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Description

This invention relates to a method of binding books having a set number of signatures each, 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 including a looped stitch sewn section obtained by alternatively moving downward and upward and alternatively angularly orientating around its longitudinal axis a crochet, cutting off the thread of one stitch every set number of signatures of a book, hooking with the crochet one loop of said looped stitch sewn section every set number of signatures of a book, dropping said loop from the crochet.

A method of this kind is known from the prior document DE-A-1921271.

In the method described in such prior document at the end of the sewing of a book such book is left unconnected to the next book being stitched.

However the mentioned loop of the looped stitch sewn section is not unravelled and therefore the free end of the plain stitch sewn section could be drawn and the continuous thread rows of stitches could be entirely unravelled.

For overcoming this inconvenience the prior art suggests to apply a tape on the loop in a subsequent book forming operation.

Another prior document, US-A-1902864 provides, as regards the disconnection of the stitched book from the rest of the signatures, instead of the above mentioned step of dropping the loop from the crochet, the step of engaging the loop with a thread-guiding device which causes the withdrawing of the loop from the adjacent interdepending loop.

However, said withdrawing of the loop, without dropping the loop itself, determines the packaging of the adjacent signatures so that the separation of the books can not be automatically achieved.

Object of the present invention is to provide a method of binding books which operates in a fully automatic manner without any further intervention.

This object is achieved by a method as indicated at the beginning, characterised by the fact that it further comprises the steps of releasing said loop to a hook and keeping said loop hooked to the hook during the shifting movement of the signature stack for unravelling the loop.

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 1 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 3 which has been fed to the stack 4 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 6 has been cut and a corresponding loop 9 in the looped stitch section 7 has been unravelled.

Thus, the books comprising the stack are isolated from 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, 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 including a looped stitch (9) sewn section (7) obtained by alternatively moving downward and upward and alternatively angularly orientating around its longitudinal axis a crochet (11), cutting off the thread (5) of one plain stitch (8) every set number of signatures (3) of a book, hooking with the crochet (11) one loop (9) of said looped stitch sewn section (7) every set number of signatures (3) of a hook (2), dropping said loop (9) from the crochet (11), characterised in that it further comprises the steps of releasing said loop (9) to a hook (14) and keeping said loop (9) hooked to the hook (14) during the shifting movement of the signature stack (4) for unravelling the loop (9).

2. A method of binding books according to claim 1, wherein said loop (9) is dropped by retaining in the downward movement of the crochet (11) the same orientation as in the upward movement of the crochet.

Patentansprüche

1. Verfahren zum Binden von Büchern (2), die jeweils eine gesetzte Anzahl von Signaturen (3) haben, mit den Schritten: Verschieben eines Stapels (4) von zusammengehefteten Signaturen (3), Anlegen einer Signatur (3) jeweils an den Signaturenstapel (4) zu dessen Vergrößerung, Heften der an den Signaturenstapel (4) angelegten Signatur (3) mittels

kontinuierlicher Faden (5a)-Reihen (5) von Stichen, die einen Geradstich (8)-Heftabschnitt (6) aufweisen und die einen Schlingenstein (9)-Heftabschnitt (7) aufweisen, der durch eine abwechselnde Auf- und Abwärtsbewegung erzielt wird und der durch abwechselnde winklige Ausrichtung einer Hakennadel (11) um seine Längsachse erzielt wird, Abschneiden des Fadens (5) eines Geradstiches (8) bei jeder gesetzten Anzahl von Signaturen (3) eines Buches, Einhängen einer Schlinge (9) des Schlingenstein-Heftabschnitts (7) mit der Hakennadel (11) einer gesetzten Anzahl von Signaturen (3) eines Buches (2), Fallenlassen der Schlinge (9) von der Hakennadel (11), **gekennzeichnet durch** die Stufen: Freigeben der Schlinge (9) an einen Haken (14) und Halten der Schlinge (9) während der Verschiebewegung des Signaturenstapels (4) eingehakt in dem Haken (14) zum Auftrennen der Schlinge (9).

2. Verfahren zum Binden von Büchern nach Anspruch 1, wobei die Schlinge (9) durch Festhalten bei der Abwärtsbewegung der Hakennadel (11) in der gleichen Ausrichtung, wie bei der Aufwärtsbewegung der Hakennadel, fallengelassen wird.

Revendications

1. Procédé de reliure de livres (2) ayant chacun un nombre défini de cahiers (3) qui comporte les étapes consistant à déplacer une pile (4) de cahiers (3) réunis par couture, à alimenter la pile (4) de cahiers à l'aide d'un cahier (3) à un moment donné pour augmenter la pile, à coudre le cahier (3) ajouté à la pile (4) de cahiers à l'aide de rangées (5) de points de couture d'un fil continu (5a), comportant une section (6) cousue à points ordinaires (8) et une section (7) cousue à points de remaillage (9) obtenues par le déplacement alternatif vers le bas et vers le haut d'un crochet (11) et l'orientation angulaire de ce dernier de manière alternative autour de son axe longitudinal, à couper le fil (5) d'un point ordinaire (8) après chacun des nombres établis de cahiers (3) d'un livre, à accrocher au crochet (11) une boucle (9) de la section (7) cousue à points de remaillage de chaque nombre établi de cahiers (3) d'un livre (2), à lâcher la boucle (9) du crochet (11), caractérisé en ce qu'il comporte en outre les étapes consistant à dégager la boucle (9) vers un croc (14) et à garder la boucle (9) crochétée au croc (14) pendant le mouvement de déplacement de la pile (4) de cahiers, de manière telle que la boucle (9) ne se déplace pas.

2. Procédé de reliure de livres selon la revendication 1, caractérisé en ce que la boucle (9) est lâchée en maintenant, pendant le mouvement vers le bas du crochet (11), la même orientation que dans le mouvement vers le haut du crochet.

