

Nov. 23, 1943.

C. E. EMMER

2,334,815

MACHINE FOR BINDING BOOKS WITH PLASTIC BINDINGS

Filed Feb. 10, 1940

4 Sheets-Sheet 1

FIG. 1

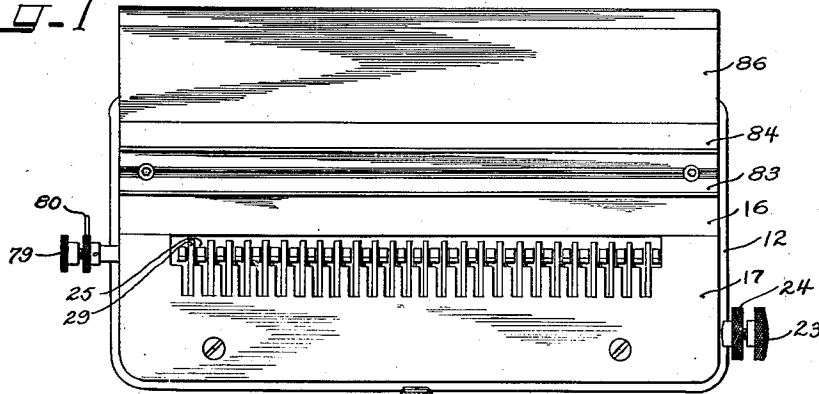


FIG. 3

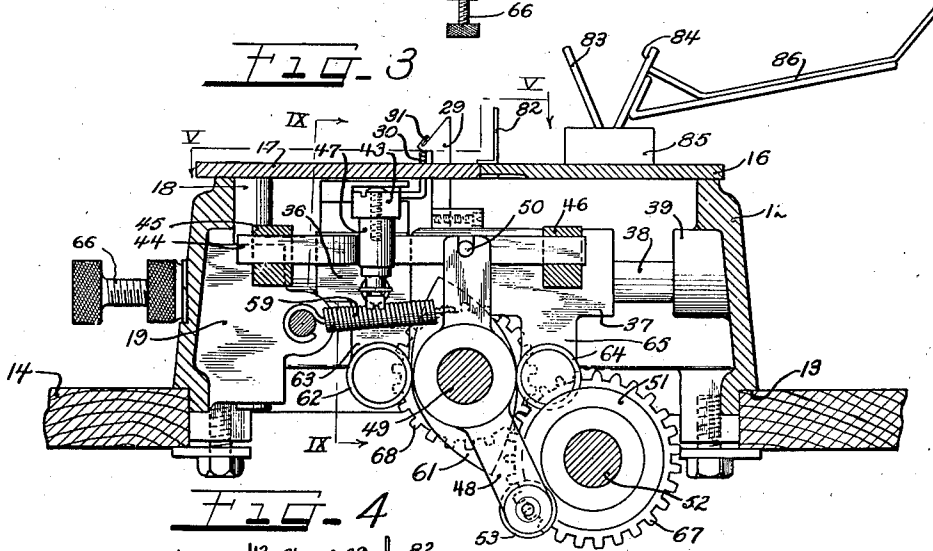
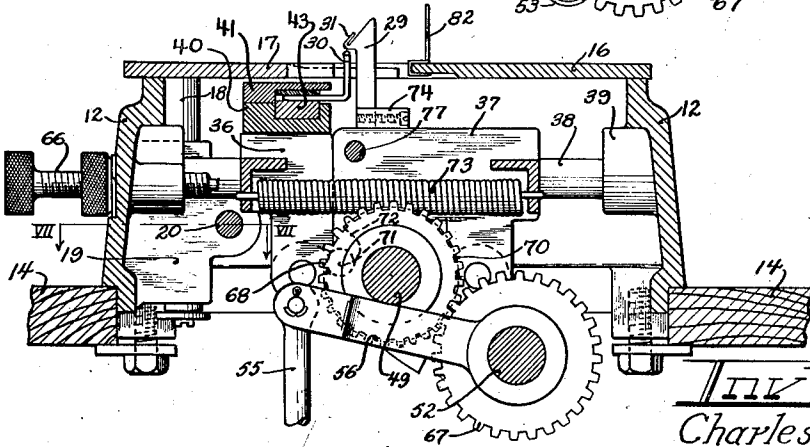


FIG. 4



Inventor
Charles E. Emmer

Charles E. Emmer
Attys

by

Nov. 23, 1943.

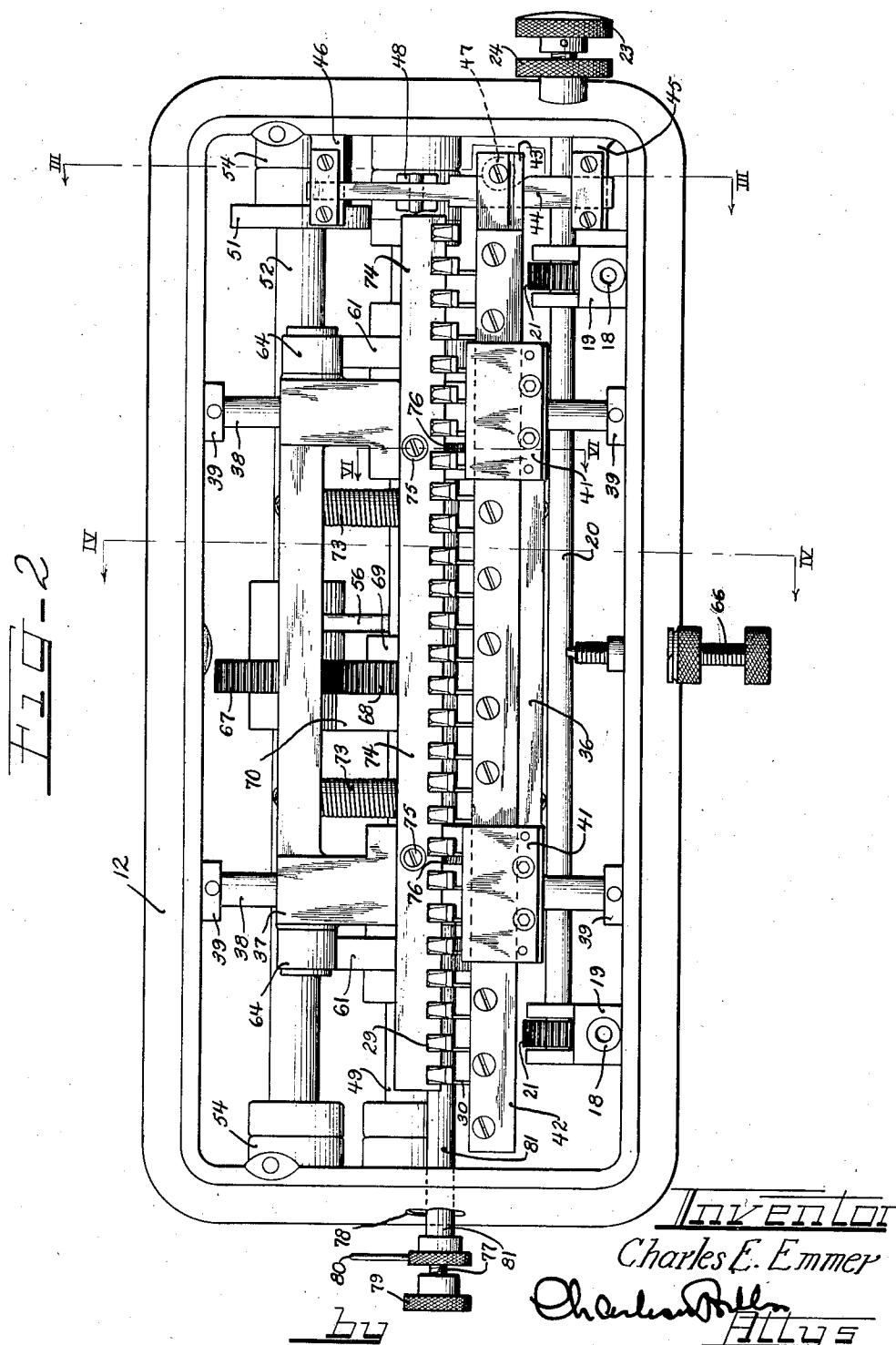
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FIG-5

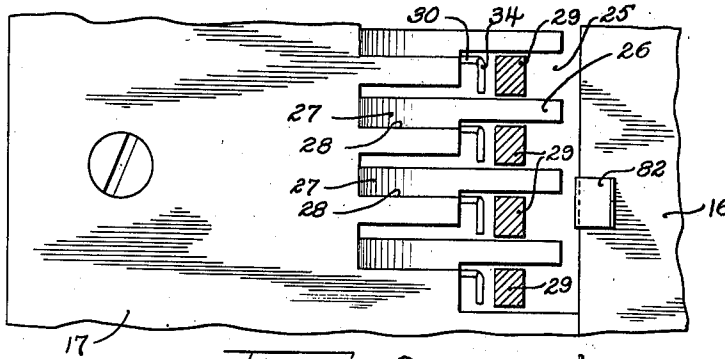


FIG-6

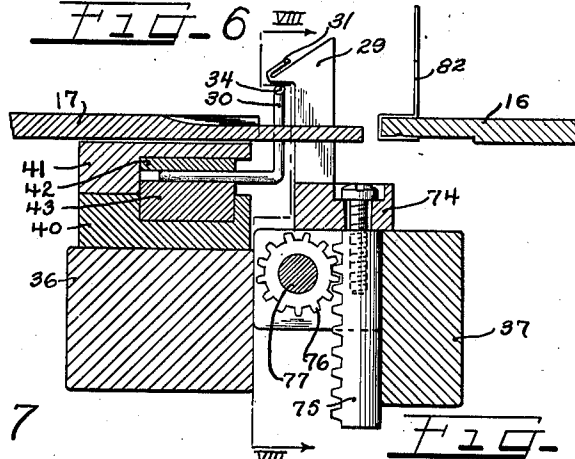


FIG-12

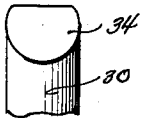


FIG-7

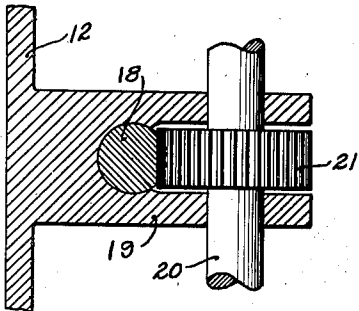
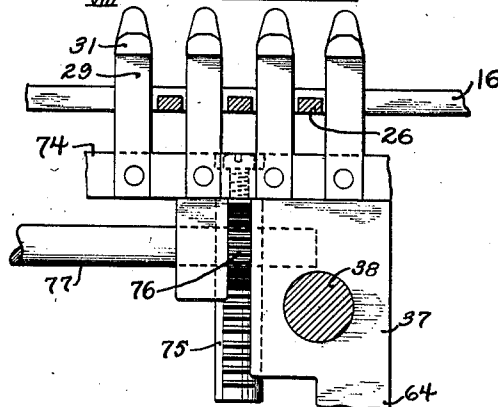


FIG-8



Inventor

Charles E. Emmer

Charles E. Emmer

by

ALLS

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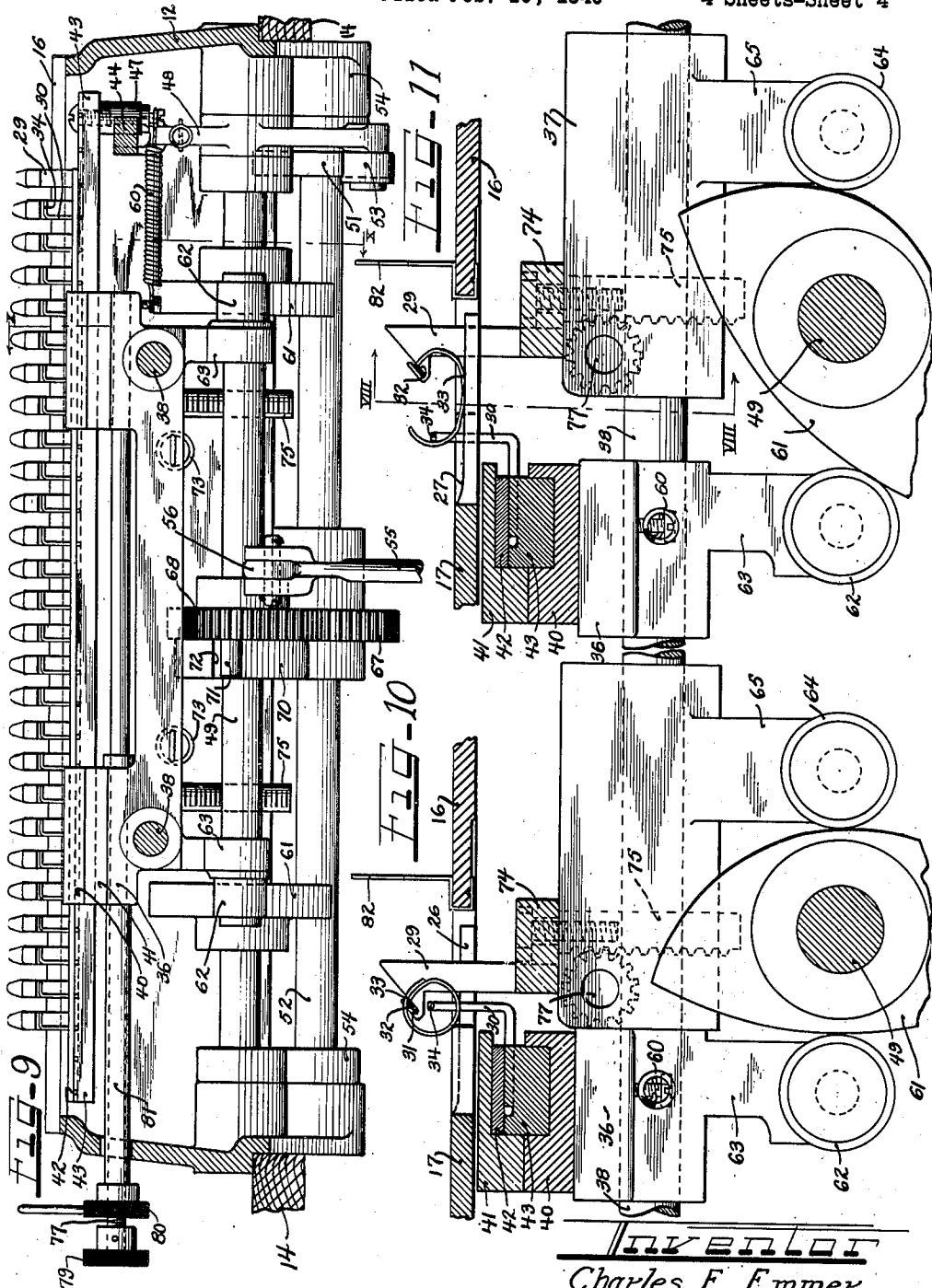
C. E. EMMER

2,334,815

MACHINE FOR BINDING BOOKS WITH PLASTIC BINDINGS

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4 Sheets-Sheet 4



INVENTOR
Charles E. Emmer

Charles E. Emmer

UNITED STATES PATENT OFFICE

2,334,815

MACHINE FOR BINDING BOOKS WITH
PLASTIC BINDINGSCharles Edward Emmer, Chicago, Ill., assignor to
General Binding Corporation, Chicago, Ill., a
corporation of Illinois

Application February 10, 1940, Serial No. 318,229

18 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, granted August 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 from each other and formed of fingers extending from one edge of the backbone and curled around to form 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, 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, 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.

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 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 this invention is to provide a machine for opening plastic bindings which is operated entirely by the feet of the operator, thereby leaving the hands of the operator free for inserting bindings in the machine and for

placing the leaves to be bound upon the bindings.

Another object of the present invention is to provide a machine for carrying out the above described operation and 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 deformation when they are being opened so that the ends of the fingers forming the rings will be evenly spaced when the leaves to be bound are to be threaded upon them.

One of the principal features of the present invention is the provision of two sets of means for grasping the binding, one means being adapted to hold either the back of the binding or the rings where they are joined to the back, and the other means being adapted to engage the rings at a point spaced from the back and to be moved away from the first means in order to uncurl or open the rings of the binding. The movement of one of the binding-engaging means relative to the other may be accomplished by moving both of the means or by moving either one or the other.

Another feature of the present invention is the provision of means for vertically adjusting one of the binding-engaging means relative to the other in order to adapt the machine to operate on different sizes of bindings.

Another feature of the present invention is the provision of a stationary member to engage the edges of the fingers as they are uncured and to prevent them from being deflected laterally.

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

Figure 1 is a plan view of one of the preferred embodiments of the invention;

Figure 2 is a plan view, on an enlarged scale, of the form of the invention shown in Figure 1, with the top plate of the device removed to more clearly illustrate its interior construction;

Figure 3 is a cross-section on the line III—III of Figure 2, looking in the direction of the arrows;

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 section on the line V—V of Figure 3, looking down in the direction of the arrows;

Figure 6 is a cross-section on the line VI—VI of Figure 2, looking in the direction of the arrows and showing the same portion of the device that is shown in Figure 5;

Figure 7 is a horizontal section through a portion of the device on the line VII—VII of Figure 4, looking down in the direction of the arrows;

Figure 8 is a longitudinal section through a portion of the device on the line VIII—VIII of Figure 6, looking in the direction of the arrows;

Figure 9 is a longitudinal section on the line IX—IX of Figure 3, looking in the direction of the arrows;

Figure 10 is a cross-section through a portion of the machine on the line X—X of Figure 9, showing a binding in the machine and about to be opened;

Figure 11 is a view similar to Figure 10 but showing the machine with the binding opened; and

Figure 12 is an end view, on a greatly enlarged scale, of a hook forming a part of the machine.

The particular form of the invention shown in the drawings is an improvement of my "Machine for applying plastic bindings and the like," described in my copending application for patent Serial No. 226,032, filed August 22, 1938. The present device comprises a case or frame 12 which fits in an opening in the top 14 of a suitable table or work bench and which is formed with a shoulder 13 seated upon the table or bench top 14 around the opening. The exact structure of the table or bench is relatively unimportant and may be as in the machine described in my above-mentioned copending application for patent and may be provided with a similar foot pedal for operating the machine. The case or frame 12 is provided with a top formed in two parts, a back portion 16, which is fixed to the case 12, and a front portion 17, which can be raised and lowered relative to the case 12.

The front top portion 17 is fixed to the upper ends of a pair of vertical supports 18 which are slidable in guides 19 formed integrally on the inside of the case 12. Each of the guides 19 also forms a bearing for a shaft 20 which carries pinions 21 which engage with rack teeth 22 on the supports 18. The adjusting shaft 20 extends out through one end of the case 12, as shown in Figure 2, and is provided with a knurled knob 23 by means of which it may be easily rotated for adjusting the height of the front top portion 17. Suitable means are provided for holding the shaft 20 in any desired adjusted position, this means, in the machine illustrated, comprising a nut 24 threaded upon the shaft 20 and adapted to bear against the end of the case 12 and act as a lock nut.

The rear portion 15 of the top plate is substantially rectangular and has no special feature. The front portion 17 of the top plate, which can be adjusted vertically by the mechanism just described, is cut and shaped along its rear edge in a special manner, as shown in Figures 1, 5 and 6. A series of deep notches 25 are formed in the rear edge of the front top plate 17, the notches 25 having a relatively wide rectangular portion extending in from the edge of the plate, and a narrow extension extending further into the plate from the end of the rectangular portion and in line with one side of the rectangular portion, as shown in Figure 5. The portions 26 of the top plate between the notches 25 form fin-

gers which project back from the main portion of the front top plate 17 towards the rear top plate 16.

The upper surfaces of the fingers 26 are milled or otherwise formed to lie below the surface of the main portion of the plate 17, as shown in Figure 6, and the depressed surfaces of the fingers 26 are continued back as far as the end of the slots 25. The depressed surfaces 27 alongside of the narrow portions of the slots 25 are of the same width as the fingers 26 so that shoulders 28 are formed between the depressed surfaces and the adjacent undepressed surface of the plate 17. Thus, the depressed surfaces 27 are each bounded on one side by the narrow portion of one of the slots 25 and on the other side by one of the shoulders 28. This arrangement is an important feature of my invention, and the purpose thereof will be described presently.

The principal purpose of the slots 25 is to allow the members 29 and 30 which engage and open the binding to project up through the plate 17 and move as required to open the binding. These members comprise a plurality of uprights 29, one projecting up through each slot 25, and a plurality of wire hooks 30, each hook 30 being located in the wide part of a slot 25 between the upright 29 and the main portion of the plate 17. Each of the uprights 29 is formed with an inclined upper surface and a hook 31 adapted to receive the longitudinal backbone 32 of the binding, as shown in Figures 10 and 11. It will, of course, be understood that the posts 29 are arranged with the same spacing as the rings 33 so that they will lie between the rings of the binding, and the hooks 31 will engage the backbone 32 between the rings.

The hooks 30 which lie in front of the uprights 29 are each formed with a laterally extending end 34 which is flat on top, as shown in Figure 12, and which, when the machine is at rest, lies directly below the backbone engaging hook 31 on the post 29. Thus, when a binding is placed upon the backbone hooks 31, as shown in Figure 10, the rings 33 of the binding will pass between the successive hooks 30 and occupy the position shown in Figure 10. It will be noted that in this position the rings 33 rest upon the depressed surfaces 27 of the plate 17 alongside of the shoulders 28. The reason for making the height of the top plate 17 adjustable will now be apparent, for it enables the above described relationship between the rings of the binding and the depressed surfaces of the top plate to be secured with whatever size of binding the machine is being used to insert.

The actual opening of the binding, that is, the uncurling of the fingers forming the rings 33 so that pages may be threaded upon them, is accomplished by moving the backbone hooks 31 on the uprights 29 and the ring-engaging hooks 30 relative to each other and to the top plate 17 in a certain manner, this movement being accomplished by the mechanism within the case 12 and described in detail below. The movement which opens the binding may be divided into two distinct portions, namely, a first or engaging portion and a second or spreading portion. The engaging portion of the movement involves the hooks 30 which move laterally in the direction of their ends 34 from one side of each slot 25 to the other side thereof. When this engaging movement is completed, the ends 34 of the ring hooks 30 lie directly above the fingers 26 and are within the rings 33 of the binding. At the same time, the upright portions of the hooks 30 are directly

in line with the narrow portions of the slots 25 in the top plate 17.

In the second or spreading portion of the operation of the machine, the uprights 29 carrying the backbone-engaging hooks 31 move directly rearwardly along the wide portions of the slots 25, while the ring-engaging hooks 30 move directly forwardly along the narrow portions of the slots 25, their position at the end of this movement being shown in Figure 11. As a result of this movement, each ring 33 of the binding has been engaged by one of the ring-engaging hooks 30, and the finger which forms the ring 33 has been uncurled to the position shown in Figure 11, this position permitting the sheets to be readily threaded upon the fingers. A reversal of these movements allows the fingers to recur into ring form and permit the binding, together with the pages now secured together by it, to be removed from the machine.

The mechanism for securing the above described movements of the members 29 and 30 which engage and open the binding will now be described. This mechanism comprises two carriages 36 and 37 which are slidably mounted upon a pair of guide rods 38 supported in bosses 39 on the inside of the case 12. The front carriage 36 has two sets of guide members 40 and 41 secured to it and supporting a slide 42, 43 for lateral reciprocation. The slide is formed of an upper member 42 and a lower member 43 secured together and clamping the base portions of the ring-engaging hooks 30 between them. The upper surface of the lower slide member 43 is provided with suitable grooves to receive the clamped portions of the hooks 30 and maintain them in alignment and spaced at the proper distance from each other.

The slide 42, 43 is moved to the left, in order to impart the first or engaging portion of its movement to the hooks 30, by a sliding cam member 44 reciprocally mounted in suitable supports 45 and 46 on the inside of the case 12. The cam 44 extends from the front to the rear of the machine, and its left side is engaged by a roller mounted on the slide member 43 and is shaped to impart the desired motion to the slide 42, 43. The sliding cam member 44 is moved rearwardly by a forked lever 48 pivoted upon a shaft 49 and engaging a pin or roller 50 carried by the sliding cam. The lever 48 is actuated by a cam 51 fixed to the primary shaft 52 of the machine and engaging a roller 53 on the lower end of the lever 48, as shown in Figure 3.

The primary shaft 52, which is journaled in bearing bosses 54 carried by the ends of the case 12, is rocked back and forth to operate the machine by means of a link 55 connected to a suitable foot pedal at its lower end and, at its upper end, to an arm 56 fixed to the primary shaft 52, as shown in Figure 4. When the primary shaft 52 is rotated counter-clockwise from the position shown in Figures 3 and 4, the mechanism which has just been described will cause the slide 42, 43, carrying the ring-engaging hooks 30, to slide laterally far enough to move the ends 34 of the hooks 30 into the rings of the binding and bring the upright portions of the hooks 30 in line with the narrow portions of the slots 25, thus completing the first or ring-engaging movement of the machine. The reverse operation is accomplished by suitable springs which return the parts to their original positions when the operator removes his foot from the pedal to which the link 55 is connected. One spring (not shown) raises

the foot pedal and returns the primary shaft 52 and cam 51 carried thereby to their original position. Another spring 59 returns the forked lever 48, the cam follower roller 53, and the sliding cam 44 to their original positions. The slide 42, 43 and the ring hooks 30 are returned to their original positions by a spring 60 secured at one end to the slide and at the other end to the carriage 36.

It will be noted from Figure 2 that the side of the sliding cam 44 which engages the roller 47 comprises a sloping portion which causes the lateral movement of the roller 47 and the slide 42, 43, and a straight portion which is parallel to the guide rods 38 and upon which the roller 47 rides after the slide 42, 43 and the ring-engaging hooks 30 carried thereby have been moved laterally. This construction enables the front carriage 36 together with the slide 42, 43 and the hooks 30 to be moved forwardly after the slide 42, 43 and the hooks 30 have been moved laterally without causing any further lateral movement of the slide 42, 43 and the hooks 30.

The forward movement of the front carriage 36 and the other members carried thereby is accomplished by means of a pair of cams 61 secured to the secondary shaft 49. The cams 61 act upon rollers 62 carried by depending arms 63 forming a part of the front carriage 36. Similar rollers 64 and arms 65 are provided on the rear carriage, the rollers 64 for the rear carriage contacting the rear of the cams 61, while the rollers 62 for the front carriage contact the front of the cams 61. This mechanism causes the front carriage 36 to move forwardly and the rear carriage 37 to move rearwardly when the secondary shaft 49 and cams 61 are turned from the position shown in Figure 10 to the position shown in Figure 11. The distances which the two carriages 36 and 37 can move is regulated by an adjustable stop screw 66 threaded through the front of the case 12 and adapted to engage the front carriage 36. A knurled nut on the screw 66 is provided to lock it in any desired position.

The secondary shaft 49 is operated from the primary shaft 52 through gearing and a lost motion connection shown in Figures 4 and 9. A gear 67 fixed on the primary shaft 52 drives a gear 68 which is free to rotate on the secondary shaft 49 and is prevented from sliding along the secondary shaft by means of a pair of collars 69 and 70 fixed thereto. The collar 70 fixed to the secondary shaft 49 on one side of the gear 68 has a portion of its periphery cut away, as shown in Figure 9 and in dotted lines in Figure 4, and forms a part of a lost motion connection between the loose gear 68 and the secondary shaft 49. The remainder of the lost motion connection is formed by a pin 71 projecting from the side of the loose gear 68 and adapted to engage a shoulder 72 at the end of the cut-away portion of the fixed collar 70.

The lost motion connection recited above is necessary to delay the movement of the carriages 36 and 37 until after the slide 42, 43 and the ring engaging hooks 30 have been moved laterally into ring engaging position. The parts are adjusted so that, as soon as the lateral movement mentioned above is completed, the lost motion is taken up and the forward and rearward movement of the two carriages 36 and 37 takes place. The return of the carriages 36 and 37 to their original positions is accomplished by means of a pair of springs 73 extending between the carriages and drawing them together as soon as the

carriage-separating cams 61 are allowed to return to their original positions shown in Figures 3 and 10.

The rear carriage 37 carries the upright members 29 upon which the rear or backbone-engaging hooks 31 are formed, but instead of being fixed directly to the carriage 37, the upright members 29 are arranged so as to be vertically adjustable to enable the apparatus to accommodate a larger range of sizes of bindings than would otherwise be possible. For very small bindings, the rear hooks 31 can be placed down very close to the front hook ends 34 because of their flat tops, and the front plate 17 can be raised to engage the undersides of the rings of the binding. For very large bindings, the front plate 17 is lowered and the rear hooks 31 are raised as much as necessary.

The uprights 29 which carry the rear hooks are fixed to a base member 74 which, in turn, is bolted to the upper ends of two vertical studs 75, the bolt holes in the base member 74 being elongated fore and aft to permit a slight horizontal adjustment of the uprights 29 relative to the hooks 30. The studs 75 are slidably mounted in vertical holes in the carriage 37, as shown in Figure 6, and the front face of each of the studs 75 is formed into a rack which is engaged by a pinion 76 carried by a shaft 77 journaled in the rear carriage 37. The shaft 77 extends out through a slot 78 in one end of the case 12, the slot permitting the shaft to move backward and forward with the carriage 37, and carries a knurled knob 79 by means of which it may be adjusted. Suitable means are provided for holding the shaft 77 in any desired adjusted position, these means, for example, comprising a lock nut 80 threaded on the shaft 77 and bearing against the end of a sleeve 81 carried by the shaft 77 and having its other end bearing against one end of the carriage 37.

Certain accessories, which are not necessary to the operation of the machine, materially facilitate its use. The first of these is employed when the book to be bound is to have what is known as a "dual binding." The "dual binding" consists of two separate binding elements placed on the back of the book, one near the top and one near the bottom, leaving a space between them, and is used when it is desired to have a binding costing less than a full length binding or when it is desired to have the central portions of the inner edges of the pages free of the rings of the binding. In placing the two binding elements upon a book to form a "dual binding," it is desirable to place the two elements simultaneously in one operation of the machine. In order to do this, it is necessary that the two binding elements be located in the machine at the proper distance apart before they are opened for the insertion of the leaves of the book.

To facilitate the correct spacing of the two binding elements, I have provided adjustable pointers or guides 82 which are clipped upon the front edge of the rear portion 16 of the top plate of the machine. The ends of the pointers 82 under the top plate 16 have small projections which fit into a groove in the underside of the top plate 16, holding the pointers on the plate and permitting them to be slid laterally of the machine to positions in which they indicate the proper location of the ends of the binding elements which are inserted to form a "dual binding." This permits the operator, in binding a number of similar books with "dual binding,"

to readily place the binding in the proper position in the machine without any loss of time.

Another accessory which has been found to be of considerable utility is a device, shown in Figures 1 and 2, for tightening the rings of the binding after they have been spread open and allowed to close through the holes in the sheets of the book by the machine. This device comprises a V-shaped trough formed by sloping front and rear side walls 83 and 84 fixed to a base 85 secured to the rear portion 16 of the top plate of the machine. A shelf 86 is fixed in back of the trough 83, 84 and may be used to keep a supply of the bindings to be inserted.

After each book is bound, there is a slight tendency for the rings of the binding to fail to return entirely to their original shape. To overcome this difficulty, the bound book is placed upright in the trough 83, 84, with the binding element wedged in the trough by the weight of the book itself. Each book is left in this position while the next book is being bound, and during this short interval of time the rings are forced back to their original shape.

From the above, it will be seen that I have provided a machine for opening plastic bindings which is readily adjustable for use with different sizes of bindings. The vertical distances between the ends 34 of the ring-engaging hooks 30, the front top plate 17, and the backbone holding hooks 31 may be separately and individually adjusted by the means which I have described above. The distance between the two carriages 36 and 37 can also be adjusted by means of the stop screws 66, so that each binding, no matter what its size, will be opened the correct distance.

It will also be seen that I have provided a means for holding the fingers of the bindings against lateral deflection while they are being opened and while the pages are being placed upon them. This means comprises the shoulders 28 formed in the front top plate 17 and against which the edges of the fingers or rings 33 of the binding are held by the hooks 30 when the binding is opened.

It will, of course, be understood that numerous details of construction may be varied through a wide range without departing from the principles of this 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 besides 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 31 for engaging the backbone, to enable it to be used with other forms of bindings than the one for which it was 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. In a machine for opening plastic bindings having a plurality of resilient fingers curved to form rings, means for holding the binding, means for uncurling said fingers, and a plurality of parallel shoulders having the same spacing as said rings and adapted to engage the edges of said rings simultaneously, said shoulders thereby providing

a guide surface for each finger as said fingers are opened to hold said fingers against lateral deflection.

2. In a machine for opening plastic bindings having a plurality of resilient fingers curved to form rings, means for holding the binding, means for uncurling the fingers thereof, and a member having a plurality of spaced surfaces perpendicular to the axis of said binding as said binding is held in said machine, said surfaces having the same spacing as the fingers of the binding to be opened and against which said fingers bear as they are uncurred, thereby to hold said fingers against lateral deflection.

3. In a machine for opening a binding having rings formed of resilient curved fingers extending from an edge of a longitudinally extending backbone, means for holding said binding near said backbone, means for engaging said rings on the inside thereof, means for moving said first and second means apart and thereby opening said rings, and means for engaging the lateral edges of said rings during said opening operation and thereby preventing lateral deflection thereof.

4. In a machine for opening a binding having rings formed of resilient curved fingers extending from an edge of a longitudinally extending backbone, means for holding said binding near said backbone, means for engaging said rings on the inside thereof, means for moving said first and second means apart and thereby opening said rings, and a stationary member having portions projecting between said rings and engaging the lateral edges thereof during said opening operation for preventing lateral deflection thereof.

5. In a machine for opening a binding having rings formed of resilient curved fingers extending from an edge of a longitudinally extending backbone, a support means mounted on said support for holding said binding near said backbone, a plurality of hooks mounted on said support for engaging said rings on the inside thereof, means for moving said backbone-engaging means and said hooks apart, and thereby opening said rings, and a member on said support having portions projecting between said hooks and adapted to engage the lateral edges of said rings during said opening operation for preventing lateral deflection thereof.

6. In a machine for opening plastic bindings having a plurality of resilient fingers extending from one edge of a longitudinal backbone and curved to form rings, means for supporting and holding said backbone, means for interiorly engaging said rings, means for moving said backbone supporting and holding means and said ring-engaging means apart horizontally, means for engaging the underside of and supporting said rings, and means for moving said backbone supporting and holding means vertically relative to said ring-supporting means.

7. In a machine for opening plastic bindings having a plurality of resilient fingers extending from one edge of a longitudinal backbone and curved to form rings, means for supporting and holding said backbone, means for interiorly engaging said rings, means for moving said backbone supporting and holding means and said ring-engaging means apart horizontally, means for engaging the underside of and supporting said rings, and means for moving said backbone supporting and holding means vertically relative to said ring-engaging means.

8. In a machine for opening plastic bindings having a plurality of resilient fingers extending

from one edge of a longitudinal backbone and curved to form rings, a stationary frame means mounted on said frame for holding said backbone, means mounted on said frame for interiorly engaging said rings, means for moving said backbone-holding means and said ring-engaging means apart horizontally, means mounted on said frame for engaging the underside of and supporting said rings, and means for moving said ring-supporting means vertically relative to said frame.

9. In a machine for opening plastic bindings having a plurality of resilient fingers extending from one edge of a longitudinal backbone and curved to form rings, a stationary frame means mounted on said frame for supporting and holding said backbone, means for interiorly engaging said rings, means for moving said backbone supporting and holding means and said ring-engaging means apart horizontally, means mounted on said frame for engaging the underside of and supporting said rings, and independent means for adjusting the height of said backbone supporting and holding means and said ring-supporting means relative to said frame.

10. In a machine for opening plastic bindings having a plurality of resilient fingers extending from one edge of a longitudinal backbone and curved to form rings, a stationary frame means mounted on said frame for holding said backbone, means mounted on said frame for interiorly engaging said rings, means for moving said backbone-holding means and said ring-engaging means apart horizontally, and means for vertically adjusting the position of said backbone-holding means relative to said frame.

11. In a machine for opening plastic bindings having a plurality of resilient fingers extending from one edge of a longitudinal backbone and curved to form rings, means for holding said binding near said backbone, fingers adapted to project between said rings and having ends formed to project into said rings, means for adjusting said holding means and said fingers relative to each other, and means separate from said adjusting means for successively moving said fingers so that said ends move into said rings and for causing said holding means and said fingers to move apart.

12. In a machine for opening plastic bindings having a plurality of resilient fingers extending from one edge of a longitudinal backbone and curved to form rings, means for holding said binding near said backbone and preventing said backbone from moving laterally or longitudinally, fingers adapted to project between said rings and having ends formed to project into said rings, means for adjusting said fingers and said backbone-holding means relative to each other, and means separate from said adjusting means for successively moving said fingers so that said ends move into said rings and for moving said backbone-holding means and said fingers apart.

13. In a machine for opening plastic bindings having a plurality of resilient fingers extending from one edge of a longitudinal backbone and curved to form rings, a plate, means for holding said backbone above said plate, means for adjusting the distance between said holding means and said plate, and means for engaging and uncurling the rings of said binding on said plate.

14. In a machine for opening plastic bindings having a plurality of resilient fingers extending from one edge of a longitudinal backbone and curved to form rings, a plurality of members

spaced to project between said rings and constructed to hold said backbone, a plurality of hooks having aligned laterally extending terminal portions located in front of said backbone-holding members, means for moving said hooks laterally for engaging said terminal portions in said rings, means for moving said backbone-holding members and said hooks apart for opening said rings, and a ring-supporting member having projections extending between said hooks, the upper surface of the portions of said projections lying directly below the paths of said hook terminal portions being lower than the upper surface of the adjacent portions of said projections.

15. In a machine for opening plastic bindings having a plurality of resilient fingers extending from one edge of a longitudinal backbone and curved to form rings, a plurality of members spaced to project between said rings and constructed to hold said backbone, a plurality of hooks having aligned laterally extending terminal portions located in front of said backbone holding members, means for moving said hooks laterally for engaging said terminal portions in said rings, means for moving said backbone holding members and said hooks apart parallel to the planes of said rings for opening said rings, and a ring-supporting member having projections extending between said hooks, said projections having shoulders on their upper surfaces, said shoulders extending parallel to the planes of said rings and facing in the direction opposite to the direction of lateral engaging movement of said hooks.

16. In a machine for opening plastic bindings, a frame, a hook mounted on said frame for engaging and holding the backbone of the binding,

and a second hook for directly engaging and hooking over a ring of the binding, said second hook lying beneath said first hook and being horizontally and vertically movable to spread said ring open, and means for moving said second hook.

17. In a machine for opening plastic bindings having a plurality of resilient fingers curved to form rings, means for holding the binding, means for uncurling said fingers, and a working plate the top of which is above the level of the bottom of the binding held in said holding means, said plate having a plurality of parallel grooves formed therein having the same center to center spacing as that of the rings and located adjacent the uncurred fingers, the uncurred fingers lying in said grooves, corresponding edges of the grooves forming a plurality of parallel shoulders having the same spacing as the rings and adapted to engage the edges of the rings simultaneously, said shoulders thereby providing a guide surface for each finger as said fingers are opened to hold said fingers against lateral deflection.

18. In a machine for opening plastic bindings having a plurality of resilient fingers curved to form rings, means for holding the binding, means for uncurling said fingers, and a working plate providing surfaces upon which the fingers are uncurred, said plate having a plurality of ridges between adjacent fingers forming a plurality of parallel shoulders having the same spacing as said rings and adapted to engage the edges of said rings simultaneously, said shoulders thereby providing a guide surface for each finger as said fingers are opened to hold said fingers against lateral deflection.

CHARLES EDWARD EMMER.