Feb. 28, 1956 C. H. KREBS ET AL 2,736,477

PACKAGING APPARATUS

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FIG. 1.

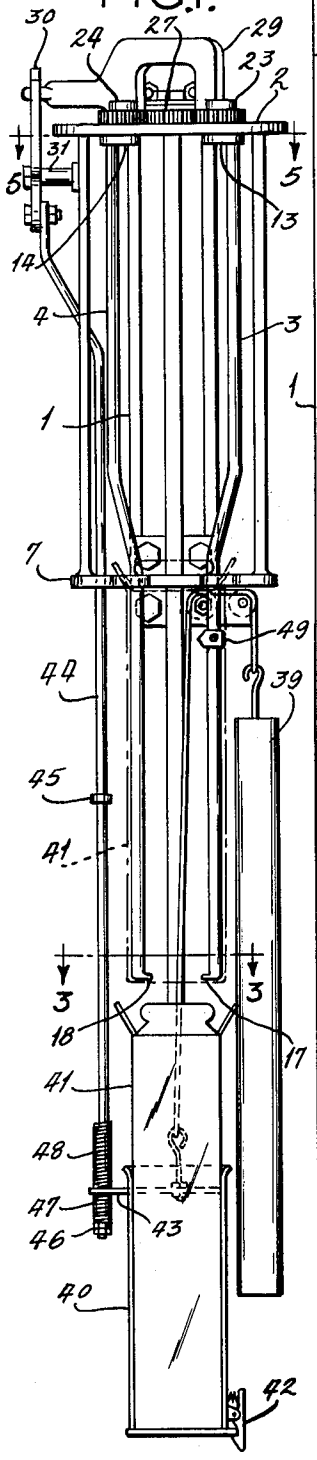


FIG. 2.

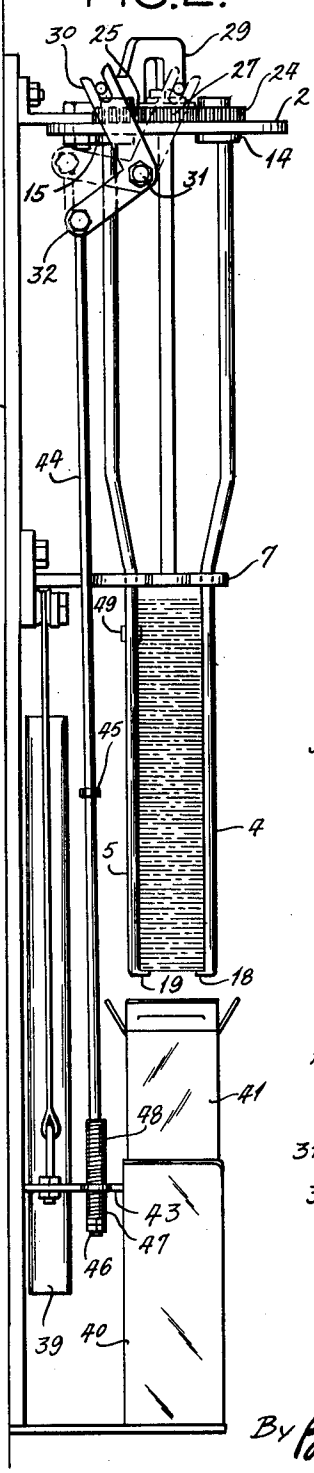


FIG. 3.

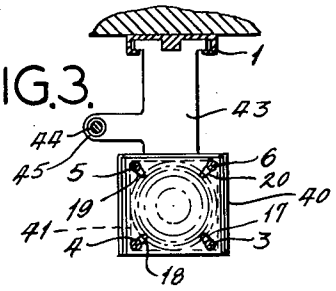


FIG. 4.

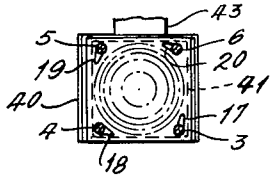


FIG. 5.

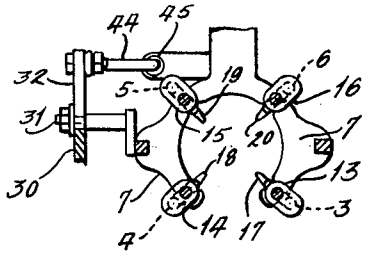
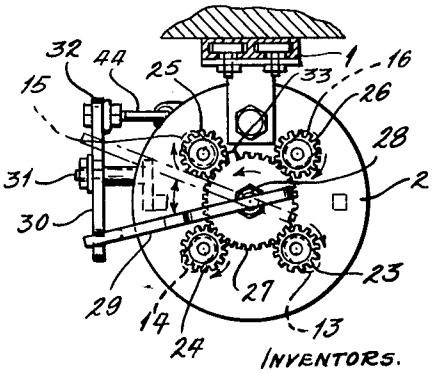


FIG. 6.



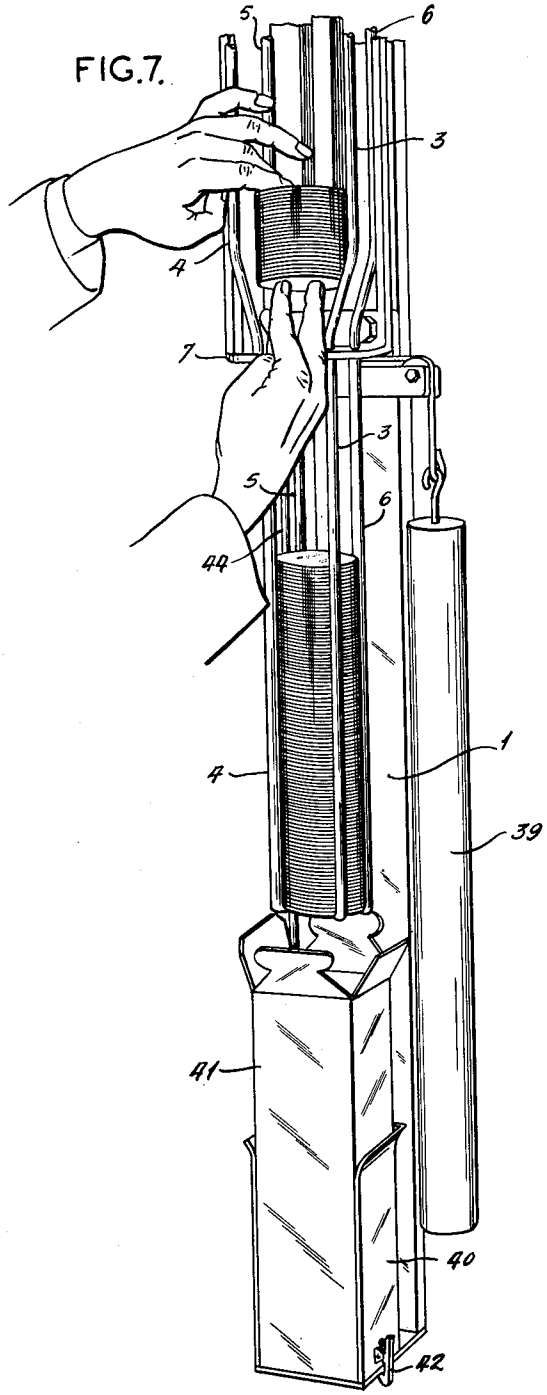
INVENTORS.
CHARLES H. KREBS
JOHN D. FRANKS
By Brumm & Sutherland
ATTORNEYS

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FIG. 7.



INVENTOR.
CHARLES H. KREBS
JOHN D FRANKS
By Brauninga and Sutherland,
ATTORNEYS.

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PACKAGING APPARATUS

Charles H. Krebs and John D. Franks, Chicago, Ill., assignors to Atlas Boxmakers, Inc., Chicago, Ill., a corporation of Delaware

Application August 18, 1952, Serial No. 305,034

12 Claims. (Cl. 226—14)

This invention relates generally to carton-filling machinery, and has particular reference to the packaging of "tin can" ends and other similar round objects.

In the manufacture of can ends, it is customary to die cut the blanks from a sheet of metal, press concentric rings into the blank, roll the chime at the edge of the blank, and apply a sealing compound in the valley of the chime. Thereafter, the lids are inspected and deposited upon a conveyor which moves the same under a suction canopy for the evaporating of solvent from the sealing compound. The latter operation is a time-consuming one made necessary only by the manner in which the can ends have heretofore been packed.

The conventional method of packing such can ends involves stacking them in multiples of a hundred or more, and then enclosing the stacks either in a cylindrical container of inside diameter just sufficient to accommodate the diameter of the can ends, or as in most cases, hand-wrapping the same with paper to form a cylindrical package of sufficient strength to withstand the rigors of handling. In either event, the can ends are closely confined by the container, but it has been discovered that if such can ends be packed in polygonal containers, the corners thereof provide sufficient air space that the excess solvent will evaporate from the sealing compound while packed, and without necessitating use of the suction-canopied conveyor above described.

The packing of stacks of can ends in a polygonal container without previous wrapping is an awkward operation, particularly when the container is proportioned to accommodate two hundred or more ends. The smaller the diameter of the ends, and the higher the stack, the more awkward the operation becomes, because the can ends tend to turn edgewise or completely over in the process of being dropped axially into an open-ended polygonal container. Side opening polygonal containers minimize this difficulty; but, unless special precautions are taken, do not afford the requisite protection in transportation and other handling.

The object of the present invention, generally stated, is to provide an apparatus for packaging can ends and other similar round objects in open-ended polygonal containers.

Another object of the invention is to provide an apparatus wherein can ends and similar round objects may be stacked in desired multiple, inspected while so stacked, and charged into a container while remaining in stacked relationship, and while in predetermined multiple sufficient to fill the container.

In accordance with this invention, round discs, such as can ends, are packed in polygonal containers by preliminarily stacking them in predetermined multiple between, and confining them by, parallel guide rods which are arranged in spaced relationship immediately outside of the margin of the discs. The lower ends of at least two of such rods are provided with projections normally pointed toward the geometrical axis of the stack, and extending in that direction so as to terminate within the

margin of the discs. In their normal position, said projections sustain the weight of the stack of discs, but the projections are retractable to permit escape of the stack of discs in the relative downward direction from between the guide rods, and without disturbing the stacked relationship of the discs.

It is desirable that the discs, while confined between the guide rods be exposed and maneuverable for visual inspection, and consequently the space between the rods is preferably left open at least at the front.

The invention also contemplates the provision of a container supporting member arranged in axial alignment with the discs as stacked between the guide rods. The container is arranged to telescope over the lower ends of the guide rods and the stack of discs confined thereby, with the guide rods occupying the corners of the polygonal container on the outside of the disc periphery. Such telescoping may be accomplished either by moving the open top container upwardly over the lower ends of the guide rods or by moving the guide rods (and the confined stack of discs) downwardly into the container. When the telescoped relationship has been achieved, the projections on the lower ends of the guide rods are retracted to release the discs from confinement with the rods, and the guide rods are then withdrawn from the container, or the container (with the stack of discs) withdrawn from the guide rods. To render the device semi-automatic in operation, the projection retracting mechanism is coordinated with the relative movement between the guide rods and the container, so that the retracting mechanism is actuated when the desired telescopic relationship is achieved.

In order that the stack of discs and guide rods be movable downwardly into the carton or the carton be movable upwardly over the stack and rods, it is essential that the retracting mechanism be disposed so as not to foul the telescopic movement of the carton. While the retracting mechanism can be arranged to actuate automatically upon contact between the lower ends of the guide rods and the bottom of the carton, it is preferred to provide the retracting mechanism at the top of the rods and to flare the rods apart in their upper reaches sufficiently to pass the full diameter of the discs. Hence a charging space is provided between the lower reaches of the rods (which confine the stack) and the retracting mechanism at the top of the rods, and such charging space is dimensioned to receive the discs in sub-stacks amounting to a handful.

Other objects and advantages of the invention will be apparent to those skilled in the art when the following description is read in connection with the accompanying drawings, in which:

Figure 1 is a view in front elevation of an apparatus constructed in accordance with the present invention for the packing of can ends in open ended containers, and showing in dotted lines the relationship of the container with the other parts when the can ends are deposited therein;

Figure 2 is a view in side elevation of the apparatus shown in Figure 1;

Figure 3 is a sectional view taken along line 3—3 of Figure 1;

Figure 4 is a sectional view taken along line 3—3 of Figure 1, but showing the relationship of the parts when the can ends are released for deposit in the container;

Figure 5 is a sectional view taken along line 5—5 of Figure 1;

Figure 6 is a plan view of the apparatus shown in Figure 1;

Figure 7 is a photograph illustrating the manner of charging the machine with can lids and maintaining a stack thereof in position preparatory to filling a container.

Upon a suitable frame 1, the several parts of the apparatus are carried.

In the embodiment shown in the drawings, the apparatus is constructed and arranged for packaging can ends in multiples of about two hundred in open-ended containers of square cross section, but it will be understood that containers of polygonal shapes other than square-ended containers and of lengths such as to accommodate more or less can ends may be utilized.

At the upper end of the frame 1, a head plate 2 is provided, and a plurality of rods 3, 4, 5, and 6 depend downwardly therefrom. The rods 3, 4, 5, and 6 are journaled in a plate 7 which spaces the rods in such manner that the inner increments of the several rods (below plate 7) will lie immediately outside the periphery of a can end or stack thereof upon which the device is to operate. The outer increments of the several rods (below plate 7) are, however, positioned so as to lie within the inside corners of a container into which the can ends are to be packed. Preferably, the interior cross-sectional dimensions of the container are substantially the same as the diameter of the can ends to be packed therein, so that when in packed position, the can ends are tangent with the several side walls of the container at the center lines of the latter. In these circumstances, the diameter of the several rods 3, 4, 5, and 6 must, therefore, be limited so that they can be accommodated within the corners of the container and outwardly of the periphery of the can ends packed therein.

Below plate 7 rods 3, 4, 5, and 6 have portions extending in parallel spaced relationship, and at the location above described with reference to the can ends and the container. Above plate 7, the several rods are linearly offset from the parallel portions thereof below plate 7. Such offsetting increases the spaced relationship between the forwardmost rods 3 and 4, so as to provide a charging space of greater width than the diameter of the can ends to be handled. The upper extremities of the rods 3, 4, 5, and 6 are respectively journaled in cranks 13, 14, 15, and 16 (shown clearly in Figure 5), whose axes of rotation are in alignment with the lower parallel portions of rods 3, 4, 5, and 6, with which they are respectively connected. The throw of the respective cranks 13, 14, 15, and 16 is equal to the amount of the lineal offset of the several rods as between the portions thereof connected with the cranks, and the portions thereof which project below plate 7.

The portion of the rods below plate 7 constitute an open frame work within which a stack of can ends may be confined in axial alignment, with sufficient freedom of movement to permit maneuvering them circumferentially for inspection while so confined. Movement of the stack of can ends downwardly below the lower extremities of rods 3, 4, 5, and 6 is, however, obstructed by projections 17, 18, 19, and 20 at the lower ends of the respective rods. Said projections normally extend from the rods in the general direction of the geometrical axis of the stack of confined ends; said projections essentially extending inwardly to a point within the periphery of the can ends being handled.

Rotation of the rods 3, 4, 5, and 6 about the axis defined by plate 7 and cranks 13, 14, 15, and 16 retracts the projections 17, 18, 19, and 20 from their obstructing position shown in Figure 3 to the position shown in Figure 4, where the projections lie wholly outside the periphery of the can ends, thereby releasing the stack of can ends for downward movement relative to the rods and out of confinement thereby.

The several cranks 13, 14, 15, and 16 are mechanically connected to be concomitantly moved through the same arc. Such a mechanical connection is shown clearly in Figure 6, where it will be observed that pinions 23, 24, 25, and 26 are secured respectively to the shafts of the cranks 13, 14, 15, and 16. The several pinions are engaged by a gear 27, so that rotation of the latter through

a given arc concomitantly rotates the several pinions and cranks through arcs of equal magnitude (which may be more or less than the arc through which gear 27 was rotated, depending upon the relative diameters of the gear and pinions). The gear 27 is driven in rotation about shaft 28 by an arm 29, secured to the gear and projecting outwardly beyond head plate 2, where it is interconnected with a bell crank 30 journaled upon a shaft 31 supported by the head plate 2. A pin-and-slot connection is provided between the bell crank 30 and the arm, so that the arm 29 will follow the movement of the bell crank 30 as the latter rotates about the shaft 31. Accordingly, the application of an upward force to end 32 of bell crank 30 moves gear 27 in the counterclockwise direction, to the position shown in Figure 6, and moves pinions 23, 24, 25, 26 in the clockwise direction.

In order to limit the amplitude of the arc through which projections 17, 18, 19, and 20 may turn, any of several arrangements of abutments may be provided for limiting the movement of the gear 27, the arm 29, or the bell crank 30. In the embodiment shown, however, such limitation of amplitude is accomplished by leaving a blank such as 33 in the gear 27. The blank 33 is provided where gear teeth would otherwise be in the periphery of gear 27. The particular blank 33 limits the clockwise movement of gear 27 by coming into engagement with the teeth of pinion 26, and thereby arresting further movement in that direction. Movement in the opposite direction is arrested when blank 33 comes into engagement with the teeth of pinion 25. While similar blanks may be provided to interfere with the meshing of the other pinions beyond the desired amplitude, one such arrangement will suffice.

A container support 40 is mounted for vertical movement in a track-way on frame 1 between the position shown in full and dotted lines in Figure 1. The container support is a box-like structure open at its upper end and front side so that an oblong container 41 of square cross section, closed at its lower end and open at its upper end, may be positioned in the support and sustained thereby below the lower termini of rods 3, 4, 5, and 6, as shown in full lines in Figure 1. The container support is provided with a latch 42 for retaining the support in its lower position. The support 40 is preferably biased as by a counterweight 39 toward its upper position, illustrated in dotted lines in Figure 1. Accordingly, upon release of latch 42 the support 40, together with container 41 sustained thereby, is moved upwardly into telescopic relationship with rods 3, 4, 5, and 6 and the stack of can ends confined thereby.

The container support 40 is provided with an ear 43 extending laterally therefrom and embracing a push and pull rod 44. The rod 44 is secured at its upper end to end 32 of bell crank 30, and is provided intermediate its length with an abutment 45, which may be adjustable lengthwise of rod 44. The rod 44 is also provided with an abutment 46 at its lower end. A coil spring 47 encircles rod 44 between ear 43 and abutment 46, and another coil spring 48 encircles rod 44 above ear 43. Consequently, when latch 42 is released, support 40 is drawn upwardly by the bias of counterweight 39; the support 40 being guided by its track way so as to direct the upper open end of container 41 over the lower ends of rods 3, 4, 5, and 6 and with the rods positioned in the corners of the container 41. When, during its upward movement, ear 43 of support 40 approaches abutment 45 on rod 44, spring 48 makes engagement with the abutment and moves rod 44 upwardly thus rocking bell crank 30 and moving arm 29 into the position shown in Figure 6. During such movement (which does not occur until container 41 has been telescoped over rods 3, 4, 5, and 6) gear 27 drives the pinions, which in turn rotate the rods to an extent such as to move projections 17, 18, 19, and 20 from the position shown in Figure 3 to the position shown in Figure 4. When the projections are thus re-

tracted, the weight of the stack of can ends confined between the rods comes to rest upon the bottom end of container **41**, and being thus transferred to the container support **40** overcomes the counterweight **39** and moves the support **40** with container **41**, and the stack of can lids therein now contained, downwardly to the position shown in full lines in Figure 1. Toward the end of this movement ear **43** engages spring **47** and delivers an impulse to rod **44**, pulling the same downwardly and thereby rocking bell crank **30** and gear **27** into the position where projections **17, 18, 19, 20** are restored to the location shown in Figure 3 where they prevent escape downwardly of a new charge of can lids which may be deposited therein.

In order to facilitate predetermination of the number of can ends to be packed in a given container, a stack height gauge **49** may be mounted on one of the rods such as **3**. Such a gauge may be adjustable vertically of the rod in order to compensate for differences in the gauge of the sheet metal from which the lids are punched or to compensate for differences in the multiples in which the lids are to be packed.

While from the foregoing description those skilled in the art should readily understand the mode of the operation of the invention and realize that it accomplishes its objects, the photograph of Figure 7 illustrates not only the manner of charging the apparatus with sub-stacks of can lids representing a typical handful of about twenty-five by inserting them through the open space provided between rods **3** and **4** above plate **7**, but also illustrates the facility with which defective lids may be detected while in the stacked relationship and confined between the several rods. While in such confined relationship, the entire stack of lids may be rotated about the longitudinal axis thereof so as to bring every increment of circumference of the lids into clear view of an operator or inspector. Defects thus become quickly apparent, whether such defects are in the chime (which is exposed to full view) or in an internal part which results in imperfect nesting of the several lids and thus reveals itself.

While one complete embodiment of the invention has been disclosed in detail, it is not to be understood that the invention is limited to that embodiment. On the contrary, it is realized that many modifications of the apparatus will present themselves to those skilled in the art as the exigencies of particular applications of the machine are confronted, and it is, therefore, to be understood that such modifications and variations do not part from the spirit of the invention, and are contemplated by and within the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. An apparatus for charging a stack of round discs into a polygonal container comprising rod-supporting means, a plurality of parallel rods projecting therefrom and having free ends remote from said supporting means in positions corresponding with corner locations of the container, the outer increments of said rods being located within the inside dimension of the container, the inner increments of said rods being located outside the periphery of the discs, projections on the ends opposite said supporting means of some of said rods extending inwardly of the periphery of said discs, and means for retracting said projections.

2. The apparatus of claim 1 wherein the rods depend vertically from said rod-supporting means, said projections being on the lower ends of the rods and said retracting means being at the upper ends of the rods.

3. The apparatus of claim 1 having a container support arranged for movement relative to said rod-supporting means in the direction lengthwise of the rods to telescope a container on said container support over said rods, and means actuated by relative movement of said container support toward said rod-supporting means to actuate the retracting means.

4. The apparatus of claim 3 wherein the container support is mounted for movement along a trackway toward and away from said telescoping relationship, and means adjacent said trackway engageable by said container support during such movement to actuate said retracting means and move said projections outwardly and inwardly relative to the periphery of the discs.

5. An apparatus for charging a stack of round discs into a polygonal container comprising rod-supporting means, a plurality of parallel rods projecting therefrom and having free ends remote from said supporting means in positions corresponding with corner locations of the container, the outer increments of said rods being located within the inside dimension of the container, the inner increments of said rods being located outside the periphery of the discs, projections on the free ends of some of said rods extending inwardly of the periphery of said discs, and means at the supported ends of said rods for turning said rods about their axes to an extent such that said projections lie outside the periphery of said discs.

6. An apparatus for charging a stack of round discs into a polygonal container comprising rod-supporting means, a plurality of rods projecting therefrom and having parallel portions remote from said supporting means positioned to correspond with corner locations of said container and other portions adjacent said supporting means lineally offset from said parallel portions, the outer increments of said parallel portions of the rods being located within the inside dimensions of said container, the inner increments of said parallel portions being located outside the periphery of the discs, the offset portions of said rods being spaced apart a distance greater than the parallel portions thereof, and selectively releasable means at the ends of said parallel portions remote from said offset portions for obstructing the passage of discs therebeyond.

7. The combination of claim 6 wherein the offset portions of the rods are mounted in cranks whose throw is equal to the amount of offset in the rods and whose axes of rotation are substantially aligned with the parallel portions of the rods respectively.

8. The combination of claim 7 wherein the obstructing means is a projection on the rod normally extending within the periphery of the discs but movable outwardly thereof upon rotation of said rods.

9. The combination of claim 7 wherein the obstructing means is a projection on the rod normally extending within the periphery of the discs but movable outwardly thereof upon rotation of said rods, and the cranks of all rods are interconnected to concomitantly drive the same through the same arc.

10. The combination of claim 7 wherein the obstructing means is a projection on the rod normally extending within the periphery of the discs but movable outwardly thereof upon rotation of said rods, the cranks of all rods are interconnected to concomitantly drive the same through the same arc, and means for limiting the amplitude of said arc.

11. An apparatus for charging a stack of round discs into a polygonal container comprising rod-supporting means, a plurality of rods projecting therefrom and having parallel portions remote from said supporting means positioned to correspond with corner locations of said container and other portions adjacent said supporting means lineally offset from said parallel portions, the outer increments of said parallel portions of the rods being located within the inside dimensions of said container, the inner increments of said parallel portions being located outside the periphery of the discs, the offset portions of said rods being spaced apart a distance greater than the parallel portions thereof, selectively releasable means at the ends of said parallel portions remote from said offset portions for obstructing the passage of discs therebeyond, and means for biasing said means into obstructing position.

12. The method of packaging can lids comprising the steps of piling the lids within an open rack of vertically-extending parallel rods, the inner increments of which lie on a circle of a diameter approximating that of the can lids, telescoping an elongate box over said rods, the box being of a polygonal cross section such that the corners thereof nest about said rods, and withdrawing said rods from between the lids and box.

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