RING BINDER MECHANISM

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 60/827,205, filed September 27, 2006, which is hereby incorporated by reference in its entirety.

BACKGROUND OF THE INVENTION

[0002] This invention relates to a ring binder mechanism for retaining loose-leaf pages, and in particular to an improved ring binder mechanism for opening and closing ring members and for locking closed ring members together.

[0003] A ring binder mechanism retains loose-leaf pages, such as hole-punched pages, in a file or notebook. It has ring members for retaining the pages. The ring members may be selectively opened to add or remove pages or closed to retain pages while allowing the pages to be moved along the ring members. The ring members mount on two adjacent hinge plates that join together about a pivot axis. An elongate housing loosely supports the hinge plates within the housing and holds the hinge plates together so they may pivot relative to the housing.

[0004] The undeformed housing is slightly narrower than the joined hinge plates when the hinge plates are in a coplanar position (180°). So as the hinge plates pivot through this position, they deform the resilient housing and cause a spring force in the housing that urges the hinge plates to pivot away from the coplanar position, either opening or closing the ring members. Thus, when the ring members are closed the spring force resists hinge plate movement and clamps the ring members together. Similarly, when the ring members are open, the spring force holds them apart. An operator may typically overcome this force by

manually pulling the ring members apart or pushing them together. Levers may also be provided on one or both ends of the housing for moving the ring members between the open and closed positions. But a drawback to these known ring binder mechanisms is that when the ring members are closed, they do not positively lock together. So if the mechanism is accidentally dropped, the ring members may unintentionally open.

[0005] Some ring binder mechanisms have been modified to include locking structure to block the hinge plates from pivoting when the ring members are closed. The blocking structure positively locks the closed ring members together, preventing them from unintentionally opening if the ring mechanism is accidentally dropped. The blocking structure also allows the housing spring force to be reduced because the strong spring force is not required to clamp the closed ring members together. Thus, less operator force is required to open and close the ring members of these mechanisms than in traditional ring mechanisms.

[0006] Some of these ring mechanisms incorporate the locking structure onto a control slide connected to the lever. The lever moves the control slide (and its locking structure) to either block the pivoting movement of the hinge plates or allow it. But a drawback to these mechanisms is that an operator must positively move the lever after closing the ring members to position the locking structure to block the hinge plates and lock the ring members closed. Failure to do this could allow the hinge plates to inadvertently pivot and open the ring members, especially if the mechanisms are accidentally dropped.

[0007] Some locking ring binder mechanisms use springs to move the locking structure into position blocking the hinge plates when the ring members close. Examples are shown in co-assigned U.S. Patent Application Nos. 10/870,801 (Cheng et

al.), 10/905,606 (Cheng), and 11/027,550 (Cheng). These mechanisms employ separate springs to help lock the mechanisms.

[0008] Movement of the locking structure is generally linear or translational, but the movement is actuator by pivoting of a lever. Accordingly, there is a need to transfer only the translational component of the lever's motion to the locking structure. There are solutions that have been proposed. For example, refer to co-owned U.S. Patent Application No. 10/870,801. However, there is a need to accomplish the transmission of motion with structure which is inexpensive to manufacture, simple in overall construction, and reliable in repeated operation.

SUMMARY OF THE INVENTION

[0009] A ring mechanism for retaining loose leaf pages generally comprises a housing, hinge plates supported by the housing for pivoting motion relative to the housing, and rings for holding the loose-leaf pages. Each ring includes a first ring member and a second ring member. The first ring member is mounted on a first hinge plate and moveable with the pivoting motion of the first hinge plate relative to the second ring member between a closed position and an open position. In the closed position, the two ring members form a substantially continuous, closed loop for allowing loose-leaf pages retained by the rings to be moved along the rings from one ring member to the other. In the open position, the two ring members form a discontinuous, open loop for adding or removing loose-leaf pages from the rings. An actuator is mounted on the housing for movement relative to the housing for causing pivoting motion of the hinge plates. A locking element releasably locks the closed ring members in a locked position and releases the closed ring members to move to the open position in an unlocked position. An intermediate

connector operably connects the locking element to the actuator. The intermediate connector is deformable during movement of the actuator.

[0010] In another aspect a ring mechanism for retaining loose leaf pages comprises a housing, hinge plates supported by the housing for pivoting motion relative to the housing, and rings for holding the loose-leaf pages. Each ring includes a first ring member and a second ring member. The first ring member is mounted on a first hinge plate and moveable with the pivoting motion of the first hinge plate relative to the second ring member between a closed position and an open position. In the closed position, the two ring members form a substantially continuous, closed loop for allowing loose-leaf pages retained by the rings to be moved along the rings from one ring member to the other. In the open position, the two ring members form a discontinuous, open loop for adding or removing loose-leaf pages from the rings. An actuator is mounted on the housing for movement relative to the housing for causing pivoting motion of the hinge plates. A travel bar is operatively connected to the actuator for movement of the travel bar relative to the housing. The travel bar has at least one locking element for releasably locking the closed ring members in a locked position and releasing the closed ring members to move to the open position in an unlocked position. An intermediate connector operably connects the travel bar to the actuator. The intermediate connector includes a hinge for allowing the intermediate connector to deform during movement of the actuator.

[0011] Other features of the invention will be in part apparent and in part pointed out hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 is a perspective of a notebook incorporating a ring binder mechanism of the present invention;

[0013] FIG. 2 is a top side perspective of the ring binder mechanism at a closed and locked position and with the lever in a first relaxed position;

[0014] FIG. 3 is an exploded perspective of the ring binder mechanism;

[0015] FIG. 4 is a bottom side perspective of the ring binder mechanism;

[0016] FIG. 5 is an enlarged fragmentary perspective of the ring mechanism of FIG. 2 with a portion of a housing broken away and with a ring member removed to show internal construction;

[0017] FIG. 6 is a fragmentary side elevation thereof with the housing and a hinge plate removed;

[0018] FIG. 7 is similar to FIG. 4 but with the ring mechanism at a closed and unlocked position and with the lever in a first deformed position;

[0019] FIG. 8 is similar to FIG. 6 but with the ring mechanism at the closed and unlocked position and the lever at the first deformed position;

[0020] FIG. 9 is a top side perspective of the ring mechanism at an open position;

[0021] FIG. 10 is a bottom side perspective thereof;

[0022] FIG. 11 is similar to FIG. 6 but with the ring mechanism at the open position and with the lever in a second deformed position;

[0023] FIGS. 12A and 12B are side views similar to FIG. 11 illustrating pivoting movement of the lever toward the closed and locked position and the concurrent deformation of a hinge of the intermediate connector;

[0024] FIG. 13 is a top side perspective of a travel bar;

[0025] FIG. 14 is a fragmentary side elevation of the travel bar of FIG. 13;

[0026] FIG. 15 is a top side perspective showing the lever disconnected from the travel bar;

[0027] FIG. 16 is a top side perspective similar to FIG. 15 but showing the lever connected to the travel bar;

[0028] FIG. 17 is a top side perspective of a travel bar having another configuration;

[0029] FIG. 18 is an exploded perspective thereof;

[0030] FIG. 19 is a fragmentary cross section taken along line 19-19 of FIG. 17;

[0031] FIG. 20 is a top side perspective of another embodiment of a ring binder mechanism at a closed and locked position and with the lever in a first relaxed position;

[0032] FIG. 21 is a bottom side perspective of the ring mechanism;

[0033] FIG. 22 is an exploded perspective of the ring binder mechanism;

[0034] FIG. 23 is an enlarged fragmentary perspective of the ring mechanism of FIG. 20 with a portion of a housing broken away and with a ring member removed to show internal construction;

[0035] FIG. 24 is an enlarged fragmentary side elevation of the ring mechanism with the housing and a hinge plate removed;

[0036] FIG. 25 is similar to FIG. 20 but with the ring mechanism at a closed and unlocked position and with the lever in a first deformed position;

[0037] FIG. 26 is a bottom side perspective thereof;

[0038] FIG. 27 is similar to FIG. 24 but with the lever at the first deformed position;

[0039] FIG. 28 is a top side perspective of the ring mechanism at the open position;

[0040] FIG. 29 is a bottom side perspective thereof;

[0041] FIG. 30 is similar to FIG. 24 but with the ring mechanism at the open position and with the lever in a second deformed position;

[0042] FIG. 31 is bottom side perspective of a travel bar;

[0043] FIG. 32 is an enlarged bottom side perspective of an intermediate connector of the travel bar of FIG. 31;

[0044] FIG. 33 is a top side perspective of a ring binder mechanism of still another embodiment;

[0045] FIG. 34 is a bottom side perspective thereof;

[0046] FIG. 35 is an exploded perspective of the ring binder mechanism;

[0047] FIG. 36 is an enlarged fragmentary perspective of the ring mechanism of FIG. 33 with a portion of a housing broken away and with a ring member removed to show internal construction;

[0048] FIG. 37 is a fragmentary side elevation thereof with the housing and a hinge plate removed;

[0049] FIG. 38 is a top plan thereof;

[0050] FIG. 39 is a bottom side perspective similar to FIG. 34 but with the lever at a first deformed position;

[0051] FIG. 40 is a fragmentary side elevation thereof with the housing and a hinge plate removed;

[0052] FIG. 41 is a top plan thereof;

[0053] FIG. 42 is similar to FIG. 33 but with the ring mechanism at the open position and with the lever in a second deformed position;

[0054] FIG. 43 is a bottom side perspective thereof;

[0055] FIG. 44 is a fragmentary side elevation of FIG. 42 thereof with the housing and a hinge plate removed;

[0056] FIG. 45 is a top plan thereof;

[0057] FIG. 46 is the side elevation of FIG. 44 illustrating pivoting movement of the lever to move the

mechanism to the closed and locked position and with the lever still deformed;

[0058] FIG. 47 is a top plan thereof;

[0059] FIG. 48 is the side view of FIG. 46 illustrating pivoting movement of the lever to move the mechanism to the closed and locked position and with an intermediate connector compressed;

[0060] FIG. 49 is a top plan thereof;

[0061] FIG. 50 is a perspective of the intermediate connector;

[0062] FIG. 51 is a top plan thereof;

[0063] FIG. 52 is a side view thereof; and

[0064] FIG. 53 is an end view thereof.

[0065] Corresponding reference numbers indicate corresponding parts throughout the views of the drawings.

DETAILED DESCRIPTION

[0066] Referring to the drawings, Figs. 1-16 show a ring binder mechanism generally at 101. In Fig. 1, the mechanism 101 is shown mounted on a notebook designated generally at 103. Specifically, the mechanism 101 is shown mounted on a spine 105 of the notebook 103 between a front cover 107 and a back cover 109 hingedly attached to the spine 103. The front and back covers 107, 109 move to selectively cover or expose loose-leaf pages (not shown) retained by the mechanism 101 in the notebook 103. Ring binder mechanisms mounted on notebooks in other ways or on surfaces other than a notebook, for example, a file, do not depart from the scope of this invention.

[0067] As shown in Fig. 1, a housing, designated generally at 111, supports three rings (each designated generally at 113) and a lever (broadly, "actuator," and designated generally at 115). The lever is attached to the housing via a pin 161. The rings 113 retain loose-leaf pages

on the ring mechanism 101 in the notebook 103 while the lever 115 operates to open and close the rings so that pages may be added or removed. Referring now also to Fig. 2, the housing 111 is shaped as an elongated rectangle with a uniform, roughly arch-shaped cross section, having at its center a generally flat plateau 117. A first longitudinal end of the housing 111 (to the right in Fig. 2) is generally open while a second, opposite longitudinal end (to the left in Fig. 2) is generally closed. Bent under rims, each designated at 121 (Fig. 4), extend lengthwise along longitudinal edges of the housing 111 from the first longitudinal end of the housing to the second longitudinal end. Mechanisms having housings of other shapes, including irregular shapes, or housings that are integral with a file or notebook do not depart from the scope of this invention.

[0068] The three rings 113 of the ring binder mechanism 101 are substantially similar and are each generally circular in shape (e.g., Fig. 2). The rings 113 are received through openings 177 in the housing 111. As shown in Figs. 1 and 2, the rings 113 each include two generally semi-circular ring members 123a, 123b formed from a conventional, cylindrical rod of a suitable material (e.g., steel). The ring members 123a, 123b include free ends 125a, 125b, respectively, formed to secure the ring members against transverse misalignment (relative to longitudinal axes of the ring members) when they are closed together (see, Fig. 1). The rings 113 could be D-shaped as is known in the art, or otherwise shaped within the scope of this invention. Ring binder mechanisms with ring members formed of different material or having different cross-sectional shapes, for example, oval shapes, do not depart from the scope of this invention.

[0069] As also shown in Fig. 3, the ring mechanism 101 includes two substantially identical hinge plates, designated generally at 127a, 127b, supporting the ring members 123a,

123b. respectively. The hinge plates 127a, 127b are each generally elongate, flat, and rectangular in shape and are each somewhat shorter in length than the housing 111. Four corresponding cutouts 129a-d are formed in each of the hinge plates 127a, 127b along an inner edge margin of the plate. A finger 131 extends longitudinally away from a first end of each of the hinge plates 127a, 127b (to the right in Fig. 3). The fingers 131 are each narrower in width than the respective hinge plates 127a, 127b and are positioned with their inner longitudinal edges generally aligned with the inner longitudinal edges of the plates. The purpose of the cutouts 129a-d and fingers 131 will be described hereinafter. The lever 115 and hinge plates 127a, 127b can broadly be referred to as an "actuation system."

[0070] Referring to Figs. 2 and 3, the lever 115 includes a grip 133, a body 135 attached to the grip, and an upper lip 136 and lower lip 137 attached to the body. The grip 133 is somewhat broader than each of the body 135, upper lip 136, and lower lip 137 (Fig. 2) and facilitates grasping the lever 115 and applying force to move the lever. In the illustrated ring mechanism 101, the body 135 is formed as one piece with the grip 133 for substantially conjoint movement with the grip. The body 135 may be formed separately from the grip 133 and attached thereto without departing from the scope of the invention.

[0071] As shown in Figs. 3 and 6, the lower lip 137 of the lever 115 is attached to the body 135 by a flexible bridge 139 (or "living hinge") formed as one piece with the body and lower lip. A mechanism having a lever in which a bridge is formed separately from a body and/or lower lip for connecting the body and lower lip does not depart from the scope of the invention. The bridge 139 is generally arch-shaped and defines an open channel 141 between the lower lip 137 and body 135. The lower lip 137 extends away from the body 135 at the

bridge 139 and channel 141 in general parallel alignment with the upper lip 136 and defines a C-shaped space between the body 135 and lower lip. It is envisioned that the lever 115 is formed from a resilient polymeric material by, for example, a mold process. But the lever 115 may be formed from other materials or other processes within the scope of this invention. A ring mechanism having a lever shaped differently than illustrated and described herein does not depart from the scope of the invention.

[0072] With reference to Figs. 3, 13, and 14, the ring mechanism includes a travel bar 145 and an intermediate connector 167 formed as one piece with the travel bar. The travel bar 145 includes an elongate locking portion 148 and three locking elements 149 spaced along a bottom surface of the locking portion. More specifically, one locking element 149 is located adjacent each longitudinal end of the locking portion 148, and one is located toward a center of the locking portion. The elongate locking portion 148 and locking elements 149 may be broadly referred to as a "locking system."

[0073] The locking elements 149 of the illustrated locking portion 148 are each substantially similar in shape. As shown in Figs. 13 and 14, each locking element 149 includes a narrow, flat bottom 153, an angled forward edge 155a, recessed lateral sides 155b (only one side is visible), and a rearward extension 156. In the illustrated embodiment, the locking elements 149 each have a generally wedge shape. The angled edges 155a of the locking elements 149 may engage the hinge plates 127a, 127b and assist in pivoting the hinge plates down. In the illustrated embodiment, the locking elements 149 are formed as one piece of material with the travel bar 145 by, for example, a mold process. But the locking elements 149 may be formed separately from the travel bar 145 and attached thereto without departing from the scope of the invention. Additionally, locking elements with

different shapes, for example, block shapes (e.g., no angled edges or recessed sides), are within the scope of this invention.

[0074] The intermediate connector 167 of the ring mechanism 101 includes a connector portion 168 at one end of the travel bar 145, and a flexible hinge 170 between the locking portion 148 and the connector portion 168. The connector portion 168 is formed with an elongate opening 168a for receiving a mounting post 179a, 179b through the opening and allowing the travel bar 145 to move lengthwise of a housing 111 relative to the mounting post during operation of the mechanism 101. The connector portion 168 connects to the lever 115 at an upper lip 136 of the lever by a mounting pin 171 so that pivoting movement of the lever produces translational movement of the travel bar 145. The flexible hinge 170 of the travel bar 145 is thin and has a generally flat "U" shape when relaxed. The flexible hinge 170 is capable of flexing, or bowing, to a more pronounced "U" shape to allow the connector portion 168 of the travel bar 145 to move relative to and toward the locking elements 149.

[0075] Figures 2 and 4-7 illustrate ring members 123a, 123b of the ring mechanism 101 in a closed and locked position. The locking elements 149 of the locking portion 148 are positioned adjacent respective cutouts 129a-d and above the hinge plates 127a, 127b generally aligned with the hinge 175. The locking elements 149 are substantially out of registration with the cutouts 129a-d. The flat bottom surfaces 153 rest on an upper surface of the plates 127a, 127b and the rearward extensions 156 extend through each respective cutouts 129a-d adjacent forward, downturned tabs 182 of the plates. Together, the locking portion 148 and locking elements 149 oppose any force tending to pivot the hinge plates 127a, 127b upward to open the ring members 123a, 123b (i.e., they lock the ring members closed).

[0076] To open the ring members 123a, 123b, the lever 115 pivots outward and downward (in a clockwise direction as indicated by the arrow in Fig. 6). As shown in Fig. 8, the lower lip 137 engages bottom surfaces of hinge plates 127a, 127b and the upper lip 136 pulls the travel bar 145 and thereby locking elements 149 toward an unlocked position. The lever 115 is formed to pull the locking elements 149 from the locked position before pivoting the hinge plates 127a, 127b to open ring members 123a, 123b. More specifically, the locking elements 149 are moved into registration over the respective cutouts 129a-d of the hinge plates 127a, 127b before the plates pivot. The flexible hinge 170 may slightly elongate under the pulling tension from the upper lip 136, but for the most part it substantially retains its generally shallow "U" shape. The flexible bridge 139 between a body 135 of the lever 115 and the lower lip 137 of the lever flexes and tensions. The open channel 141 between the body 135 and lower lip 137 closes and the body moves into engagement with the lower lip. Continued opening movement of the lever 115 causes the body 135 to conjointly pivot the lower lip 137, pushing the hinge plates 127a, 127b upward through the co-planar position. This moves the ring members 123a, 123b to an open position as shown in Figs. 9-11.

[0077] To close the ring members 123a, 123b and return the mechanism 101 to the locked position, an operator can pivot the lever 115 upward and inward. As shown in Fig. 12A, this moves the upper lip 136 of the lever 115 into contact with the upper surfaces of the hinge plates 127a, 127b (if it is not already in contact with the hinge plate upper surfaces). The upper lip 136 engages the upper surfaces of the hinge plates 127a, 127b and begins pushing them downward, but the spring force of the housing 111 resists the initial hinge plate movement. The travel bar 145 may initially move forward with the movement of the upper lip 136 to seat forward

edges 155a of the locking elements 149 against tabs 182 of the hinge plates 127a, 127b (if the locking elements are not already seated). As the lever 115 continues to pivot, the seated locking elements 149 resist further movement of the travel bar 145. As shown in Fig. 12A, the flexible hinge 170 of the travel bar 145 begins to bow (or deflect downward to a more pronounced "U" shape) to allow the lever 115 to continue to pivot. This relative movement between the connector portion 168 of the intermediate connector 167 and the locking elements 149 causes tension in the flexible hinge 170. At this instant in the closing movement, if the lever 115 is released before the hinge plates 127a, 127b pivot downward through their co-planar position (i.e., before the ring members 123a, 123b close), the tension in the flexible hinge 170 will automatically recoil (and push) the lever back to its starting position.

[0078] As shown in Fig. 12B, continued closing movement of the lever 115 causes the upper lip 136 to pivot the interconnected hinge plates 127a, 127b downward. Once the hinge plates 127a, 127b pass just through the co-planar position, the housing's spring force pushes them downward, closing the ring members 123a, 123b. As the hinge plates 127a, 127b pivot downward, the angled forward edges 155a of the locking elements 149 allow the locking elements and travel bar 145 to move to the left (as viewed in Fig. 12B). The flexible hinge 170 remains deformed and tensioned during this initial movement. Once the hinge plates 127a, 127b clear the angled forward edges 155a of the locking elements 149, they no longer operate to resist forward movement of the locking elements and travel bar 145. The locking elements 149 now move conjointly with the lever 115 to their locked position behind the hinge plates 127a, 127b. At the same time, the bridge 139 flattens and the tension in the flexible hinge 170 recoils and further pushes the locking elements 149 to the

locked position. The bridge 139 and flexible hinge 170 return to their relaxed positions. The mechanism 101 is again in the position shown in Fig. 6.

[0079] In this ring mechanism 101, the flexible hinge 170 of the intermediate connector 167 allows the lever 115 to pivot to move the hinge plates 127a, 127b downward to close the ring members 123a, 123b before pushing the locking elements 149 to the locked position behind the hinge plates. It also provides a flexible connection between the connector portion 168 and locking portion 148. The flexible hinge 170 receives slight vertical movement from the lever 115 (through the connector portion 168) when the lever pivots and shields the locking portion 148 from the vertical movement so that the locking elements 149 remain stationary (vertically) during operation.

[0080] In the embodiment of Figs. 1-16, the illustrated flexible hinge 170 of the intermediate connector 167 is formed as one piece with the locking portion 148 and the connector portion 168 of the travel bar 145 generally between the locking portion and the connector portion. However, as shown in Figs. 17-19, a flexible hinge 170' may be formed as a separate piece from a locking portion 148' of the travel bar 145' and a connector portion 168' of a intermediate connector 167' and connected thereto. The flexible hinge 170' is formed with hook-shaped ends 170a' that are received in openings 150', 152' in the locking portion 148' and in the connector portion 168', respectively. The flexible hinge 170' may be connected to the locking portion 148' and connector portion 168' differently within the scope of the invention. In operation, the flexible hinge 170' of Figs. 17-19 is bowed similarly to the flexible hinge 170 of Figs. 1-16.

[0081] It is understood that a flexible hinge may be shaped differently than illustrated herein and still be within the scope of the invention. For example, the flexible hinge

may be resiliently collapsible in accordion fashion to accommodate the longitudinal movement of the connector portion relative to the locking portion.

[0082] It is contemplated that each part of the travel bar an intermediate connector is made from a plastic material, but they may be made from another suitable material such as a metal. In addition, different parts of the travel bar may be formed from different materials, but it is to be understood that the flexible hinge is formed from spring steel, plastic, or other flexible material.

[0083] Figures 20-32 illustrate a ring binder mechanism 201 according to yet another embodiment. The mechanism 201 is similar to the mechanism 101 previously described and illustrated in Figs. 1-19, but does not include a U-shaped hinge 170. Parts of the ring mechanism 201 corresponding to parts of the ring mechanism 101 of Figs. 1-16 are designated by the same reference numerals, plus "100". In this embodiment, an intermediate connector 267 is formed as one piece with the travel bar 245, but is connected by a living hinge 272 that permits pivoting of the intermediate connector relative to the travel bar but does not deform lengthwise as does the U-shaped flexible hinge 170, 170' of Figs. 1-19. Thus, in this mechanism 201, the living hinge 272 converts the pivoting motion of a lever 215 to translational movement of the travel bar 245, but does not allow a lever 215 to pivot to close hinge plates 227a, 227b before moving a travel bar 245 and locking elements 249 to a locked position. To close the ring members 223a, 223b, they can be manually pushed together.

[0084] As shown in Figs. 22, 31, and 32, the illustrated travel bar 245 of this embodiment includes an elongate locking portion 248 having three locking elements 249. An intermediate connector 267 is hingedly connected to the locking portion. The locking elements 249 of the locking portion 248 are shaped similar to the locking elements 49 of

the previously described mechanism 1. The intermediate connector 267 is formed with an elongate opening 267a for receiving a mounting post 279a, 279b through the opening and allowing the travel bar 245 to move relative to the mounting post during operation of the mechanism 201. As shown in Figs. 23 and 25, the intermediate connector 267 connects to a flattened lever 215 (i.e., a lever with a flattened grip as compared to the lever 115 of the previous mechanism (Figs. 1-19)) at an upper lip 236 of the lever. A cross bar 267a of the intermediate connector 267 is captured by a hook 236a in the upper lip 236 of the lever 215.

[0085] Opening operation of this mechanism 201 is similar to the opening operation of the mechanism 101 previously described (Figs. 1-19). Figures 20-25 illustrate the ring mechanism 201 in a closed and locked position. To open the ring members 223a, 223b, the lever 215 pivots outward and downward (in a counter-clockwise direction as indicated by the arrow in Fig. 24). As shown in Fig. 27, a lower lip 237 of the lever 215 begins pushing upward on bottom surfaces the hinge plates 227a, 227b and the upper lip 236 of the lever pulls the travel bar 245 and locking elements 249 to an unlocked position in registration with openings 229a, 229b, 229c in the hinge plates. The hinged connections between the locking portion 248 of the travel bar 245 and the intermediate connector 267 and between the intermediate connector and the lever 215 allow the intermediate connector to pivot slightly upward relative to the locking portion to accommodate slight upward movement of the lever as it pivots. A flexible bridge 239 between a body 235 of the lever 215 and the lower lip 237 of the lever flexes and tensions. An open channel 241 between the body 235 and lower lip 237 closes and the body moves into engagement with the lower lip. Continued opening movement of the lever 215 causes the body to conjointly pivot the lower lip 237, pushing the hinge plates 227a, 227b upward through

the co-planar position. This moves the ring members 223a, 223b to an open position as shown in Figs. 28-30. To close the ring members 223a, 223b and return the mechanism 201 to the locked position, an operator pushes the ring members together.

[0086] In this ring mechanism 201, the hinged connection between the intermediate connector 267 and the travel bar 245 shields the locking elements 249 from the slight vertical movement of the lever 215 during pivoting operation of the lever. The hinge 272 provides a pivoting connection between the intermediate connector 267 and locking portion 248 that allows the intermediate connector to pivot upward and downward relative to the locking portion and locking elements 249.

[0087] Figures 33-53 illustrate a ring binder mechanism 301 according to still yet another embodiment. The mechanism 301 is similar to the mechanism 101 previously described and illustrated in Figs. 1-19 but includes an intermediate connector 366 different than the intermediate connector 167 of Figs. 1-19. Parts of the ring mechanism 301 corresponding to parts of the ring mechanism 101 of Figs. 1-19 are designated by the same reference numerals, plus "200". In this embodiment, the intermediate connector 366 is a bent wire having a first end 366a, a second end 366b, and an arcuate portion 366c intermediate the first and second ends (Figs. 50-53). The second end 366b includes a small gap 366e between the beginning and ending points of the wire.

[0088] As shown in Figs. 35, 37, and 38, the illustrated travel bar 345 of this embodiment includes an elongate locking portion 348 having three locking elements 349. The intermediate connector 366 is connected to the locking portion 348. More specifically, the locking portion 348 includes a slot 360 and a tab 362 adjacent the slot. The second end 366b of the intermediate connector 366 is received in the slot 360 and a portion of the intermediate connector adjacent the

second end thereof extends under the tab 362. Besides the slot 360 and tab 362, the locking elements 349 of the locking portion 348 are shaped similar to the locking elements 149 of the previously described mechanism 101. As shown in Figs. 36-38, the intermediate connector 366 connects to a flattened lever 315 at an upper lip 336 of the lever. The first end 366a of the intermediate connector 366 fits within apertures 336a in the upper lip 336 of the lever 315 so that pivoting movement of the lever produces translational movement of the travel bar 345.

[0089] Opening operation of this mechanism 301 is similar to the opening operation of the mechanisms 101, 201 previously described (Figs 1-32). Figures 34 and 36-38 illustrate the ring mechanism 301 in a closed and locked position. To open ring members 323a, 323b, the lever 315 pivots outward and downward (Figs. 39-41). As shown in Fig. 39, a lower lip 337 of the lever 315 begins pushing upward on bottom surfaces of hinge plates 327a, 327b and the upper lip 336 of the lever pulls the travel bar 345 and locking elements 349 to an unlocked position in registration with openings 329a, 329b, 329c in the hinge plates. The connection between the locking portion 348 of the travel bar 345 and the intermediate connector 366 allows the intermediate connector to pivot slightly upward relative to the locking portion to accommodate slight upward movement of the lever 315 as it pivots. A flexible bridge 339 between a body 335 of the lever 315 and the lower lip 337 of the lever flexes and tensions. An open channel 341 between the body 335 and lower lip 337 closes and the body moves into engagement with the lower lip (Fig. 40). Continued opening movement of the lever 315 causes the body to conjointly pivot the lower lip 337, pushing the hinge plates 327a, 327b upward through the co-planar position. This moves the ring members 323a, 323b to an open position as shown in

Figs. 42-45. The arcuate portion 366c does not substantially deform during movement.

[0090] To close the ring members 323a, 323b and return the mechanism 301 to the locked position, an operator can pivot the lever 315 upward and inward. As shown in Figs. 46 and 47, this moves the upper lip 336 of the lever 315 into contact with the upper surfaces of the hinge plates 327a, 327b (if it is not already in contact with the hinge plate upper surfaces). The upper lip 336 engages the upper surfaces of the hinge plates 327a, 327b and begins pushing them downward, but the spring force of a housing 311 of the mechanism 301 resists the initial hinge plate movement. The travel bar 345 may initially move forward with the movement of the upper lip 336 to seat forward edges 355a of the locking elements 349 against tabs 382 of the hinge plates 327a, 327b (if the locking elements are not already seated). As the lever 315 continues to pivot, the seated locking elements 349 resist further translational movement of the travel bar 345.

[0091] As shown in Fig. 47, the arcuate portion 366c of the intermediate connector 366 compresses (or bows outward to a more pronounced arcuate shape) to allow the lever 315 to continue to pivot. This relative movement between the lever 315 and the locking elements 349 causes tension in the intermediate connector 366. At this instant in the closing movement, if the lever 315 is released before the hinge plates 327a, 327b pivot downward through their co-planar position (i.e., before the ring members 323a, 323b close), the tension in the intermediate connector 366 will automatically recoil (and push) the lever back to its starting position. In this ring mechanism 301, the compressibility of the intermediate connector 366 allows the lever 315 to pivot to move the hinge plates 327a, 327b downward to close the ring members 323a, 323b before pushing the locking elements 349 to the locked position behind the hinge plates.

[0092] As shown in Figs. 48 and 49, continued closing movement of the lever 315 causes the upper lip 336 to pivot the interconnected hinge plates 327a, 327b downward. Once the hinge plates 327a, 327b pass just through the co-planar position, the housing's spring force pushes them downward, closing the ring members 323a, 323b. As the hinge plates 327a, 327b pivot downward, the angled forward edges 355a of the locking elements 349 allow the locking elements and travel bar 345 to move to the left (as viewed in Figs. 48 and 49). Once the hinge plates 327a, 327b clear the angled forward edges 355a of the locking elements 349, they no longer operate to resist forward movement of the locking elements and travel bar 345. The locking elements 349 now move conjointly with the lever 315 to their locked position behind the hinge plates 327a, 327b. At the same time, the tension in the intermediate connector 366 caused by it being compressed releases and further pushes the locking elements 349 to the locked position. The bridge 339 and intermediate connector 366 return to their relaxed positions. The mechanism 301 is again in the position shown in Fig. 43.

[0093] When introducing elements of the ring binder mechanisms herein, the articles "a", "an", "the" and "said" are intended to mean that there are one or more of the elements. The terms "comprising", "including" and "having" and variations thereof are intended to be inclusive and mean that there may be additional elements other than the listed elements. Moreover, the use of "forward" and "rearward" and variations of these terms, or the use of other directional and orientation terms, is made for convenience, but does not require any particular orientation of the components.

[0094] As various changes could be made in the above without departing from the scope of the invention, it is intended that all matter contained in the above description

and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A ring mechanism for retaining loose leaf pages, the mechanism comprising:

a housing;

hinge plates supported by the housing for pivoting motion relative to the housing;

rings for holding the loose-leaf pages, each ring including a first ring member and a second ring member, the first ring member being mounted on a first hinge plate and moveable with the pivoting motion of the first hinge plate relative to the second ring member between a closed position and an open position, in the closed position the two ring members forming a substantially continuous, closed loop for allowing loose-leaf pages retained by the rings to be moved along the rings from one ring member to the other, and in the open position the two ring members forming a discontinuous, open loop for adding or removing loose-leaf pages from the rings;

an actuator mounted on the housing for movement relative to the housing for causing pivoting motion of the hinge plates;

a locking element for releasably locking the closed ring members in a locked position and releasing the closed ring members to move to the open position in an unlocked position;

an intermediate connector operably connecting the locking element to the actuator, the intermediate connector being deformable during movement of the actuator.

2. A ring mechanism as set forth in claim 1 wherein the intermediate connector deforms in a direction generally transverse to a lengthwise extension of the housing.

3. A ring mechanism as set forth in claim 1 wherein the intermediate connector is formed as one piece with the locking element.

4. A ring mechanism as set forth in claim 1 further comprising a travel bar supporting the locking element, the travel bar and intermediate connector being formed as one piece.

5. A ring mechanism as set forth in claim 1 wherein the intermediate connector comprises a hinge and a connector portion.

6. A ring mechanism as set forth in claim 5 wherein the hinge has a generally flat "U" shape when relaxed and is capable of bowing to a more pronounced "U" shape to allow the intermediate connector to move relative to the locking elements.

7. A ring mechanism as set forth in claim 5 wherein the hinge comprises a hinge member, the hinge member being formed as a separate piece from the connector portion.

8. A ring mechanism as set forth in claim 7 wherein the hinge member is formed as a separate piece from the locking element.

9. A ring mechanism as set forth in claim 8 wherein the hinge member is formed with generally hook-shaped ends, and the connector portion and locking element include openings for receiving the hook-shaped ends therein.

10. A ring mechanism as set forth in claim 1 wherein the locking element and intermediate connector are made from plastic.

11. A ring mechanism as set forth in claim 1 wherein the intermediate connector comprises a wire connector having ends and an arcuate portion intermediate the ends.

12. A ring mechanism for retaining loose leaf pages, the mechanism comprising:

a housing;

hinge plates supported by the housing for pivoting motion relative to the housing;

rings for holding the loose-leaf pages, each ring including a first ring member and a second ring member, the first ring member being mounted on a first hinge plate and moveable with the pivoting motion of the first hinge plate relative to the second ring member between a closed position and an open position, in the closed position the two ring members forming a substantially continuous, closed loop for allowing loose-leaf pages retained by the rings to be moved along the rings from one ring member to the other, and in the open position the two ring members forming a discontinuous, open loop for adding or removing loose-leaf pages from the rings;

an actuator mounted on the housing for movement relative to the housing for causing pivoting motion of the hinge plates;

a travel bar operatively connected to the actuator for movement of the travel bar relative to the housing, the travel bar having at least one locking element for releasably locking the closed ring members in a locked position and releasing the closed ring members to move to the open position in an unlocked position;

an intermediate connector operably connecting the travel bar to the actuator, the intermediate connector including a hinge for allowing the intermediate connector to deform during movement of the actuator.

13. A ring mechanism as set forth in claim 12 wherein the intermediate connector and travel bar are formed as one piece.

14. A ring mechanism as set forth in claim 13 wherein the hinge of the intermediate connector has a generally flat "U" shape when relaxed and is capable of bowing to a more pronounced "U" shape to allow the intermediate connector to move relative to the locking elements.

15. A ring mechanism as set forth in claim 12 wherein the intermediate connector comprises a wire connector having ends and an arcuate portion intermediate the ends.

16. A ring mechanism as set forth in claim 12 wherein the intermediate connector has a first length in a relaxed position, and a second length different than said first length during pivoting of the actuator.

17. A ring mechanism as set forth in claim 12 wherein the actuator is pivotable in a direction toward the housing, the intermediate connector being adapted to contract in length during pivoting of the actuator toward the housing.

18. A ring mechanism for retaining loose leaf pages, the mechanism comprising:

a housing;

hinge plates supported by the housing for pivoting motion relative to the housing;

rings for holding the loose-leaf pages, each ring including a first ring member and a second ring member, the first ring member being mounted on a first hinge plate and moveable with the pivoting motion of the first hinge plate relative to the second ring member between a closed position and an open position, in the closed position the two ring members forming a substantially continuous, closed loop for allowing loose-leaf pages retained by the rings to be moved along the rings from one ring member to the other, and in the open position the two ring members forming a discontinuous, open loop for adding or removing loose-leaf pages from the rings;

an actuator mounted on the housing for movement relative to the housing for causing pivoting motion of the hinge plates;

a travel bar operatively connected to the actuator for movement of the travel bar relative to the housing, the travel bar having at least one locking element for releasably locking the closed ring members in a locked position and releasing the closed ring members to move to the open position in an unlocked position;

an intermediate connector operably connecting the travel bar to the actuator; and

a living hinge for allowing the intermediate connector to pivot during movement of the actuator.

19. A ring mechanism as set forth in claim 18 wherein the living hinge interconnects the intermediate connector and the travel bar.

20. A ring mechanism as set forth in claim 19 wherein the intermediate connector, travel bar, and living hinge are formed as one piece.