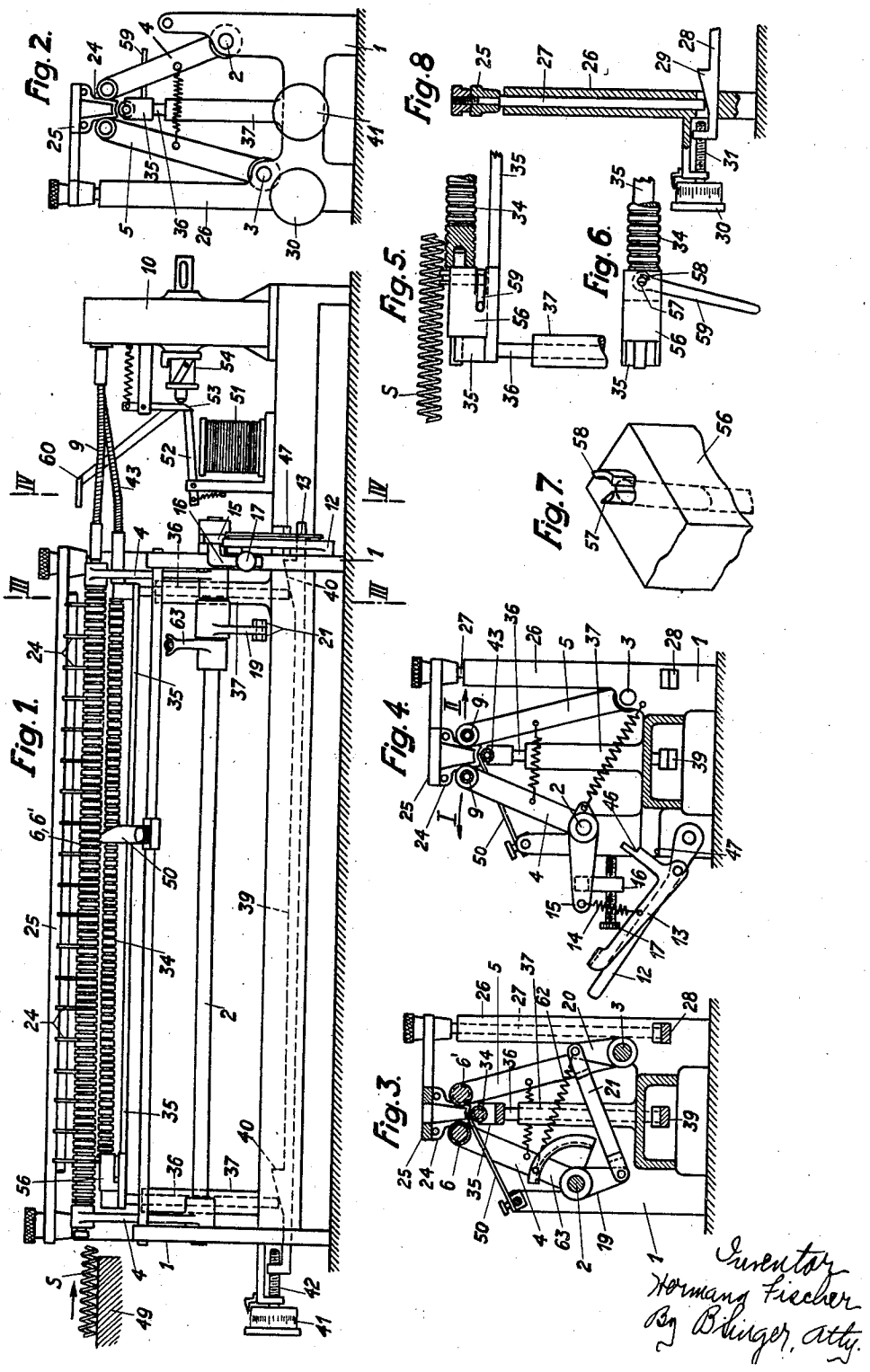
Aug. 8, 1939. H. FISCHER 2,168,865

DEVICE FOR BINDING BOOKS AND SO FORTH

Filed March 15, 1934 3 Sheets-Sheet 1



Inventor
Hermann Fischer
By Blinger, Atty.

Aug. 8, 1939. H. FISCHER 2,168,865

DEVICE FOR BINDING BOOKS AND SO FORTH

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Fig. 10.

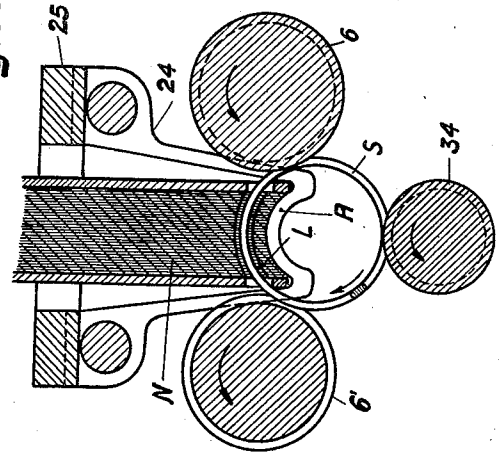


Fig. 12.

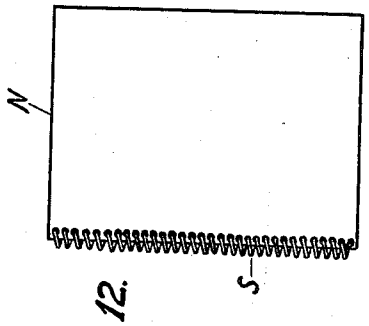


Fig. 9.

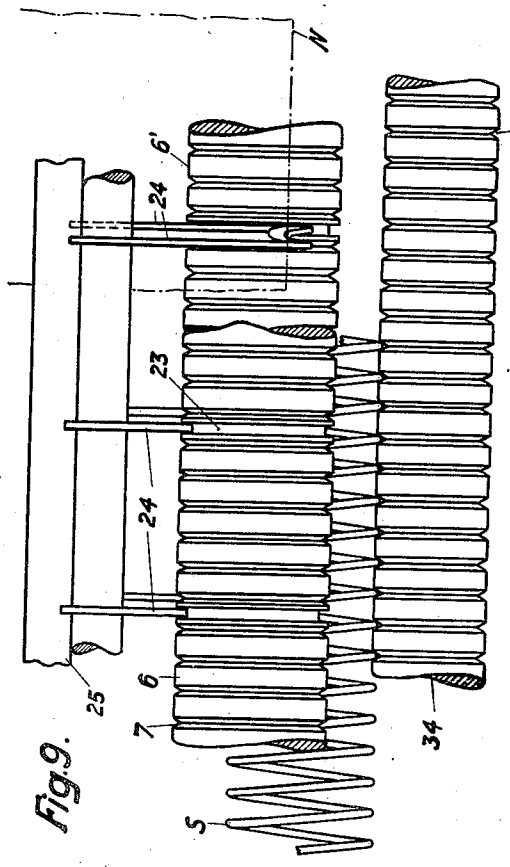
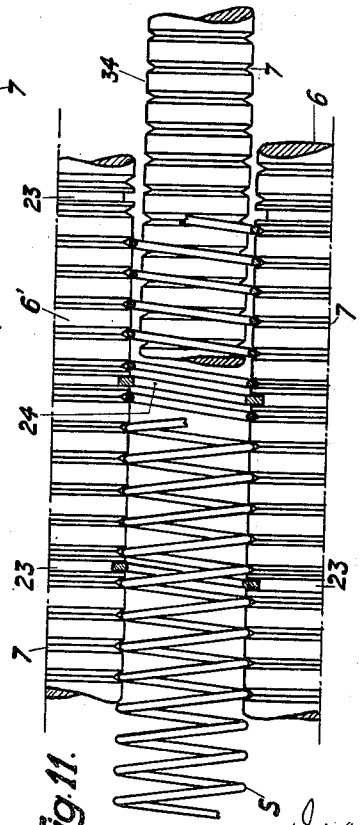


Fig. 11.



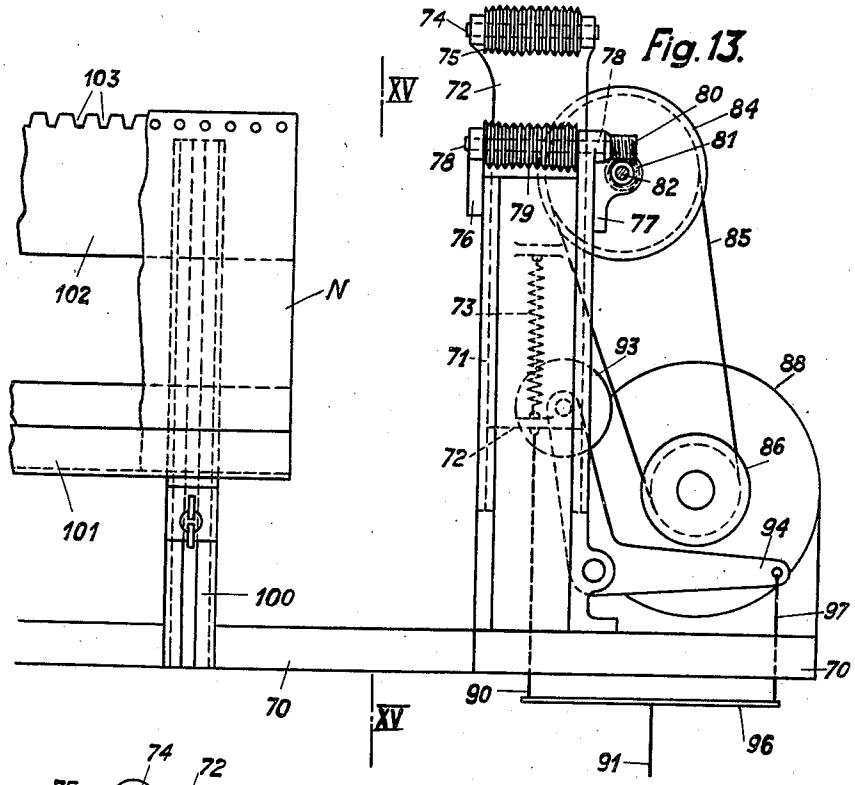
Inventor
Hermann Fischer
By Bisinger, Atty.

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DEVICE FOR BINDING BOOKS AND SO FORTH

Filed March 15, 1934 3 Sheets-Sheet 3

Fig. 13.



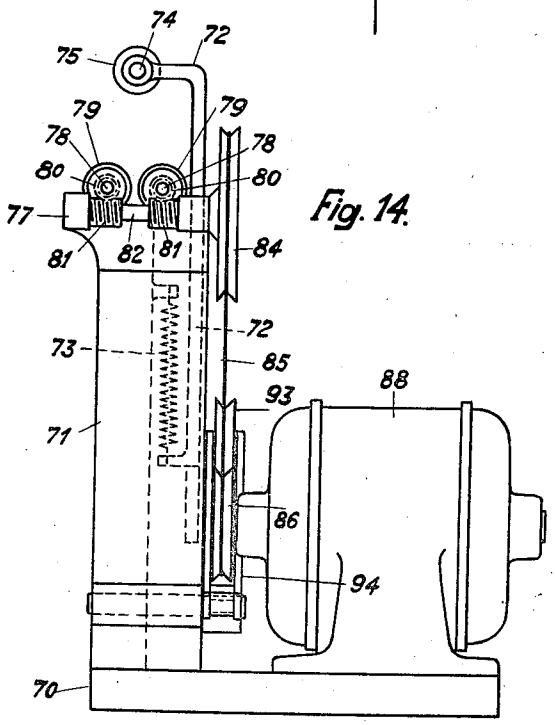


Fig. 14.

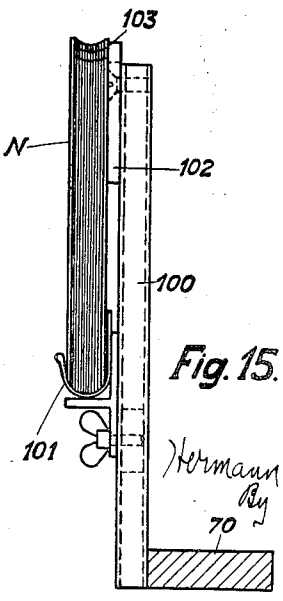


Fig. 15.

Inventor
Hermann Fischer
By Bilinger
Atty

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UNITED STATES PATENT OFFICE

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DEVICE FOR BINDING BOOKS AND SO FORTH

Hermann Fischer, Thalwil, Zurich, Switzerland

Application March 15, 1934, Serial No. 715,741
In Germany March 18, 1933

10 Claims. (Cl. 11—1)

This invention relates to a device for binding books and so forth by inserting a wire spiral into an apertured pile of paper.

The binding by means of a wire spiral is known per se. Hitherto the wire spiral was threaded through the previously apertured pile of paper by hand. A higher output is obtained by means of a machine wherein the wire spiral is gripped at one end and from there threaded through the holes of the pile. The present invention differs from this known arrangement in that motor driven exchangeable rollers having annular grooves are provided for turning and for feeding the wire spiral axially forwards.

The new form of construction possesses many advantages, particularly there is obtained a very rapid and reliable operation as the entire wire spiral which is being moved is gripped, guided and driven at each of its turns. At least one of the rollers is adjustable so that wire coils of different sizes can be used for binding, according to the size of the pile of paper and so forth to be bound. As the books to be bound are frequently comparatively short there is used, according to the present invention, a wire spiral, which is as long as possible, from which the length required for binding is cut. The rollers are driven positively by a common motor. The motor is stopped automatically by disengaging a clutch or otherwise when the wire spiral has been wound fully into the pile of paper. The wire spiral located in the pile is then cut off. The cutting can be effected by a cutting device actuated by hand or the cutting may also be performed automatically by the machine. The ends of the wire spiral are then bent towards the pile by a subsequent operation so as to prevent release of wire from the pile.

In order to enable the wire spiral to be inserted readily the device is provided with a support, on which the pile is placed, and which so locates the pile that the holes therein lie in a circular path along which the end of the wire spiral is fed forwardly.

In the accompanying drawings are shown two examples of construction of the subject of the invention.

Fig. 1 is a front elevation and

Fig. 2 is a side elevation of the first form of construction.

Figs. 3 and 4 are sections on the lines III—III and IV—IV of Fig. 1.

Figs. 5 to 8 show details to a larger scale.

Fig. 9 shows to a larger scale a portion of the rollers in side elevation, whilst

Fig. 10 shows a cross section thereof.

Fig. 11 is a plan of Fig. 8 (some parts being in section).

Fig. 12 shows a note-book provided with the spiral.

Fig. 13 shows in front elevation a second form of construction of the subject of the invention.

Fig. 14 is a side elevation.

Fig. 15 is a section on the line XV—XV of Fig. 13.

In a frame 1 are rotatably mounted two shafts 2, 3. To the shaft 2 are keyed two levers 4 and to the shaft 3 two levers 5. In the upper ends of each pair of levers 4, 5 are mounted rollers 6, 6', the latter being provided with uniformly spaced annular grooves 7. The rollers 6, 6' are rotated from a hand operated or motor driven gear 10 through the medium of flexible shafts 9. The spacing of the rollers 6, 6' may be suitably varied within predetermined limits. For this purpose there is mounted on the frame 1 an arm 12 to one end of which is pivoted a bell crank lever 13. A spring 14 is connected to one end of the bell crank lever 13 and at the other end to a link 15 keyed to the shaft 2. The link has an extension 16 with which engages a screw 17 bearing against the frame 1. To each of the shafts 2 and 3 are also keyed levers 19, 20 connected by a link 21.

Between the rollers 6, 6' are provided distance pieces 24 engaging with grooves 23 in the rollers and secured to a holder 25 which is screwed, and consequently readily removable, on two vertical rods 27 movable in columns 26 (Fig. 8). The rods 27 rest on a rail 28 provided with inclined supporting surfaces 29. The rail 28 can be moved by rotating a drum 30 provided with a screw bolt 31 engaging with the rail 28. The rods 27 and thus the holder 25 is raised or lowered by the inclined surfaces 29. The drum 30 is provided with a scale from which the position in height of the holder can be read directly.

Between the rollers 6, 6', but below these, there is rotatably mounted in a bearing 35 a further roller 34. The latter rests at both ends on rods 36 which are guided for vertical movement in bearings 37. The lower end of each rod 36 rests on a rail 39, mounted in the frame 1 for longitudinal movement, provided with raised portions 40. Into this rail is screwed a screw bolt 42 provided with a drum 41 having a scale. The roller 34 is driven from the gear 10 by a flexible shaft 43, the condition being that the peripheral speeds of the roller 6, 6' and of the roller 34 are the same.

The method of operation is as follows:

Before inserting a wire spiral 5 into a pile of paper it is necessary to mount on the rods 27 a holder 25 with distance pieces 24 corresponding with the thickness of the book to be produced and with the diameter and pitch of the wire spiral S. In order that the distance pieces 24 engage easily with the annular grooves 23 of the rollers 6, 6' it is necessary first to increase the spacing between the latter. For this purpose the arm 12 is moved downwardly, whereby the bell crank lever 13 pivoted thereto, rocks the link 15 and the shaft 2 through spring 14. As a result the levers 4 and roller 6 are rocked in the direction of the arrow I (Fig. 4). By the lever connection 19—21 (Fig. 3) the levers 5 and shaft 6' are rocked in the direction of arrow II. A projection 46 on the bell crank lever 13 has simultaneously moved under a projection 47 on the frame 1 so that the parts 15, 4, 19, 21, 20 are locked temporarily in position. By adjusting the screw 17 the increase in the roller spacing may be limited as desired. After mounting the holder 25 pressure is applied to the bell crank lever 13 whereby the projection 46 thereof is disengaged from the projection 47 and thus all the above-mentioned parts return to their initial position shown in Figs. 3 and 4.

By turning the drums 30, 41 the position in height of the holder 25 the roller 34 are adjusted, through the medium of the corresponding rails 28 and 39, to the necessary amount corresponding with the diameter of the wire spiral.

After these preparations have been made a predetermined number of sheets with the cover sheets assembled to form a paper pile N (Fig. 10), are placed vertically in the distance pieces 24 and the gear 10 and rollers 6, 6' and 34 are rotated. A wire spiral S, which rests on a support 49, is then pushed against the rollers (Fig. 1). These engage the wire spiral and feed it forwardly by turning it about it axis. The forward end of the spiral moves forwardly through the holes L of the paper pile N. These are punched in advance in an accurately adjusted punching machine and when placing the sheets into the distance pieces 24 together assume a radius accurately corresponding with that of the wire spiral (Fig. 10), as the paper pile rests on the support A corresponding with the diameter of the wire spiral.

As soon as the wire spiral has reached the end of the paper pile it comes into contact with a contact spring 50 located at this point. There is thus closed an electric circuit including a magnet coil 51 which attracts a plate 52. Under the action of a spring, a lever 53, previously locked by the plate 52, rocks and releases the pin of the gear clutch 54. The gear 10 is thus disengaged and the rollers stopped. If desired the motor itself could be switched off.

At one end of the bearing 37 is also provided a wire cutting device 56. The wire spiral moves between the two cutting jaws 57 and 58. The cutting jaw 57 is connected to a lever 59 whilst the jaw 58 is fixed (Fig. 7).

By rocking the lever 59 the jaw 57 passes closely against the jaw 58 and thus cuts the wire. The completely bound book can now be removed. The cutting device could also be actuated automatically by the gear. The ends of the wire spiral are bent over by a device which is not described herein. The device for bending the ends of the wire spiral could also be incorporated in the present device.

The gear is again set in operation by applying pressure to an arm 60, whereby the parts 54, 53 and 52 return to their original position.

The force necessary to press the rollers 6, 6' towards one another is applied by a spring 62 (Fig. 3) which at one end engages with the lever 20 and at the other end to a segment 63 keyed to the shaft 2. By varying the point of attachment of the spring to the segment the spring may be more or less tensioned.

The rollers 6, 6' and 34 are readily exchangeable. The spacing apart of the annular groove 7 must correspond accurately with the pitch of the spiral S which is being used (Figs. 9 and 10). The annular grooves of the separate rollers are also relatively displaced in accordance with the pitch of the spiral, as will be seen clearly from Figs. 9 and 10.

A further form of construction is shown in Figs. 13 to 15. On a base plate 70 is mounted a frame 71. In the latter is mounted for vertical movement a slide 72 which is held raised by the action of spring 73. In the upper end of the slide 72 there is mounted for free rotation a roller 75 provided with grooves. The frame 71 has two bearings 76, 77 in which are mounted two shafts 78. To each of these are keyed a roller 79, each provided with grooves, and a worm wheel 80 each of which gears with a worm 81 on the shaft 82. On the shaft 82 is mounted a pulley 84 driven by a belt 85 from the pulley 86 mounted on the motor shaft. The motor 88 is mounted on the base plate 70.

In order to enable wire spirals of different diameter to be fed between the rollers 75 and 79 the distance between the roller 75 and the rollers 79 can be varied. The spacing shown in Fig. 14 is the maximum. It can be reduced by pulling the slide 72 downwardly. For this purpose there are provided pulling members 90, 91 and a blade spring 96. By the member 91 the spring 96 may be connected to a pedal not shown in the drawings. The belt 85 rests loosely in the pulleys 84, 86. When, however, the member 91 is pulled downwardly a bell crank lever 94, mounted in the frame 71 and provided with a pulley 93, is rocked through the medium of the transmission members 96, 97. The pulley 93 bears against the belt 85 thus tensioning the latter. The normally running motor thus rotates the rollers 79 through the medium of the parts 86, 85, 84, 82, 81, 80 and 78.

Adjacent the frame 71 there are provided on the base plate 70 two supports 100, of which only one is shown in the drawings. On these is mounted a trough 101, for the reception of the paper pile N, which is exchangeable and movable vertically. The trough has a shape corresponding with that of the wire spiral to be used so that the holes in the separate sheets of the pile are located accurately along an arc. The pile bears against a plate which at the top is provided with slots 103 of which the spacing corresponds accurately with the pitch of the wire spiral to be used. The plate 102, as also the trough 101 are secured to the supports in a readily detachable manner.

The rollers 75 and 79 can be exchanged readily and replaced by others when a wire spiral of different pitch is to be used. In order to enable the rollers to be removed the bearing 76 is removed whereupon these rollers can be moved freely on the shafts 78 and removed. The roller 75 rotates on a shaft 74 secured in the slide 72 by screws. By releasing these screws the shaft 74 can be

removed from the slide and thus also therewith the roller **75**.

What I claim is:

1. In a device for binding books and the like consisting of a plurality of apertured sheets by means of a wire spiral, and including a holder for holding the holes in the sheets in the path of the separate turns of the wire spiral, the wire spiral being screwed through the holes by being simultaneously rotated and moved axially in guides, the combination comprising a plurality of rollers, said rollers being provided with annular grooves, said grooves being relatively displaced so as to correspond with the pitch of the wire spiral which engages therewith, means for rotating said rollers, and a plurality of distance pieces on said holder, said distance pieces being adapted to engage between said rollers and serving to ensure the spacing between the pile of sheets and the rollers and for guiding said rollers.

2. A device according to claim 1, including driving means for said rollers, a stop in the path of axial movement of said wire spiral, and an electric stop device, the arrangement being such that when the spiral comes into contact with the stop the stop device is actuated so as to interrupt the drive of the rollers.

3. A device according to claim 1, including bearings, shafts mounted in said bearings, said rollers being mounted on said shafts, a plurality of vertical rods on which said bearings are mounted, horizontally movable rails, said rails having inclined surfaces, said inclined surfaces co-operating with said vertical rods, and means for moving said rails horizontally.

4. A device according to claim 1, including links supporting said rollers, means for spreading said links apart and springs between said links, said springs normally drawing said links towards one another.

5. A device according to claim 1, including links supporting said rollers, means for spreading said links apart and springs between said links, said springs normally drawing said links towards one another, cranks associated with said links, said cranks being directed in opposite directions, a connecting rod between said cranks, a sector connected to one of said cranks, and a spring connected at one end to the other crank, the other end of the spring being connected adjustably to said sector for adjusting the tension of the last mentioned spring.

6. Apparatus for threading a spiral binding element into a stack of perforated sheets, comprising rotating means for rectifying the coils of the spiral to a predetermined contour and simultaneously causing its advance along a predetermined path, means for positioning said stack with its perforations aligned with the coils of the advancing spiral, and stop means having a portion thereof located in the path of the advancing spiral for stopping the rotation of the rotating means when the advancing spiral contacts with said portion of the stop means in its path.

7. In apparatus for threading a spiral binding element into a stack of sheets having uniformly spaced perforations along one edge thereof, guiding means for said spiral, pitch rectifying means for said spiral, said guiding means being adapted to cause the advance of said spiral so as to thread the same through the perforations of said stack, adjustable means for positioning said stack so that its perforations lie in the path of said advancing spiral, and means for automatically stopping the advance of said spiral at a predetermined point in relation to the stack.

8. Apparatus for binding books, comprising annularly grooved rollers mounted for rotation, means to rotate said rollers and means to hold apertured sheets between the rollers so that the coils of a spiral binding wire engaged, revolved, and moved endwise by the rollers will be caused to pass through the apertures of the sheets, two of said rollers being arranged in the same horizontal plane and being adjustable toward and from each other and another roller also arranged in a horizontal plane being arranged with its axis in a vertical plane midway between the first named rollers and being adjustable vertically, the means for holding the apertured sheets being arranged between the first named rollers and presents downwardly converging sides which bear against the first named rollers and including means to vertically adjust said sheet holding means.

9. A device for threading a spiral binding element through the perforations of a stack of sheets to be bound, said device comprising means for causing the advance of the successive portions of a spiral binding element along a predetermined path and thereby positively causing the successive portions thereof to conform to a predetermined contour, means for positioning the perforations of the stack in threading relation to the coils of the advancing spiral, and means for stopping the advance of the spiral binding element at a predetermined point.

10. A device for threading a spiral binding element through the perforations of a stack of sheets to be bound, said device comprising means for causing the advance of the successive portions of a spiral binding element along a predetermined path and thereby positively causing the successive portions thereof to conform to a predetermined contour, means for positioning the perforations of the stack in threading relation to the coils of the advancing spiral, said advancing means comprising a pair of elements spaced so as to receive therebetween the stack to be bound and to hold the sheets of the stack against separation, said apparatus also having automatic means for stopping the advance of the spiral at a predetermined point.

HERMANN FISCHER.