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BOTTOM DRAINING SPINNING BUCKET

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The present invention relates to improvements in the construction of spinning buckets and is concerned particularly with the drainage of liquid material from the bucket and the alignment of yarn delivery guides with respect thereto.

In large scale operations of centrifugal spinning equipment, such as that used to collect cakes of viscose rayon yarn, it is quite advantageous to discharge the liquid carried into a spinning bucket through a funnel guide directly from the bottom surface of the bucket rather than permitting such liquid to work radially and upwardly through the yarn already collected in the bucket and then outwardly through or over the rim structure of the bucket. As the liquid material is generally of highly acid character which is corrosive with respect to many of the materials that may be used in fabricating a spinning bucket, prevention of the passage of the liquid over or through the upper portions of the bucket substantially lowers maintenance costs and increases service periods of such buckets if the liquid carried into the bucket may be eliminated in some other manner. The action of the acid in conjunction with the working of adjacent surfaces of the bucket and the cover, and the abrasive action produced by particulate material carried by the acid solution and lodged between these surfaces, produce rapid deterioration and erosion of these surfaces.

Spinning buckets have heretofore been constructed which provide drainage through the bottom thereof. However, when aluminum, or other material which is not resistant to acid, is used as the principal fabricating material of a bucket having radial passageways in the bottom thereof for discharging the acidic liquid material, a corrosion problem occurs which has not heretofore been satisfactorily solved because of the difficulty of coating the aluminum surfaces within the passageways.

It is an object of the invention to provide a spinning bucket constructed of aluminum, or other material which may be non-resistant to corrosive action, having an improved system for draining the bucket. Another object is to incorporate a dual-purpose well or depression in the bucket as a part of the drainage system which may also be used in centering a funnel guide with respect to the bucket axis. It is also an object to provide buckets constructed primarily from aluminum or other material lacking in acid-resistance which are less subject to sludge formation around the rim section thereof, and less subject to damage from corrosion and abrasion.

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 an elevation partially in section of a spinning bucket in accordance with the invention, and a funnel guide centering device;

Fig. 1a is a fragmentary section view of a funnel guide;

Fig. 1b is an end view of the device shown in Fig. 1;

Fig. 2 is a top view of an insert included in the construction of the bucket of Fig. 1;

Fig. 3 is a fragmentary sectional view of the bottom of a bucket, a funnel centering device, and a lower portion of a funnel guide stem; and

Fig. 4 is a broken view partially in section of an implement for removing the funnel centering device of Fig. 3 from the bucket.

To carry out the objects of the present invention, a spinning bucket is provided with a well or depression accurately centered within the interior bottom surface of the bucket, and passageways leading radially from the well to the exterior of the bucket and extending through tubes of acid-resistant material having exterior surfaces in tightly-fitting or sealed relationship with complementary bores through the material comprising the lower portion of the bucket. The well is shaped to receive a device for aligning a funnel guide with its stem tip centered on the axis of the bucket.

Fig. 1 illustrates in section a bucket 5 having an interior lining 6 of corrosion-resistant material and a recessed bottom portion occupied by an insert or liner 7 of corrosion-resistant material permanently secured within the bucket body. The bucket 5 is constructed in such a manner that materials which lack corrosion-resistance, especially resistance to strong acid solutions, may be utilized in fabricating the body portion of the bucket. A material preferred in the construction of the body portion is aluminum since it is light in weight, and readily cast and machined. The insert 7 fits tightly and permanently within the recess provided therefor in the body portion and is provided with a recess 9 defined by surfaces 10 and 11. The circular tapered surface 10 is accurately centered with respect to the axis of rotation of the bucket so that a fixture may be used in conjunction with this tapered surface to position portions of a bracket 14 adapted to hold a funnel guide 13 (partly illustrated in Fig. 1a) accurately over the spinning bucket to support the funnel guide.
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with the lower tip thereof precisely centered with respect to the axis of rotation of the bucket. The surface 11 is cylindrical as shown, or if desired, it may taper to a larger diameter toward the bottom of the recess so that liquid discharged from the funnel is not urged centrifugally upwardly outward of the recess of the insert and into the strand material being collected within the bucket, but instead enters the tubes 18 herein after described.

The bracket 14 comprises an arm 14a having an aperture 14b, an exteriorly and interiorly threaded outer sleeve 15 extending through, and transversely movable within, the aperture 14b, and an inner bushing 16 having an outer threaded surface in threaded relationship with the bore of the sleeve 15. The bushing has a smooth surfaced bore which is complementary to the outer surface 12a of the fixture 12 and the outer surface 13a of the flure of the guide 13. To properly position the sleeve 15 and the bushing 16 within the arm 14a for supporting the funnel guide 13 over the bucket, the fixture 12 is temporarily supported by the bracket 14, in lieu of the guide, with the tapered end of the fixture in engagement with the surface 16 of the insert. When the complete engagement of these surfaces is obtained, the lower tapered end-portion of the fixture is centered on the axis of the bucket. To obtain the required adjustment of the sleeve 15 and the bushing 16 for supporting the guide 13 of Fig. 1a, the sleeve 15 is moved laterally and the bushing 16 is adjusted vertically relative the sleeve until the tapered surfaces of the fixture 12 and the insert 7 engage. To obtain lateral adjustment of the sleeve and the bushing, the sleeve 15 (with the lock-nut 15a screwed out of engagement with the bracket 14a) is adjusted along the upper surface of the bracket 14 laterally with respect to the axis of the bucket 5; the correct position of the sleeve and the bushing is obtained over the recess 5; the nut 15a is tightened to maintain the desired position. The bushing is withdrawn from the sleeve until just engages the under surface of a nut 12b of the fixture 12.

The upper portion of the fixture 12 is threaded to receive a nut 12b and a head 12c having a complementarily threaded bore. The nut 12b is adjusted to a predetermined position along the threaded portion of the fixture 12 wherein the lower surface of the nut corresponds to the desired distance above the interior bottom surface of the bucket at which the under surface of a flange 13c is disposed when the funnel guide 13 is supported by the bracket. The head 12c is tightened against the nut 12b to maintain a desired adjustment thereof. If desired, other means for providing a shoulder surface, such as a flange, may be provided in lieu of the nut 12b on the fixture 12 to obtain a surface for engaging the upper end surface of the bushing 16.

The top surface 12d of the head 12c lies in a plane normal to the axis of the thread bore of the head and the spindle portion of the fixture 12. On the surface 12d is mounted a spirit level 12e so that when the fixture 12 is used to affect lateral and vertical adjustments of a funnel guide 7, but in any other practical method and fits with close clearance within the surface of the gunning 6a which covers the lateral surfaces of the recess 8. The recess 8, after being coated, receives a removable insert 23 temporarily placed there into for the purpose of obtaining accurate positioning of a funnel guide having the lower end of its stem extending over a centering boss 24 of the insert. The insert is provided with a ring 25 of magnetically-sensitive material which may be imbedded in the material of the insert. In one economically fabricated form, the insert 23 comprises a material which is molded around the ring 25. The radially outer surface of the insert is formed by molding, machining, or any other practical method and fits with close clearance within the surface of the gunning 6a which covers the lateral surfaces of the recess 8. The recess 8 preferably with a minimum of looseness permitting easy insertion and removal. The boss 24 is accurately centered with respect to the outer surfaces of the insert so that when the insert is positioned
in the bucket recess 8, the boss 24 accurately positions the tip of a funnel guide stem 34 placed therearound with respect to the bucket axis. The insert is readily removed by an implement 28 such as illustrated in Fig. 4 comprising a handle portion 29, the shank portion 30, and a flared portion 31 in which a magnet 32 is secured. The insert 23 may be readily positioned in the box by hand; removal of the insert, however, is facilitated by a device such as the implement 28.

The bucket 5 is provided with passages 17 and tubular liners 18a of corrosion-resistant material (Fig. 3) which terminate at the bottom of the recess 8. A sealed joint is obtained between the ends of the tubes 19a and portion 8a of the corrosion-resistant material comprising the inner liner of the bucket 6 to prevent access of corrosive fluids to the material constituting the bucket body. Liquid material discharged from the lower end of the funnel stem 34, drops into the recess 8, and is promptly carried therefrom under the action of centrifugal force and gravity to the tubes 19a to a region exterior to the bucket. For use in the collection of regenerated cellulose yarns, the coating 6 (and 6a) may comprise any composition having as its basic ingredient, a highly acid-resistant resinous material. Some of the synthetic resinous materials which are suitable in forming the coatings are phenolic resins and polyethylene, polymers and copolymers of vinyl chloride and vinylidene chloride, alkyl resins and polymerized fluorinated ethylenic compounds such as polytetrafluoroethylene and polychlorotrifluoroethylene.

In accordance with the present invention, a spinning bucket may be constructed with the body portion thereof fabricated from materials which lack corrosion-resistance, such a bucket being provided with, however, a central well and passageway system which extends over the interior surfaces of the rim portion for drainage. A spinning bucket such as herein described may be constructed, for example, of aluminum and be used for substantially longer service periods before any breakdown occurs in the portion of the coating that extends over the interior surfaces of the rim section or surfaces closely adjacent thereto; sludge formation on these surfaces is also reduced. The discharge of acidic liquid material from such buckets in a downward direction toward the bottom of a spinning bucket compartment or nest results in substantial reduction in the amount of toxic fumes discharged through the lid of the compartment. Because of the rapid rotation of the buckets, strong currents are developed within the atmosphere of the compartment adjacent the compartment lid. When liquid is discharged from the top portion of the box, the liquid is immediately disintegrated into spray and vapor which is carried to some extent outwardly through the compartment lid aperture and/or past the seating surface for the lid. The buckets constructed as herein described discharge the liquid toward the outlet of the compartment. As this outlet is conventionally placed near the bottom and connected with a vacuum, the liquid and the obnoxious fumes such as carbon disulfide, hydrogen sulfide, or the like are promptly removed from the compartment.

While preferred embodiments of the invention have been shown and described, 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.

1. A spinning bucket having a substantially vertical axis of rotation and comprising a bucket body having a recess accurately centered with respect to the axis within the interior bottom surface of the bucket, an insert of corrosion-resistant material secured within the recess of the bucket body, said insert having a recess accurately centered with respect to said axis, and a tubular liner connected in a sealed joint with the liner within the recess, the interiors of the tubular liners being open at both ends to provide passageways for connecting the recess with a region outside the bucket.

2. A spinning bucket having a substantially vertical axis of rotation and comprising a bucket body having a recess accurately centered with respect to the axis within the interior bottom surface of the bucket, an insert of corrosion-resistant material secured within the recess of the bucket body, said insert having a recess in its upper surface accurately centered with respect to said axis, said insert and the bucket body having radial passageways extending from the recess of the insert to the outer surface of the bucket body, liners for the passageways being coated with a corrosion-resistant material.

3. In combination with a spinning bucket having a recess accurately centered within the interior surface thereof with respect to its axis of rotation, an adjustable support for a funnel guide, said support being adjustable longitudinally and laterally with respect to the axis, means for aligning and positioning the guide support over the recess, said aligning means having a surface for engaging the support similar to a surface of the funnel guide which engages the support, and a tapered surface in coaxial spaced relationship with the support-engaging surface for engaging the recess.

4. Apparatus for centering a funnel guide with respect to the axis of the spinning bucket comprising a support for the funnel guide, said support being laterally adjustable with respect to the axis and said bucket having a recess at least partially defined by a tapered surface joining with, and accurately centered within, the interior surface thereof with respect to said axis, a removable fixture for positioning the guide support over the recess, said fixture having an annular surface for engaging the support similar to that of the funnel guide which engages the support, and a shank portion having a tapered end coaxial with the support-engaging surface for engaging the recess.

5. In combination with a spinning bucket support on a fixed vertical axis of rotation and having an aluminum body portion, said bucket having a recess accurately centered in the interior bottom surface thereof with respect to said axis, and a support for a funnel guide, said support comprising means for holding the guide which is laterally adjustable with respect to the axis, an in-
sert of corrosion-resistant material secured within the recess, the insert having a recess centered accurately with respect to the axis, a coating of corrosion-resistant material extending over the inner surfaces of the bucket and being joined with the material of the insert in a liquid impervious joint, a fixture for positioning the holding means over the recess, said fixture having an annular surface for engaging the holding means similar to that of the funnel guide for engaging the holding means, said fixture having a shank portion terminating in a tapered surface which is coaxial with the other-named surface of the fixture for engaging the recess of the insert when the fixture is mounted in the support.

6. In combination with a spinning bucket supported on a fixed vertical axis of rotation, and having a recess accurately centered in the interior bottom surface thereof with respect to said axis, a funnel guide, a support for the funnel guide comprising means for holding the guide which is laterally adjustable with respect to the axis, a removable insert adapted to fit slidably within the recess, said insert having a boss extending from the surface thereof which is exposed when the insert is positioned within the recess, said boss being accurately centered with respect to said axis and having a peripheral surface adapted to fit in slidable relationship within the inner surface of the lower end-portion of the guide.

7. In combination with a spinning bucket having a recess accurately centered within the interior surface thereof with respect to its axis of rotation, an adjustable support for a funnel guide, said support being universally adjustable with respect to the axis, comprising a removable fixture for aligning and positioning the support over the recess, said fixture having a peripheral surface similar to that of the funnel guide which engages the support and comprising a shank portion having a tapered end surface coaxial with the support-engaging surface for engaging a surface of the recess, and level indicating means.

8. In combination with a spinning bucket having a recess accurately centered within the interior surface thereof with respect to its axis of rotation, an adjustable support for a funnel guide, said support being universally adjustable with respect to the axis, a removable fixture for aligning and positioning the support over the recess, said fixture having a peripheral surface similar to that of the funnel guide which engages the support and comprising a shank portion having a tapered end surface coaxial with the support-engaging surface for engaging a surface of the recess, a head portion having an upper surface extending in a plane normal to the axis of the shank portion, and a spirit level mounted on said surface to indicate variance of the fixture with a true vertical alignment.

9. In combination with a spinning bucket having a recess accurately centered within the interior surface of the bucket concentrically about its axis of rotation, a support for a funnel guide, means for adjusting the support in directions substantially normal as vectors parallel to said axis, said support having a surface for aligning the guide with respect to the bottom of the bucket, and means simultaneously engaging said support surface and a surface within the recess to indicate the relative positions of the support and recess, said bucket having passageways extending radially from the bottom of the recess to an outer surface of the bucket for draining the recess.

10. A combination as defined in claim 9 wherein the bucket comprises a metallic body portion and a liner of corrosion-resistant material extending over at least the inner surface of the body portion, the surface of the recess, and the surfaces of passageways within the body portion.

11. In combination with a spinning bucket having a recess accurately centered within the interior surface of the bucket concentrically about its axis of rotation, a support for a funnel guide, means for adjusting the support in directions substantially normal as vectors parallel to said axis, said support having a surface of substantially circular cross section with its longitudinal axis substantially parallel to said axis for aligning the guide, and means simultaneously engaging said support surface and an annular surface of the recess to indicate the relative positions of the support and the recess, said bucket having passageways extending radially from the bottom of the recess to an outer surface of the bucket for draining the recess.

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