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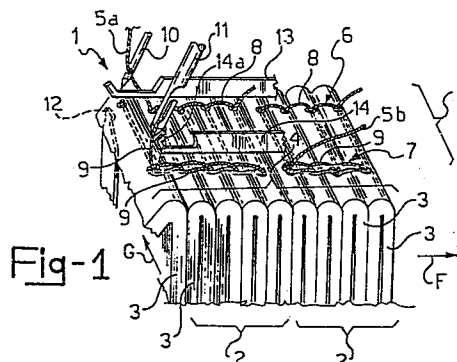
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⑤④ **A bookbinding method.**

⑤⑦ A method of binding books (2) formed from signatures (3) piled into a stack (4), whereby separation of the signatures forming each book (2) is accomplished directly in the stack (4), comprises the steps of shifting a stack (4) of sewn-together signatures (3), feeding one signature (3) at a time to the stack (4) for augmentation of the latter, sewing the signature (3) fed to the signatures (3) in the stack (4) by a continuous thread (5a) row of stitches (5) having a plain stitch (8) section (6) and a looped stitch (9) section (7), cutting the thread (5) of one stitch (8) every set number of signatures (3) in a book (2), hooking one loop (9) every set number of signatures (3) in a book (2), drooping said loop (9), and having said loop (9) unravelled by shifting the stack (4).



## Description

This invention relates to a method of binding books having a set number of signatures each, of a type which comprises the steps of shifting a stack of sewn-together signatures, feeding one signature at a time to the signature stack for the augmentation thereof, sewing the signature fed to the signature stack by means of continuous thread rows of stitches including a plain stitch sewn section and a looped stitch sewn section, cutting off the thread of one stitch every set number of signatures in a book, characterized in that it comprises the steps of hooking one loop every set number of signatures in a book, dropping said loop, and having said loop unravelled.

It is a well-known fact that for bookbinding by sewing, sewing machines are employed whereto the signatures are fed one by one to form a stack of signatures, each signature being then sewn to the signatures in the stack with at least one continuous thread row of stitches including a plain stitch section and a looped stitch section.

Such machines are operative to produce a stack of sewn-together signatures. It should be noted that in the process of stacking the signatures, the thread of a stitch in the plain stitch section of the row of stitches is cut off automatically at each pre-set number of signatures making up a book.

That procedure, while being in several ways satisfactory and widely employed because it yields a good quality binding at a high production rate, still has a well-recognized drawback.

In fact, it involves manual handling by specially appointed operators who act on a stack being delivered by the sewing machine to progressively separate from the stack each set number of signatures forming a book. The problem underlying this invention is to provide a method as specified above, which can overcome the above-noted limitation.

This problem is solved by a method as indicated being characterized in that it comprises the steps of hooking one loop every set number of signatures in a book, dropping said loop, and having the loop unravelled.

Further features and the advantages of the method according to this invention will be more clearly understood from the following detailed description of an exemplary embodiment thereof, given herein below with reference to a sewing machine shown by way of illustration and not of limitation in the accompanying drawings, where:

Figure 1 is a perspective view showing schematically a detail of a sewing machine for bookbinding applications at a stage of implementation of this method; and

Figures 2 and 3 are perspective views showing schematically the sewing machine of Figure 1 at two different and successive stages of implementation of this method.

With reference to the drawing views, the numeral 1

generally designates a sewing machine for binding books 2 from signatures, the latter being collectively designated 3.

Each book 2 includes a set number of signatures, four in the example shown.

The machine 7 accommodates a stack 4 of signatures, which is moved in a direction indicated by the arrow F.

The stack 4 is fed one signature 3 at a time along a direction indicated by the arrow G, perpendicularly to the stack shifting direction.

Each signature 3 fed to the stack 4 is then sewn to the signatures in the stack by means of a row of stitches 5 formed with a continuous thread 5a.

The row of stitches 5 includes a section 6 with plain stitches 8 and a section 7 with looped stitches 9. The plain stitches 8 and looped stitches 9 bridge the gap between any signature 3 and the next in the stack 4.

For this purpose, the machine 1 is provided with a linearly reciprocable sewing needle 10, and with a crochet 11 which is reciprocable linearly as well as pivotally around to change its orientation and includes a hook portion 11a and back portion 11b.

More specifically, the crochet 11 would be oriented, during its loop 9 forming upward stroke, with the hook 11a facing the stack of signatures, whereas during its downward stroke, it would be oriented with the back 11b facing the stack.

A shuttle 12 is reciprocable between the needle 10 and the crochet 11 on the inside of a signature which has just been fed to the stack and is held slightly spread open in order for the thread to be taken from the needle 10 to the crochet 11.

The sewing machine 1 further comprises a blade 13 which can be shifted every set number of signatures between a home position and an operative position where it locates close against the needle, upstream thereof in the stack shifting direction, and interferes with the thread of a stitch 8 just formed in the section 6.

The machine 1 for implementing the method of this invention also comprises a hook 14 having a tip 14a and an intrados 14b. The hook 14 is shiftable every set number of signatures between a home position and an operative position where it locates close against the crochet, upstream thereof in the shifting direction of the stack, and interferes with a loop 9 just formed in the section 7.

The machine 1 is also provided with a means, known per se and not illustrated, of blocking the crochet pivotal movement every set number of signatures such that, every set number of signatures, the crochet will retain in its downward stroke the same orientation as in its upward stroke, i.e. with the hook 11a next to the stack.

A method of binding books having a set number of signatures each, for example four signatures each, comprises, in accordance with this invention, the steps described herein below.

A stack 4 of signatures is shifted in the direction

indicated by the arrow F. Along a perpendicular direction thereto, designated G, one signature 3 at a time is fed, in a slightly spread condition, to said stack 4 for the augmentation thereof.

The signature 4 which has been fed to the stack 3 is then sewn to the signatures in the stack by operation of the needle 10, crochet 11, and shuttle 12 acting therebetween; this results in a row of stitches 5 being formed, specifically a plain stitch section 6 formed by the needle, and a looped stitch section 7 formed by the crochet.

Every set number, in the example shown four, of signatures the thread of a stitch 8 in the freshly formed section 6 is cut by the blade 13 owing to the shifting movement of the stack 4.

The cut off end of the thread from the last-but-one signature in the stack, that is the fourth signature of a four-signature book, is indicated at 5b.

At the same time, a loop 9 in the freshly formed section 7 and still held in the crochet 11 is picked up by the tip 14a of the hook 14.

At this time, the crochet is inhibited from turning, thereby the crochet will be kept oriented, in its downward stroke, with the hooked portion 11a facing the stack.

During its downward stroke, the crochet 11 releases the loop 9 just formed to the hook 14. Consequently to the shifting movement of the stack 4, the loop 9 is caught on the intrados 14b of the hook 14 and unravelled, thereby the cut off end 5b of the thread is allowed to run out.

As the loop is being unravelled, a slight tension is applied to the cut off end 5b of the thread, which results in the loop 9 preceding the one just unravelled being pulled tight. Thus, the last loop in a looped stitch section is fixed.

It eventually occurs, on completion of the steps described hereinabove, that between the last-but-one signature in the stack and the last signature just fed in -- that is, between the fourth signature of one book and the first signature of the next book in the stack -- the row of stitches is discontinued both at the plain stitch section and the looped stitch section; in fact, a stitch 8 in the plain stitch section 8 has been cut and a corresponding loop 9 in the looped stitch section 9 has been unravelled.

Thus, the books comprising the stack are isolated from one another. Accordingly, as the growing stack exits the machine, the books will separate from one another naturally.

The method of this invention affords the distinctive advantage of enabling bookbinding in a fully automatic manner, without the intervention of personnel to separate the books from one another.

An additional advantage of the method according to this invention is that it may be employed both with books sewn with a blank stitch and without blank stitch.

Understandably, the method described in the foregoing may be altered and modified in many ways by a skilled person in the art for the purpose of meeting specific contingent demands, without departing from the scope of this invention as set forth in the appended claims.

## Claims

1. A method of binding books (2) having a set number of signatures (3) each, of a type which comprises the steps of: shifting a stack (4) of sewn-together signatures (3); feeding one signature (3) at a time to the signature stack (4) for the augmentation thereof; sewing the signature (3) fed to the signature stack (4) by means of continuous thread (5a) rows (5) of stitches including a plain stitch (8) sewn section (6) and a looped stitch (9) sewn section (7); cutting off the thread (5) of one stitch every set number of signatures (3) in a book (2); characterized in that it comprises the steps of hooking one loop (9) every set number of signatures (3) in a book (2), dropping said loop (9), and having said loop (9) unravelled.

2. A method according to Claim 1, characterized in that said loop (9) is unravelled by the shifting movement of the signature stack (4) undergoing augmentation.

3. A method according to Claim 2, characterized in that the loop (9) is dropped by means of a crochet (11) while retaining in the downward movement the same orientation as in the upward movement of the crochet.

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European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number

EP 88 83 0237

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
Y	DE-A-1 921 271 (MIEHLE-GOSS-DEXTER INC.) * Page 11, paragraph 2; page 15, paragraph 2 - page 20, paragraph 1; claims 14-20; figures 2-4,9,10 * ---	1-3	B 42 B 2/04
Y	US-A-1 902 864 (O. KLEINSCHMIT) * Page 3, lines 25-90; figures 2,12,13 * ---	1-3	
A	FR-A- 744 098 (G. BREHMER) * Whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 42 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16-08-1988	Examiner WEBER P.L.P.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document			