Dec. 8, 1942. C. E. EMMER 2,304,630

PLASTIC BINDING MACHINE

Filed Nov. 18, 1939 3 Sheets-Sheet 1

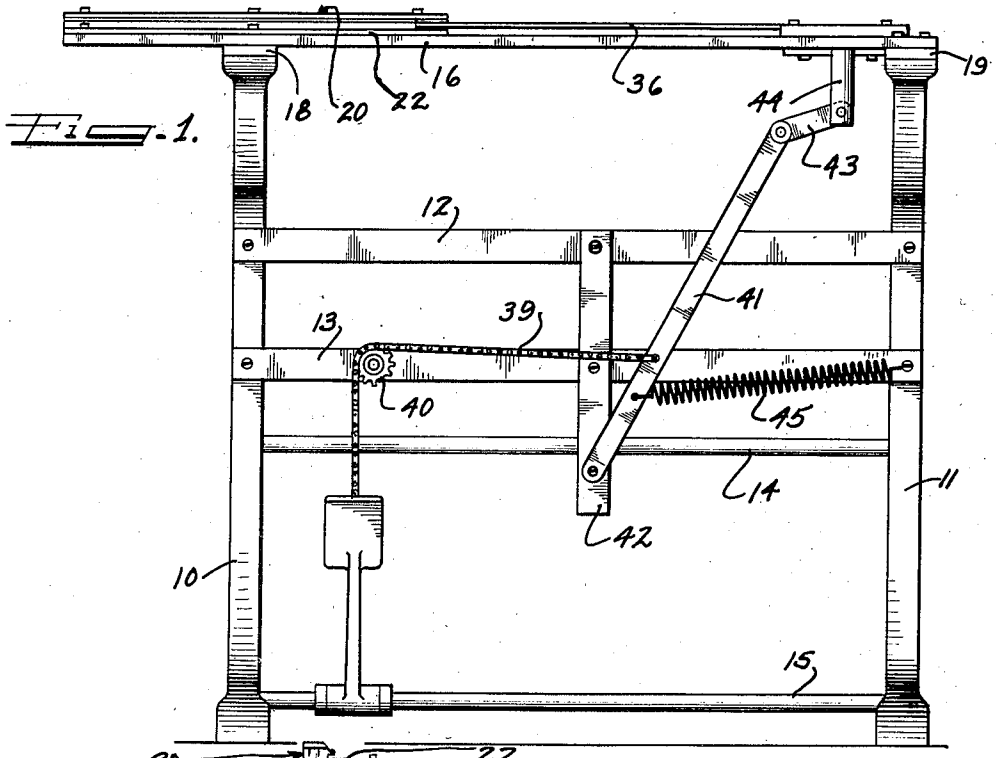


Fig. 1.

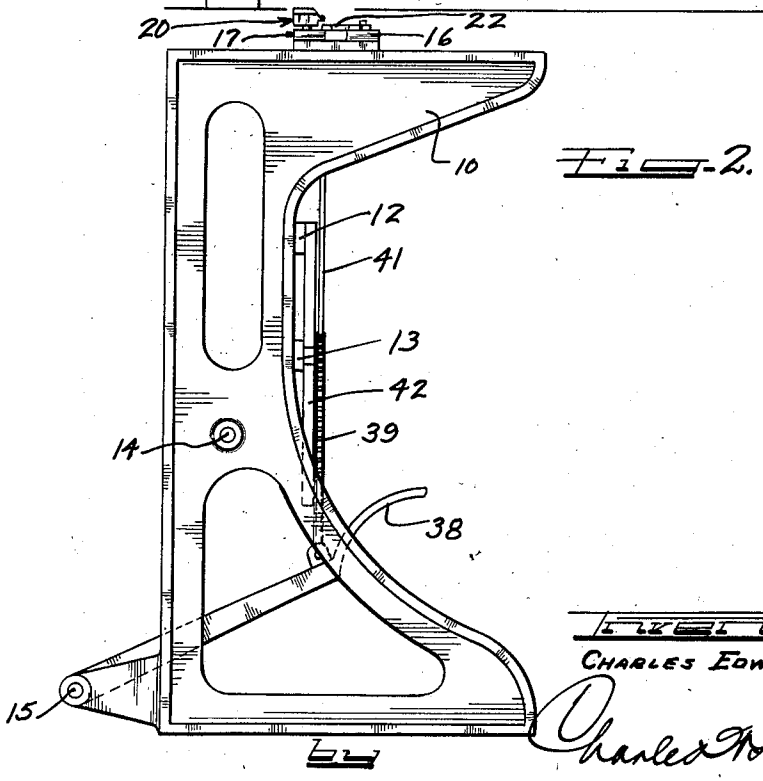


Fig. 2.

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Attorney.

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PLASTIC BINDING MACHINE

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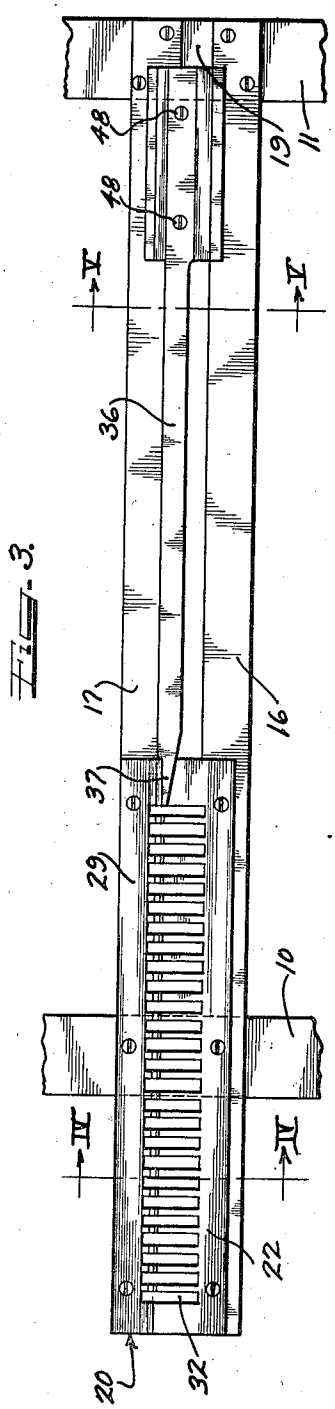


Fig. 3.

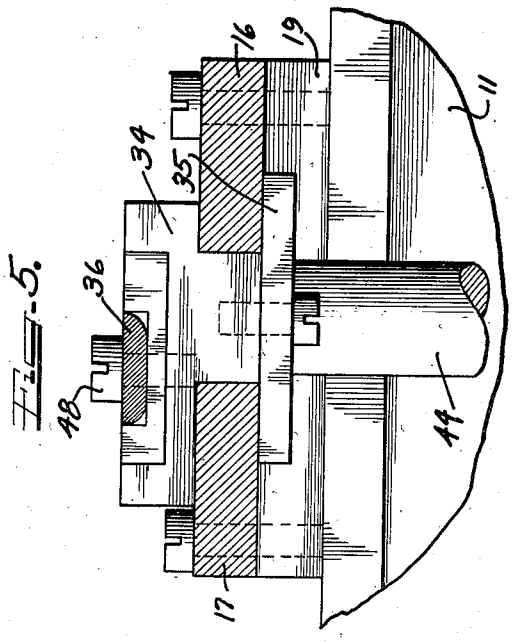


Fig. 5.

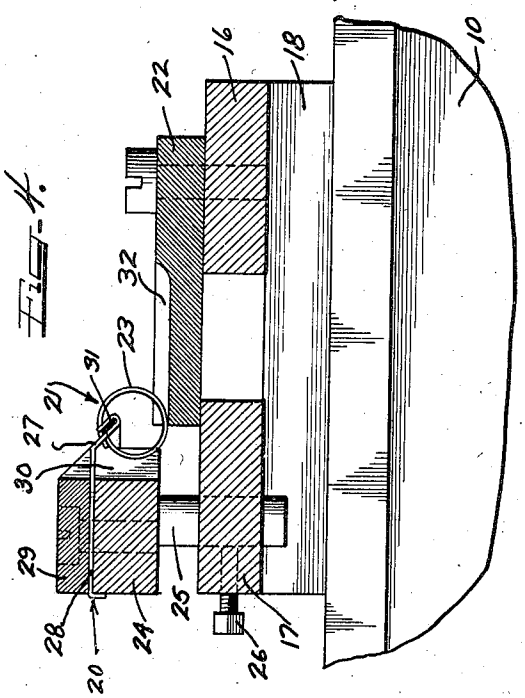


Fig. 4.

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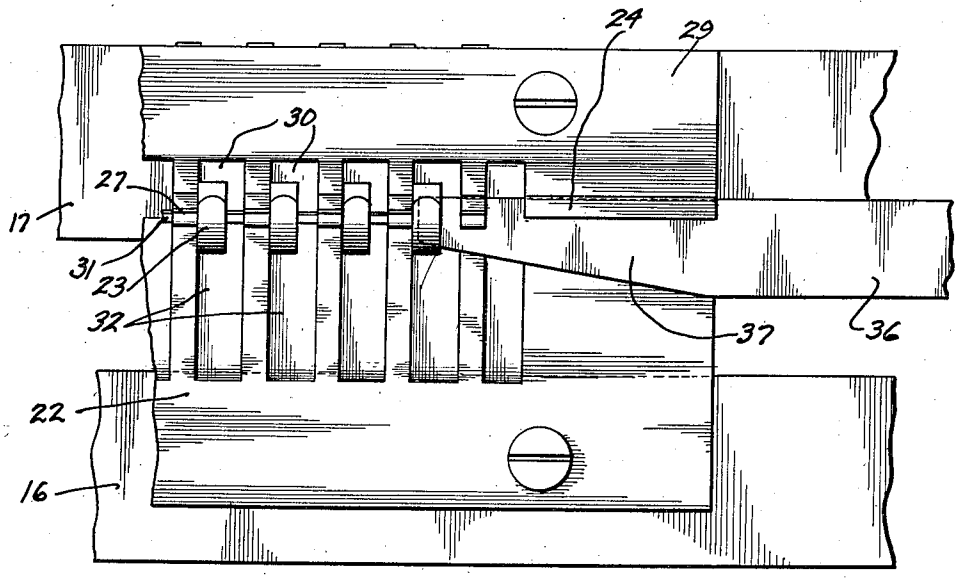
by Charles O. Gill Attys.

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Fig. 6.



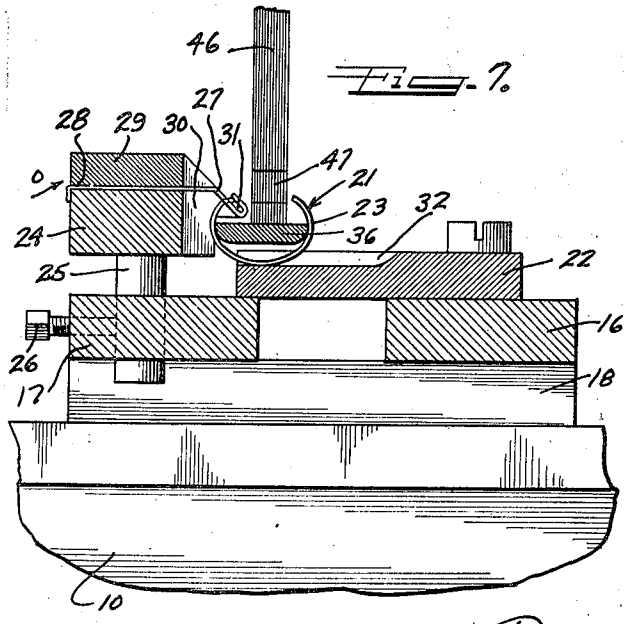


Fig. 7.

Inventor

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Patented Dec. 8, 1942 2,304,630

UNITED STATES PATENT OFFICE

2,304,630

PLASTIC BINDING MACHINE

Charles Edward Emmer, Chicago, Ill., assignor to General Binding Corporation, Chicago, Ill., a corporation of Illinois

Application November 18, 1939, Serial No. 305,096

9 Claims. (Cl. 11—1)

This invention relates to plastic bindings, such as are disclosed in the United States Patent No. 1,970,285 to Douvry, issued August 14, 1934, and in my copending United States patent application, Serial No. 227,242 entitled "Plastic binding," and filed on August 29, 1938, and has for its principal object to provide a simple machine for opening bindings of this character to allow the pages to be bound to be inserted in the binding.

Another object of this invention is to provide a machine for spreading open the rings of plastic bindings and for allowing the rings to curve back into their closed form one at a time so that, when a binding is being inserted into a group of sheets, the sheets may be manipulated so as to guide the end of each ring into its aperture in the sheets.

Another object of this invention is to provide a means for holding the rings of a plastic binding at exactly the correct spacing from each other when they are being inserted into the perforations in a group of sheets to be bound so that each ring will readily enter the proper perforation.

Another object of the present invention is to provide a machine for the purpose described above which shall be extremely simple in its construction and therefore low in cost and which shall be rugged and reliable in use.

One of the principal features of the present invention is the provision of a mandrel having a tapered end and a parallel sided body portion which is adapted to be forced through the rings of a plastic binding and to expand them to an open position.

Another feature of the present invention is the provision of means adapted to engage the sides of the separate rings of the plastic binding to hold the rings in line while they are being opened so that they will be correctly spaced when the leaves or sheets to be bound are placed upon the rings.

Still another feature of the present invention is the provision of a guide or slide for holding the mandrel in line with the rings of the plastic binding so that it may readily enter them.

Other objects and features of the present invention are set forth with greater particularity in the following description and the accompanying drawings, in which:

Figure 1 is a front elevation of one of the preferred forms of the invention;

Figure 2 is an end elevation of the machine shown in Figure 1;

Figure 3 is a plan view, on an enlarged scale of the essential portion of the machine;

Figure 4 is a cross-sectional view taken on the line IV—IV of Figure 3 and looking in the direction of the arrows;

Figure 5 is a cross-sectional view taken on the line V—V of Figure 3 and looking in the direction of the arrows;

Figure 6 is a plan view of a portion of the machine;

Figure 7 is a cross section similar to Figure 4 but showing the mandrel in operative relation to a binding;

The form of the invention illustrated in Figures 1 to 7 comprises a pair of standards 10 and 11 connected together by stringers 12 and 13 and tie rods 14 and 15. The top of the standards 10 and 11 carry a pair of guide rails 16 and 17 mounted upon spacer blocks 18 and 19.

At one end of the machine, the rear guide rail 17 carries a holder 20 for a plastic binding 21 and the front guide rail 16 carries a device 22 for maintaining the spacing of the rings 23 of the binding 21. The holder 20 comprises a base 24 fixed to studs 25 vertically slidable in holes in the rear guide rail 17. Setscrews 26 are provided in the guide rail 17 for gripping the studs 25 and holding the binding holder 20 at any desired height above the guide rail. A plurality of hooks 27 formed of flat strips of metal bent to the shape shown in Figure 4 are mounted on top of the base 24 with their stem portions 28 extending under and clamped by a cover plate 29. The front edges of the base 24 of the holder and the cover plate 29 are notched out between the hooks 27 so that the rings 23 of a binding 21 whose backbone 31 is held by the hooks 27 can extend in back of the hooks.

The ring spacer 22 is formed of a metal plate having a plurality of transverse grooves cut into its upper surface and extending out to the edge adjacent the binding holder 20. Both the grooves 32 in the ring spacer 22 and the notches 30 between the hooks 27 of the binding holder 20 are made with the same spacing as the rings 23 of the binding, and the sides of the grooves 32 are in line with the sides of the notches 30, as shown in Figure 6, so that the edges of the rings 23 of the binding may bear simultaneously against the sides of the grooves 32 and notches 30 without any distortion of the rings. This will hold the rings straight when any lateral force is applied to them. The guide rails 16 and 17 carry a slide 34 movable along the guide rails and prevented from coming off of the rails by a

keeper 35 secured to its underside and extending under the guide rails. The slide 34 carries a mandrel or sword 36 which extends parallel to the guide rails 16 and 17 and is located so as to pass under the hooks 27 on the binding holder 20 and above the ring spacing plate 22, as shown in Figure 7. The free end 37 of the mandrel 36 is pointed, as shown in Figures 3 and 6, so that it may readily enter the rings 23 of the binding, and the body of the mandrel 36 is parallel sided and is wide enough to spread open the rings 23 of the binding as shown in Figure 7.

The slide 34 and the mandrel 36 are caused to slide from one end of the machine to the other by a foot pedal 38 journaled upon the lower frame tie rod 15, as shown in Figures 1 and 2. The pedal 38 is connected to a chain 39 which travels over a pulley or sprocket 40 mounted upon the stringer 13 and which is connected to a lever 41. The lever 41 is fulcrumed upon a bracket 42 on the frame and extends up to near the guide rails 16 and 17 where its upper end is connected by a link 43 to a depending stud 44 on the slide 34. A spring 45 acts upon the lever 41 to swing it over to one side and resiliently hold the mandrel 36 withdrawn from the position in which it engages the binding 21.

The operation of the machine is as follows:

A binding 21 is placed in the machine as shown in Figure 4 with its backbone 31 inserted into the hooks 27 on the binding holder 20. The holder 20 is then adjusted vertically for the particular size of binding so that the rings 23 of the binding rest slightly in the grooves 32 of the ring spacer 22. A mandrel or bayonet 36 of the proper width is then secured to the slide 34 by the screws 48, the machine being provided with a plurality of interchangeable bayonets 36 for use with bindings having rings of different sizes.

The operator then depresses the pedal 38 which swings the lever 41 to the left, in Figure 1, and moves the slide 34 to the left on the guide rails 16 and 17. The mandrel 36 carried by the slide 34 thereupon enters the rings 23 of the binding 21, and the tapered end 37 of the mandrel spreads the rings apart as shown in Figure 7. During this operation, the sides of the grooves 32 in the ring spacer 22 prevent the rings 23 of the binding from being pushed over to the side by the mandrel 36.

The group of pages or leaves 46 to be bound is then taken and placed on edge on top of the mandrel 36 with the holes or apertures 47 in the pages opposite the ends of the individual rings 23 of the binding, as shown in Figure 7. The pedal 38 is then allowed to rise slowly, this movement being caused by the spring 45, and each ring 23 of the binding closes upon itself through the holes 47 in the sheets 46 as the mandrel 36 is withdrawn from it.

After the mandrel 36 is withdrawn from the entire binding 21, the binding, together with the pages 46 which are now secured together by the binding, may be removed from the machine by merely being slid out of the hooks 27, and the machine is ready to bind another book.

While I have shown only one embodiment of my invention, it will of course be understood that the machine which I have illustrated and described in this specification and the accompanying drawings embodies features which are useful, not only in combination, but also individually. For example, the ring spacer 22 may be used in other forms of machines for opening plastic bindings, such as are shown in U. S. Patent No. 2,108,136 issued to Nelson et al. on February 15, 1938, or in my copending application entitled "Machine for applying plastic bindings and the like," Serial No. 226,032, filed on August 22, 1938. The ring spacer 22 may be made with slots cut through its entire thickness instead of with grooves as shown, and it may then be possible to eliminate the vertical adjustment of the binding holder 20. It is also to be understood that the term "plastic binding," as used in this specification is not to be limited to bindings made of plastic material but includes any other binding of the same type made of other materials such, as for example, resilient metal, this term being used in the specification and claims because it is the term by which bindings of this general type are known in the trade. My invention, therefore, is not to be limited to the exact structure which I have shown but includes anything falling within the terms of the accompanying claims, these terms being, of course, given the broadest meaning which they will reasonably support.

I claim as follows:

1. A machine for opening a plastic binding, comprising means for holding said binding against longitudinal movement, and a mandrel longitudinally movable relative to said means along a path passing through the rings of a plastic binding held in said means, said mandrel having a tapered portion adapted to enter and open said rings.

2. A machine for opening a plastic binding formed of a longitudinal backbone and a plurality of fingers extending from an edge of said backbone and curling around to form rings, said machine comprising means for holding said binding against longitudinal movement, a mandrel having an end small enough to enter said rings and having a body portion large enough to spread said rings open, and means for moving said mandrel into the rings of a binding held by said holding means.

3. A machine for opening a plastic binding formed of a longitudinal backbone and a plurality of fingers extending from an edge of said backbone and curling around to form rings, said machine comprising hooks adapted to hold said backbone between said fingers, a mandrel having an end small enough to enter said rings and having a body portion large enough to spread said rings open, and means for moving said mandrel into the rings of a binding held by said holding means.

4. A machine for opening a plastic binding formed of a longitudinal backbone and a plurality of fingers extending from an edge of said backbone and curling around to form rings, said machine comprising means for holding said binding against longitudinal movement, a mandrel having an end small enough to enter said rings and having a body portion large enough to spread said rings open, a guideway extending parallel to the position of the backbone of a binding held by said holding means, and a slide on said guideway, said slide having said mandrel affixed thereto in alignment with the position of the rings of a binding held by said holding means.

5. A machine for opening a plastic binding formed of a longitudinal backbone and a plurality of fingers extending from an edge of said backbone and curling around to form rings, said machine comprising a row of hooks adapted to engage said backbone between said fingers, a guideway parallel to said row of hooks, a slide movable on said guideway, and a mandrel fixed

to said slide, said mandrel having an end small enough to enter said rings and having a body portion large enough to spread said rings open, said end of said mandrel being aligned with the position of the rings of a binding supported by said hooks.

6. A machine for opening a plastic binding formed of a longitudinal backbone and a plurality of fingers extending from an edge of said backbone and curling around to form rings, said machine comprising means for engaging and holding each ring of said binding against movement longitudinally of said binding, a mandrel having an end small enough to enter said rings and having a body portion large enough to spread said rings open, and means for moving said mandrel into the rings of a binding held by said holding means.

7. A machine for opening a plastic binding formed of a longitudinal backbone and a plurality of fingers extending from an edge of said backbone and curling around to form rings, said machine comprising a row of hooks adapted to engage said backbone between said fingers, additional means adapted to engage the edges of said rings and to prevent displacement thereof longitudinally of said binding, a mandrel having an end small enough to enter said rings and having a body portion large enough to spread said rings open, and means for moving said mandrel into the rings of a binding held by said holding means.

8. A machine for opening a plastic binding formed of a longitudinal backbone and a plurality of fingers extending from an edge of said backbone and curling around to form rings, said machine comprising means for engaging and holding each ring of said binding against movement longitudinally of said binding, a slide movable longitudinally of said binding, and a removable and replaceable mandrel carried by said slide and having an end small enough to enter said rings and a body portion large enough to spread said rings open, the removability of said mandrel permitting the employment of mandrels of different sizes for opening bindings having rings of different sizes.

9. A machine for opening a plastic binding formed of a longitudinal backbone and a plurality of fingers extending from an edge of said backbone and curling around to form rings, said machine comprising means for holding said binding near said backbone, means for engaging each of the rings of a binding so held on the inner sides thereof at a point remote from said backbone and for spreading said rings open, a working plate upon which said rings are unrolled including means for engaging each of said rings on the side thereof at a point remote from said backbone for preventing lateral bending of said rings, said holding means and said last mentioned engaging means being relatively movable at right angles to each other thereby to position said holding means at preselected distances above said working plate.

CHARLES EDWARD EMMER.