until the plastic has set. Heads **33** thus formed in the counterbore **32** secure the strips **26** and **29** in spaced position with the covers **36, 37** and sheets **21** secured therebetween. The book is thus completed.

Directing attention now to FIG. **2**, an inverted-channel-shaped cap **41** is applied over the spine edg0s of the sheets **21**a and underneath the reduced thickness areas **38***a* of the covers **36***a*, **37***a*. Holes **42** are formed in cap **41**, the spacing corresponding to the spacing of holes **21**. In other respects, the element in the modification of FIG. **2** resemble those of FIG. **1**. In the completed book, the spine of the book is covered by the cap **41** thereby improving the appearance thereof. Ornamentation of indicia such as the title of the book may be applied to the outside of the base of the channel cap **41** as desired. Alternatively, the edges of cap **41** may be applied over the areas **38***a*.

In the form of the invention shown in FIG. **3**, the reduced thickness area **38***b* of one of the covers **36***b* is made with flexible tab **61** of extended length so that it completely encases the spine edges of the sheets **21***b* and underlies the opposite cover **37***b*. The wide flexible tab **61** is formed with holes **62** corresponding in spacing to the holes **22***b*. The holes **62** may be punched after the thickness of sheets **21***c* has been determined, thereby making it possible to so space the holes **62** to form a tight book.

In the form of the invention shown in FIG. **4**, the reduced thickness areas **38***c* of the covers **36***c*, **37***c* are joined together in a channel **43** formed with holes **44**. The width of the base of channel **43** corresponds to the thickness of sheets **21***c*. However, the material of construction of the channel **43** may be selected so that it will shrink with the application of heat. In such case, a wide channel may be used and it may be srunk to size after the book is assembled. See FIG. **5** and FIG. **5A**. A connector **46** of heat shrinkable material connects the spine edges of covers **38***d* and **37***d*. The studs **27***d* of strip **26***d* pass through the holes in covers and sheets and are cut off and headed, as in previous modifications. Thereupon, connector **46** is shrunk (as by a conventional heat shrunk tunnel), causing spin cover **47** to result, the resultant cover **47** being neat, tight and, optionally, ornamental.

FIG. **6** shows a still further modification. Covers **36***f*, **37***f* are formed of substantially uniform thickness except that they are weakened in hinged lines **48** which permit the covers to flex and permit the book to be exposed. It will also be seen in FIG. **6**, that the studs **27***f* are formed integral with the cover **36***f* and the holes **31***f* are formed integral in the cover **37***f*; or in other words, strips corresponding to strips **26, 29** of FIG. **1** are eliminated.

FIG. **6A** shows a still further modification similar to FIG. **5**. A heat shrinkable connector **46***g* joins together the spine edges of the front and back covers **36***g*, **37***g*. At the time of assembly of the book, there is an excess fullness of connecting material **46***g*. However, after the book has been bound, it is passed through a heat shrink tunnel or other heating means which causes the connection **46***g* to contract, thereby forming the neat, tight spine cover **47***h* shown in FIG. **6B**.

Directing attention now to FIG **7**, the bottom cover **37***i* is similar to the cover **37***f* of FIG. **6**. The front cover consists of a transparent member **51** formed with holes **52** corresponding to the holes in sheets **21***e* the combination of studded trip **26***i* and separate cover **51** replacing cover **36***f* with integral studs **27***f* of FIG **6**.

In many respects, the elements of the various modifications of the invention are similar to those of other modifications and the same reference numerals followed by subscripts *a* to *i* inclusive and used to designate substantially corresponding parts in FIGS. **2 3, 4, 5, 5A, 6, 6A, 6B** and **7** respectively.

What is clamed is:

1. A bound book comprising a plurality of sheets each formed with a plurality of spaced first apertures adjacent one margin, a front cover of about the size of said sheets formed with second apertures adjacent said one margin, a back cover of about the same size as said sheets, formed with third apertures, said second and third apertures spaced the same as said first apertures, at least one said cover formed with a flexible area spaced inward of said one margin, said flexible area of said one cover being substantially more bendable along a line parallel to said one edge than an area of said one cover remote from said one margin, a plurality of studs, first means fixing said studs to said one cover, said studs being initially a length greater than the greatest thickness of a wide range of thickness of books, said studs extending entirely through said first and second apertures said studs sheared close to said second cover and formed with beads larger than said third apertures and second means permanently securing said heads to the covers opposite said first means.

2. A bound book according to claim **1** in which said first means comprises a first plastic self-supporting strip outside said back cover, said back cover formed with said third apertures, said studs fixed to said first plastic strip andextending through said third apertures.

3. A bond book according to claim **2** in which said second means comprising a second plastic self-supporting strip along the outside of said front cover, said second strip formed with fourth apertures spaced the same as said first apertures, said studs passing through said fourth apertures and said head formed on the outside of said second strip.

4. A book according to claim **3** in which said flexible area is formed in said front cover and in substantially thinner than the remainder of said front cover.

5. A book according to claim **4** in which one said trip is of a thickness about equal to the difference between the thickness of said flexible area and said remainder of said first cover.

6. A book according to claim **4** in which a flexible area is formed in both said covers adjacent said one margin.

7. A book according to claim 6 in which said flexible area of one said cover is of extended width and is wrapped around the spine edge of said book.

8. A book according to claim 7 in which said flexible area is tucked under the other said cover.

9. A book according to claim 7 in which said flexible area of said one cover is joined to said flexible area of the other said cover.

10. A book according to claim 6 which further comprises a channel shaped cap having the base of said channel covering the spine of said book, said cap formed with fifth and sixth apertures in the sides of said channel, said studs passing through said fifth and sixth apertures.

11. A book according to claim 10 in which said cap is formed of heat-shrinkable material and is shrunk to tightly cover said spine.

12. A book according to claim 1 in which said means attach said studs to said one cover, the other said cover formed with third apertures spaced the same as said first apertures, said studs extending through said third apertures.

13. A book according to claim 12 which further comprises a plastic self-supporting strip along the outside of said one cover, said studs fixed to said plastic strip.

14. A book according to claim 2 which further comprises a heat shrinkable connection between said covers around the spine of said book, said connection heat-shrunk to tightly cover said spine.

15. A method of forming a book comprising the step of providing a plurality of sheets, a front and back cover of about the same size as said sheets each formed with a flexible area spaced inward of the spine margin more bendable along a line parallel to said spine margin than an area remote from said margin, a plurality of spaced studs, means fixing sa0d studs to one said cover, said studs being initially of greater length than the greatest thickness of a wide range of thickness of books, means permanently fixing said studs to one said cover, a cap dimensioned to fit across the spine of the book to be formed and having third means for connection to each of said covers, said cap being of a heat shrinkable material, at least one said cover and each of said sheets formed with apertures spaced the same as said studs, and the further steps of inserting said studs through said apertures, pressing said covers towards each other with said sheets between said covers, cutting off excess lengths of said studs extending beyond said second cover, forming heads on the cut-off ends of said studs to second said covers and strips in bound condition, and shrinking said cap by application of heat to form a neat, tight spine binding for said book.

16. A method according to claim 15 which said means fixing said studs comprises a first strip to which said studs are attached, said strip being narrow and lying along said flexible area of on said cover.

17. A method according to claim 16 which further comprises providing a second narrow strip lying along the flexible area of the other said cover formed with apertures receive said studs, said heads being formed on the outside of said second strip.

* * * * *