

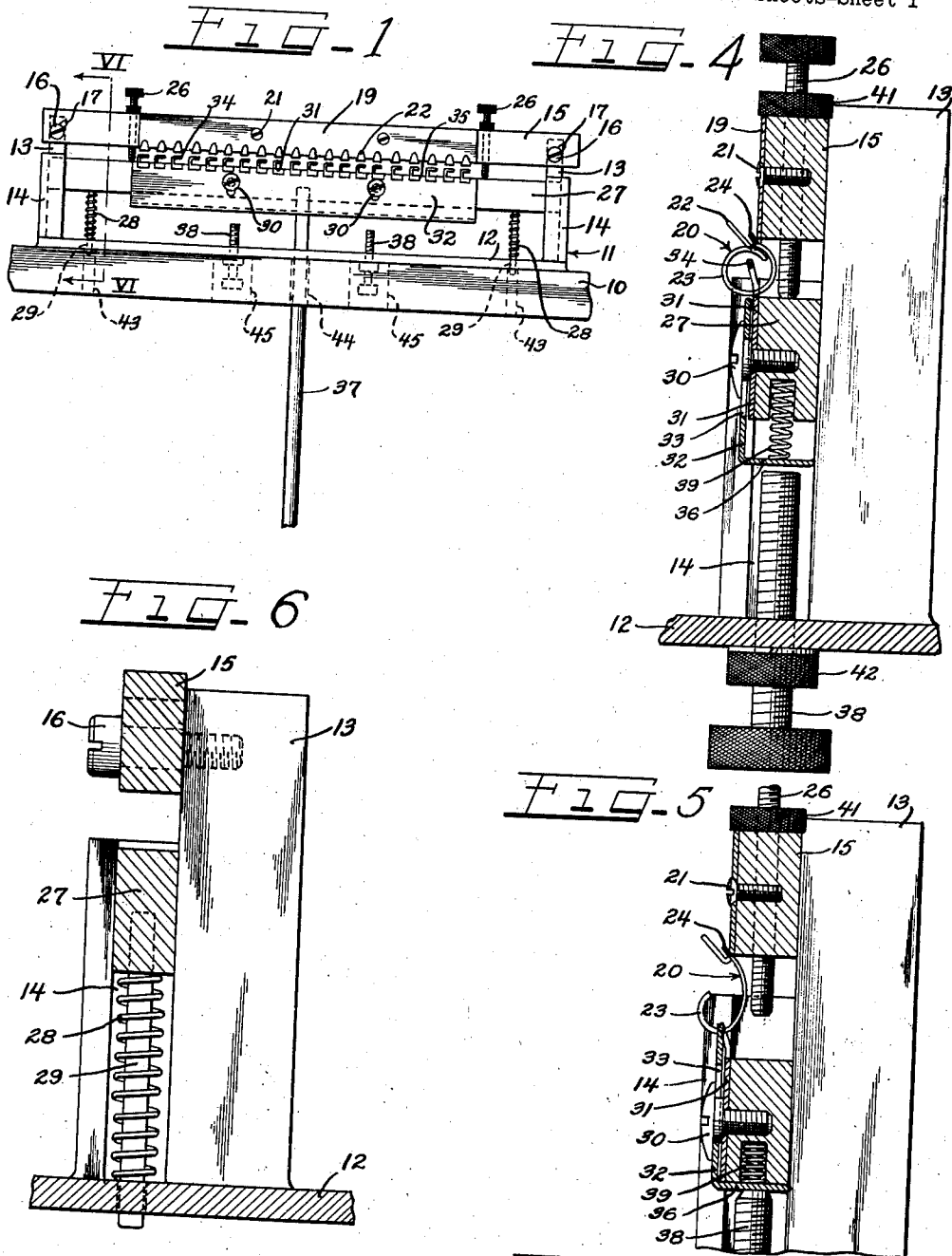
Sept. 30, 1941.

C. E. EMMER
BINDING MACHINE

2,257,714

Filed April 3, 1940

2 Sheets-Sheet 1



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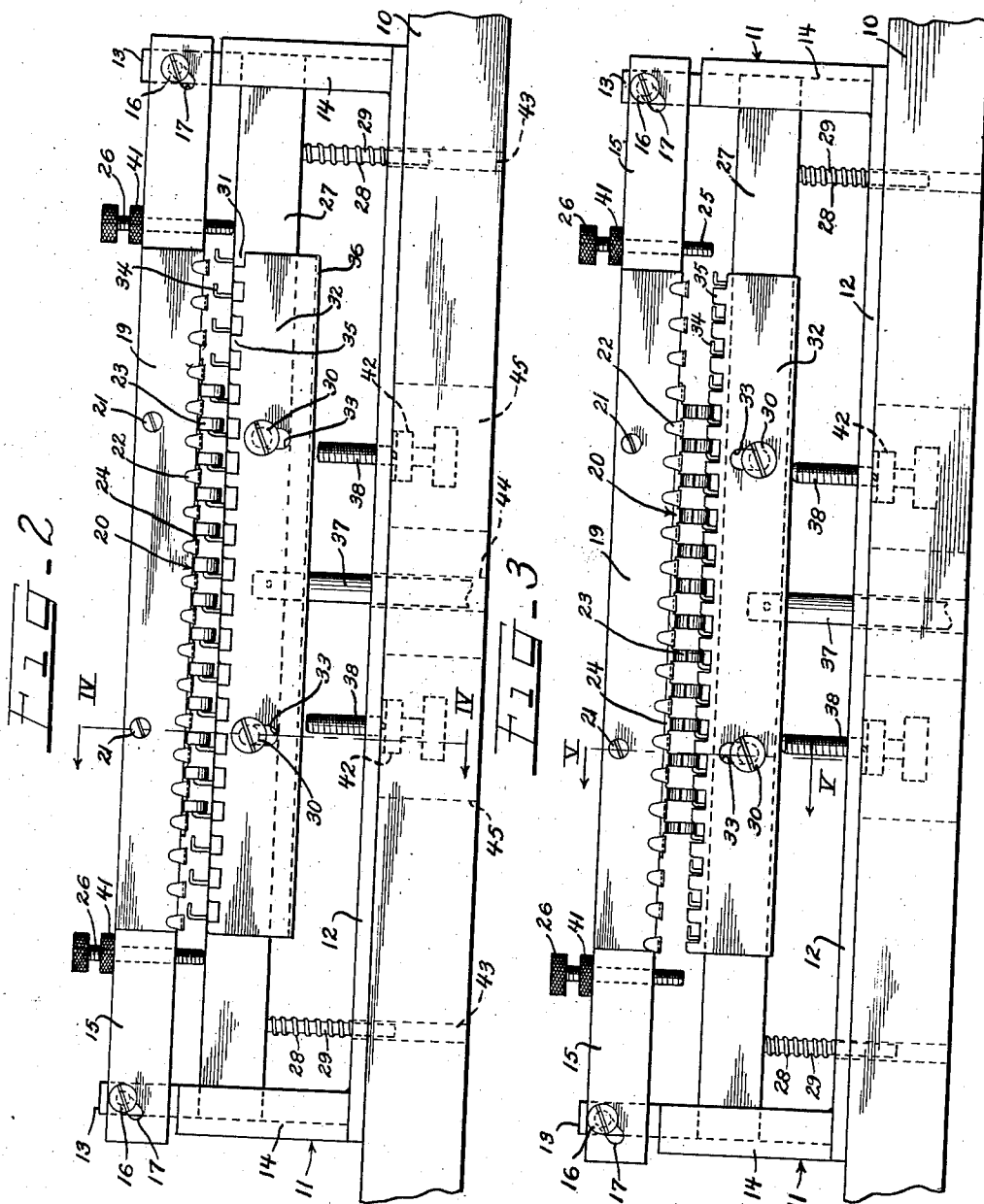
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2,257,714

BINDING MACHINE

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Application April 3, 1940, Serial No. 327,571

14 Claims. (Cl. 11—1)

This invention relates to the art of binding books with mechanical bindings, and particularly with the type of bindings known in the trade as plastic bindings. Two principal forms of plastic bindings are in use in this country at the present time, one of them being shown in the U. S. patent to Douvry No. 1,970,285 dated Aug. 14, 1934, and the other being shown in my copending application for patent entitled: "Plastic binding," Serial No. 227,242, filed August 29, 1938. Both of these bindings are formed of a resilient plastic, such as Celluloid, cellulose acetate, or a suitable synthetic resin, and comprise a longitudinally extending portion, termed a backbone, and a plurality of rings evenly spaced along the backbone and formed of fingers extending from one edge of the backbone and curled around into rings.

In the Douvry type of plastic binding, the backbone is relatively wide and lies on the surface of the imaginary cylinder defined by the rings. In the other form of plastic binding mentioned above, the backbone is narrow and lies at an angle to the adjacent portion of the rings. In the form of plastic binding with the wide backbone, the ends of the fingers overlap the backbone and, in the other form of plastic binding mentioned above, the ends of the fingers overlap the base portions of the fingers next to the backbone, but, in both forms of binding, the fingers can be straightened out in order to open the rings to allow the sheets to be bound to be placed upon the binding.

Another form of plastic binding, which is now coming into use in this country, is similar to the form shown in my copending patent application identified above but differs therefrom in that the backbone lies outside of the rings instead of inside of them.

The sheets to be bound with the plastic binding are each provided with a row of holes along one edge, the spacing of the holes being the same as the spacing of the rings of the binding. To bind the sheets with the binding, the rings of the binding are opened up, the pages are inserted upon the fingers forming the opened-up rings, and the fingers are allowed to spring back into their original ring form.

One of the principal objects of the present invention is to provide a machine for conveniently and quickly carrying out the above described operation.

Another object of this invention is to provide a relatively simple machine for opening plastic bindings which will both engage and open the

rings of a binding in response to a single movement on the part of the operator.

Another object of the present invention is to provide a machine for carrying out the above described operations and which is readily adjustable to different sizes of bindings so that it will operate equally well upon large and small bindings.

Another object of the present invention is to provide a means for positively holding the rings of the binding against lateral movement after they are opened so that the ends of the fingers forming the rings will remain properly spaced as the leaves to be bound are being threaded upon them.

One of the principal features of the present invention is the provision of a series of hooks to engage the rings of the binding for opening them and a series of fingers adapted to cooperate with the hooks to positively hold each ring against sliding off of the hook which engages it.

Another feature of the present invention is the provision of means for holding the binding and a series of hooks for engaging the rings of the binding, the engagement of the rings on the hooks being caused by a movement of the binding supporting means rather than by a movement of the hooks.

Other objects and features of the invention will appear from the following description and accompanying drawings, in which:

Figure 1 is a front elevational view of one of the preferred embodiments of the invention, showing a machine embodying the invention in its position of rest;

Figure 2 is a view similar to Figure 1, on an enlarged scale, and showing the machine with the parts thereof in one of the positions which they assume during the operation of the machine;

Figure 3 is a view similar to Figure 2 but with the parts in a still different position;

Figure 4 is a cross section on the line IV—IV of Figure 2, looking in the direction of the arrows;

Figure 5 is a cross section on the line V—V of Figure 3, looking in the direction of the arrows; and

Figure 6 is a cross section on the line VI—VI of Figure 1, looking in the direction of the arrows.

The particular form of the invention shown in the drawings is mounted upon the top 10 of an ordinary table and comprises a frame 11 having a base 12 fixed to the table top 10. The frame 11 has a pair of uprights 13, one at each end, formed with vertical extending channels or guideways 14 facing towards each other. The guideways 14

are shorter than the uprights 13, the upper portions of the uprights 13 projecting above the guideways 14 and serving to carry an upper cross member 15. The upper cross member 15 extends across in front of the upper ends of the uprights 13 and is secured to them by means of shoulder bolts 16 extending through oblique slots 17 in the cross member 15. While the shoulder bolts 16 are screwed tightly into the uprights 13, they do not fit tightly against the face of the cross member 15 or within the slots 17. This arrangement permits the upper cross member 15 to move relative to the uprights 13 in an oblique direction while holding it at all times parallel to its original position and preventing any undesirable twisting or turning.

The cross member 15 carries a means 19 for supporting a plastic binding 20, this means in the particular machine illustrated being a plate secured to the cross member by screws 21 and having a row of hooks 22 along its lower edge. The hooks 22 are arranged in a row and open upwardly, and their spacing is the same as the spacing of the rings 23 of the binding. Thus they are adapted to fit between the successive rings 23 of the binding and to engage the longitudinally extending backbone 24 thereof, as shown in Figure 2.

When the machine is in its initial position, as shown in Figure 1, the upper cross member 15 and the binding supporting means 19 secured thereto are supported in their uppermost positions by a pair of screws 26 extending down through the upper cross member 15 and resting upon the upper surface of a lower cross member 27 located directly below the upper cross member and having its ends guided in the vertical channels or guideways 14 on the uprights 13. The lower cross member 27 is supported by a pair of compression springs 28 acting between the top of the frame base 12 and the underside of the cross member 27. Suitable guide rods 29 secured to the cross member 27 and extending slidably through holes in the frame base 12 are provided to prevent buckling of the springs 28. When the machine is at rest, the springs 28 hold the lower cross member 27 up against the supporting screws 26 in the upper cross member 15 and thereby hold the upper cross member 15 in its uppermost position, as shown in Figure 1.

The lower cross member 27 has a pair of shoulder screws 30 on its front face, these screws serving to hold a hook plate 31 and a retainer 32 in position. The hook plate 31 lies under the shoulders on the shoulder screws 30 and is thereby affixed to the cross bar 27, while the retainer 32 is provided with vertical slots 33 through which the shoulder portions of the screws 30 extend and which permit the retainer 32 to move vertically a predetermined distance with respect to the lower cross member 27.

The hook plate 31 is formed with a series of hooks 34 along its upper edge and projecting above the top of the cross member 27. The hooks 34 on the hook plate are arranged with exactly the same spacing as the hooks 22 on the binding supporting means 19 and lie directly beneath them when the machine is at rest, as shown in Figure 1. Thus, when a plastic binding is placed in the machine with its rings passing between the hooks 22 on the binding support 19, the rings will also pass between the hooks 34 on the hook plate.

The retainer 32 is formed with a series of fingers or projections 35 along its upper edge, 75

the fingers 35 having the same spacing as the hooks 22 and the hooks 34 and lying directly beneath the spaces between the hooks when the machine is at rest, as shown in Figure 1. The range of movement which is provided for the retainer 32 by the slots 33 is such that, when the retainer 32 is in its upper position with respect to the lower cross member 27, as shown in Figure 3, the upper ends of the fingers or projections 35 of the retainer will lie in line with the ends of the hooks 34. In order that these parts may be exactly in line under these conditions, the hooks 34 are bent slightly forward, as shown in Figure 4.

The bottom of the retainer 32 is formed into a horizontal flange 36 which extends back under the lower cross member 27, which is bored out, as shown in Figure 4, to receive one or more compression springs 39 arranged to press down upon the flange 36 and resiliently hold the retainer 32 in its lower position with respect to the cross member 27.

The machine is operated by means of a rod 37 which is fixed to the lower cross member 27 which extends down through suitable apertures in the flange 36 of the retainer, the base 12 of the frame, and the table top 10 and is connected to a pedal (not shown) of any desired construction. The movement of the lower cross member 27 when pulled down by the operating rod 37 is limited by a pair of stop screws 38 threaded up through the base 12 of the machine and located so as to engage the flange 36 on the retainer. Thus, when the operating rod 37 is pulled down, the retainer flange 36 comes into contact with the stop screws 38, as shown in Figures 2 and 4, before the downward movement of the lower cross member is arrested, and, during the final portion of the downward movement of the lower cross member 27, the retainer 32 remains still while the hooks 34 on the hook plate move down between the fingers 35 on the retainer, as shown in Figures 3 and 5.

The operation of the machine is as follows. When both of the cross members 15 and 27 are in their upper positions, as shown in Figure 1, the plastic binding to be opened is placed in the machine with its backbone 24 resting in the hooks 22 on the upper cross member and with its rings 23 hanging down between the hooks 34 carried on the hook plate 31 on the lower cross member. The operating rod 37 is then pulled down by the pedal, treadle, or other operating means (not shown), thereby moving the lower cross member 27 in a downward direction. Since the lower cross member 27 supports the upper cross member 15 by means of the screws 26, the upper cross member 15 moves down with the lower cross member 27 until it reaches the limit of the movement allowed it by the oblique slots 17. Because the slots 17 are oblique, the upper cross member 15 moves to one side as well as down, reaching the position shown in Figure 2, in which the rings 23 of the binding 20 have been moved laterally so that they now encircle the ends of the hooks 34 on the lower cross member.

As the lower cross member 27 continues to be moved down, the hooks 34 carried by this cross member move down away from the hooks 22 on the upper cross member and engage the rings 23 of the binding on the inside. As they continue to move down, the hooks 34 flex the fingers forming the rings 23 and open the rings out to the position shown in Figure 5. At the same time, the flange 36 on the bottom of the retainer

32 has come into contact with the stop screws 38, thus causing the retainer 32 to move upwardly with respect to the hooks 34 on the lower cross member so that the fingers 35 on the retainer project up alongside of the ends of the hooks, as shown in Figure 3, and hold the spread-open rings 23 in their correct positions on the hooks.

With the rings 23 of the binding opened as described above and shown in Figure 5, it is a simple matter to thread the pages to be bound onto the rings. If the number of pages is small, all of the pages to be bound together can be put into place at once or, if their number is large, they can be placed upon the binding in two or more groups one after the other. After the pages are in place, the operating rod 37 is allowed to rise to its original position, and all of the parts of the machine are thereby permitted to return to their original positions under the influence of the springs 28 and 39. This allows the rings 23 of the binding, which are resilient, to return to their original closed form and also disengages the hooks 34 on the lower cross member from the binding. The book which has been bound can then be removed from the machine and the binding operation repeated on another book.

The machine can be used for opening and inserting bindings of different sizes by adjusting the vertical screws 26 in the upper cross member and by adjusting the stop screws 38 which limit the downward movement of the lower cross member 27. Lock nuts 41 and 42 are provided on these screws for retaining them in their adjusted positions.

Attention is especially directed to the simplicity of the machine as compared with other machines that have been constructed for accomplishing the same purpose. It will be noted that there are a small number of moving parts and that all of the parts are of such a shape as to be economically constructed. For example, the binding support 19 which is mounted upon the upper cross member and includes the upper hooks 22 is formed of sheet metal and can be manufactured very economically. The same is true of the lower hook plate 31 and the retainer 32. It may also be noticed that the table upon which the machine is mounted serves only as a support and that all that is needed to enable the machine to be mounted upon any table or bench that may be available is to provide suitable apertures 43, 44 and 45 for the various portions of the machine that project below the base 12. Thus, in manufacturing and distributing the machine, all that is necessary is to manufacture and ship the relatively small machine itself, permitting the purchaser to secure a suitable table from a local source.

From the above, it will be seen that I have provided an extremely simple and economical machine for applying plastic bindings and that the machine is inexpensive enough to allow it to be purchased or rented by many small print shops that would otherwise be forced to have their binding done by other concerns.

While I have shown only one embodiment of my invention, it will of course be understood that many modifications and changes may be made without departing from the spirit of my invention. It will also be understood that bindings of the general type with which this machine is intended to be used may be made of other materials than plastics, such as, for example, resilient metal, and it is to be understood that the

term "plastic binding" is to include any such bindings. It will further be understood that this machine may readily be modified, as, for example, by merely changing the shape of the hooks 22 for engaging the backbone of the binding, to enable it to be used with other forms of bindings than the one for which the particular machine shown as an example has been specifically designed. I therefore do not intend to limit the patent granted hereon to the specific construction which I have shown, but it is to be clearly understood that it embraces all constructions falling within the terms of any one or more of the following claims.

I claim as my invention:

1. A machine for spreading open the rings of plastic bindings, comprising a stationary frame means mounted on said frame for supporting the rings of a plastic binding near the backbone thereof, a series of hooks carried on said frame in proximity to said supporting means and located in position to lie between the rings of a binding when said binding is supported by said means, means for moving said supporting means and said binding in the direction of the length of said binding to place said rings in encircling relation to said hooks, and means for subsequently moving said hooks away from said supporting means.

2. A machine for spreading open the rings of plastic bindings, comprising a stationary frame means mounted on said frame for supporting a plastic binding by the backbone thereof, a series of hooks carried on said frame in proximity to said supporting means and located in position to lie between the rings of a binding when said binding is supported by said means, means for moving said supporting means and said binding in the direction of the length of said binding to place said rings in encircling relation to said hooks, and means for subsequently moving said hooks away from said supporting means.

3. A machine for spreading open the rings of plastic bindings, comprising a stationary frame, a row of hooks carried on said frame and adapted to fit between the rings of a plastic binding and engage the backbone thereof, a second row of hooks carried on said frame in proximity to said first row of hooks and located in position to lie between the rings of a binding supported by said first row of hooks, the ends of said hooks of said second row being aligned in a direction extending lengthwise of said second row of hooks and parallel to said backbone, means for moving said first row of hooks and said binding in a direction opposite to said first mentioned direction to place said rings in encircling relation to said hooks in said second row, and means for subsequently moving said two rows of hooks laterally apart.

4. A machine for spreading open the rings of plastic bindings, comprising a stationary frame, means mounted on said frame for supporting the rings of a plastic binding near the backbone thereof, a row of hooks carried on said frame in proximity to said supporting means and located in position to lie between said rings, means for first moving said supporting means and said hooks together and for thereafter moving said hooks transversely away from said supporting means, and means for moving said supporting means in a direction parallel to said row of hooks simultaneously with the transverse movement thereof.

5. A machine for spreading open the rings of

plastic bindings, comprising a stationary frame, means mounted on said frame for supporting the rings of a plastic binding near the backbone thereof, a row of hooks carried on said frame in proximity to said supporting means and located in position to lie between said rings, means for first moving said supporting means and said hooks together in a direction transverse to said binding and to said row of hooks, and for thereafter moving said hooks away from said supporting means, and means for moving said supporting means in a direction parallel to said row of hooks simultaneously with the transverse movement thereof.

6. A machine for spreading open the rings of plastic bindings, comprising a stationary frame, means mounted on said frame for supporting the rings of a plastic binding near the backbone thereof, a row of hooks carried on said frame in proximity to said supporting means and located in position to lie between said rings, means for first moving said supporting means and said hooks together in a direction transverse to said binding and for thereafter moving said hooks away from said supporting means, and cam means for moving said supporting means longitudinally simultaneously with the transverse movement thereof said cam means comprising oblique pin and slot connections.

7. A machine for spreading open the rings of plastic bindings, comprising a stationary frame, a first row of hooks movably mounted on said frame and adapted to engage the longitudinally extending backbone of a plastic binding, a second row of hooks movably mounted on said frame and located in position to lie between the rings of said bindings and having the ends thereof directed parallel to said backbone, means for first moving said two rows of hooks together in a direction transverse to said backbone and for thereafter moving one of said rows of hooks away from the other, and means for moving said other row of hooks longitudinally simultaneously with the transverse movement thereof.

8. A machine for spreading open the rings of plastic bindings comprising a stationary frame, a first row of hooks movably mounted on said frame and adapted to engage the longitudinally extending backbone of a plastic binding, a second row of hooks movably mounted on said frame and located in position to lie between the rings of said bindings and having their ends extending in a direction parallel to said backbone, means for first moving said two rows of hooks together in a direction transverse to said backbone and for thereafter moving said second row of hooks away from said first row of hooks, and cam means for moving said first row of hooks longitudinally simultaneously with the transverse movement thereof, said cam means comprising oblique pin and slot connections.

9. A machine for opening plastic bindings, comprising a stationary frame, means mounted on said frame for supporting the rings of a plastic binding near the backbone thereof, a row of hooks carried on said frame in proximity to said supporting means and located in position to lie between the rings of a binding supported by said means, a member extending along said row of hooks and having transverse projections, and means for first moving said row of hooks and said member longitudinally relative to said supporting means to place said rings in encircling relation to said hooks and for thereafter moving said member transversely relative to said row of hooks and

bringing said projections into close proximity to the ends of said hooks.

10. A machine for opening a plastic binding having a longitudinally extending backbone and a row of split rings formed of resilient material and integral with said backbone, comprising a stationary frame, a first row of hooks movably mounted on said frame and having a spacing similar to the spacing of said rings and adapted to engage said backbone between said rings, a second row of hooks movably mounted on said frame and having a spacing similar to the spacing of said rings and located in position to lie between said rings, a member extending along said second row of hooks and having transverse projections with a spacing similar to the spacing of said hooks, and means for first moving said second row of hooks and said member longitudinally relative to said first row of hooks to place said rings in encircling relations to the hooks in said second row and for thereafter moving said member transversely relative to said second row of hooks and bringing said projections into close proximity to the ends of said hooks in said second row.

11. A machine for spreading open the rings of a plastic binding, comprising a frame, a pair of parallel cross members movably mounted on said frame for movement in a common plane, the direction of movement of each cross member being at an angle to the direction of movement of the other but in the same plane, means for moving said cross members simultaneously and together with respect to said frame, and for thereafter moving said cross members apart with respect to each other, and means on said cross members for engaging said plastic binding at spaced points.

12. A machine for spreading open the rings of a plastic binding having a longitudinally extending backbone and fingers extending transversely thereto and curved to form rings, comprising a frame, a pair of parallel cross members movably mounted on said frame for movement in a common plane, the direction of movement of said cross members being at an angle to each other but in the same plane, a row of hooks on one of said cross members spaced and shaped to fit between said rings and around said backbone, a second row of hooks on the other of said cross members spaced to fit between said rings and having the ends thereof extending in the direction of extension of said second row of hooks and parallel to said backbone, and means for moving said cross members simultaneously and together with respect to said frame, and for thereafter moving said cross members apart with respect to each other.

13. A machine for spreading open the rings of a plastic binding having a longitudinally extending backbone and fingers extending transversely thereto and curved to form said rings, comprising a frame, an elongated upper member movably mounted on said frame and lying in a fixed upright plane, means interconnecting said upper member and said frame for restricting said upper member to movement in said plane in an inclined direction between fixed limits, a row of hooks on said upper member spaced and shaped to fit between said rings and around said backbone, an elongated lower member movably mounted on said frame, means for restricting said lower member to movement in said plane in a vertical direction, means for supporting said upper member on said lower member for movement therewith between said limits, a row of hooks on said

lower member spaced to fit between said rings and having the ends thereof extending in a direction parallel to said backbone, and means for raising and lowering said lower member a distance greater than the vertical range of movement of said upper member.

14. A machine for spreading open the rings of a plastic binding having a longitudinally extending backbone and fingers extending transversely thereto and curved to form said rings, comprising a frame, an elongated upper member movably mounted on said frame and lying in a fixed upright plane, means interconnecting said upper member and said frame for restricting said upper member to movement in said plane in a fixed direction between fixed limits, a row of hooks on said upper member spaced and shaped to fit between said rings and around said backbone, an elongated lower member movably mounted on said frame, means for restricting said lower member to movement in said plane in a direction

at an angle to said first direction, means for supporting said upper member on said lower member for movement therewith between said limits, a row of hooks on said lower member spaced to fit between said rings when said lower member is supporting said upper member in the uppermost position thereof, said hooks having the ends thereof extending in a direction parallel to the longitudinal axis of said lower member, a retainer mounted on said lower member for vertical movement with respect thereto, said retainer having projections movable therewith into close proximity to the ends of said hooks on said lower member, means for raising and lowering said lower member a distance greater than the vertical range of movement of said upper member between said limits, and stop means adapted to engage said retainer upon downward movement of said lower member.

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