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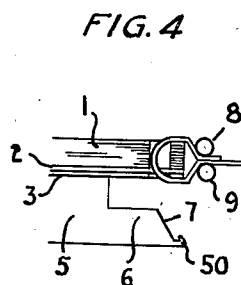
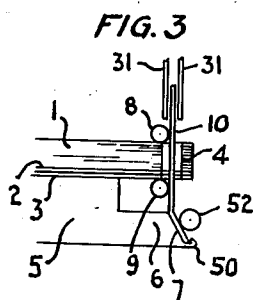
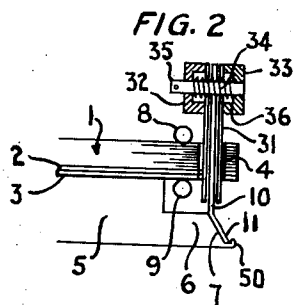
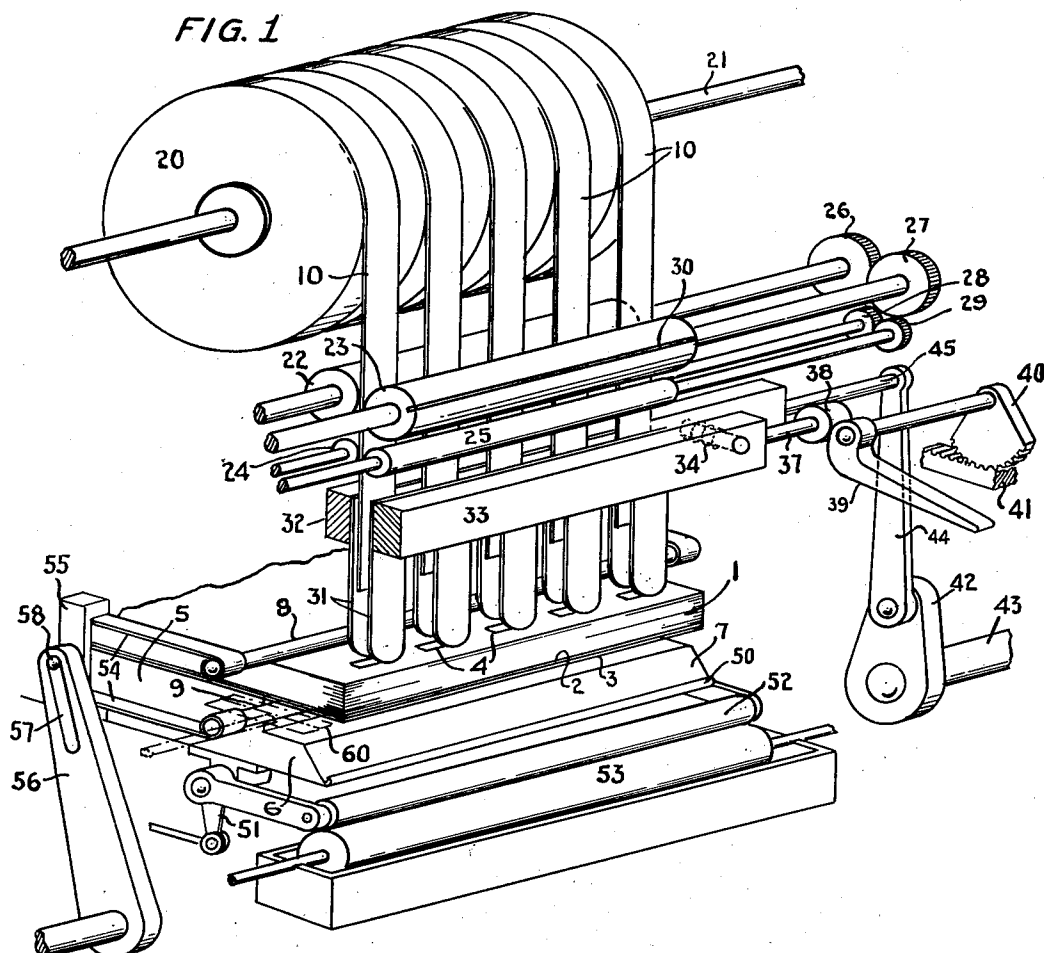
E. N. FARKAS

2,200,877

LOOSE-LEAF BINDING METHOD AND APPARATUS

Filed Feb. 10, 1939

2 Sheets-Sheet 1



INVENTOR.
 EMIL N. FARKAS
 BY
Panewitz
 ATTORNEY.

May 14, 1940.

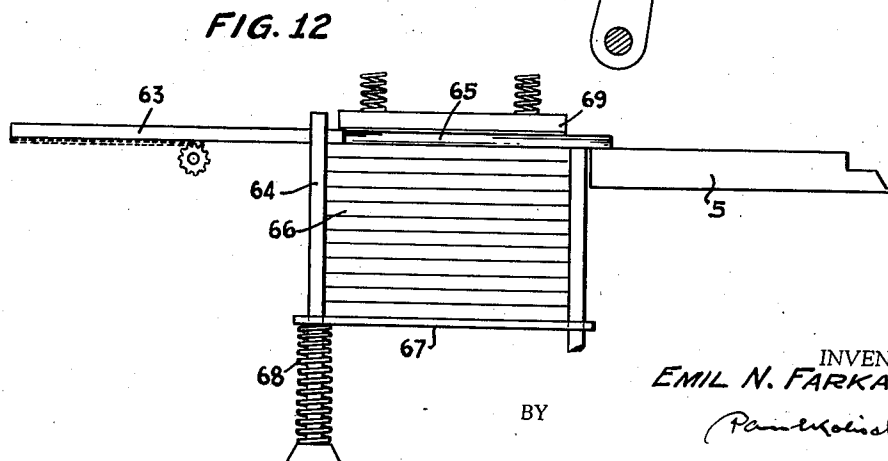
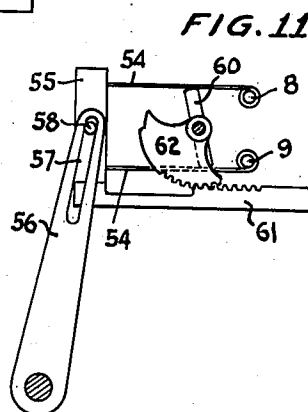
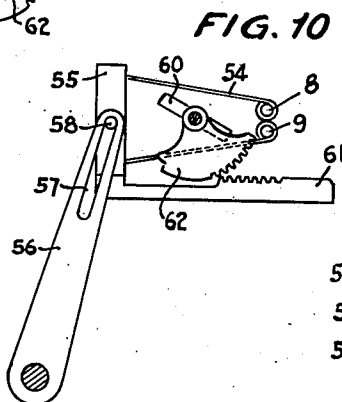
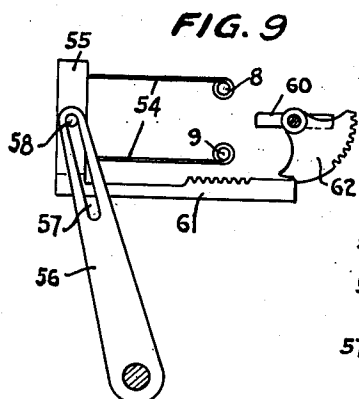
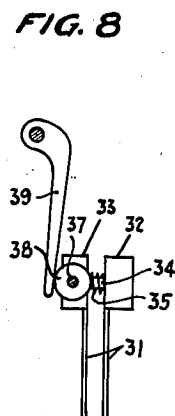
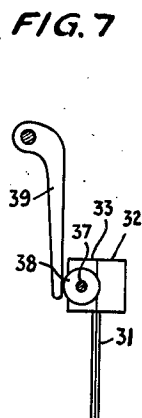
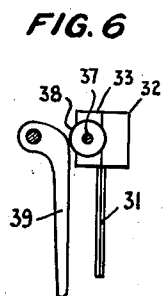
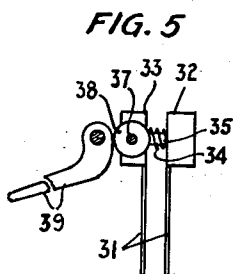
E. N. FARKAS

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LOOSE-LEAF BINDING METHOD AND APPARATUS

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2 Sheets-Sheet 2



INVENTOR.
EMIL N. FARKAS
Paul Kolisch
ATTORNEY.

UNITED STATES PATENT OFFICE

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LOOSE-LEAF BINDING METHOD AND APPARATUS

Emil N. Farkas, Chicago, Ill., assignor of one-half to Frank F. Farkas, Chicago, Ill.

Application February 10, 1939, Serial No. 255,581

6 Claims. (Cl. 11—1)

This invention relates to new and useful improvements in methods and apparatus to attach loose leaf binders to books and the like.

The object of the present invention is to devise a method and apparatus of the above identified character which will permit the use of a simple strip or ribbon of paper or the like for binding books, pamphlets, etc., in loose leaf fashion.

The so-called "mechanical" or loose leaf "type" of binding which combines into a book a stack of separate, marginally perforated leaves and covers therefor, permitting free flat opening of it at any point, is a popular, useful and greatly desired article of trade.

Heretofore, the cost of such books, greatly higher than that of ordinary wire-stapled or stitched books, has prevented their use in many instances. Considerable effort and inventive activity has been applied to remove this obstacle of high cost.

Many variants of such binding means have been suggested. Of these, a large number use inexpensive material, such as paper, in the effort to reduce costs. While paper, as a material is cheap, previous efforts have failed to provide any method or means for applying it to form a book in an economical manner. The main reason for this is that in all prior constructions it was necessary to preform such paper, or other binding structures into elaborate blanks by means of costly dies. The elaborate blanks in turn necessitated tedious methods for applying them to form the completed book. The costs have defeated the economy achieved by the use of cheap materials.

My invention provides a binding in the form of plain paper ribbons, easily obtainable and cheap, a method, and machine for practicing the method. My invention permits the use of plain paper ribbons to be fed continuously from rolls, and practically sews them through the leaf assemblies as a sewing machine feeds thread through a fabric. The act of applying the binding to the leaves is the only forming or fabricating operation required to transform the plain paper ribbon into a practical binding structure. There is no need to make a variety of sizes to fit different thicknesses of books. This is accomplished automatically from the continuous ribbon by an adjustment of the knife on the machine.

The invention will be explained in connection with an apparatus by means of which it may be practiced, and the parts whereof that are necessary for the understanding of the present in-

vention are illustrated in the drawings, in which

Fig. 1 is a perspective view;

Figs. 2, 3 and 4 are vertical cross-sections of a detail of the assembled book in various stages of the binding process;

Figs. 5, 6, 7 and 8 are side elevations, partly in section, of the ribbon-threading mechanism in successive stages of its operation;

Figs. 9, 10 and 11 are side elevations of the binder fastening mechanism in three positions; and

Fig. 12 is a side elevation of the book feeding mechanism.

1 represents a stack of leaves constituting a book or pamphlet. The two covers of the book are both at the bottom of the stack as indicated at 2 and 3. The leaves 1 and the covers 2 and 3 are provided with oblong marginal perforations 4.

The cover and leaf assembly lies on a table with the marginal perforations overhanging the edge of the table top and in alignment with a ledge 6 projecting from the table and having a sloping side 7. The book assembly is held together by means of spring-pressed bars 8 and 9 engaging the top and bottom thereof. A length of paper ribbon 10 is then passed through the perforations 4 with the ends projecting (Fig. 3). A coating of glue is applied to one of these ends and the bars 8 and 9 are rolled along the book to fold the paper strip 10 around the back of the book (Fig. 4); whereby a ring will be formed around the perforated margin with glued overlapping ends.

The book may now be removed and by rotating the cover 3 on top of the pile-up 1, we will have a finished book structure between two covers held together by means of the loops formed of paper ribbon. The longer glued end of the paper strip may be glued to the inside of the cover.

I shall now describe a mechanism for performing the above described operations.

The paper ribbon for each perforation 4 is provided in spools 20 on an arbor 21. From these spools the paper is led down between a pair of large feeding rollers 22, 23, below which a second pair of small feeding rollers 24, 25 is provided. These feeding rollers may be rotated by a motor (not shown) through the agency of gears 26, 27, 28, 29, at the proper speed for permitting the performance of the operations to be presently described.

The feeding roller 23 is provided with a knife 30 by means of which the required length of

paper ribbon is severed during each revolution of the roller 23.

The severed ribbons of paper will continue to be fed by the rollers 24 and 25 between pairs of steel gripping fingers 31 provided in rails 32, 33 in alignment with the marginal perforations 4. Rails 32 and 33 and, therefore, the fingers 31 are normally held apart by means of a coiled spring 34 provided around a pin 35. The pin is within a cavity 36 formed in the rails 32, 33, and projects through holes provided in the two rails. Rail 32 is held stationary against horizontal movement, being guided in its vertical movement by a slot (not shown) in the frame of the machine. The rail 33 may be laterally displaced against the tension of spring 34 by means of a rod 37 which carries a roller 38 cooperating with a cam 39. The cam 39 may be rotated to actuate the roller 38 by means of a toothed segment 40 cooperating with a rack 41 and so timed with respect to the gears 26 to 28, that the two rails 32, 33 will be pushed together when the lower ends of the paper ribbons 4 reach or slightly protrude from the ends of the fingers 31. This condition is illustrated in Fig. 6.

A crank 42 provided on a shaft 43, also geared with the rest of the mechanism in proper time relation, is in the position shown in Fig. 1. As the shaft 43 continues to rotate in a clockwise direction, the crank will move downward the compressed finger assembly by means of a lever 44 pivoted on crank 42 and carrying at its upper end a rod 45 fastened to the rail 32.

As the crank 42 rotates and moves the lever 44 downward, the two rails 32, 33 remain compressed, since the roller 38 will ride along the cam 39. The fingers 31 with the paper strips held between them enter the perforations 4 and pass through the whole stack 1. The fingers 31 with the paper strips held between them will be in the position shown in Fig. 2 when the crank 42 has been rotated by 180°. At this instant the cam 39 will be rotated into the position shown in Fig. 8 and permits spring 34 to force bar 33 slightly away from 32. The fingers 31 will part sufficiently for paper strips 4 to drop with their ends 11 against the inclined edge 7 of ledge 6 and into a trough-shaped stop 59 at the bottom of the ledge 6. At this instant, through a bell crank 51, a roller 52 which normally rests against a glue pot roller 53, is moved into engagement with the paper end (Fig. 3) resting on the surface 7, whereby this end of the paper will be coated with glue.

The continued rotation of crank 42 will cause the fingers 31 to rise into the position shown in Fig. 5, the cam 39 having been rotated into the position shown in Fig. 1 after the ends of the fingers have left the perforations (Fig. 3).

The stack of leaves 1 are held together by means of the rods 8 and 9 which are mounted on leaf springs 54 projecting from an upright 55. A crank 56 having a long slot 57 which engages a pin 58 projecting from the upright 55 will cause said upright 55, with the springs 54 and bars 8 and 9, to move horizontally, the bars 8 and 9 gliding along the upper and lower surfaces of the book while the crank 42 is rotating back into its normal position and elevates the fingers 31. The rotation of the crank 56 is so timed that when the fingers 31 are removed from the perforations 4, the bars 8 and 9 engage the protruding ends of the paper ribbons and fold them over the book margin (Figs. 4 and 10).

The motion of the bars 8 and 9 is continued until they slip down into the position shown in Fig.

4 in which the two ends of the strips are clamped and glued together.

The arrangement shown in Figs. 9 to 11 will now be described, whereby the bars 8 and 9 will be forced apart so as to permit the bars 8 and 9 to assume their original positions once the gluing of the strips has been completed. A horizontal rack 61 projects from the upright 55 and is carried therewith when the crank 56 is moved. A portion of this rack has teeth cut in it which cooperate with gear teeth in a segment 62. During the initial movement of the rack from left to right, while the smooth end thereof cooperates with the smooth surface of the segment 62, the latter is not rotated. However when the gear teeth mesh the latter will be rotated and will assume the position shown in Fig. 10. A wedge 60 carried by the segment and rotatable therewith will now be between the springs 54 and assume the position shown in Fig. 10. Upon the movement of the crank 56 in the opposite direction and the displacement of rack 61 from right to left, the gear teeth on the rack and on the segment 62 will be in mesh from the beginning of the movement, causing the tilting of the segment 62 and associated wedge into the position shown in Fig. 11, in which the wedge will separate the two leaf springs 54, insuring that the bars 8 and 9 will clear the book and contact with the top and bottom surfaces thereof. This movement will be continued until this structure returns to its normal position shown in Fig. 9.

When the wedge 60 forced the bars 8 and 9 apart, a horizontal plunger 63 (Fig. 12) was moved from left to right through frame member 64. This will push a new book on table 5, bars 8 and 9 having forced out the bound book 1. The plunger is then returned to normal and a plate 67 on which a stack of books 66 rests is lifted by a spring 68 until the top book is stopped by plate 69.

The apparatus is now ready to bind the next book.

What I claim is:

1. The method of binding books having marginal perforations through the leaves and the covers comprising the following steps: holding together the leaves with the two covers one on top of the other and the perforations in alignment, simultaneously passing lengths of paper ribbon through all the perforations with the ends of the ribbons projecting, cutting off each ribbon at a predetermined point above the book, whereby all the cut-off ribbon portions will be of the same length, and forming the projecting ribbon ends over the perforated edge of the book into rings.

2. The method of binding books having marginal perforations through the leaves and the covers comprising the following steps: holding together a stack of leaves with the two covers one on top of the other at one end of the stack and the perforations in alignment, simultaneously passing paper ribbons through all the perforations with the ends projecting, simultaneously cutting the paper ribbons to desired equal lengths, applying glue to one projecting end, folding the ends into rings surrounding the perforated edge of the book with the ends overlapping, and rotating one cover towards the other end of the stack.

3. The method of binding books having marginal perforations through the leaves and the covers comprising the following steps: holding together a stack of leaves with the two covers one on top of the other at one end of the stack and the perforations in alignment, simultaneously

passing paper ribbons through all the perforations with the ends projecting, simultaneously severing the ribbons to the required equal lengths, applying glue to one projecting end, folding the ends into rings surrounding the perforated edge of the book with the ends overlapping, and forming a glued tag, rotating one cover towards the other end of the stack, and gluing the tag of each ring to said one cover.

10 4. In a book binding machine, a clamp for marginally perforated book leaves, a table on which said leaves rest, said table having a ledge, a stop for loose pieces of paper, means for carrying a plurality of supplies of paper ribbons adjacent one
15 another, a plurality of pairs of fingers, one pair for each supply of paper ribbons, means for advancing the ribbons from each of said supplies between said pairs of fingers, means for causing the pairs of fingers to grip the ribbons between
20 them, means for severing the lengths of ribbons gripped by the pairs of fingers, means for moving the pairs of fingers through the marginal perforations in the book leaves, means for separating the pairs of fingers to release the severed
25 lengths of ribbons against said stop, means for folding the ends of the ribbons over the perforated margin to form rings with overlapping ends, means for removing the book from the clamp, and means for feeding a new book into binding position in the machine.

30 5. In a book binding machine, a clamp for marginally perforated book leaves, means for carrying a plurality of supplies of paper ribbons adjacent one another, a plurality of pairs of fingers, one pair for each supply of paper ribbons, means for
35 advancing ribbons from said supplies between said pairs of fingers, means for causing the pairs of fingers to grip the ribbons between them,

means for severing the lengths of ribbons gripped by the pairs of fingers, means for moving the pairs of fingers through the marginal perforations, means for separating the pairs of fingers to release the severed lengths of ribbons, a stop below said perforations against which one end of each of said ribbons rests, means for applying glue to one of the protruding ends of said ribbons, means for folding the ends of the ribbons over the perforated margin and into contact to form rings with glued overlapping ends, and means for removing the book from the clamp.

6. In a book binding machine, a clamp for marginally perforated book leaves, a table on which said leaves rest, said table having a ledge, a sloping wall for said ledge terminating in a trough-shaped stop, means for carrying a plurality of supplies of paper ribbon adjacent one another, a plurality of pairs of fingers, one pair for each supply of paper ribbons, means for advancing ribbons from said supplies between said pairs of fingers, means for causing the pairs of fingers to grip the ribbons between them, means for severing the lengths of ribbons gripped by the pairs of fingers, means for moving the pairs of fingers through the marginal perforations in the book leaves, means for separating the pairs of fingers to release the severed lengths of ribbons permitting them to drop until their lower ends come to rest on the sloping wall of said ledge against said stop, means for applying glue to the ends resting against said sloping wall, means for folding the ends of the ribbons over the perforated margin of the book leaves and into contact to form rings with glued overlapping ends, and means for removing the book from the clamp.

EMIL N. FARKAS.