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# LOOSE-LEAF RING BINDER WITH IMPROVED LOCK MECHANISM

## FIELD OF THE ART

This invention relates to a loose-leaf ring binder provided with a lock mechanism for removably retaining loose-leaf pages and other sheet-like materials by means of lock rings which can be opened and closed.

## BACKGROUND ART

A typical prior-art ring binder for loose-leaf pages has an elongated coverplate, whose longitudinal edges are bent inwardly to form support ribs, and a pair of opposing hookplates disposed within the coverplate. The opposing hookplates are joined in a hinged relationship along their inner edges and pivotably supported along their outer edges by the support ribs of the coverplate so that the hookplates are movable between an inwardly-bowed position toward the coverplate and an outwardly-bowed position away from the coverplate. At least two pairs of opposing ring halves are attached at their bottom ends to the hookplates and extend outwardly through openings made in the coverplate. As the hookplates move between the inwardly-bowed position and the outwardly-bowed position, the opposing ring halves move between their open and closed positions. In order to drive the hookplates between the inwardly-bowed and outwardly-bowed positions, pivotable manipulating levers are provided at both ends of the coverplate.

In this typical arrangement of the prior-art ring binder, when the manipulating levers are moved outward by hand, the lower end of the lever push the hookplates from the outwardly-bowed position toward the inwardly-bowed position, thereby causing the opposing

ring halves to open. With the hookplates in their outwardly-bowed position and the ring halves in their closed position, as the manipulating levers are pivoted further a short stroke inward, the bottom end of the levers work to constrain the ends of the hookplates against movement, thereby locking the plates in their outwardly-bowed position.

However, since the hookplates are rather long corresponding to the spine of the binder cover, even if the ends of the plates are held against movement to lock the ring members in the closed position, when the hookplates are subjected to an impact or other forces as in the case of the ring binder having been dropped onto the floor, the plates are likely to be twisted or otherwise distorted, thereby causing the ring halves to accidentally and temporarily open apart. In those ring binders which are not provided with the loose-leaf retaining rings at the ends of the hookplates, even if the hookplates are locked, the loose-leaf pages retained by the rings will disadvantageously slip off the binder.

In order to overcome this problem, it has been proposed to dispose under the hookplates a pair of control slides that respectively extend from the ends of the cover plate to the longitudinal center thereof so that the control slides may be movable back and forth in the axial direction. Provided at the outer end of each slide in operative engagement is a manipulating lever with a projection integrally formed thereon, so that as the slides are moved, the projections thereon move the hookplates from the outwardly-bowed position to the inwardly-bowed position or to lock them in the outwardly-bowed position.

However, with the proposed construction, in order to open the

binder rings, it is necessary to pull outward the manipulating levers at both ends of the slides simultaneously using both hands. The consumers who are accustomed to the widely circulating coventional ring binders with swingable levers may feel ill at ease with the operation of the pull-out type manipulating lever. Since both hands must be used, the proposed ring binder with the pull-out levers is not considered easy to use.

In the proposed slide lever type, unlike the swing lever type, there must be provided between the operating levers and the edge of the bound sheets of paper a space for accommodating a finger to exert a sufficient operating force on the levers, and two operating levers must be provided at both ends, so that the whole length of the ring binder mechanism becomes unreasonably long. In particular, with the sheets of paper having standard sizes, if a space for a finger to be inserted is provided between the edges of the sheets and each of the operating levers at both sides, the whole length of the mechanism must be made longer than the conventional swing lever type mechanism now wide in use, so that the files with such a long binder mechanism would stand irregular beside the conventional files.

DISCLOSURE OF THE INVENTION

In order to solve the above problem, an improved ring binder mechanism is provided. The ring binder mechanism in accordance with this invention comprises an elongated coverplate having inwardly bent retaining ribs along its longitudinal edges; a pair of hookplates disposed within the coverplate with their outer longitudinal edges supported by the retaining ribs of the coverplate and with their inner longitudinal edges joined together for pivotal

movement between an inwardly-bowed position toward the coverplate and an outwardly-bowed position away from the coverplate; one or more pairs of opposing ring halves attached at their bottom ends to the hookplates and extending outwardly through the coverplate for movement between open and closed positions as the hookplates move between the inwardly-bowed and outwardly-bowed positions; a control slide disposed along the hookplates for longitudinal movement between advanced and retracted positions; a manipulating lever pivotably provided at one longitudinal end of the coverplate; a motion translating means for converting the pivotal movement of the manipulating lever into a longitudinal movement of the control slide; actuating means provided at a suitable location on the control slide for driving the hookplates from the outwardly-bowed position into the inwardly-bowed position as the control slide is moved to one of its advanced and retracted positions; and locking means provided at a suitable location on the control slide so as to be brought into engagement with the hookplates for locking them in the outwardly-bowed position as the control slide is moved to the other of the two positions.

In one preferred embodiment, driving and locking of the hookplates in accordance with the slide movement are effected by means of projections integrally made on the control slide. Each of the projections extends upwardly into an opening cut out in the abutting inner longitudinal edges of the hookplates. A slanted cam surface is formed along the front or rear edge of each of the projections and provides the hookplate-actuating means, while a notch is formed in the rear or front edge thereof for operative engagement with the hookplates via the opening and provides the

hookplate-locking means. In order to more effectively prevent the loose-leaf pages retained in the binder from slipping off, the projections may preferably be provided in the vicinity of the binder rings which are located near the axial center of the hookplates. Further, with this construction, any malfunction or inaccurate operation of the hookplate-actuating and locking means due to deformation or displacement of the control slide may effectively be avoided by providing on the control slide a plurality of projections and a longitudinally elongated slot between the projections, with a fixing pin inserted through the slot slidably for guiding and holding the control slide.

For the purpose of accomplishing a compact design of the manipulating lever which, at the same time, is capable of an accurate and reliable operation, the manipulating lever may preferably include a vertical section pivotally supported on one end of the coverplate; a horizontal section extending horizontally outward from the bottom edge of the vertical section; an upright section extending upwardly from the outer edge of the horizontal section in parallel with the vertical section; and a manipulating section formed integrally at the upper end of the upright section. The motion translating means preferably comprises a through hole punched at a location between the horizontal and upright sections of the manipulating lever, and an upright extension formed integrally at the outer end of the control slide so as to extend into the through hole in operative engagement. A recess or hole may be provided in the vertical section of the lever for the purpose of peventing interference with the upright extension of the control slide and reducing the thickness of the coverplate to a minimum.

With this arrangement, as the manipulating lever is turned, it causes, via the motion translating means, the contorl slide to move toward the advanced or retracted position. The advancing or retracting movement of the control slide in turn causes, via its actuating cam surface, the hookplates to move from the outwardly-bowed position to inwardly-bowed position, thereby opening the opposing binder ring halves apart. The ring halves may be snap-closed by pressing them toward each other with fingers, bringing the hookplates in the inwardly-bowed position back to the original outwardly-bowed position. With the hookplates held in this outwardly-bowed position, as the manipulating lever is turned further inward, the control slide is retracted or advanced, causing the locking means of the slide ot lock the hookplates in their outwardly-bowed position. Thus, the hookplate are effectively prevented from moving away from the outwardly-bowed position to the inwardly-bowed position, keeping the ring halves locked in the closed state. Since the locking means uses the back and forth movements of the control slide to lock the hookplates, it is possible to provide the locking means at any location along the control slide other than the end of the hookplates. By locating the locking means in the neighborhood of the ring halves which would otherwise tend to open under impact or other external forces, undesired accidental slip-off of the retained loose-leaf pages is effectively prevented.

It should be pointed out that only one manipulating lever provided at one end of the coverplate is sufficient for obtaining the above unique results. In addition, this lever can be rotated back and forth by one hand thereby to open and close-lock the binder

rings. Also, it is possible with the manipulating swing lever to impart a large amount of actuating force to the control slide simply by pushing the lever back and forth with one finger on the upper end of the lever. This eliminates the need for securing a space between the swing lever and the side edges of the retained loose-leaf pages for inserting a finger or fingers, as is the case with the conventional ring binders equipped with the swing type manipulating levers. This, in turn, makes it possible to have the whole length of the present ring binder mechanism substantially equal to those of the conventional swing-lever type binder mechanisms.

With the unique and imporved mechanism of the invention, the binder rings, even if they are located away from both ends of the hookplates, can securely and reliably be locked in their closed state, thereby effectively preventing the retained loose-leaf pages from slipping off the rings under severse impact or other forces experienced as when the binder is accidentally dropped off onto the floor. The fact that, in order to open or close the binder rings, only one lever is to be rotated back and forth through a particular angle of rotation, instead of a pair of opposite levers being axially slid to and fro, makes the user feel easy to operate. Also since it is much easier to operate the swing lever with thumb-force than to operate the slidable lever, there is no need to provide a space for any finger between the lever and the side edge of the retained loose-leaf pages. As a result of this feature, the ring binder of the invention can be designed of much the same length as the conventional swing-lever type binders, avoiding any mismatch in longitudinal length with the prior-art binders currently in wide use.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a ring binder mechanism according to one embodiment of the invention;

Fig. 2 is an exploded perspective view of the ring binder mechanism shown in Fig. 1;

Fig. 3 is a plan view of the ring binder mechanism shown in Fig. 1;

Fig. 4 is a cross-sectional view of the ring binder mechanism taken along the line A-A of Fig. 3;

Fig. 5 is an enlarged partial view in cross section of the ring binder mechanism of Fig. 1 showing the operation of the mechanism;

Fig. 6 is an exploded perspective view of the ring binder mechanism according to another embodiment of the invention;

Fig. 7 is an exploded perspective view of the ring binder mechanism according to still another embodiment of the invention;

Fig. 8 is a perspective view of the ring binder mechanism according to still another embodiment of the invention;

Fig. 9 is a perspective view of the ring binder mechanism according to still another embodiement of the invention;

Fig. 10 is a perspective view of the ring binder mechanism according to still another embodiment of the invention;

Fig. 11 is a perspective view of the ring binder mechanism according to still another embodiment of the invention;

Fig. 12 is a perspective schematic view of the ring binder mechanism according to still another embodiment of the invention;

Fig. 13 is an exploded perspective view of the ring binder mechanism of Fig. 12;

Fig. 14 is a cross-sectional schematic view of the ring binder mechanism of Fig. 12; and

Fig. 15 is a cross-sectional view similar to Fig. 14 showing the operation of the mechanism.

BEST MODES OF EMBODYING THE INVENTION

Referring to now to Figs. 1-5, there is illustrated a ring binder mechanism 1 for loose-leaf pages and other sheet material in accordance with a first embodiment of the invention. The ring binder 1 essentially comprises a coverplate 2, a pair of hookplates 3A and 3B retained within the coverplate 2, and a plurality of pairs of opposing semicircular ring halves 4A and 4B. The entire ring binder 1 is attached to the back or spine 61 of a file cover 6 by means of fixing pins 5 at locations near both ends of the coverplate 2 and halfway between them.

The coverplate 2 is made of resilient metal in the form of a longitudinally elongated member curved away from the back 61 in transverse cross section. The longitudinal edges of the coverplate are inwardly folded or bent to form retaining ribs 21 for pivotally supporting the hookplates 3A and 3B.

The hookplates 3A and 3B are elongated strips made of relatively rigid metal. The inner edges of the plates are joined in a hinged abutting relationship such that the plates are positionable in an inwardly-bowed orientation toward the coverplate and an outwardly-bowed orientation away from the coverplate. With the hookplate assembly retained in place within the coverplate 2, the outer edges 32 of the hookplates 3A and 3B are supported by the retaining ribs 21 so that the hookplates are pivotable along the longitudinal axes defined by these outer edges.

A plurality of pairs of opposing semicircular ring halves 4A and 4B are affixed at their base ends 41 to the upper faces of the hookplates as by caulking. The opposing ring halves 3A-3B assume selectively an open or a closed position in relation to each other as the hookplates are moved between an outwardly-bowed position and an inwardly-bowed position. As shown clearly in Fig. 1, when the coverplate and hookplates are assembled together, the substantial portions of the ring halves 3A and 3B project out of the coverplate 2 through notches 22 cut out along its folded edges. Since the illustrated embodiment is for two-hole loose leaf pages, two pairs of opposing ring halves 4A and 4B are provided at locations close to the axial center of the hookplates 3A and 3B.

Located at one end of the coverplate 2 is a manipulating swing lever 7 for moving the hookplates between the inwardly-bowed and outwardly-bowed positions. A control slide 8, which is to be driven between a retracted position and an advanced position by the lever 7, is located below the hookplates 3A and 3B. Motion translating means 9 operatively connects the lever into a longitudinal movement of the control slide to and fro between its retracted and advanced positions.

The swing lever 7 has a vertical lip 71 which sits on a support bridge 23 stamped in one end of the coverplate 2. The swing lever 7 also has a horizontal extension 72 integral with the vertical lip 71, and an upright extension 73 which is integral with and extending upwardly from the horizontal extension 72 in parallel with the vertical lip 71. The upper end portion 74 of the upright extension 73 serves as a manipulating end. The swing lever 7 with these component sections is preferably stamped out from a metal sheet.

The motion translating means 9 comprises an aperture 91 made in the swing lever 7 at a location between the horizontal extension 72 and the upright extension 73, and a vertically extending or upright projection 92 formed integrally at the outer end of the control slide 8. In the assembled state, this upright projection 92 fits in operative engagement within the aperture 91 in the swing lever 7. In order to prevent interference with the upright projection 92, there is provided in the vertical lip 71 an opening 93, thereby reducing the thickness of the coverplate 2.

The control slides 8 is formed in the shape of an elongated planar member and has slots 81 made at locations close to one end of and at the middle of the coverplate 2. The fixing pins 5 mounted on the coverplate extend into the slots 81 so that the slide 8 is longitudinally slidable. Projections 82 are provided on the control slide 8 at locations opposite the central fixing pin 5. These projections 82 are inserted into slots 33 made in the abutting inner edges of the hookplates 3A and 3B. Each of the projections 82 has a slanted cam surface 83 formed on its front edge. The slanted cam surface 83 acts as a first engaging means to drive the hookplates from the outwardly-bowed orientation into the inwardly-bowed orientation when the control slide 8 is moved to its advanced position. The projections 82 also have a locking notch 84 cut out at the base of their rear edges, which functions to lock the hookplates 3A and 3B in the outwardly-bowed position. The upper portion 85 of the rear edge above the notch 84 is formed to extend parallel to the first slanted cam surface 83 and serve as a second cam surface.

With this arrangement, as the swing lever 7 is pivotally moved

outward to its horizontally disposed position as best shown in Fig. 5B, it advances the control slide 8 inward toward the left in Fig. 5B via the motion translating means 9. As the control slide advances, the first slanted cam surfaces 83 on the projections 82, through their operative engagement with the hookplates 3A and 3B, drive the hookplates away from the outwardly-bowed orientation to the inwardly-bowed orientation, thereby causing the ring halves 4A and 4B to move apart into an open position. As the opposing ring halves 4A and 4B are snap-closed by direct manipulation or the swing lever 7 is pivotally lifted inwardly and upwardly back to its upright position, the control slide 8 is moved back to its retracted position. The retracting control slide 8 causes the hookplates to move back to the outwardly-bowed orientation by means of the second cam surfaces 85, which pull down the abutting edges of the hookplates toward the control slide. This results in the closure of the ring halves 4A and 4B. In addition, if the swing lever 7 is further pivoted inward to its fully upright position as shown in Figs. 1 and 5A, the notch 84 formed in the rear edge of each of the projections 82 moves into engagement with one edge of the slot 33 thereby to hold the hookplates 3A and 3B in the outwardly-bowed orientation. The hookplates are thus locked against possible or accidental movement toward the inwardly-bowed position, which in turn keeps the opposing ring halves 4A and 4B locked in their closed state.

It is possible to form the engaging projections 82 with a notch 84 at suitable locations on the control slide 8. In the particular embodiment illustrated in Figs. 1 through 5, the projections are located in the vicinity of the two pairs of opposing ring halves

4A and 4B. This arrangement effectively protects the ring halves against any accidental opening, thus preventing loose-leaf pages (not shown) retained within the binder rings from dropping off. This is especially useful for the ring binder 1 of the present embodiment designed to hold two-hole loose-leaf pages since no binder rings are provided at locations close to both ends of the ring binder. It should be noted that, with the illustrated arrangement, the loose-leaf pages are effectively held by the binder rings even if the ring binder is accidentally dropped off or is subjected to unwanted external forces.

In addition, with the above described structure of the ring binder, the swing lever 7 provided at only one end of the coverplate 2 is sufficient for obtaining the desired loose-leaf retaining result. The simple mechanism of the lever facilitates easy and smooth manipulation thereof with one hand to open the opposing ring halves 4A and 4B for inserting and removing loose-leaf pages or to lock them in the closed position.

Moreover, in this embodiment, the slanted cam surface 83 integrally formed in the projection 82 of the control slide 8 acts on the hookplates 3A and 3B, so that the optimum operative relationship between the amount of the pivotal movement of the swing lever 7 and the required stroke of the hookplates can easily be obtained by suitably adjusting and selecting the inclination of the slanted cam surface 83. The simple structure of the mechanism also makes it easy to manufacture. In the present embodiment of the invention, the control slide 8 guided at the middle part thereof by the fixing pin 5 so as to be moved stably and the projections 82 with their actuating cam surfaces 83 and the locking notches 84

provided in proximity to and at both sides of the fixing pin 5 assure precise and correct operation of the projections 82 with respect to the hookplates 3A-3B as well as the ring halves 4A-4B, thereby enabling both opening and lock-closing of the binder rings precisely as intended without fail.

Further, in the unique arrangement of the swing lever mechanims, the manipulating lever 7 is made pivotally movable back and forth between the upright and horizontal positions, with the vertical extension 92 of the control slide 8 engaging in the aperture 91 which is formed between the horizontal extension 72 and the upright portion 93. This arrangement makes it possible for the swing lever 7 to start pushing the vertical extension 92 of the slide 8 forward at a point well before the pivot axis S of the lever (see Fig. 5A) and to continue pushing as far as the vertical extension 92 reaches a point well behind the pivot axis (see Fig. 5B). The result of this is that the swing lever can, without difficulty, have an effective operating stroke much longer than a similar lever which would start pushing action just under the pivot axis S. This in turn results in a control slide which is compact in size and capable of moving forward and backward with a longer stroke. In this connection, by providing in the vertical lip 71 of the swing lever 7 the opening 93 for prevention of interference with the upright extension 92, the motion translating means 9 can be made compact without making the whole coverplate 2 unreasonably bulky.

It should be noted that the present invention is not limited to the above-described ring binder mechanism for two-hole loose-leaf pages, but it can also be readily embodied as a ring binder with more than three pairs of opposing ring halves which is suitable for

retaining those loose-leaf pages with more than three holes.

As to the unique and improved manipulating lever mechanism of the invention, there are shown in Figs. 6 through 9 three other embodiments thereof different from the one described above. The manipulating lever mechanism of Fig. 6 has a swinging body 107 with a support lip 172 inwardly cut out and rolled backward for pivotal engagement with an elongated support bridge 123 formed in the coverplate 102. An outer cover piece 173 is attached onto the outer surface of the lever body 171. Provided between the bottom edge of the outer cover 173 and the horizontally bent lower section of the lever body 171 is a hole 191 into which the upright extension 192 of the control slide 108 extends for operative engagement.

In still another embodiment of the invention as shown in Fig. 7 an improved manipulating swing lever mechanism 207 is shown comprising a manipulating lever body 272 with a pair of support sections 271 provided along its lower edge. The support sections 271 are pivotally held within retaining pieces 222 of the end cover 221 which is to be fitted over the end of a coverplate 202. The manipulating lever mechanism 207 further includes a first section 273 which extends vertically downward from the manipulating lever body 272, a second section 274 which projects horizontally outward from the bottom edge of the first vertical section 273, and a third section 275 which extends vertically upward from the outer edge of the second horizontal section 274. A through hole 291 is formed at the border between the horizontal section 274 and the upright section 275 for accommodating an upright projection 292 of a control slide 208 in operative engagement.

In still another embodiment of the invention as shown in Fig.

8, a manipulating lever mechanism 307 for the ring binder is shown comprising a lever body 371, a horizontal section 372 extending horizontally inward from the lower edge of the lever body section 371, and an inclined section 373 suspended outwardly from the inner edge of the horizontal section 372. With this configuration of the lever mechanism, the lever body 371 is pivotally supported along the border between the horizontal section and the inclined section by an elongated support bridge 323 which is integrally formed in the coverplate 302. The lower end of the inclined section 373 projects into a through hole 391 made in the control slide 308 between the upright extension 392 and a curved bridge 393 for operative engagement.

In still another embodiment of the invention shown in Fig. 9, the manipulating lever 407 has a vertical section 471, whose upper edge portion 471a is to be pivotally supported in a curled support 423 integrally formed in one end of the coverplate 402. The manipulating lever 407 also includes a horizontal section 472 extending substantially horizontally from the bottom edge of the vertical section 471, an upright section 473 extending vertically from the outer edge of the horizontal section 472 in parallel with the vertical section 471, and a slight recess 474 for thumb-manipulation integrally provided in the upper portion of the upright section 473. The entire lever structure may be formed as a unitary component, for example, by stamping a metal sheet. The upper edge portion 471a in the form of an elongaged strip or bridge can integrally be made simply by punching out an opening 471b in the middle of the vertical section 471. The motion translating mechanism 409 of this embodiment is essentially similar to the one

incorporated in the embodiment of Fig. 2. It comprises an upright projection 492 extending upwardly from the outer end of the control slide 408 and a through hole 491, which is provided at the border between the horizontal section 472 and the upright section 473 of the manipulating lever, and in which the upright projection 492 engages for operative connection. Also in this embodiment, the opening 471b made in the vertical section 471 plays a unique role as recess means for avoiding operational interference between the lever 407 and the uprihgt projection 792.

The structure and arrangement for pivotally supporting the manipulating lever on the coverplate is not limited to those shown and described in detail hereinabove, but various other forms may be designed as long as they are capable of supporting the swing lever on either one of the longitudinal ends of the coverplate for pivotal movement.

Also, the upward projection on the control slide may be made in the form and design other than those described above. For example, it can take the forms illustrated in Figs. 10 and 11. In the embodiment shown in Fig. 10, the projection 482 is made integrally out of the control slide 408 by cutting a portion thereof and bending it slightly upward away from the planar surface of the slide. The upper surface 483 of the projection 482 serves as a slanted cam surface and the lower surface 484 as a locking surface. This projection is especially simple in construction and easy to manufacture.

In the embodiment shown in Fig. 11, an upward projection 582 is formed by cutting a portion of the control slide 508 and bending it to extend essentially perpendicularly with respect to the upper

surface of the slide. Thus, the projection 582 is generally similar in its shape to the projection 82 in the embodiment illustrated in Figs. 1 through 5.

Also, in the preferred embodiments of the invention described hereinabove, the control slide has been explained as being disposed behind the hookplates and on the inside of the spine of the cover of the loose-leaf binder. However, the present invention is in no way limited to this configuration, and may have the arrangement, for example, as schematically illustrated in Fig. 12 through Fig. 15. In the arrangement shown in Fig. 12 through Fig. 15, the control slide 608 is disposed between the coverplate 602 and the hookplates 603A and 603B. Integrally provided on the lower edge of an end plate 624 of the coverplate 602 is a curled support 625 for pivotally supporting the pivot axis 671 which is integrally formed on the bottom edge of the manipulating lever 607. A motion translating mechanism 609 in this embodiment comprises an extended end 608a of the control slide 608, which projects slidably through an opening 626 formed in the coverplate 602 adjacent the end plate 624, with the lever 607 being connected by a pivot 672 formed at its middle portion to the extended end 608a of the control slide 608 pivotally and slidably substantially perpendicularly thereto. In particular, the extended end 608a of the control slide 608 comprises an upright section 608b, a horizontal section 608c forwardly extending from the upper end of the upright section 608b, and a suspending section 608d downwardly extending from the forward end of the horizontal section 608c. The control lever 607 is formed at its middle with a pivot pin 672, which engages the space defined by the above-mentioned sections 608b, 608c and 608d so that the

lever 607 has its pin 672 connected to the slide pivotally and slidably substantially in the vertical direction. With this arrangement it is possible to have the distance between the middle and lower pivot pins 672 and 671 of the control lever 607 without increasing the height of the cover 602, so that the distance the control slide 608 is moved by rotating the lever 607 for an angle can be increased without difficulty. What is unique in this embodiment is the provision of a pair of downward projections 682 on the bottom surface of the slide control 608. The downward projections 682 extend through openings 633 formed along the abutting inner edges of the hookplates 603A, 603B. Each of the projections 682 has a slanted cam surface 683 formed on its rear edge. The slanted cam surface 683 acts as a first engaging means to drive the hookplates from the outwardly-bowed orientation to the inwardly-bowed orientation when the control slide 608 is moved to its retracted position. Each of the projections 682 also has a locking notch 684 made in its front edge, which functions to lock the hookplates 603A and 603B in the outwardly-bowed position. Fig. 14 shows the hookplates 603A and 603B being locked in the outwardly-bowed position. It should be noted that, in each projection, the locking notch 684 is located in the bottom end of the front edge, while the upper portion 685 of the front edge above the notch 684 is formed to extend generally parallel to the first slanted cam surface 683 and serve as a second cam surface. In Fig. 13, the ring halves 604A and 604B are not shown. The reference numerals 604a and 604b indicate the positions at which the ring halves are to be fixed.

With this arrangment, as the manipulating swing lever 607 is

pivotally moved outward as best shown in Fig. 15, it retracts the control slide 608 generally horizontally outward. As the control slide is retracted, the first slanted cam surfaces 683 on the projections 682, through their operative engagement with the hookplates 3A and 3B, work to drive the hookplates away from the outwardly-bowed orientation into the inwardly-bowed orientation, thereby causing the ring halves 604A and 604B to move apart into an open position. As the opposing ring halves 604A and 604B are snap-closed by direct hand manipulation or the lever 607 is moved inwardly toward the position shown in Fig. 14, the control slide 8 moves generally horizontally to its advanced position, with the second slanted cam surfaces 685 causing the hookplates to move downward into their outwardly-bowed orientation. This, in turn, brings the ring halves 604A and 604B into the closed state. In addition, if the manipulating lever 607 is further pivoted inward, the notches 684 formed in the projection 82 of the control slide 608 is brought into engagement with one edge of the opening 633 in the hookplates 603A and 603B as shown in Fig. 14, thereby to hold these hookplates in the outwardly-bowed orientation. The hookplates are thus locked against possible or accidental movement toward the inwardly-bowed position, which in turn keeps the opposing ring halves 604A and 604B locked in their closed state.

There are many other modifications and changes without departing from the scope of the invention.

POSSIBLE APPLICATIONS IN INDUSTRY

As mentioned above, the ring binder of the invention is used to removably bind perforated sheets of paper such as loose-leaf pages and phtograph mounts by means of the rings that can be

selectively opened and closed.

CLAIMS:

1. A loose-leaf ring binder comprising:

an elongated coverplate having inwardly bent retaining ribs along its longitudinal edges;

a pair of opposing hookplates disposed within said coverplate with their outer longitudinal edges supported by said retaining ribs of said coverplate and with their inner longitudinal edges joined together for pivotal movement between an inwardly-bowed position toward said coverplate and an outwardly-bowed position away from said coverplate;

at least a pair of opposing ring halves attached at their bottom ends to said hookplates and extending outwardly through openings made in said coverpalte for movement between an open and a closed position as said hookplates move between said inwardly-bowed and outwardly-bowed positions;

a single control slide disposed under said hookplates for longitudinal movement between an advanced and a retracted position in the axial direction of said hookplates;

a manipulating lever pivotably provided at one longitudinal end of said coverplate;

a motion translating means for converting a pivotal movement of said manipulating lever into a longitudinal movement of said control slide;

actuating means provided at a suitable location on said control slide for driving said hookplates from said inwardly-bowed position into said outwardly-bowed position as said control slide is moved to said advanced or retracted position; and

locking means provided at a suitable location on said control

slide to be brought into engagement with said hookplates for locking the same in said outwardly-bowed position as said control slide is moved into said retracted or advanced position.

2. The ring binder as defined in claim 1, wherein said hookplates include at least an opening formed along their abutting edges; and said control slide includes a projection formed in the vicinity of said ring halves located near the axial center of said hookplates so as to be extendable into said opening, said projection having actuating means in the form of a slanted cam surface provided along its front or rear edge surface, and locking means in the form of a notch provided along its rear or front edge surface.

3. The ring binder as defined in claim 2, wherein said control slide includes a plurality of projections; an elongated slot provided at a location between said plurality of projections so as to extend in the direction of movement of said slide; and a fixing pin extending in said slot for suitably guiding and holding said control slide.

4. The ring binder as defined in claim 1, 2 or 3, wherein said manipulating lever includes a vertical section to be pivotally supported on one end of said coverplate; a horizontal section extending horizontally outward from the bottom edge of said vertical section; an upright section extending upwardly from the outer edge of said horizontal section in parallel with said vertical section; and a manipulating section formed integrally at the upper end of said upright section; said motion translating means include a through hole formed at a location between said horizontal and upright sections of said manipulating lever, and a vertical extending portion formed integrally at the outer end of said control slide so as to extend into said through hole in operative engagement.

5. The ring binder as defined in claim 2, wherein said vertical section of said lever includes a recess or opening formed therein in order to prevent interference with said upright projection of said control slide.