July 8, 1952 G. M. ALLEN 2,602,284

MAGNETIC SPINNING BUCKET CLOSURE AND CAKE EXTRACTING SYSTEM

Filed Oct. 23, 1950

Fig. 2

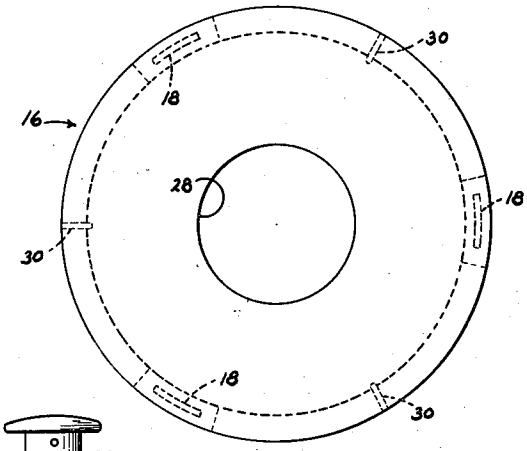
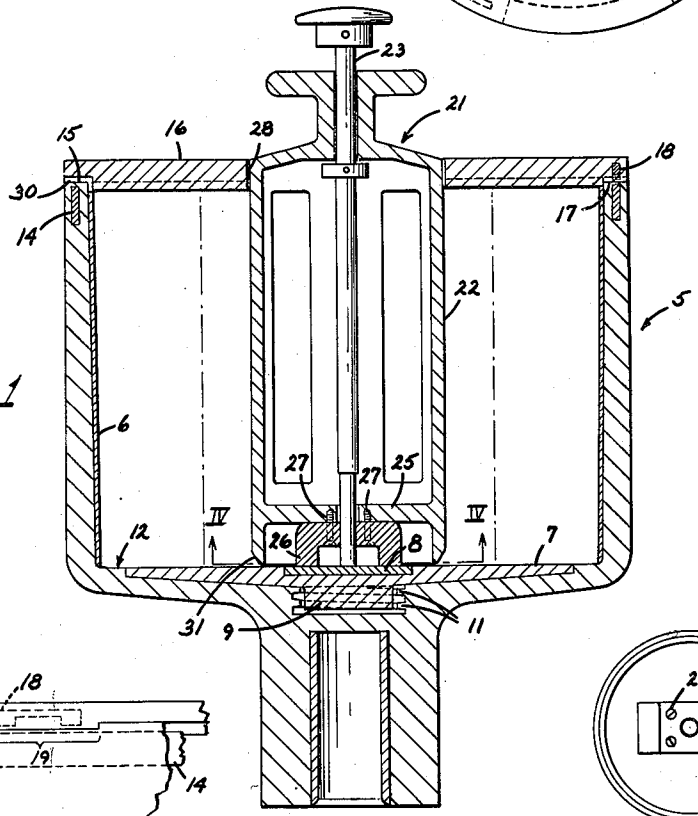


Fig. 1



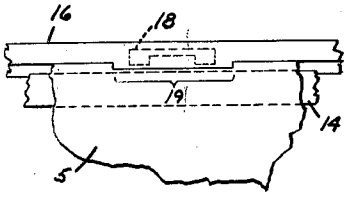


Fig. 3

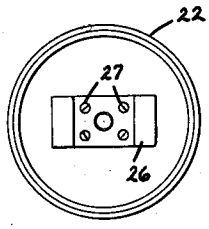


Fig. 4

INVENTOR.
GEORGE M. ALLEN
BY
Thomas P. O'Malley
ATTORNEY.

Patented July 8, 1952 2,602,284

UNITED STATES PATENT OFFICE

2,602,284

MAGNETIC SPINNING BUCKET CLOSURE AND CAKE EXTRACTING SYSTEM

George M. Allen, Swarthmore, Pa., assignor to American Viscose Corporation, Wilmington, Del., a corporation of Delaware

Application October 23, 1950, Serial No. 191,687

15 Claims. (Cl. 57—76)

1

This invention relates to centrifugal yarn spinning and/or collecting equipment and particularly to spinning buckets and apparatus for extracting yarn packages therefrom. The invention is generally applicable to any system for centrifugally collecting a strand of natural or artificial fiber into an annular package. Since yarn packages of regenerated cellulose yarn are commonly obtained in centrifugal equipment, the invention will be described in connection with the spinning of viscose rayon yarn.

Equipment for spinning viscose yarn is conventionally arranged with an open tank or trough containing an acid bath and a line of spinnerets; the tank extends longitudinally between a line of spinning bucket nests and an aisle providing access for personnel to the equipment. The top of the tank is usually two to three feet above the floor level and sufficiently wide that an operator must lean over the tank to accomplish doffing or other manual work on or about the spinning nest. Since the conventional type of bucket is equipped with a cover which is secured by a lockring or other device, the yarn collection equipment is so arranged that the entire box assembly may be lifted from the driving spindles and out of the spinning nest or compartment rather than to subject personnel to the inconvenience and safety hazard of working over the acid bath in an awkward posture while removing the lock-lid device, the lid and the package. Moreover, if the bucket is left on its spindle during the doffing operation, any yarn which becomes disarranged or loosened while removing the cake from the bucket must be discarded. Although the removal of the cake directly from the bucket without lifting the bucket from its spindle appears to be an obvious advantage, no satisfactory arrangement has been devised whereby a cake may be removed conveniently and quickly, and without considerable waste of yarn.

It is an object of the present invention to provide a combination comprising a spinning bucket and a cake extracting device for facilitating the doffing of centrifugally formed cakes. It is another object to provide a spinning bucket which need not be removed from its spindle during cake-doffing. It is also an object to provide a box which may be mounted on its spindle in positive drive relationship. It is still another object to provide a spinning bucket of simpler, lighter construction which more efficiently utilizes the space between adjacent spindles and within the walls of spinning bucket nests of existing construction. A further object is to

2

provide spinning and cake extracting equipment with which package-doffing may be accomplished without manual contact. Other objects, features and advantages will be apparent from the following description of the invention and the drawing relating thereto in which

Fig. 1 is a section in elevation of a spinning bucket and cake extracting apparatus in accordance with the invention;

Fig. 2 is a fragmentary plan view of the bucket closure of Fig. 1;

Fig. 3 is a fragmentary elevation of adjacent portions of the spinning bucket and the closure illustrated in Fig. 1; and

Fig. 4 is a bottom view of the cake extracting device shown in Fig. 1.

To accomplish the objects of the invention as stated hereinabove, a magnetized material and magnetic material are incorporated into a bucket and a cover therefor adjacent the engaging surfaces of both the bucket and the cover to hold the cover in operative position during the collection of yarn. To extract a package of the yarn and to break the magnetic force relationship between the cover and the bucket, the bucket has a false bottom member comprising at least in part a magnetically sensitive material, and the cover is apertured to receive a cake-extracting device provided with a magnet which engages the bottom member. The peripheral surface of the cover aperture has close clearance with the device and sufficient depth to substantially center the device and prevent contact thereof with the inner windings of the cake contained within the bucket. The device is provided with a longitudinal push rod which may be actuated to break the grip of the device on the member.

In Fig. 1 is illustrated a bucket 5 having a porous liner 6 in adhesive relationship with its inner cylindrical wall. The liner 6 is included for reasons hereinafter explained but may be omitted from the bucket assembly, if desired. The bucket comprises also a false floor member 7 having a recessed center portion in which is secured a magnetically sensitive element 8. The upper surface of the element 8 and that of the member 7 are preferably flush to form a smoothly contoured cake-forming bottom surface for the bucket. The element 8 is preferably coated with an acid-resistant varnish or other coating material. The member 7 is provided with a boss or extension 9 which fits within a circular threaded recess within the bottom of the bucket 5. The boss 9 is unthreaded and fits with close clearance within the internal periphery of the square threads 11 within the recess to center

and secure the false bottom member within the the bottom of the bucket. Since a bucket of the type herein described is highly adaptable to the type of spinning equipment installation in which buckets are permanently mounted on their spindles and maintained in positive drive relationship therewith, the square threads are provided for the purpose of screwing a complementarily threaded pulling tool into the recess so that the bucket may be forcibly lifted from the spindle when it is necessary to remove the bucket from its compartment.

When the bucket assembly includes a liner 6, the false bottom member preferably does not extend completely to the cylindrical cake-forming surface of the bucket. Since the member 7 is removed with each yarn package extracted from the bucket, a non-removable marginal surface 12 adjacent the cylindrical surface is retained, as shown in Fig. 1, so as to maintain clearance between the member and the porous liner 6 and to avoid possible abrasion thereof by contact with the periphery of the false bottom member.

In the preferred embodiment of the invention, a bucket is provided as shown without the conventional enlarged rim section. An enlarged rim section, although heretofore considered necessary as structure in which to accommodate an arrangement for locking the cover to the bucket, adds weight to the bucket, makes fabrication of the bucket more costly, and limits the size of the packages which may be produced within a limited space such as provided by a spinning box compartment. An enlarged rim section is not necessary in the construction of the present bucket because of the magnetic forces which are produced between the rim of the closure and the rim section of the bucket to secure the cover to the bucket. A metallic ring or band 14 of magnetic material extends completely through the annular section of the bucket adjacent the uppermost surface 15 which serves as the seating surface for a lid or cover 16. The element 14 serves also to reinforce and strengthen the open end of the bucket and to compensate for the strength obtained from the additional material which is conventionally used in enlarged rim sections. The element 14 is protected from corrosion such as caused by acids normally present in spinning operations, by being entirely surrounded with appreciable thickness of a non-corrosive material. If the bucket is fabricated from a molded thermoplastic or thermosetting material, the ring 14 may be positioned within a fabricating mold so that during the molding operation, the ring is sealed within the principal material comprising the bucket. Presently preferred materials from which the bucket body is fabricated are aluminum, and a laminated product comprising a urea-formaldehyde condensation product as a binder and a fabric of cotton or glass fabric as a filler. When the bucket body is constructed from aluminum, a recess is formed in the rim section of the bucket body having sufficient depth to receive the band 14 and a thin layer of corrosion-resistant resinous material which seals the band within the recess such as may be used to coat the entire bucket.

The cover 16 is provided with an annular recess 17 which constitutes a marginal portion of its lower surface and is complementary to the rim surface 15 and a narrow margin of the cylindrical surface of the bucket body adjacent the rim surface. The cover 16 is fabricated from a non-magnetic material in which is imbedded a plurality of magnets 18 adjacent the surface of the recess 17. In the embodiment illustrated, three magnets are provided in peripheral boss sections of the cover at 120 degrees apart. These sections are defined by shallow downwardly extending lugs 19 which fit within complementary recesses in the upper surface of the bucket rim. Thus, the cover is secured non-rotatably with respect to the bucket. However, the magnetic relationship between the bucket and the cover also tends to prevent rotative movement of the cover relative to the bucket and, if desired, the complementary boss-recess construction of the bucket rim and the cover may be supplanted with smooth engaging surfaces.

As a part of this invention, a cake-extracting device 21 is provided which comprises a cage or shell 22 of non-magnetic material having a central bore for a plunger 23 and a recessed end wall 25. A magnet 26 is secured by screws 27 to the wall 25 within the recess formed in the lower end of the device. The exterior surfaces of the shell 22 are parallel with the axis of the shell 22 so that an aperture 28 may be provided in the cover 16 having close clearance with the surfaces of the cage 22. The cover 16 has an appreciable thickness, particularly adjacent the aperture 28, so that the surfaces defining the aperture may have sufficient depth to restrict the device 21 to an alignment within the bucket in which the device is prevented from contacting or abrading the inner surface of the cake contained therein.

The device 21 is inserted through a cover and into a bucket constructed in accordance with the invention after a cake has been collected therein and the bucket brought to a stop. The device is guided by the surface of the aperture in the cover hereinbefore described along an axial path until the end of the device to which the magnet 26 is affixed engages the magnetically sensitive element 8 of the false bottom member 7. The magnetic force established between the magnet 26 and the element 8 is substantially greater than the sum of the magnetic forces between the cover 16 and the body portion of the bucket, and the weight of the cake. Thus, when the device 21 is lifted lengthwise of the bucket axis, the lid 16, the cake and the bottom member 7 are lifted out of the box. These articles are thereafter removed from the device by pushing the plunger 23 in a direction against the element 7 to push the element 8 out of engagement (or the magnetic influence) of the magnet 26. Once this magnetic relationship is disrupted, the device 21 is readily lifted from the cake and the cover. The member 7 and cover may be placed by hand into the bucket, or if desired, positioned with the aid of the device 21.

In the single embodiment herein described and illustrated, the cage 22 of the extractor 21 is cylindrical in general outline to provide surfaces which engage the cylindrical surface within the aperture 28 of the cover and maintain the device 21 in axial alignment while inserted into or withdrawn from the bucket or a cake. The cage 22 has a small taper 31 at the end thereof to facilitate the entry of the cage into the aperture of the cover and the passage thereof into the bucket. The taper, however, may be increased or extended farther along the cage as desired, but preferably within the limit that the cage is not permitted sufficient misalignment with bucket axis to contact the inner surface of the cake. The cross-sectional contour of the cage is not necessarily annular but may be of any contour such as

polygonal, or spider-shaped to provide the desired guide relationship between the extractor and the cover aperture.

In the embodiment of the invention herein described, the spinning bucket **5** is equipped with a porous liner **6** which facilitates the removal of liquids from the box during the collection of the yarn. The liner may comprise a porous fibrous material such as a paper comprising primarily cellulose fibers and a thermoplastic resinous material of the type commonly used for tea bags intermixed in bonded relationship with the fibers. In operation, the porous liner is placed loosely into the bucket prior to a spinning operation. When collection of the yarn is commenced, the liner is forced centrifugally into contact with the wall of the bucket and during the subsequent collection of yarn, the liner becomes adhesively attached to the bucket wall. The adhesion is such, however, that the liner remains intact for an indefinite time during the collection of a series of packages. However, if the liner becomes damaged or deteriorates otherwise to such an extent as to affect the quality of the yarn, the liner is readily pulled from the cake wall and replaced with a new one. The function of the liner is to permit the escape of liquid and solid particle material through the material of the liner in a direction parallel to the bucket wall. The liquid is discharged from the liner into a plurality of grooves **30** extending transversely of the marginal recess of the bucket cover **16**. However, the practice of the invention is not limited to lined buckets and the magnetic cover holding and cake-extracting systems of the invention may be readily applied to unlined buckets.

In addition to providing a new type of spinning bucket, the present invention provides a system for extracting cakes from buckets which is much simpler than the prior art devices. For example, a cake-extracting system comprising co-operative magnetic means mounted partly on the cake extractor and partly on the false bottom bucket member is generally disclosed in application Serial No. 97,643, now Patent No. 2,580,571. However, in using that system, the bucket cover cannot be removed without first unfastening the cover from the bucket such as by removing a lock ring. In U. S. Patent 2,486,489, a cake-extracting device engages the inner walls of the cake; the device operates by cam action a latching mechanism built into the cover for releasing the cover from the bucket. In the present invention, however, no mechanism for latching the cover to the bucket is necessary and the cover may be separated therefrom by a direct pull while using any type of lifting instrument which will apply sufficient force to the cake to overcome the magnetic forces between the cover and the bucket. An implement which engages the inner walls of the cakes as does the device disclosed in the above-mentioned patent is within the scope of the invention.

While a preferred embodiment of the invention has been shown, 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. In combination, a spinning bucket for collecting annular strand packages, said bucket having a closed end and an open end, a cover for the open end, a removable member comprising at least a portion of the inner surface of the closed end, said cover having a central aperture of less diameter than the inner diameter of the packages, an elongated implement having a cross-sectional contour of less width than the diameter of the aperture, magnetic means for holding the cover on the bucket and magnetic means for holding the implement and the removable member together with a greater force than the sum of the weights of the member and the cake and the magnetic force of the first-named magnetic means.

2. In combination, a spinning bucket having a rim section and a cover therefor having an annular marginal surface complementary to at least a portion of the surface of the rim section, and at least one magnet and a magnetically sensitive element separately imbedded in the cover and bucket rim adjacent to surfaces thereof in engagement.

3. In combination, a spinning bucket of non-magnetic material having an annular seating surface for supporting a cover, a cover of non-magnetic material for the bucket having an annular surface complementary to the seating surface of the bucket, at least one magnet imbedded within the non-magnetic material defining one of the annular surfaces, and a magnetically sensitive material imbedded within the non-magnetic material defining the other annular surface.

4. In combination, a spinning bucket of non-magnetic material having a substantially cylindrical surface terminating in an annular end surface, a cover of non-magnetic material for the bucket having an annular surface which is complementary to the annular surface of the bucket, at least one magnet imbedded within the non-magnetic material defining one of the annular surfaces, and a magnetically sensitive material imbedded within the non-magnetic material defining the other annular surface.

5. In combination, a spinning bucket having a rim section and a cover therefor having a peripheral marginal surface complementary to at least a portion of the surface of the rim section, a magnetically sensitive material imbedded in at least a portion of the rim section underlying the surface thereof engaged by the cover, and arcuately spaced magnets imbedded in portions of the cover underlying the marginal surface which occur in superimposition with the magnetically sensitive material of the rim section when the cover is positioned on the bucket.

6. In combination, a spinning bucket of non-magnetic material having an annular seating surface for supporting a cover, a cover of non-magnetic material for the bucket having an annular surface that is complementary to said seating surface and a central aperture of less diameter than the strand packages to be collected, a plurality of uniformly arcuately-spaced magnets imbedded within the non-magnetic material defining one of the annular surfaces, a ring of magnetically sensitive material imbedded within the non-magnetic material defining the other annular surface with the ring being coextensive with said surface, a removable member fitting within the closed end of the bucket and constituting at least a portion of the inner surface thereof, said member comprising at least in part a magnetically sensitive material and having a width substantially greater than the interior diameter of said packages, an elongate member of non-magnetic material having a length greater than the length of the interior of the bucket and being laterally dimensioned to move lengthwise

at small clearance through the cover aperture, and a magnet secured to one end portion of the member.

7. In combination, a spinning bucket for collecting a strand material into an annular package and having a removable floor member, said member having a magnetically sensitive element centered approximately along the axis of the bucket, a lid for the bucket having a central aperture of which the periphery lies within the inner radius of the package, a package-extracting device comprising an elongate cage of non-magnetic material having a cross-sectional peripheral contour which is substantially uniform lengthwise of the cage and approximately complementary to the aperture of the lid but having a small clearance therewith, a magnet attached to the cage centrally of one end thereof, a push rod of non-magnetic material being longer than the cage and extending longitudinally and slidably through the cage and the magnet.

8. In combination, a spinning bucket and a cover therefor having a central aperture, the cake-forming surfaces of the bucket comprising an end surface and a circular surface extending from the end surface to a rim section of the bucket, a porous liner for the circular surface, a removable member forming substantially the end surface except for a marginal portion adjacent the circular surface, a magnetically sensitive element secured within the member and centered substantially about the axis of the bucket, a cake-extracting device comprising an elongate cage of non-magnetic material, a magnet attached centrally at an end of the cage, a push rod longer than the cage and the magnet and extending centrally and longitudinally through the cage and the magnet, said cage having a uniform cross-sectional peripheral contour which is complementary with the aperture of the cover except for small clearance, the peripheral surface of said aperture being parallel to the axis of the bucket and of sufficient length for guiding and restricting the extracting device to movement within the bucket in an axial direction.

9. In combination, a spinning bucket of non-magnetic material having an annular seating surface for supporting a cover, a cover of non-magnetic material for the bucket having an annular surface that is complementary to said seating surface, said surface of the cover having shallow boss portions and the annular surface of the bucket having complementary recessed portions, a magnet imbedded in the material which defines each of the boss portions, and a ring of magnetically sensitive material imbedded within the material which defines the annular surface of the bucket.

10. In combination, a spinning bucket of non-magnetic material having a substantially cylindrical surface terminating in an annular seating surface, a cover of non-magnetic material for the bucket having an annular recess comprising a surface complementary to the seating surface and a surface complementary to a margin of the cylindrical surface adjacent the seating surface, a plurality of uniformly arcuately spaced magnets imbedded within the material defining the annular recess of the cover, drain grooves extending transversely of the recess surfaces and spaced between the magnets.

11. A combination as in claim 10 wherein a permeable liner covers the cylindrical surface except for said marginal portion adjacent the seating surface.

12. In combination, a spinning bucket for collecting annular strand packages, a cover therefor having a central aperture of less diameter than the inner diameter of the packages, magnetic means for holding the cover on the bucket, an elongate implement having a cross-sectional contour of less width than the diameter of the aperture and adapted to be inserted through the aperture, and means associated with the implement for engaging a surface of a package within the bucket, said means being movable with the implement and transmitting through the engaged surface a force for moving the package from the bucket and for separating the cover therefrom when said force is applied to the implement.

13. In combination, a spinning bucket for collecting annular strand packages, a cover therefor having a central aperture of less diameter than the inner diameter of the packages, magnetic means for holding the cover on the bucket, an elongate implement for removing the package from the bucket, said implement adapted to pass through the aperture and having a cross-sectional contour which has small clearance with the aperture along a substantial continuous portion of the implement including the section adjacent the aperture when fully inserted, said aperture defined by surfaces parallel to the axis of the bucket which maintain the implement in an approximately axial alignment, and means associated with the implement for engaging a surface of a package within the bucket, said means being movable with the implement and transmitting through the engaged surface a force for moving the package from the bucket and separating the cover therefrom when said force is applied to the implement.

14. In combination, a spinning bucket member of non-magnetic material having an annular seating surface, a cover member of non-magnetic material for the bucket member having an annular surface complementary to said surface, detent means extending from one member into engagement with a portion of the other member to prevent movement of one member relative to the other, at least one magnet imbedded within the non-magnetic material defining one of said surfaces, and a magnetically-sensitive material imbedded within the non-magnetic material defining the other surface.

15. In combination, a spinning bucket for non-magnetic material having an annular seating surface, a cover of non-magnetic material for the bucket having an annular surface complementary to said seating surface, detent means extending from one of said surfaces into engagement with the other surface to prevent rotative movement of one surface relative to the other, at least one magnet imbedded within the non-magnetic material defining one of said surfaces, and a magnetically-sensitive material imbedded within the non-magnetic material defining the other surface.

GEORGE M. ALLEN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,147,482	Butler	Feb. 14, 1939