

May 10, 1960

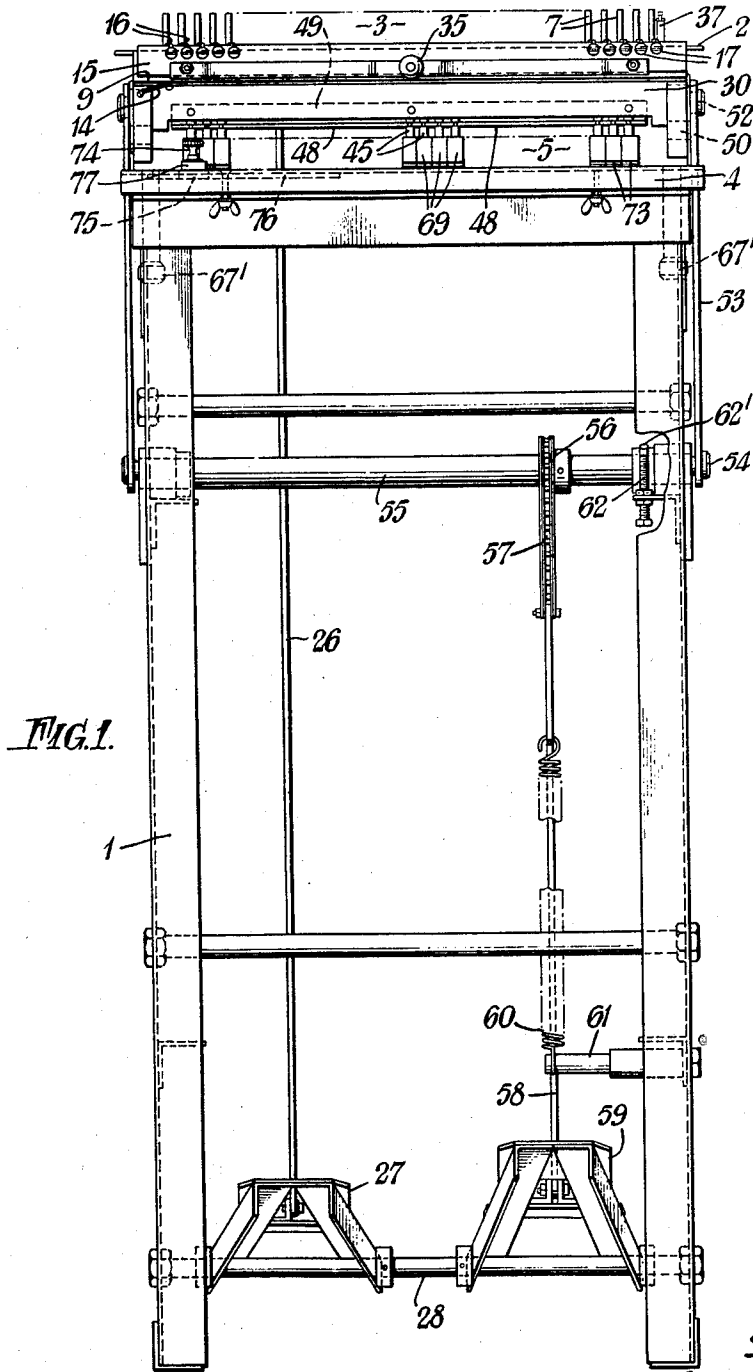
G. A. ROWLEY

2,935,752

COMBINED PUNCHING AND UNCURLING MACHINE

Filed May 27, 1953

5 Sheets-Sheet 1



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**May 10, 1960**

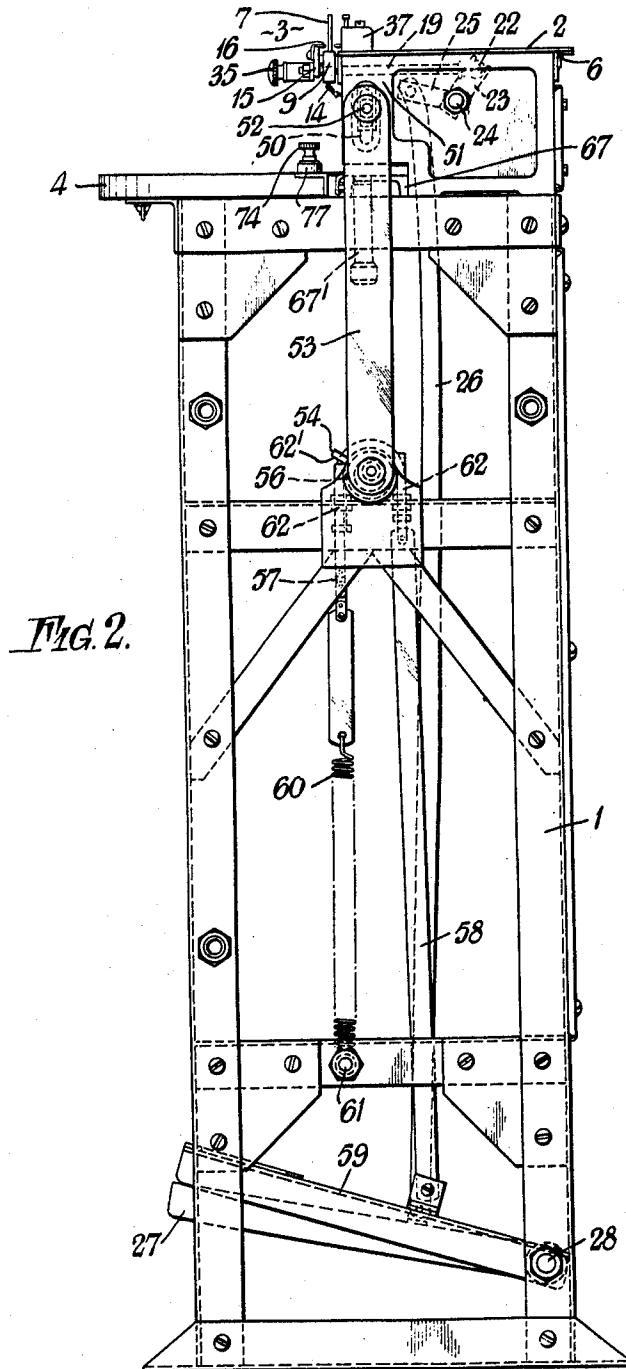
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## COMBINED PUNCHING AND UNCURLING MACHINE

Filed May 27, 1953

5 Sheets-Sheet 2



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COMBINED PUNCHING AND UNCURLING MACHINE

Filed May 27, 1953

5 Sheets-Sheet 3

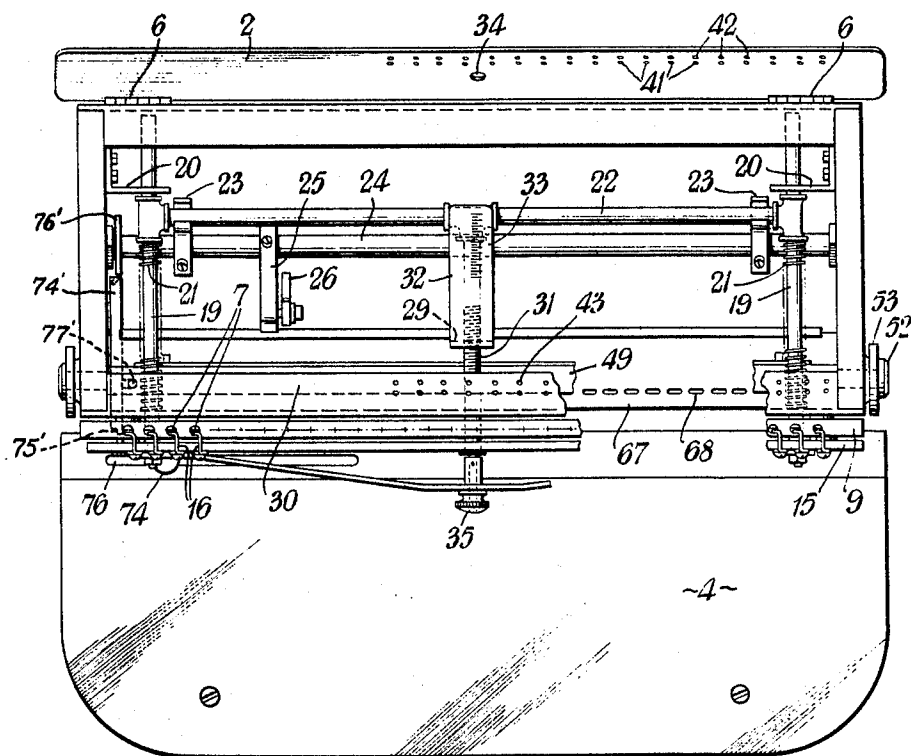


FIG. 3

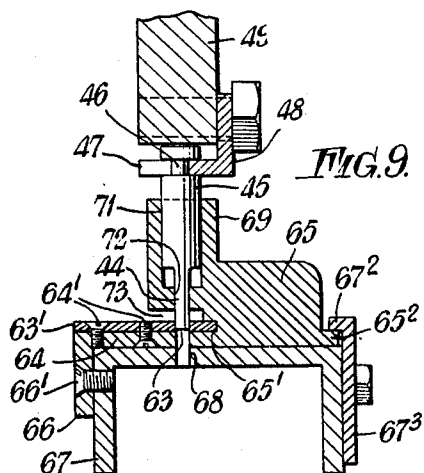


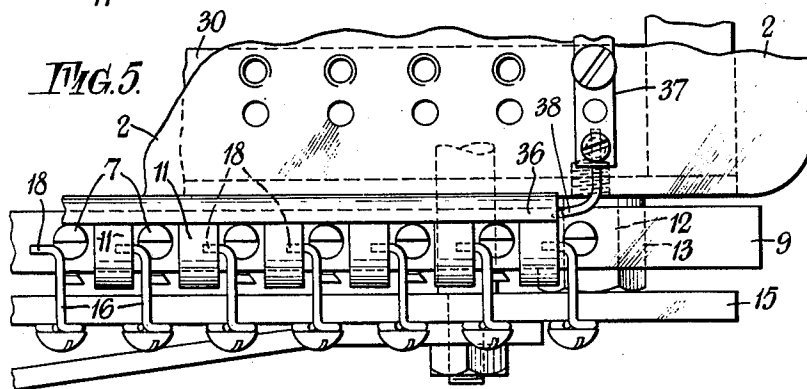
FIG. 9

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## COMBINED PUNCHING AND UNCURLING MACHINE

5 Sheets-Sheet 4



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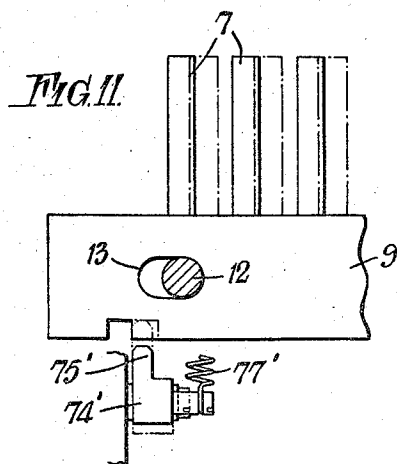
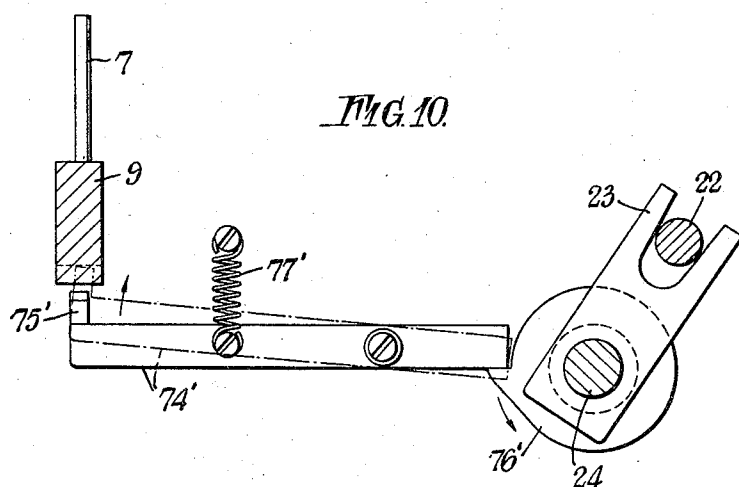
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COMBINED PUNCHING AND UNCURLING MACHINE

Filed May 27, 1953

5 Sheets-Sheet 5



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2,935,752

## COMBINED PUNCHING AND UNCURLING MACHINE

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Application May 27, 1953, Serial No. 357,758

3 Claims. (Cl. 11—1)

This invention concerns improvements relating to apparatus for binding books, pamphlets or other assemblies of sheets by means of resilient tubular binders of the kind formed from a comb-shaped body, usually of thermoplastic material, by rolling the said body so that the ends of the comb teeth are curled into engagement with other portions of the binder.

One object of the invention is to provide a simple mechanical device for temporarily uncurling the teeth sufficiently to enable the sheets, which have been previously slotted, to be engaged thereover.

Such a device, in accordance with the invention, comprises holding means with which the spine portion of the binder can be engaged, hooks with which the teeth of the binder can be engaged by simple sliding movement of the holding means and binder, in the longitudinal direction of the latter, in relation to the hooks, and means for moving the hooks at right angles to the binder for uncurling the teeth of the latter.

A further object of the invention is to provide, particularly in combination with the binder-uncurling device set forth above, a simple mechanical device for punching binding slots in sheets.

Such a device, in accordance with the invention, comprises a plurality of punch devices mounted upon supporting means in individually removable manner.

One embodiment of the invention by way of example will now be more fully described with reference to the accompanying drawings, in which:

Figure 1 is a front elevation of a combination machine comprising a device for uncurling binders and a device for punching binding slots in sheets,

Figure 2 a side elevation thereof,

Figure 3 a plan view to a larger scale,

Figures 4, 5 and 6 are detail plan views to a yet larger scale illustrating three stages in an uncurling operation,

Figures 7 and 8 are detail side elevations corresponding to Figures 4 and 6,

Figure 9 is a detail vertical section through a punch and die unit,

Figure 10 a detail side elevation of locking means, and

Figure 11 a detail front elevation thereof.

The machine comprises an upright framework 1 which supports, at the rear, a horizontal metal plate 2 with binder-uncurling means 3 in front of it and, at a lower level at the front, a removable table 4 with slot-punching means 5 behind it. A particularly simple, easily operated and compact combination machine results from the aforesaid arrangement.

Under the plate 2, which takes the form of a cover hinged to the frame 1 at 6, is simple operating mechanism for the uncurling means. This cover is shown open in Figure 3. Means for holding the binder while its teeth are being uncurled comprises a row of vertical posts 7 replaceably secured by set screws 8 in the top of a bar 9, the pitch of the posts 7 being equal to the pitch of the slots 10 between the comb teeth 11, as is best seen by reference to Figure 6. The bar 9 is mounted

along the top front member of the frame 1, with the top of the bar and the plate 2 flush, by means of shouldered screws 12 passing through longitudinal slots 13 in the bar (Figure 5), which slots permit of a limited longitudinal sliding movement of the said bar. The bar 9 is urged towards its, initial, lefthand end position by a light tension spring 14 (Figure 1). The posts 7 are of half-circular cross section and of a width rather less than that of the slots 10.

Located in front of the bar 9, with its top at a slightly higher level, is a bar 15 having a series of horizontally disposed hooks 16 secured to it, by means of screws 17, at the pitch of the slots 10. Each hook 16 is made of a simple length of wire extending rearwardly from the bar 15 and having its end bent to the left at right angles. The bent end 18 lies closely in front of the flat face of the coating post 7 in the initial relative disposition of the hook and post (Figure 4), the length of the end 18 being substantially equal to the width of the post 7. As may be seen from Figure 4, this arrangement permits a comb to be placed upon the binding means without obstruction. The half-cylindrical shape of the posts allows the hook ends 18 to be brought close to the posts 7, thus ensuring a compact arrangement and allowing the uncurling means to be used with binders of small diameter.

The hook bar 15 is supported near its ends by rods 19 which extend at right angles to the said bar and are guided, in a front member 30 of the framework 1 and in brackets 20 (Figure 3), for movement away from and towards the bar 9. The rods 19 pass through the bar 9 by way of slots. The bar 15 is urged towards its initial position adjacent to the bar 9 (Figure 4) by helical compression springs 21 arranged on the rods 19 (Figure 3). To permit movement to be imparted to the bar 15, the rods 19 are connected by a cross rod 22 engaged by forked arms 23 on a lower shaft 24 extending parallel to said cross rod. The shaft 24 also carries an arm 25 connected by a link 26 to a pedal 27 mounted on a shaft 28 in the lower part of the framework 1. Movement of the bar 15 away from the bar 9 may be limited, to suit the size of binder to be opened, by means of a stop 29 (Figure 3) which is adjustable towards and away from the frame member 30 by means of a screw 31 which is mounted in the bar 15 and rod 22 so as to be rotatable but not axially movable in relation to the bar 15 and which engages by its thread with the stop 29. Rotation of the stop is prevented by a rearwardly extending flat strip 32 resting on the rod 22. This strip may also bear a scale 33 of adjustments which is visible through an opening 34 in the plate 2. Adjustment is effected by a knob 35 on the front end of the screw 31.

The manner of use of the part of the machine so far described is as follows:

With the posts 7 and hooks 16 on the bars 9 and 15 respectively in the relative positions shown in Figure 4, a curled binder is placed over the posts 7 with its spine 36 to the rear thereof (Figures 4 and 7). The bar 9 is then moved to the right by hand to bring the posts 7 and the binder into the position shown in Figure 5. The movement is thus sufficient to carry the curled teeth 11 over the ends 18 of the respective hooks 16 to the right thereof. The pedal 27 is then depressed to move the hook bar 15 forwardly away from the post bar 9 (Figure 6), so that the binder teeth 11 are uncurled by the hooks 16 (Figures 6 and 8). Slotted sheets to be bound can be engaged over the teeth 11 at this stage. During the forward movement of the bar 15, the bar 9 is effectively prevented from returning to the left by the frictional engagement between the comb teeth 11 and hooks 16. After the sheets have been placed on the teeth 11, the pedal 27 is released and the bar 15 is drawn back to the position shown in Figure 5, whereupon the bar 9 is returned auto-

matically by the spring 14 to the initial position shown in Figure 4. The binder and sheets bound thereby are then removed.

A stop piece 37 may be provided which has a hook 38 engageable inside the spine 36 at the right-hand end of the binder when the bar 9 is moved to the right, as shown in Figure 5. The hook 38 helps to prevent bending of the unsupported free end of the binder. The stop piece 37 is secured in position by a screw 39 and locating pin 40 which are engageable in selected holes 41, 42 of lines of such holes in the plate 2, the holes being selected to suit the length of binder to be used. The screw 39 may also serve to secure the plate 2 in the closed position, for which purpose it is screwed through the selected hole 41 into one of a line of corresponding holes 43 in the frame member 30 (Figure 3).

The above-described simple machine enables binders to be opened and engaged with sheets at a high rate of production. It can be used with binders of different lengths and diameters and could be adapted for different tooth sizes and tooth pitches. It can also be used for binding with a plurality of short binders instead of one long one, in which case several stop pieces 37 may be provided. The simple compact nature of the machine makes it suitable for offices or other comparatively small establishments.

It is particularly for use in these establishments, that such a machine may advantageously also comprise a device for punching the binding slots in the sheets. For this purpose, slot-punching means 5 (Figure 1) is provided comprising a series of punch and die units each of which is readily removable and replaceable. As illustrated in Figure 9, each punch comprises a punch part 44 proper and a full cylindrical body 45 with a neck 46. As shown, the part 44 is of flattened cross-section, but retains the rounded form of the body at the ends of the section, which occupies a diametrical position in relation to the said body. However, punch parts of other shapes within the circumference of the body part 45 may be employed. The necks 46 of the several punches are engaged in slots 47 in a supporting bar 48 secured to a robust transverse punch bar 49. The ends of the bar 49 are guided in vertical slots 50 (Figure 2) in side members 51 of the framework 1 and are connected by pivots 52 and vertical links 53 to crank pins or eccentric pins 54 at the ends of a lower shaft 55. The shaft 55 (Figure 1) carries a sprocket wheel 56 over which runs a chain 57 connected at one end by a link 58 to a pedal 59 mounted on the shaft 28 and at the other end through a tension return spring 60 to a fixed anchorage 61. The effective movement of the shaft 55 (for example rather more than 90°) is limited by stop means comprising adjustable fixed stops 62 and a stop finger 62<sup>1</sup> movable with the shaft. By this simple mechanism, adequate mechanical advantage for the punching operation can be effectively secured.

Each die (Fig. 9) comprises a slot 63 in a die-plate 63' which is mounted flush with the table 4 on a forward shelf-like part 64 of a body 65. The die plate is received in a slot 65<sup>1</sup> in the said body and is screwed to the part 64 thereof by screws 64<sup>1</sup>. The part 64 has a flange 66 secured by a single screw 66<sup>1</sup> to the front of a robust bar 67 which is connected to the framework 1 in readily removable fashion by means of large accessible screws 67<sup>1</sup>. A rear ledge 65<sup>2</sup> on the body 65 is received under a lip 67<sup>2</sup> on a strip 67<sup>3</sup> secured to the bar 67. A slot 68 in the bar 67 below the die slot 63 allows the punchings to fall clear. The body 65 is formed with an upstanding part 69 which serves to steady and guide the punch, for which purpose it has a bore 71 for guiding the cylindrical portion 45 of the punch and a slot 72 through which works the punch proper 44. Its lower end serves to strip the sheets from the punch.

To insert a complete punch and die unit, it has only to be placed in position from the front with the punch

neck 46 engaged in the slot 47 and the screw 66<sup>1</sup> tightened. Removal of a unit is equally simple. Units not required for a given punching operation may be removed. The sheets to be punched are laid on the table 4 and pushed firmly back into the slot 73 (Figure 9) formed for this purpose.

An adjustable end stop for the sheets comprises a post 74 screwed into a slider 75 guided in a slot 76 in the table 4 (Figure 1). The post 74 and slider 75 are secured in position when the post is screwed down tightly. By adjusting this stop appropriately and, if necessary, removing punch and die units not required, the slots in the sheets may be located as required in relation to the length of the rear edges thereof.

If desired, positive means may be provided for preventing return of the post bar 9 to the left once the hook bar 15 has commenced its forward movement. As shown in Figures 10 and 11, locking means for the purpose may comprise a lever 74' with a latch piece 75' which is normally held clear of the post bar 9 by a stop 76' fast on the shaft 24 (full-line position in Figures 10 and 11), but can be drawn into the locking (dotted line) position by a tension spring 77' when the shaft 24 is turned anti-clockwise for moving the hook bar 15 forward. The latch piece 75' then rises beside the left-hand end of the post bar 9, already shifted to the right, and prevents return of the said bar until the hook bar is retracted.

In compliance with the requirements of the patent statutes there has here been shown and described a preferred embodiment of the present invention. It is, however, to be understood that the invention is not limited to the precise construction herein shown, the same being merely illustrative of the principles of the invention. What is considered new and sought to be secured by

Letters Patent is:

I claim:

1. A device for temporarily uncurling the teeth of binders of the kind set forth for the purpose of allowing slotted sheets to be engaged over the teeth, comprising a bar having a line of upstanding posts for holding the binder between adjacent teeth thereof, a bar having a line of hooks with laterally directed ends which, in the initial positions of the bars, are located one closely in front of each post, the posts being of semi-circular cross section and the hooks having straight end portions which in the initial positions of the bars are located closely against the flat front faces of the respective posts, means for moving the first bar in the direction of its length for engaging the teeth of the binder over the hooks, and means for moving the second bar away from the first in a direction at right angles thereto.

2. A device for temporarily uncurling the teeth of binders of the kind set forth for the purpose of allowing slotted sheets to be engaged over the teeth, comprising manually actuated binder holding means including a line of holding posts behind which the spine portion of the binder can be engaged, hooks with which the teeth of the binder can be engaged, means supporting said binder holding means for sliding movement in the direction of the line of holding posts, means for moving the hooks horizontally at right angles to the said direction, a pedal operated mechanism for operating the hooks in one direction, and spring means urging said binder holding means and hooks in the opposite direction.

3. In a device for uncurling looped teeth of tubular binders, a binder supporting means, an uncurling means including projections for engaging the teeth of the binders, means supporting one of said means for movement relative to the other of said means whereby the projections are selectively locatable either in a position between the binder teeth or in a position within the binder teeth, means for locking one of said means in a position where said projections extend into the loops of the binder teeth, and additional hook member adapted to engage the end of the binder when the projections are in a position ex-

tending into the loops of the binder teeth, and means for moving one of said first two mentioned means laterally of the other of said first two mentioned means to uncurl the binder teeth.

4. A device for temporarily uncurling the teeth in tubular binders comprising first means for supporting a binder, second means including projections with which the teeth of the binder can be engaged, third means for supporting one of said first two mentioned means for movement relative to the other of said first two mentioned means so that the projections may be located selectively in a first position between the binder teeth and in a second position within the binder teeth, fourth means for urging the movable one of said two first mentioned means into a position where the projections are located between the binder teeth, fifth means for moving the movable one of said first two mentioned means laterally with respect to the other of said first two mentioned means to effect the uncurling of the binder teeth, spring urged means for locking said second means in said second position, stop means for preventing operation of the spring urged means and means responsive to the movement of the movable one of the first two mentioned means laterally away from the other of the first two mentioned means to disable said stop means and permit operation of said spring urged means to lock said projections into said second position.

5. In a device for uncurling the teeth of a comb-type tubular binder, a frame, first means for supporting a tubular binder with its longitudinal axis horizontally oriented, second means supporting said first means for horizontal movement on said frame in a direction parallel to the longitudinal axis of the tubular binder supported thereon, an uncurling means in proximity to said binder support means and carrying a row of binder teeth engaging projections aligned in said direction, said second means enabling said binder support means to be moved independently of said uncurling means from a position where said projections are between the binder teeth to a position where the binder teeth overlap the projections, spring means urging said second means into a position where the projections are between the binder teeth, stop means for preventing operation of the spring means, and means for moving said uncurling means horizontally and laterally of said first means for uncurling the binder teeth.

6. In a device for uncurling the teeth of a comb-type tubular binder, a frame, first means for supporting a tubular binder, second means supporting said first means for movement on said frame in a direction parallel to the longitudinal axis of the tubular binder supported thereon, an uncurling means in proximity to said binder support means and carrying a row of binder teeth engaging projections aligned in said direction, said second means enabling said binder support means to be moved independently of said uncurling means from a position where

said projections are between the binder teeth to a position where the binder teeth align with the projections in a direction at right angles to the longitudinal axis of the binder, spring means urging said second means into a position where the projections are between the binder teeth, spring urged means for locking said second means in said second position, stop means for preventing operation of the spring urged means and means to disable said stop means and permit operation of said spring urged means for moving said uncurling means laterally of said first means for uncurling the binder teeth.

7. In a device for uncurling the teeth of a comb-type tubular binder, a frame, first means for supporting a tubular binder, slidably mounted second means supporting said first means for movement on said frame in a direction parallel to the longitudinal axis of the tubular binder supported thereon, an uncurling means in proximity to said binder support means and carrying a row of binder teeth engaging projections aligned in said direction, said second means enabling said binder support means to be moved manually independently of said uncurling means from a position where said projections are between the binder teeth to a position where the binder teeth align with the projections in a direction at right angles to the longitudinal axis of the binder, spring actuated means for locking said second means in their moved positions means for moving said uncurling means laterally of said first means for uncurling the binder teeth and for returning the same to permit recurling of the binder teeth, and means for returning said second means to their initial positions.

8. A device for temporarily uncurling the teeth of binders of the kind set forth for the purpose of allowing slotted sheets to be engaged over the teeth, comprising binder holding means with which the spine portion of the binder can be engaged, hooks with which the teeth of the binder can be engaged, means supporting said binder holding means for sliding movement in the direction of the longitudinal axis of the binder, means for moving the hooks at right angles to the said direction for uncurling the teeth of the binder, and an additional fixed hook over which the end of the binder is engaged when the binder holding means and the binder are moved longitudinally of the latter.

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