Nov 1, 1949. H. J. McDERMOTT 2,486,489

CAKE-LIFTING AND REMOVING TOOL

Filed July 23, 1946

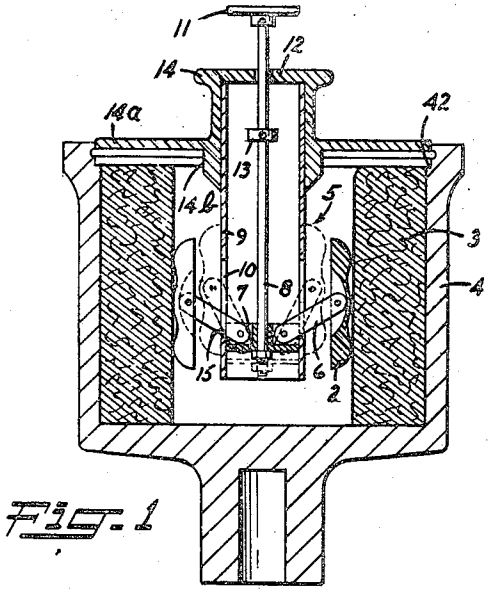


Fig. 1

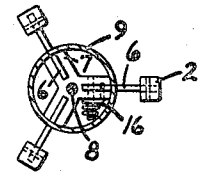


Fig. 2

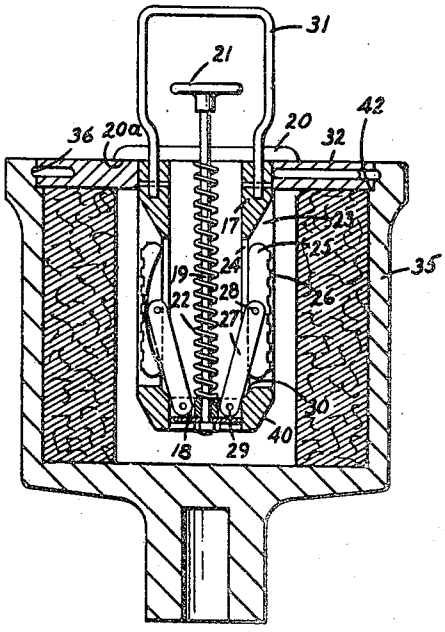


Fig. 3

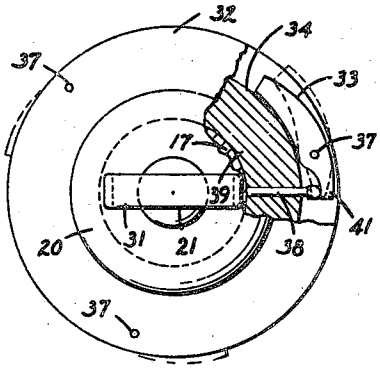


Fig. 5

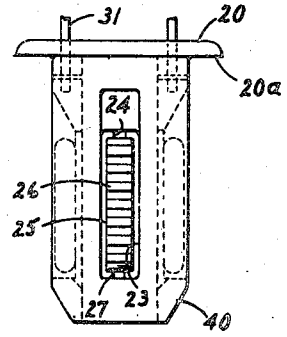


Fig. 4

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CAKE-LIFTING AND REMOVING TOOL

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21 Claims. (Cl. 57—76)

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This invention relates to a device for lifting annular packages, such as those formed of wound filamentary material. It is particularly adapted to the removal of rayon cakes from centrifugal spinning buckets.

It is a primary object of the present invention to provide a contractible tool or device which is adapted to grip the interior of a cake and is adapted to be centered within the cake. A further object is to provide a contractible device which is adapted to grip the interior of a cake with a force which may be independent of the exertions of the individual operator. It is a further object of the present invention to provide a form of tool or device for lifting or removing rayon cakes in which the gripping force is mainly determined by the weight of the cake itself but can be further augmented by the operator's exertions as desired. Further objects and advantages of the invention will be apparent from the drawing and the description thereof hereinafter.

In the drawing, which is illustrative of preferred embodiments of the invention—

Figure 1 is an elevational cross-section illustrating one form of the device in operative position within a spinning bucket containing a rayon cake,

Figure 2 is a horizontal section through a modification,

Figure 3 is an elevational cross-section of a modification,

Figure 4 is a side view of the device of Figure 3 alone, and

Figure 5 is a plan view of the device of Figure 3 in operative relation with the spinning bucket cover.

In general, the invention comprises a contractible gripping means adapted to engage the inner periphery of the cake, and supporting means for the gripping means of such a character as to allow contraction or expansion of the gripping means when desired. Preferably, the supporting means is provided with means for centering the device within the annular package, for which purpose the centering means may have a part adapted to engage a part associated with the container such as the upper rim or the cover thereof. The more detailed construction for accomplishing the preferred objects of the invention, such as that of assuring that the gripping means engages the cake with a force independent of the exertions of the operator are more specifically described hereinafter with reference to the illustrated embodiments.

Referring first to the embodiment of Figure 1, the device generally comprises a plurality of gripping elements 2 adapted to engage the internal periphery of an annular package, such as the cake of rayon 3 shown in the spinning bucket 4. The device comprises the central supporting

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means or structure 5 with respect to which the gripping elements 2 are mounted thereabout at circumferentially spaced intervals. The mounting means for the gripping elements comprising links 6 provides for swinging movements of the gripping elements from an upper inwardly disposed position indicated by the dotted lines and a lower outwardly disposed position shown in solid lines in which the elements 2 grip the internal windings of the cake.

The weight of the gripping elements 2 alone suffices to cause them to engage the cake windings in the position shown and, as the device is lifted, the weight of the cake tends to increase the gripping force to a definite maximum depending upon the weight, size and other characteristics of the cake.

As shown, the links 6 are pivotally mounted on a common spider or hub member 7 carried upon a rod 8. The rod and spider may be moved relative to the sleeve 9 through the slots 10 of which the links 6 extend. Such axial movement of the spider 7 relative to the sleeve 9 may be accomplished by manipulation of the hand knob 11 carried on the end of the rod 8 projecting endwise of the supporting structure and slidably fitting within a cap 12 secured to one end of the sleeve 9. A collar 13 may be provided to limit upward movement of the rod 8.

The members 2 may be so heavily weighted as to normally fall by gravity into the position shown where they engage the internal periphery of the cake. In such an arrangement, manual pressure on the knob 11 in opposition to a lifting pressure under the flange 14 of the cap 12 serves to retract the gripping elements 2 into the dotted line position. The lower ends 15 of the slots 10 serve as detents and cause upward and inward swinging of the links 6 upon depression of the knob 11 relative to flange 14. This retracted position facilitates the introduction of the device into the space within the annular package. To lift the cake after insertion of the device therein, it is merely necessary to release flange 14 and lift knob 11, the cake 3 by its own weight assuring adequate gripping pressure against the elements 2. The links 6 even in the gripping position are inclined upwardly and outwardly from their pivotal connections to the hub 7, thereby constituting a toggle linkage and assuring such gripping action as the result of the weight of the cake.

To facilitate centering of the device within the cake, the device may be provided with a disk-like projection 14*a* (herein shown integral with the cap 12) to engage the inside wall of the upper rim of the bucket. For the same purpose, a flange 14*b* may be provided. The diameter of the flange 14*b* should be a freely sliding fit within the center opening of a bucket cover such as that shown in Figure 3 hereinbelow. Either or both of the cen-

tering flanges 14a and 14b may be omitted depending upon whether the cover is removed from or left in position on the bucket before insertion of the device or reliance on manual skill of the operator is desired.

Figure 2 is a horizontal cross-section through a device similar to that of Figure 1 in all respects except that a torsion spring 16 is provided to normally urge the elements 2 outwardly. In this embodiment, the chances of the link and elements 2 sticking in retracted position are minimized. The spring itself may have some additive effect to the gripping action of the elements 2 against the internal windings of the cake but this is not essential.

In the embodiment of Figures 3 to 5, the supporting structure comprises a cylindrical member 17 within the bore of which a spider or hub 18 is slidably mounted. The hub is secured to a rod 19 extending through a cap 20 and having a knob 21 at the free end thereof. A coil spring 22 surrounding the rod 19 bears against the cap 20 and the hub 18, thereby urging the latter into the position shown in Figure 3.

The cylindrical member 17 is provided with a plurality of circumferentially spaced recesses 23; and slits 24 provide intercommunication between the bottoms of the recesses 23 and the bore of the cylindrical member 17. A plurality of gripping elements 25 which may take the form of longitudinal shoes, preferably provided with transverse ridges 26 for increasing the gripping force, are pivotally secured to links 27 at 28. The links 27 extend through the slits 24 to their points of pivotal securement 29 upon the hub 18. The lower end 30 of the slit 24 serves as an abutment or detent to engage the links 27 and cause retraction of the gripping elements 25 into the recesses 23 when the spring 22 is free to move the hub 18 into the position shown in Figure 3.

The device is provided with a handle 31 in the form of a U-shaped loop surrounding the knob 21 carried by the rod 19. This arrangement enables the operator to grip the handle 31 in his hand while placing his forefinger and middle finger beneath the flange of knob 21. Lifting the knob with his two fingers, the operator disengages links 27 from the abutments 30, thereby allowing the gripping elements 25 to fall freely under the influence of gravity into engagement with the internal surface of the package.

As in the embodiments of Figures 1 and 2, the toggle linkage is such that the gripping force is increased under the influence of the weight of the package to a predetermined maximum depending upon the characteristics of the package. The links 27 are inclined upwardly and outwardly at all times up to and including the position of engagement of the package by the gripping elements 25. After the gripping elements or shoes 25 have once engaged the cake, the operator can, if he so desires, exert additional force between the elements 25, cake 3, cover 32, and cap 20. By so doing, he may tilt the loaded device without loss of grip on the cake.

This embodiment of Figures 3 to 5 may be utilized for unlocking a box lid of the type shown in the U. S. patent of Henry J. McDermott and Richard W. Stanley, No. 2,325,787, August 3, 1943. As shown in Figures 3 and 5, the bucket cover 32 is provided with a plurality of fingers 33 pivoted within an annular recess 34 at the outer periphery of the cover. The spinning bucket 35 is provided with a groove 36 adapted to co-operate with the fingers which by virtue of their being eccentrically

weighted about their pivots 37 are thrown outwardly by centrifugal force into engagement within the groove 36, thereby forcing pin 38 to protrude internally of the central opening 39 of the cover. The external sloped surface 40 at the bottom of the cylindrical member 17 acts as a cam to force the pins 38 against the tails 41 of the fingers, thereby retracting them from the groove 36 in the spinning bucket and releasing the cover when the device is inserted into the central opening 39 thereof. When utilized in this fashion to release a latched cover, the cover is lifted out of the bucket along with the package.

The cap 20 secured to the lifting device may also serve to stop rotation of the spinning bucket when the device is inserted therein prior to complete stopping thereof. For this purpose, the cap 20 is provided with an outwardly projecting flange 20a adapted to be pressed against the cover 32, which cover is thereby pressed into engagement with its seat 42 in the rim of the bucket.

The device or tool herein shown and described can be used for lifting an annular package of any type whatsoever and transporting it from one stage to another. Advantageously, the device may be employed for removing cakes of rayon from spinning buckets as more particularly illustrated herein. When employed for this purpose, it may also, as illustrated, be adapted to stop the spinning bucket as well as to unlock a cover adapted to be latched to the bucket under the influence of centrifugal force. Alternatively, the bucket may be allowed to come to a complete rest before inserting the lifting device. Similarly, the cover may be removed from the bucket manually or by a separate device prior to the introduction of the cake-lifting device herein disclosed.

As pointed out briefly hereinabove, the devices of the present invention exert a gripping force upon the internal surface of the package which in the case of Figure 1 is entirely independent of any manual exertions on the part of the operator and in the case of Figure 3 may be substantially independent of such exertions but at will can be augmented so that the loaded device can be tilted through any angle from the vertical shown without slipping of the cake relative to the gripping elements. As pointed out, the package itself by virtue of its weight controls the maximum gripping force. This assures the lifting or removal of the package without distortion or damage thereof.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A device for lifting an annular package comprising a plurality of gripping elements having outer surfaces adapted to frictionally engage the internal periphery of the package, supporting means, said gripping elements being mounted about the supporting means freely swingable under the influence of gravity from upper inwardly disposed positions near the supporting means to lower outwardly disposed positions in engagement with the internal periphery of the package, and resilient means normally opposing the outward swinging of said elements.

2. A device for lifting an annular package comprising a plurality of gripping elements having outer surfaces adapted to frictionally engage the internal periphery of the package, a supporting structure adapted to be inserted into the space surrounded by the winding, said structure comprising two members relatively movable in a di-

rection generally parallel to the axis of the package, said gripping elements being attached by links to the supporting structure swingably to and from upper inwardly disposed positions near the supporting means and lower outwardly disposed positions in engagement with the internal periphery of the package, one of said members having portions engaging the links to prevent outward swinging of the gripping elements upon relative motion of said members in one direction, said portions disengaging the links to permit free outward swinging of the gripping elements under the influence of gravity upon relative motion of said members in the opposite direction, said members each having a handle projecting endwise of the structure to facilitate imparting relative movement to said members, and resilient means normally urging said members into their relative position in which outward swinging of the gripping elements is prevented.

3. A device for lifting an annular wound package comprising a plurality of gripping elements, supporting means, a link secured to each element and pivotally connecting the element to the supporting means for free swingable motion to and from upper inwardly disposed positions near the supporting means and lower outwardly disposed positions in engagement with the internal periphery of the package, each of said links being inclined from its connection to the supporting means upwardly to its connection with the gripping element.

4. A device for lifting an annular wound package comprising a plurality of gripping elements, supporting means, a link secured to each element and pivotally connecting the element to the supporting means for free swingable motion to and from upper inwardly disposed positions near the supporting means and lower outwardly disposed positions in engagement with the internal periphery of the package, each of said links being inclined from its connection to the supporting means upwardly and outwardly to its connection with the gripping element.

5. A device for lifting an annular wound package comprising a plurality of gripping elements, a supporting structure adapted to be inserted into the space surrounded by the winding, said structure comprising two members relatively movable in a direction generally parallel to the axis of the package, links secured to the element pivotally connecting them to one of the members for free swingable motion relative thereto, the other of the members having portions engaging the links to prevent outward swinging of the gripping elements upon relative motion in one direction, said portions disengaging the links to permit free outward swinging of the gripping elements under the influence of gravity into engagement with the internal periphery of the package.

6. A device for lifting an annular wound package comprising a plurality of gripping elements, a supporting structure adapted to be inserted into the space surrounded by the winding, said structure comprising two members relatively movable in a direction generally parallel to the axis of the package, links secured to the elements pivotally connecting them to one of the members for free swingable motion relative thereto, the other of the members having portions engaging the links to prevent outward swinging of the gripping elements upon relative motion in one direction, said portions disengaging the links to permit free outward swinging of the gripping elements under the influence of gravity into engagement with

the internal periphery of the package, and resilient means normally urging said members into their relative position in which outward swinging of the gripping elements is prevented.

7. A device for removing an annular wound package from a spinning bucket comprising a plurality of gripping elements having outer surfaces adapted to frictionally engage the internal periphery of the package, a supporting structure adapted to be inserted into the space surrounded by the winding, said structure comprising two members relatively movable in a direction generally parallel to the axis of the package, said gripping elements being attached by links to the supporting structure swingably to and from upper inwardly disposed positions and lower outwardly disposed positions in engagement with the internal pheriphery of the package, one of said members having portions engaging the links to prevent outward swinging of the gripping elements upon relative motion of said members in one direction, said portions disengaging the links to prevent free outward swinging of the gripping elements under the influence of gravity upon relative motion of said members in the opposite direction, a cover for the spinning bucket having a central opening through which the lifting device is adapted to be inserted, latch means in the cover adapted to lock the cover to the bucket under the influence of centrifugal force, and cam means on the supporting structure adapted to co-operate with the latch means in the cover to unlatch the same upon insertion of the device into the bucket.

8. A device for lifting an annular package comprising a plurality of gripping elements having outer surfaces adapted to frictionally engage the internal periphery of the package, a sleeve, a rod axially movable within the sleeve, a hub carried by the rod, axially extending slots in the sleeve spaced circumferentially with respect thereto, and links pivotally connected to the gripping elements extending through the slots and pivotally connected to the hub on the rod.

9. A device for lifting an annular package comprising a plurality of gripping elements having outer surfaces adapted to frictionally engage the internal periphery of the package, a sleeve, a rod axially movable within the sleeve, a hub carried by the rod, axially extending slots in the sleeve spaced circumferentially with respect thereto, links pivotally connected to the gripping elements extending through the slots and pivotally connected to the hub on the rod, and spring means urging the hub downwardly to cause the links to engage the lower ends of said slots in the sleeve and thereby to be retracted toward the sleeve.

10. A device for lifting an annular package comprising a plurality of gripping elements having outer surfaces adapted to frictionally engage the internal periphery of the package, a sleeve, a rod axially movable within the sleeve, a hub carried by the rod, axially extending slots in the sleeve spaced circumferentially with respect thereto, said sleeve having recesses in its outer periphery in communication with the slots, links pivotally connected to the gripping elements extending through the slots and pivotally connected to the hub on the rod, spring means urging the hub downwardly to cause the links to engage the lower ends of said slots in the sleeve and thereby to be retracted into the recesses in the sleeve.

11. A device for lifting an annular package

comprising a plurality of gripping elements having outer surfces adapted to frictionally engage the internal periphery of the package, a supporting structure comprising a cylindrical member, a plate at one end of the supporting structure having a central bore, a rod slidably mounted in said bore, a knob on the end of the rod projecting outwardly from said plate, a looped handle projecting from that end of the supporting structure provided with a plate, said handle extending around the knob, a carrier secured to the rod and mounting means for pivotally securing the gripping elements to said carrier whereby said gripping elements are swingable to and from upper inwardly disposed positions near the supporting means and lower outwardly disposed positions in engagement with the internal periphery of the package in response to relative movements in opposite directions of the looped handle and the knob, and resilient means normally urging the cylindrical member and the rod into their relative positions in which outward swinging of the gripping elements is prevented.

12. A device for lifting an annular package comprising a supporting structure comprising two members relatively movable in the direction of their length, a plurality of gripping elements having gripping surfaces extending longitudinally of the structure, and said elements being mounted about the supporting structure freely swingable under the influence of their own weight independently of said two members from upper inwardly disposed positions near the supporting means to lower outwardly disposed positions in engagement with the internal periphery of the package.

13. A device for lifting an annular package comprising a supporting structure comprising two members relatively movable in the direction of their length, a plurality of gripping elements having gripping surfaces extending longitudinally of the structure, and said elements being connected by links to the supporting structure swingably to and from upper inwardly disposed positions near the supporting means and lower outwardly disposed positions in engagement with the internal periphery of the package, one of said members having portions engaging the links to prevent outward swinging of the gripping elements upon relative motion of said members in one direction, said portions disengaging the links to permit free outward swinging of the gripping elements under the influence of gravity upon relative motion of said members in the opposite direction.

14. A device as in claim 13 wherein one of the members of the supporting structure has a handle projecting endwise of the structure to facilitate imparting relative movement to the members.

15. A device as in claim 13 wherein each member of the supporting structure has a handle projecting endwise of the structure to facilitate imparting relative movement to said members.

16. A device for lifting an annular package comprising a supporting structure comprising two members relatively movable in the direction of their length, a plurality of gripping elements having gripping surfaces extending generally

longitudinally of the structure and adapted to frictionally engage the internal periphery of the package, a plurality of links each pivotally secured at one end to one of the members and pivotally connected to one of the gripping elements at an upper end portion, and said gripping elements being mounted about the supporting structure freely swingable under the influence of gravity from upper inwardly disposed positions in engagement with the internal periphery of the package, and resilient means normally opposing the outward swing of said elements.

17. A device for lifting an annular package comprising a supporting structure comprising two members relatively movable in the direction of their length, a plurality of gripping elements having gripping surfaces extending generally longitudinally of the structure and adapted to frictionally engage the internal periphery of the package, a plurality of links each pivotally secured at one end to one of the members and pivotally connected to one of the gripping elements at an upper end portion, the other of said members having portions engaging the link means to prevent outward swinging of the gripping elements upon relative motion of said members in one direction, said portions disengaging the link means to permit free outward swinging of the gripping elements under the influence of gravity upon relative motion of said members in the opposite direction.

18. A device as in claim 17 wherein at least one of said structure members has a handle projecting endwise of the structure to facilitate imparting relative movement to said members.

19. A device as in claim 17 wherein each of said structure members has a handle projecting endwise of the structure to facilitate imparting relative movement to said members.

20. A device as in claim 17 wherein each of said structure members has a handle projecting endwise of the structure to facilitate imparting relative movement to said members, and resilient means normally urging said members into their relative positions in which outward swinging of the gripping elements is prevented.

21. A device as in claim 17 which has a cover for a spinning bucket having a central opening through which the lifting device is adapted to be inserted, latch means in the cover adapted to lock the cover to the bucket under the influence of centrifugal force, and cam means on the supporting structure adapted to co-operate with the latch means in the cover to unlatch the same upon insertion of the device into the bucket.

HENRY J. McDERMOTT.

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