[54] DISPENSERS FOR DISPENSING BOWED OPEN SPRING RETAINING RINGS PROVIDED WITH LOCKING PRONGS

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UNITED STATES PATENTS
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[57] ABSTRACT

A dispenser of the swinging magazine-rail type according to U.S. Pat. No. 2,900,107, for dispensing bowed "open" springmetal retaining rings having locking prongs projecting from the convex side or face thereof, as are known in the art and sold under the registered trademark "Prong-lock," and which is characterized by its ability to accept for dispensing a supply of such rings arranged in stack or column formation but disposed in relatively turned-over or upside-down relation, as results in their convex sides facing and their locking prongs pointing in the direction of ring-column feed. Such disposition of the locking prongs, because of the unique shaping and edge configuration thereof, is favorable to an applicator or assembly tool by which the dispenser is "operated" (which tool may take the form either of a hand-push applicator tool according to U.S. Pat. No. 2,835,028 or of a plier-type ring gripping and assembly tool according to that disclosed and claimed in applicant's co-pending U.S. Pat. application Ser. No. 292,100, filed Sept. 25, 1972), upon gripping the endmost ring of the ring column then in the "dispense ready" position, also applying a lateral push force on the one or two of the rings of the column next above the so-gripped endmost ring, which force is transmitted by said one or two of the so-pushed rings to the magazine rail, thereby imparting limited swinging motion to said rail which is utilized in separating and freeing said endmost ring from the rings of the column above same for relatively easy withdrawal from said dispenser.

8 Claims, 14 Drawing Figures
3,827,598

DISPENSERS FOR DISPENSING BOWED OPEN SPRING RETAINING RINGS PROVIDED WITH LOCKING PRONGS

INTRODUCTION

This invention relates to improvements in dispensers for spring retaining rings and more particularly to an improved dispenser for dispensing bowed, "open" spring retaining rings of the type having locking prongs projecting from the convex side thereof, known in the art as "Prong-Lock" rings, as disclosed and claimed in the U.S. Pat. to Wurzel No. 2,775,698, dated July 24, 1956.

By "dispensing" as used herein is meant the sequential operations of picking off and withdrawing each endmost or lowermost ring then in a "dispense-ready" position, of a supply thereof disposed in stack or column formation on a magazine rail, by proper cooperation therewith of a so-called ring applicator or assembly tool, i.e., a tool serving also to assemble each so dispensed ring in a shaft or spindle groove.

BACKGROUND OF THE INVENTION

While my prior U.S. Pat. No. 2,900,107, dated Aug. 18, 1959, discloses and claims a prototype dispenser for dispensing "Prong-Lock" rings, continuing experience with same has given indication that the operation thereof was unreliable because of the tendency of rings having locking prongs which project from the convex face thereof to lock to each other and/or to make extremely difficult the swinging movement of the magazine rail which is requisite to the freeing of each endmost ring then in the "dispense-ready" position from the ring or rings immediately to the rear or above same, when) magazine in column or stack formation on a rail with their prongs projecting relatively upwardly or in the direction from which the rings are feeding.

OBJECTS OF THE INVENTION

The present invention contemplates and provides a dispenser of so-called "Prong-Lock" rings which is more reliable and certain in its operation and substantially less likely to jam than a dispenser according to my aforementioned U.S. Pat. No. 2,900,107. The improved operating characteristics of a dispenser as herein proposed are achieved in large part by a disposition of the "Prong-Lock" rings of the column or stack to be dispensed such that the locking prongs thereof, rather than projecting relatively into or upwardly toward the ring next above same, instead point in the opposite direction, i.e., relatively downwardly or in the direction of ring-column feed.

Yet another objective of the invention is that of providing a dispenser capable of dispensing so-called "Prong-Lock" retaining rings in single or one-at-a-time sequence as needed, upon proper cooperation therefor of an applicator according to the U.S. patent to Wurzel No. 2,835,028, dated May 20, 1958, or of a specially designed pronged-assembly tool according to my application Ser. No. 292,100, filed Sept. 25, 1972, for example.

Yet another and more specific object of the invention is the provision of a dispenser for dispensing bowed "Prong-Lock" type retaining rings in one-at-a-time sequence from a supply thereof arranged in column or stack formation feeding along a magazine rail and ori-
assembly supporting upright 16 projecting therefrom, the latter in turn directly supporting the aforementioned magazine- rail assembly generally designated 18.

As seen in FIGS. 3 and 4, said magazine rail-assembly comprises a longitudinally extending mounting bracket 20, to one longitudinal side edge of which a strap-form rail part 22 and a substantially half-round rail member 24 are fixedly secured as by rivets or pins 24r. As usual, said half-round rail member 24 has diameter only slightly less than that of the circles of the inner edges of the “Prong-Lock” rings of the particular size thereof being dispensed at any one time, and the strap-rail part 22 is dimensioned so that its longitudinal side edges provide oppositely projecting side flanges which are adapted to fit into the inner-edge notches n1, n2, (FIG. 1) characterizing said “Prong-Lock” rings, thereby to maintain the column or stack thereof magazine and feeding along the half-round rail component 24 in substantially exact alignment. It will be self-evident also that by disposing the magazine rail ‘on edge’ and faced as in FIG. 4, the rings of the column or stack thereof are uniformly oriented with their gaps aligned and opening in sideward direction as in FIG. 5. It will be understood also that the column or stack of rings magazine on the rail 22, 24 will feed downwardly by gravity (assuming that the inclination of the magazine rail is such as provides for the ring-column feeding therealong by gravity) as each endmost or lowermost ring is withdrawn therefrom, which latter constitutes a full dispensing operation.

Bodily feed movement of the ring column down (along) the length of the magazine rail 22, 24 disposes each then lowermost or endmost ring of said column in a “dispense-ready” position, i.e. a position in which it is clear of the corresponding end of the magazine rail although still axially aligned with the rings of the ring column or stack thereof magazine thereon, in which it is maintained until, upon being gripped by an applicator or assembly tool, it is withdrawn from the dispenser by substantially horizontal backing-off movement which the workman imparts to said applicator or assembly tool. It is a feature of the invention that, in the aforementioned “dispense-ready” position assumed by each lowermost (endmost) ring, it is turned so that its locking prongs p1, p2 point and the convex side of its bowed body portion faces away from the magazine rail and that said position is determined by the ring having moved against the rear side (face) of a dispenser front-plate 30 affixed as by machine screws 32a, 32b to the front edge of the aforementioned sub-base 14 so as to extend upwardly therefrom in a plane at a substantial right angle to the axis of said magazine rail 22, 24.

Illustratively, said front-plate 30 is so formed and/or configured through a horizontal zone portion thereof disposed symmetrically to the sides of the horizontal line of withdrawal of each ring in the aforementioned “dispense-ready” position by the applicator or assembly tool as, in the first instance, to accommodate both for the bowing or convexity of said ring body and for its projecting locking prongs; secondly, to hold said ring substantially immobile against the thrust force engendered as an incident to that outer-edge portion of said ring which is disposed opposite its gap being gripped as is necessary for its withdrawal; and thirdly, to assist in guiding the applicator or assembly tool throughout its ring-gripping and subsequent ring-withdrawing strokes or movements.

More particularly, the aforementioned formation and/or configuration of said rear face of the front plate 30 includes a parallel-sided slot 36 which extends horizontally from one vertical side edge 36a of said front plate into the front-plate proper for a distance permitting movement of the applicator or assembly tool therealong to a position enabling its ring-gripping means to grip that outer arcuate-edge portion of said endmost ring which is disposed diametrically opposite its gap.

Furthermore, the rear-face zones of the front-plate which extend (top-and-bottom) along said parallel-sided slot, i.e. the rear-face zones designated 36a, 36b, have curvature substantially complementary to the convex curvature of the bowed bodies of the rings of the particular size thereof being dispensed.

Additional features of the aforesaid rear-face formation and/or configuration include those of the width of the slot 36, i.e. the relatively vertical distance between its parallel edges or sides, being such that the locking prongs of the endmost ring assumed to have moved against the front plate and maintained thereagainst with its convex side or face nested in the concave rear-face portions 36a, 36b of said front-plate, are accommodated in said slot; and of the total height of said concavely-shaped surface portions 36a, 36b being less than the overall width dimension of said nested ring by an amount such that the ring side-wings w1 and w2 (FIG. 1) extend above and below, respectively, said concave rear-face portions 36a, 36b, thus to engage and ride on the planar rear-face portions of the front-plate disposed directly above and below said concave rearface portions thereby to stabilize and steady said ring.

Finally, the inner end of the slot 36 is narrowed as at 36a and said narrowed end is bounded top and bottom by short-length concave rear-face portions 36a’, 36b’ which are separated from said outer-end concave rear-face portions by spaced, vertically extending abutment shoulders 36a”, 36b”, which together provide means for maintaining the endmost ring relatively immobile against the thrust force which the applicator or assembly tool exerts thereon as an incident to the tool gripping the ring preliminary to withdrawing (dispensing) same.

The aforementioned machine screws 32a, 32b also function to secure an elongated reversely turned L-block 32 flush against the front side of the frontplate 30, at a level thereof as to form with said front face a transversely extending tool guidechannel T, for a ring applicator and/or pick-off and assembly tool, which ever is employed to “operate” the dispenser.

As forecast supra, the aforesaid magazine rail assembly 20, 22, 24, rather than being fixedly mounted to the dispenser sub-base 14, is mounted for limited swinging movement throughout a relatively horizontal arc from and to its normal position in which it is best shown in FIG. 3. More particularly, said magazine-rail assembly is pivotally connected to said sub-base at its end remote from its ring-dispensing end, as by a pivot bolt 40, for limited swinging movement, the extent of which is determined by the pin-and-slot means generally designated 42, 44.

The operating principle of the dispenser according to the present invention is as follows: Referring to FIG. 9 illustrative thereof and which assumes the part designated A thereof to be a hand applicator which is being
actuated (pushed) in left-to-right direction along the guide channel $T$, and in so doing to grip between its under surface and an associated leaf spring $B$ the endmost i.e. the "assembly-ready" ring $R$ of a column of so-called "Prong-Lock" rings magnetized on a swingably mounted magazine rail $D$ and being disposed in "upside down" position so that their locking prongs point relatively downwardly, it will be understood that sustained push force applied as by hand to the applicator will impart a corresponding push force on the one (or two) rings $R_i$ of the column positioned immediately beneath said push force ring $R$, which latter is effectively held in place, i.e. against substantial rightwise movement, by the engagement of the gapspaced edge portions $e_1$, $e_2$ of its ring body against the fixedposition abutment or shoulder $S$ (as provided by the abovedescribed vertical abutment shoulders $361$, $362$).

The aforesaid push force applied to the one or two ring(s) $R_i$ of the column which is or are disposed immediately above the stationarily held endmost or "dispense-ready" ring $R$ is transmitted by said ring(s) to the magazine rail $D$ which, by virtue of its pivotal mounting, can swing and in fact swings more or less freely to the right (in the direction of the arrow) responsive to said sustained push force. And since the downwardly pointing locking prongs $p_1$, $p_2$ of said rings have an approximate $30^\circ$ angle in a direction which aids such swinging movement, the ring(s) $R_i$ of the column thereof immediately above said held-in-place endmost ring $R$ will readily and quite easily separate and free themselves from said endmost ring, whereupon said already gripped endmost ring $R$ is readily drawable by the applicator, such completing a ring dispensing operation.

In sharp contrast to the just described simple, easily-practiced ring dispensing operation, FIG. 10 illustrates identical dispenser structure but with the rings of the column thereof magnetized on the rail $D$ turned "right-side-up," i.e. so that their convex sides face and their locking prongs point upwardly or in the direction from which the ring column feeds, as was heretofore conventional. From this view, it will be seen that the magazine rail $D$ is held stationary against any substantial swinging movement in response to the applicator A moving against the one or more rings $R_i$ immediately above the endmost ring $R$, since now the $90^\circ$ edges of the upwardly pointing prongs $p_1$, $p_2$ of said endmost ring effectively block such swinging movement. Stated otherwise, the magazine rail $D$, in addition to the endmost ring $R$ of the column thereof, is in practical effect held against partaking of the limited swinging movement which is required for each ring-dispensing operation, by the blocking effect exercised on the rail end ($90^\circ$) edges by the prongs of the said endmost ring of the column thereof of magazine on the rail $D$.

Means other than and/or supplementing that illustrated and described supra for imparting positive swinging movement to the dispensing end of said magazine rail assembly may profitably be employed. For example and referring to FIG. 3 illustrating alternate means serving such purpose, the mounting bracket $20$ of the magazine rail assembly $20$, $22$, $24$ is formed with an integral finger-like extension $50$ which projects into the path of travel, i.e. into the aforementioned tool guide channel $T_r$, of the extended end of the elongate body member of a plier-type ring gripping and assembly tool, as disclosed and claimed in my aforementioned application for U.S. Letters Patent Ser. No. 292,100 said finger $50$ being engageable by said extended end of said tool substantially simultaneously with the ring in the "dispense-ready" position being gripped by said tool for withdrawal. Bodily return movement of the magazine rail assembly $20$, $22$, $24$ to its initial position following each such positive actuation thereof, takes place upon release of the energy stored in a coil spring $60$ as an incident to the magazine rail assembly being positively swinging in clockwise direction.

Relative to the mention earlier made in the foregoing to the feature of the upper edge of the vertical upright $12$ on which the magazine rail is affixed being inclined to the horizontal thereby to support the sub-base $14$ and magazine rail assembly $20$, $22$ and $24$ at a corresponding inclination, the inclination so referred to is $45^\circ$ (approx.) to the horizontal which was arrived at as one enabling gravity feed of the column of the rings being dispensed downwardly along the length of the magazine rail proper under the weight of the ring column, as each lower-most ring was dispensed. However, should it be determined that gravity feed alone is impractical for columns of rings of the smaller sizes, for example, such may be supplemented by an elongate coil spring means, all as illustrated in FIG. 11.

FIGS. 12, 13 and 14 illustrate a dispenser employing only spring means for feeding the ring column along a magazine rail, which latter is horizontally disposed. Obviously, the spring feed means according to FIGS. 12-14 form will of necessity be capable of applying substantially greater spring bias on the ring column than the spring feed means of FIG. 11, since the FIG. 11 spring means is designed only to supplement the gravity feed provided in the first instance by magazine rail inclination.

It will be observed also that FIG. 14 illustrates the magazine-rail assembly to have been actuated to the limit of its swinging movement in direction away from normal, by the just prior-acted engagement of the extended body-part of a plier-type ring pick-off and assembly tool according to my aforementioned allowed application Ser. 292,100, filed Sept. 25, 1972, with finger $F_1$ provided on the bracket-part $20$ of said assembly and which extends into the tool-guide channel $T_r$.

Without further analysis, it will be appreciated that a dispenser as disclosed in the foregoing description and accompanying drawing figures represents a workable practical and effective advance in the particular art and accordingly I make the following claims therefor.

What is claimed is:

1. A dispenser for dispensing bowed open retaining rings having locking prongs projecting from their convex sides and being arranged in column formation on an elongate magazine rail along which the column feeds as each endmost ring is dispensed and wherein the rings of the column thereof are turned "upside down" so that their convex sides face and their locking prongs point in the direction of ring-column feed, comprising: a horizontal base member, an elongate magazine rail mounted on said base and said mounting enabling limited swinging movement of an end thereof towards which the ring column feeds as aforesaid, a front plate affixed to the base forwardly of the swinging end of said magazine rail, said front plate having on its side which is disposed towards said rail-end horizon-
tally extending surfaces which are shaped complementally to the convex sides of the "upside down" rings of the column thereof and which are located so as to accommodate the bowed body of each endmost ring disposed beyond the end of the magazine rail, said front plate further having a tool-part and ring-prong accommodating slot extending inwardly from a side edge thereof and being bounded top and bottom by said surfaces, means secured against the forward side of the front plate and providing therewith a generally horizontal tool-guide channel, means for maintaining the endmost ring of the column thereof stationary against sustained thrust force effective thereon by a ring-gripping and withdrawing tool moving relatively inwardly along said channel preliminary to ring withdrawal, means for imparting limited swinging movement to the swingable end of the magazine rail from and to its normal position, and means responsive to swinging movement imparted to the rail end in direction away from its normal position for freeing the ring(s) of the column disposed immediately above said gripped endmost ring from said latter ring, as in turn permits of ready withdrawal of said endmost ring with corresponding withdrawal movement of said tool along the tool guide channel.

2. A dispenser according to claim 1, wherein the magazine rail is disposed at an angle to the horizontal such that the ring column feeds downwardly therealong by gravity as each endmost ring is withdrawn therefrom as aforesaid.

3. A dispenser according to claim 1, wherein the magazine rail is disposed at an angle of approximately 45° to the horizontal as provides for gravity feed of the ring column therealong.

4. A dispenser according to claim 2, wherein spring means supplementing the gravity feed of the ring column is provided.

5. A dispenser according to claim 1, wherein the magazine rail is horizontally disposed and spring means is provided for feeding the ring column therealong.

6. A dispenser according to claim 1, wherein said means for maintaining the endmost ring stationary against the thrust force effective thereon by the ring-gripping and withdrawing tool as aforesaid comprises vertically disposed abutments, positioned to be engaged by edge portions of said endmost ring moving thereagainst in response to initial application of tool thrust force thereto.

7. A dispenser according to claim 1, wherein said means for imparting limited swinging movement to the swingable end of the magazine rail includes an end surface of the tool and an approximately 30 percent slope of the downwardly pointing prongs of said endmost ring.

8. A dispenser according to claim 1 wherein said means for imparting limited swinging movement to the swingable end of the magazine rail comprises finger means extending into the path of movement of an extended-length body part of a plier-type ring gripping and assembly tool moving into and along the tool guide channel, said finger means in turn being a part fixedly connected to and movable with said magazine rail.

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