Dec. 5, 1950 A. FREUNDLICH 2,532,443

BOOK BINDING MACHINE

Filed Feb. 19, 1947 4 Sheets-Sheet 1

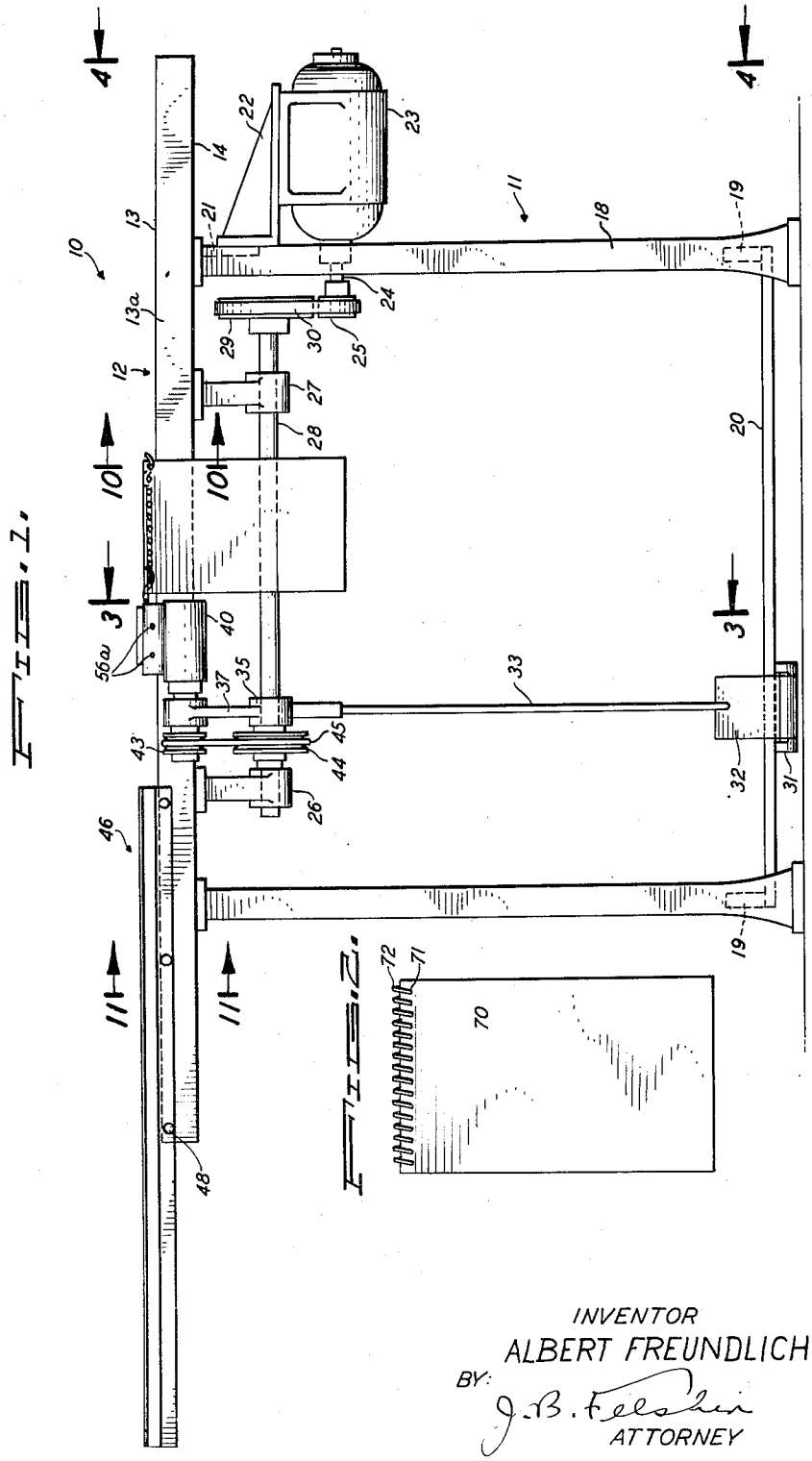


FIG. 1.

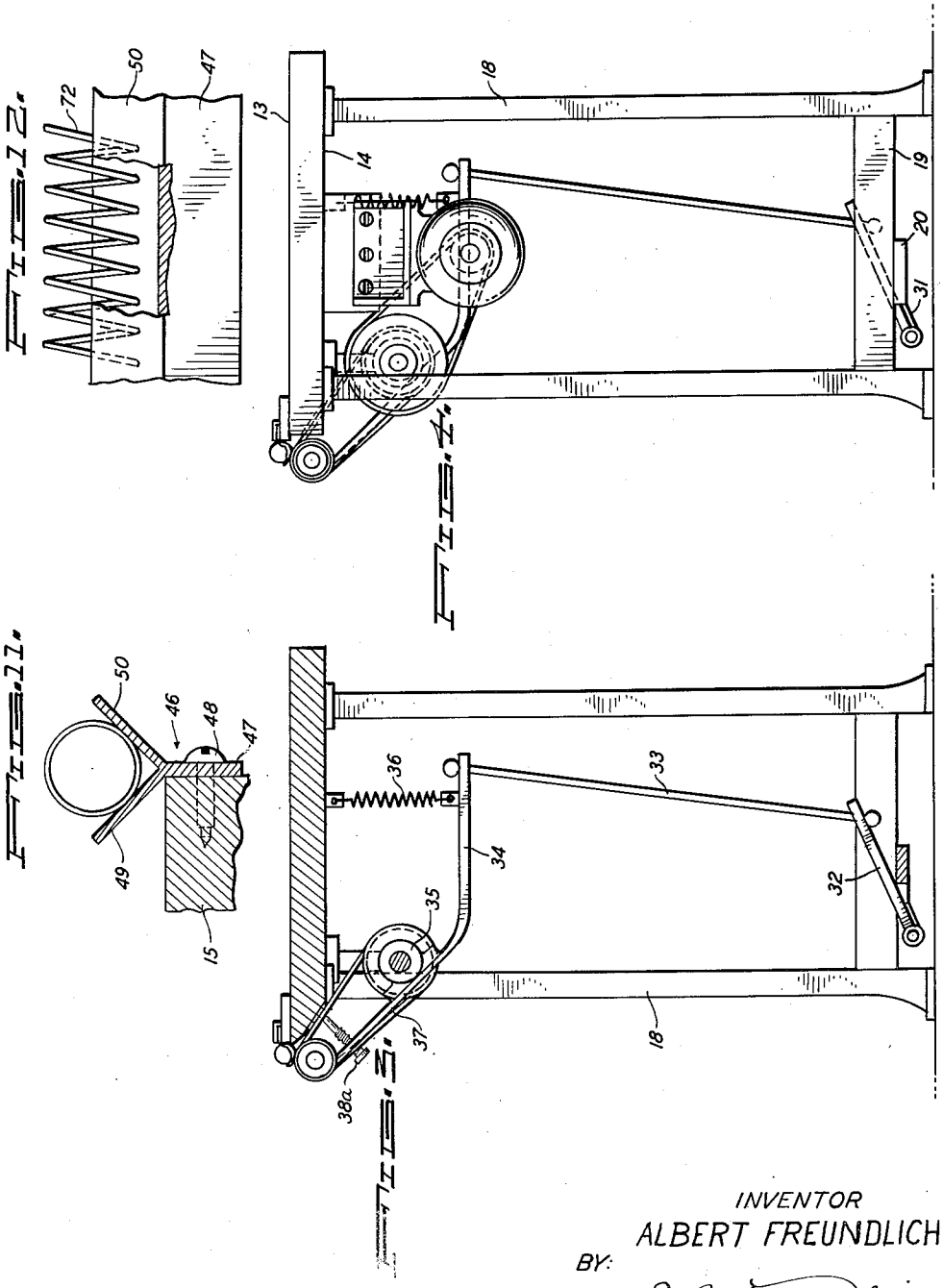
FIG. 2.

INVENTOR
ALBERT FREUNDLICH
BY: J. B. Felsher
ATTORNEY

Dec. 5, 1950 A. FREUNDLICH 2,532,443

BOOK BINDING MACHINE

Filed Feb. 19, 1947 4 Sheets-Sheet 2



INVENTOR
ALBERT FREUNDLICH

BY: J. B. Felsher
ATTORNEY

Dec. 5, 1950 A. FREUNDLICH 2,532,443

BOOK BINDING MACHINE

Filed Feb. 19, 1947 4 Sheets-Sheet 3

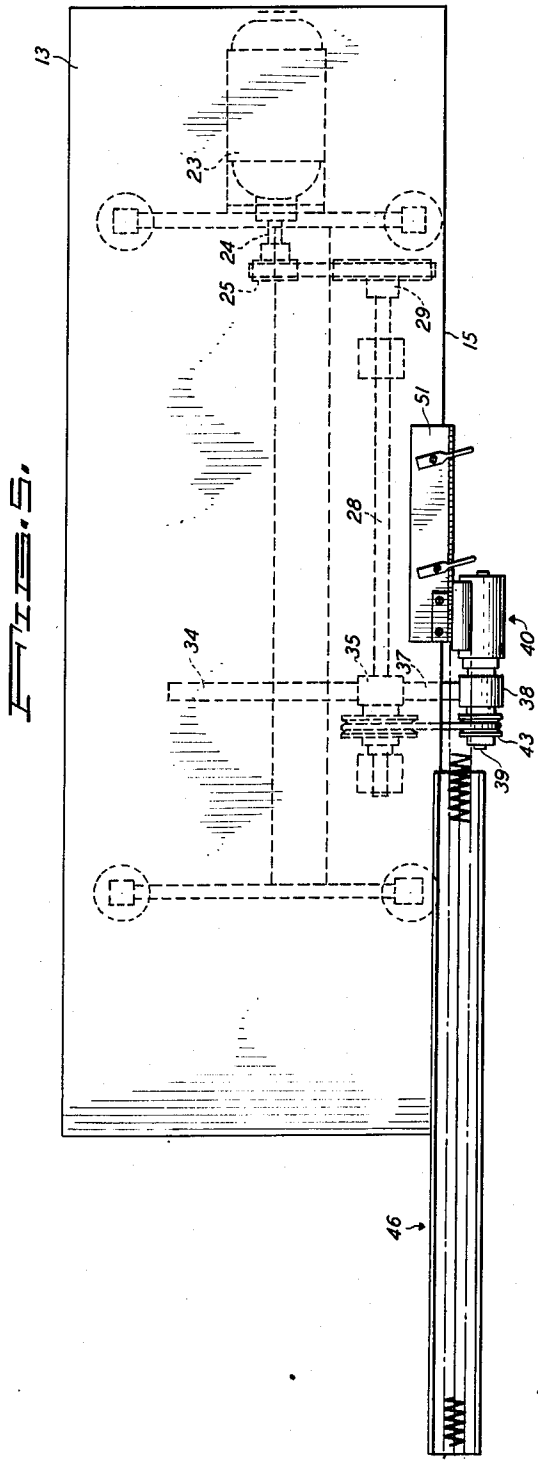


FIG. 5.

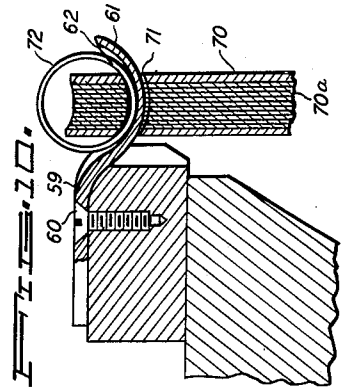


FIG. 10.

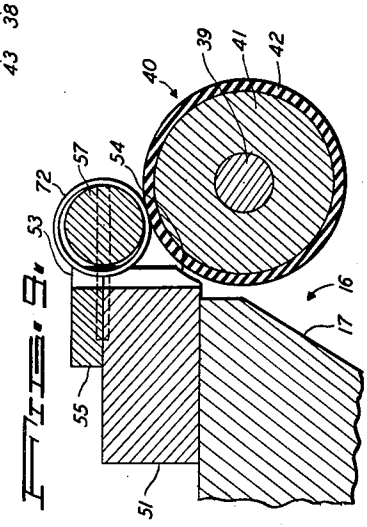


FIG. 9.

INVENTOR
ALBERT FREUNDLICH
BY: J. B. Feeley
ATTORNEY

Dec. 5, 1950 A. FREUNDLICH 2,532,443

BOOK BINDING MACHINE

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FIG. 6.

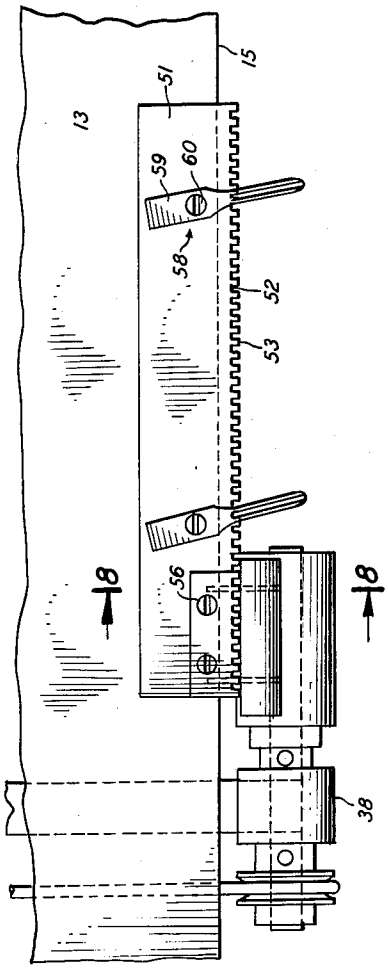


FIG. 7.

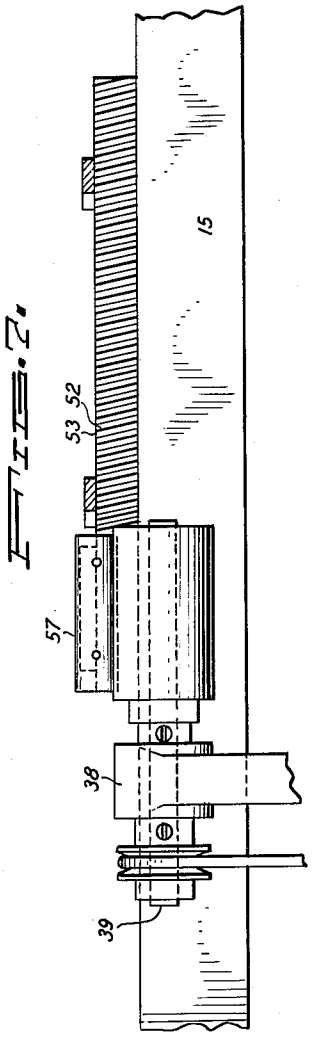
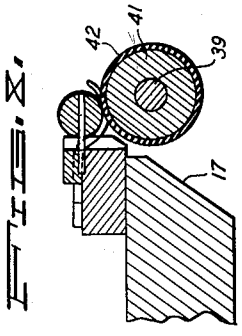


FIG. 8.



INVENTOR
ALBERT FREUNDLICH
BY:
J. B. Felsher
ATTORNEY

Patented Dec. 5, 1950 2,532,443

UNITED STATES PATENT OFFICE

2,532,443

BOOKBINDING MACHINE

Albert Freundlich, Bronx, N. Y., assignor to Nu-Plast Binding Co. Inc., Flushing, N. Y.

Application February 19, 1947, Serial No. 729,633

17 Claims. (Cl. 11—1)

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This invention relates to a machine and method for making book construction, particularly of the type in which a plurality of sheets are loosely bound together by means of a helical or spirally shaped binder which passes through a row of registering openings forming a row of passages through a margin of the superposed sheets.

In previous devices used for binding books of the character described, the perforated sheets are in a horizontal position at the time the helical binder is to be introduced into the perforations. It is necessary to shift the sheets so that the rows of perforations in the sheets will define arcuate passageways for the binder, and further, to secure the sheets in this position. This has involved the use of guides, clamps and various movable means which are automatically operated. Accordingly, it is an object of this invention to provide a device for binding a plurality of marginally perforated sheets with a helical binder wherein the sheets are positioned vertically in a manner to properly arrange the sheets for the introduction of the helical binder into the perforations of the sheets without the use of movable guides, clamps and the like.

Another object of this invention is to provide in a device of the character described, means for supporting a plurality of marginally perforated sheets wherein the supporting means is fixed and is further designed to so position the sheets that the perforations in the sheets will define an arcuate passageway for the reception of a binder fed towards the supported sheets.

Still another object of this invention is to provide in a device of the character described, means for frictionally feeding or threading a spiral binder into engaging relationship with a plurality of marginally perforated sheets positioned to receive said binder, wherein the feeding operation may become ineffective in the event that the binder jams or an obstruction in the perforations in the sheets, is encountered.

Yet another object of this invention is to provide in a device of the character described, means for suspending and positioning a plurality of marginally perforated sheets in a vertical position, the said positioning means having curved hooklike portions which permit the perforations in the sheets to define an arcuate passageway, the positioning means further functioning as a guide means for a spiral binder which is introduced into said passageways.

A further object of this invention is to provide in a device of the character described, the combination of a fixed guide means for an advancing

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sprial binder and means adjacent said guide for effecting the advance of said spiral binder longitudinally of said guide.

Other objects of this invention will in part be obvious, and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the following claims.

In the accompanying drawing, in which is shown various possible illustrative embodiments of this invention,

Fig. 1 is a front elevational view of the binding machine embodying the invention;

Fig. 2 is a top plan view of the book binder construction resulting from the operation of the machine shown in Fig. 1;

Fig. 3 is a cross sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a cross sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a top plan view of the machine shown in Fig. 1;

Fig. 6 is a detailed plan view of the binder feeding means, guide and sheet supporting means of the machine shown in Fig. 1;

Fig. 7 is a front elevational view of the details shown in Fig. 6;

Fig. 8 is a cross sectional view taken on the line 8—8 of Fig. 6;

Fig. 9 is a cross sectional view of the details of the spiral binder guide and the binder feeding means in feeding contact with the guide;

Fig. 10 is a cross sectional view taken on the line 10—10 at Fig. 1;

Fig. 11 is a cross sectional view taken on the line 11—11 of Fig. 1; and

Fig. 12 is a front elevational view, broken away in part, of the spiral binder support shown in Fig. 11.

Referring now in detail to the drawing, 10 designates the device embodying the invention. The same comprises a table 11 which includes a top member 12 of rectangular shape comprising an upper surface 13, a lower surface 14, and a front edge 15. A centrally located portion of the edge 15 is formed with a longitudinally extending notch 16 which includes a rearwardly inclined back wall 17, for the purpose hereinafter described. The top member 12 is supported at a proper height by legs 18, which are interconnected at their lower portions by side braces 19. The mid portions of the braces 19 are intercon-

nected by an elongated member 20 which extends parallel to the top member 12.

Secured to the lower surface 14 of the top member 12 at the right hand end thereof, looking at Fig. 1, is a downwardly extending bracket 21. Secured to the bracket 21 and extending outwardly thereof is a right angle motor mounting bracket 22 on which is mounted a motor 23 with its armature shaft 24 extending parallel to the length of the top member 12, and having secured thereto a pulley 25. A pair of spaced, similar, aligned bearing brackets 26, 27 are also secured to the lower surface 14 of the top member adjacent the front edge 15. Journaled in the bearing brackets 26, 27 is a rotatable shaft 28, the right hand end of which extends beyond bracket 27 and has secured thereto a pulley 29. The pulley 29 is in alignment with the pulley 25 and is interconnected thereto by means of a belt 30.

Secured to the elongated member 20 is a bracket 31 to which is hingedly or pivotally secured a treadle member 32. Extending upwardly from the treadle member 32 is a link 33 which is connected to the rear end of a forwardly extending arm 34, the other end of which extends upwardly and outwardly to a bracket 35 which is journaled for pivotal movement on shaft 28. A spring 36 has one end thereof secured to the undersurface 14 of the top member 12 and the other end is secured to a rear portion of arm 34. The bearing bracket 35 further comprises a forwardly and upwardly extending arm 37 to which is secured a bearing bracket 38. The bearing bracket 38 lies adjacent the front edge 15 of the top member 12, and is further provided with a stop screw 38a which extends through the arm 37 and bears against the inclined wall 17, for the purpose hereinafter described. A rotatable shaft 39 is journaled in the bearing bracket 38 and has secured to a portion projecting on one side thereof a roller member 40. The roller member 40 comprises a core 41 and an outer surface 42 of rubber or the like. The portion of shaft 39 projecting on the other side of the bracket 38 has secured thereto a pulley 43. A pulley 44 is secured to shaft 28 in alignment with pulley 43 and is interconnected thereto by a belt 45. It will be apparent from a consideration of Figs. 1 and 5, that the motor 23 imparts rotary movement to shaft 28 by means of pulleys 25, 26, which in turn imparts rotation to roller member 40 by means of pulleys 43, 44. The roller member 40 may also be moved to and from a position adjacent the front edge 15 of the top member 12, by the use of the treadle member 32.

On the front edge 15 of the top member 12 there is secured an elongated trough shaped member 46. The member 46 comprises an upwardly extending wall 47 which contacts the front edge 15 of the top member and is secured thereto by means of screws 48 or the like. Extending upwardly and outwardly of the wall 47 are a pair of similar walls 49, 50, symmetrically arranged with respect to the wall 47, with wall 49 overlying an edge portion of upper surface 13 of top member 12. The member 46 extends from a point adjacent pulley 43 along edge 15 of top member 12, beyond the end of the top member 12.

Secured to a forward edge portion of the upper surface 13 and projecting beyond the front edge 15 is an elongated guide plate 51. The plate 51 is formed on its forward edge with regularly spaced rectangular shaped grooves 52 alternating with rectangular shaped ribs 53 which extend in an inclined direction of predetermined angularity between the upper and lower surfaces of the plate as shown in Fig. 7. The ribs 53 adjacent the roller 40 have lower portions 54 cut away to accommodate the adjacent circumferential portion of the roller 40. Mounted on plate 51 is a rectangular shaped plate 55. The forward edge of the plate 55 is formed with grooves and ribs similar to those found on plate 51 and are in overlying registry therewith. The plate 55 is secured to plate 51 by means of screws 56. Clamped between the elongated plate 51 and the overlying plate 55 are a pair of spaced, similar pins 56a which project beyond the edges of plates 51, 55. Fixedly secured on the projecting portions of pins 56a is a cylindrical member 57, the axis of which is parallel to the forward edge of plates 51, 55 and circumferential portions of which contact the ribs 53. From a consideration of Fig. 6, it will be noted that each of the pins 56 is clamped between plates 51, 55 in alignment with a rib 53, for the purpose hereinafter described.

On the plate 51 there is mounted a pair of similar, spaced hook like members 58. Each hooklike member 58 comprises a flat shank portion 59 which is secured to the plate 51 by means of screws 60 or the like. Extending from the shank 59 is an arcuate portion 61 of a predetermined radius. The arcuate portion 61 has a substantially circular cross section and is formed with a groove 62 on the inner, uppermost portion thereof. As shown in Fig. 10, the groove 62 is coextensive with the extent of the arcuate portion of the member. The hooklike members 58 extend from the plate 51 at a predetermined angle to the edge thereof and are mounted so that the members are aligned with a groove 52 on the plate 51. The arcuate portion 61 of members 58 has the same inclination from the vertical as the grooves 52.

The device described is adapted to form a bound book of the type shown in Fig. 2, which comprises a multiplicity of superposed sheets 70 (the topmost or cover sheet being shown in Fig. 2) which are formed with a row of registering perforations 71 along a margin thereof which in turn receive the spiral or helical binder 72.

In using the device embodying the invention, the operator suspends a multiplicity of sheets 70a together with the cover sheets 70 having the usual marginal perforation on the hooklike members 58. From a consideration of Fig. 10 is will be noted that the sheets 70, 70a hang freely in a vertical position on the arcuate portions 61 of the hooklike members 58 and further that rows of perforations 71 in the sheets define arcuate passageways corresponding to the arcuate form of the suspending element.

The spiral binder 72 in continuous lengths is placed in the troughlike supporting member 46 and the leading end of the binder is moved towards the fixed cylindrical guide member 57. As shown in Fig. 9 the diameter of member 57 is slightly less than the diameter of the helical binder 72 which passes over it upon continued movement of the binder 72 with respect to the member 57, the leading end of the binder is threaded into the first groove 52 in plates 51, 55. At this time, the operator steps on the treadle 32 which brings the rubber covered roller 40 into contact with the helical portion of the binder supported by the member 57 and positioned in the groove 52. The rotary motion of roller 40 will impart helical movement to the helical binder by reason of the frictional contact of the rubber cover 42 of the roller with respect to

the supported portions of the binder. It is to be noted that the dimensions of the grooves 52 are such that the wire of the binder will lie within the grooves yet move easily with respect to the walls of the grooves. The width of the ribs 53 corresponds to the normal spacing between the successive rows of perforations in the marginal portions of the book to be bound. The convolutions of the binder 72 will pass on either side of the pins 56 which position the member 57, inasmuch as pins 56 overly a rib 53 in plates 51, 55 and therefore do not interfere with the movement of the binder. As the rotation of roller 40 continues to produce helical movement in the binder, the convolutions of the binder will be received in the grooves 52 of plates 51, 53 and longitudinally guided thereby. When the leading end of the binder wire reaches the first hook like member 58, the wire will be received in the groove 62 in the arcuate portion 61 of the hooklike member and will pass through the passageway defined by the row of perforations in the sheets suspended on the member 58, as shown in Fig. 10. It will be noted that the curvature of the arcuate portion 61 of the member 58 corresponds to the curvature of the wire in the helical binder 72. In the same manner, the inclination of the grooves 52 and the hooklike member 58 corresponds to the inclination of the convolutions of the helical binder. In this manner the introduction of the binder into passageways defined by the perforations in the sheets is made possible by the use of fixed guide means for the helical binder and fixed guide means which properly position the perforated sheets.

The continued helical movement of the helical binder will bring the leading end of the binder to the second hook-like member 58, after having passed through the intermediate rows of perforations in the suspended sheets. At the second hooklike member 58, the leading end of the binder is again guided by the groove 62 in the arcuate portion 61 of the member, in the manner previously described.

When the helical movement of the binder has extended to the point where the binder has engaged all the rows of perforations in the book, the operator releases the treadle 32 which moves upwardly by the action of spring 36, which in turn has the effect of pivoting the arm 37 thereby moving the roller 40 out of contact with the helical binder. This stops the helical movement of the binder and the operator then proceeds to cut the binder at a rear portion adjacent the left hand edge of the book. The projecting ends of the binder are bent adjacent the edge of the book so that the binder is retained in its position.

The movement of the roller 40 towards the fixed member 57 may be limited by means of the stop screws 38*a* which extends through the arm 37 of the bracket supporting the roller and bears against the inclined wall 17. By suitably adjusting the screw 38*a*, the maximum pressure of the roller 40 with respect to the wire coils of the helical binder may be determined. This feature also permits adjustments in the feeding pressure in order to avoid jamming of the moving coil. It is to be noted that since the feed used is of the frictional type rather than by positive movement, the feed becomes ineffective in the event that the wire becomes jammed for any reason or if an obstruction in the perforations of the book is encountered.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use. The binder may be cut and its ends bent by suitable means.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In combination, means for suspending a book of superposed sheets having rows of registering openings forming a row of passages through the book, including means passing through a plurality of said passages, and means for threading a helical binder through said row of passages.

2. In combination, means for suspending a book of superposed sheets having rows of registering openings forming a row of passages through the book, said means comprising a pair of fingers passing through a pair of said passages, and means for threading a helical binder through said row of passages, said threading means comprising means to rotate said binder, and guide means to cause said binder to move longitudinally as it rotates and is threaded through said passages, said guide means having spaced inclined grooves through which convolutions of said binding pass.

3. In combination, means for suspending a book of superposed sheets having rows of registering openings forming a row of passages through the book, and means for threading a helical binder through said row of passages, said threading means comprising means to rotate said binder, and guide means to cause said binder to move longitudinally as it rotates, said suspending means including a pair of curved fingers passing through a pair of said passages.

4. In combination, means for suspending a book of superposed sheets having rows of registering openings forming a row of passages through the book, and means for threading a helical binder through said row of passages, said threading means comprising means to rotate said binder, and guide means to cause said binder to move longitudinally as it rotates, said suspending means including a pair of curved fingers passing through a pair of said passages, said fingers having grooves to guide the binder through said pair of passages.

5. In combination, means for suspending a book of superposed sheets having rows of registering openings forming a row of passages through the book, and means for threading a helical binder through said row of passages, said suspending means including a pair of curved fingers passing through a pair of said passages.

6. In combination, means for suspending a book of superposed sheets having rows of registering openings forming a row of passages through the book, and means for threading a helical binder through said row of passages, said suspending means including a pair of curved fingers passing through a pair of said passages, said fingers having grooves to guide the binder through said pair of passages.

7. In combination, means for suspending a book of superposed sheets having rows of registering openings forming a row of passages through the book, and means for threading a helical binder through said row of passages, said

suspending means including fingers having grooves to engage the binding, said threading means comprising means to rotate said binder, and guide means to cause said binder to move longitudinally as it rotates, said guide means comprising a member having spaced inclined grooves through which the convolutions of the binder pass.

8. In combination, means for suspending a book of superposed sheets having rows of registering openings forming a row of passages through the book, and means for threading a helical binder through said row of passages, said threading means comprising means to rotate said binder, and guide means to cause said binder to move longitudinally as it rotates, said suspending means including a pair of curved fingers passing through a pair of said passages, said fingers being inclined to the direction of movement of said binder.

9. In a device for binding a book comprising a plurality of superposed sheets having rows of registering perforations along a marginal edge thereof forming a row of passages through said book with a helical binding, fixed fingers passing through selected passages to freely suspend said sheets thereon and including curved portions passing through said selected passages whereby all said passages are curved, means for advancing said helical binder longitudinally of said marginal edge, towards said suspending means, said suspending means having means to guide successive portions of the advancing binder through the arcuate passageways in said book.

10. In a device for binding a book comprising a plurality of superposed sheets having rows of registering perforations along a marginal edge thereof forming a row of passages through said book with a helical binding, fixed fingers passing through selected passages to freely suspend said sheets thereon and including curved portions passing through said selected passages whereby all said passages are curved, means for advancing said helical binder longitudinally of said marginal edge, towards said suspending means, said suspending means having means to guide successive portions of the advancing binder through the arcuate passageways in said book, said advancing means comprising a fixed cylindrical member over which the binder passes, a roller movable into contact with the portion of the binder passing over said cylindrical member.

11. In a device for binding a book comprising a plurality of superposed sheets having rows of registering perforations along a marginal edge thereof forming a row of passages through said book with a helical binding, fixed fingers passing through selected passages to freely suspend said sheets thereon and including curved portions passing through said selected passages whereby all said passages are curved, means for advancing said helical binder longitudinally of said marginal edge, towards said suspending means, said suspending means having means to guide successive portions of the advancing binder through the arcuate passageways in said book, said rotatable cylindrical member comprising a core and a resilient, frictional surface covering thereon.

12. In a device for binding a book comprising a plurality of superposed sheets having rows of registering perforations along a marginal edge thereof forming a row of passages through said book with a helical binding, fixed fingers passing through selected passages to freely suspend said sheets thereon and including curved portions passing through said selected passages whereby all said passages are curved, means for advancing said helical binder longitudinally of said marginal edge, towards said suspending means, said suspending means having means to engage and guide successive portions of the advancing binder through the arcuate passageways in said book, said advancing means comprising a fixed cylindrical member over which the binder passes, a roller movable into contact with the portion of the binder passing over said cylindrical member, means for moving said roller into contact with said binder and means for rotating said roller.

13. In a device for binding a book comprising a plurality of superposed sheets having rows of registering perforations along a marginal edge thereof forming a row of passages through said book with a helical binding, fixed fingers passing through selected passages to freely suspend said sheets thereon and including curved portions passing through said selected passages whereby all said passages are curved, means for advancing said helical binder longitudinally of said marginal edge, towards said suspending means, said suspending means having means to guide successive portions of the advancing binder through the arcuate passageways in said book, said advancing means comprising a fixed cylindrical member over which the binder passes, a roller movable into contact with the portion of the binder passing over said cylindrical member, means for moving said roller into contact with said binder and means for rotating said roller, and stop means to limit movement of said roller toward said cylindrical member.

14. In a device of the character described, a table having an edge portion, a guide member secured to the upper surface of said table and projecting beyond said edge portion, said guide member being formed with successively alternating inclined grooves and ribs, a pair of hooklike supporting members secured to said guide member in spaced, parallel relationship ot each other, said supporting members being adapted to support a plurality of superposed sheets formed with registering marginal perforations whereby a helical binder may be introduced into said perforations.

15. In a device of the character described, a table having an edge portion, a guide member secured to the upper surface of said table and projecting beyond said edge portion, said guide member being formed with successively alternating inclined grooves and ribs, a pair of hooklike supporting members secured to said guide member in spaced, parallel relationship to each other, said supporting members being adapted to support a plurality of superposed sheets formed with registering marginal perforations whereby a helical binder may be introduced into said perforations, said hooklike members comprising a shank portion, an arcuate portion extending from said shank portion, said arcuate portion being formed with a groove on the upper surface thereof.

16. In a device of the character described, a table having an edge portion, a guide member secured to the upper surface of said table and projecting beyond said edge portion, said guide member being formed with successively alternating inclined grooves and ribs, a pair of hooklike supporting members secured to said guide member in spaced, parallel relationship to each other, said supporting members being adapted to support a plurality of superposed sheets formed with registering marginal perforations whereby a heli-

cal binder may be introduced into said perforations, said hooklike members comprising a shank portion, an arcuate portion extending from said shank portion, said arcuate portion being formed with a groove on the upper surface thereof, the arcuate portions of said hooklike members being in registry with grooves in said guide members.

17. In a device of the character described, a table having an edge portion, a guide member secured to the upper surface of said table and projecting beyond said edge portion, said guide member being formed with successively alternating inclined grooves and ribs, a pair of hooklike supporting members secured to said guide member in spaced, parallel relationship to each other, said supporting members being adapted to support a plurality of superposed sheets formed with registering marginal perforations whereby a helical binder may be introduced into said perforations, said hooklike members comprising a shank portion, an arcuate portion extending from said

shank portion, said arcuate portion being formed with a groove on the upper surface thereof, the arcuate portions of said hooklike members being in registry with grooves in said guide members, said hooklike members being angularly positioned with respect to the edge of said guide member and the arcuate portion of said hooklike member having an inclination equal to that of the grooves in said guide member.

ALBERT FREUNDLICH.

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