Feb. 17, 1953 H. D. HALEY 2,628,740

SPINNING BUCKET AND COVER THEREFOR

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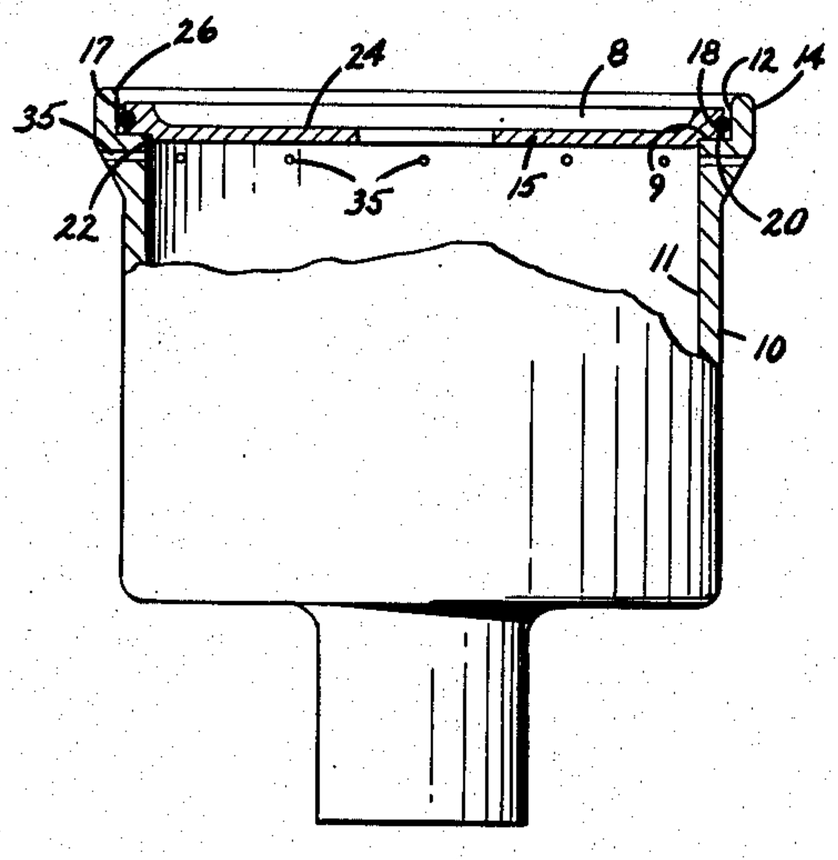


Fig. 1

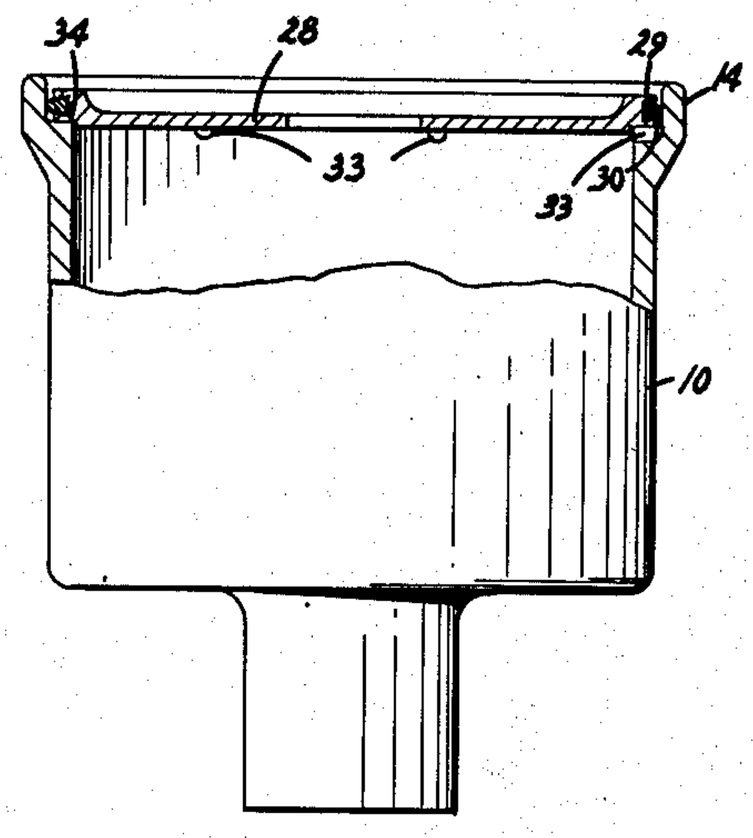


Fig. 3

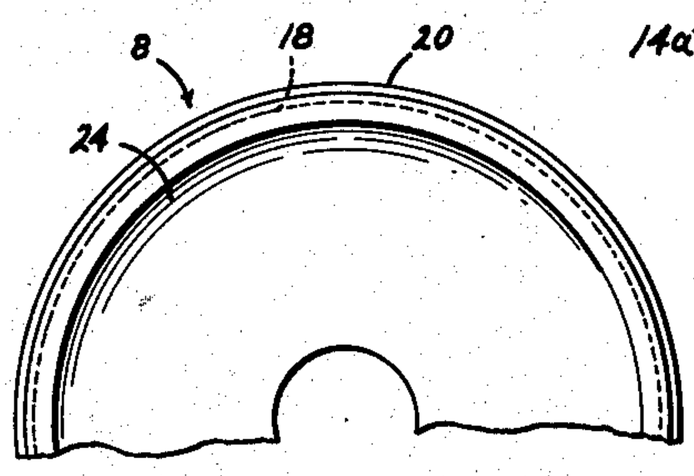


Fig. 2

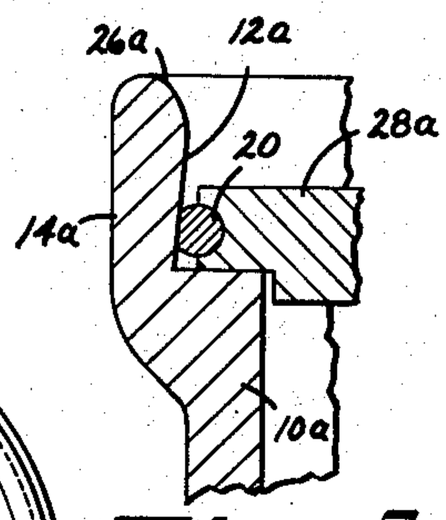
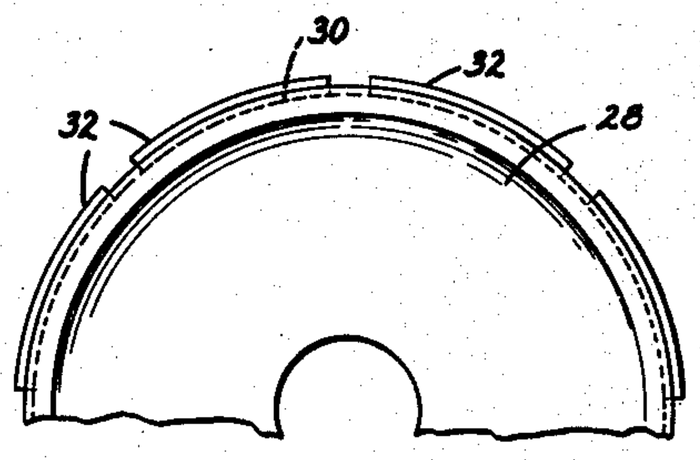


Fig. 5

Fig. 4



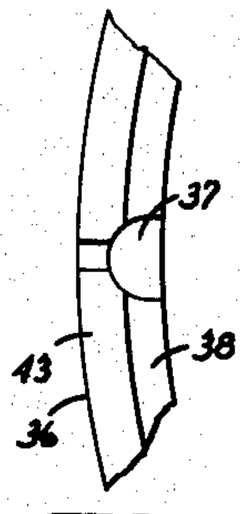


Fig. 6

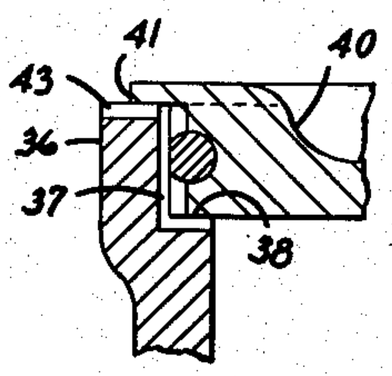


Fig. 7

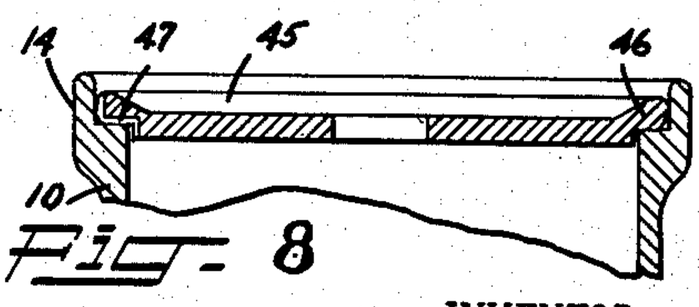


Fig. 8

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SPINNING BUCKET AND COVER THEREFOR

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This invention relates to a spinning bucket and removable cover therefor having cooperating parts which maintain the cover in place during collection of a strand, such as a freshly spun viscose rayon yarn, at high speed rotation of a spinning bucket assembly.

It is an object of the invention to provide a spinning bucket cover which may be readily pushed into place by manual effort and may be quickly removed by moderate manually applied pulling force. It is also an object to provide a lightweight tightfitting cover of inexpensive construction. It is another object to provide a lightweight and well-balanced construction having dynamic stability at high speed of rotation. Still another object is to provide a cover which fits closely to the cylindrical cake forming area of the bucket so as to prevent irregular cake formation at the end thereof adjacent the cover. Other objects, features, and advantages of the invention will be obvious from the following description and the drawing in which;

Fig. 1 is a front elevation partly in section of one embodiment of the invention;

Fig. 2 is a fragmentary top view of the cover illustrated in Fig. 1;

Fig. 3 is a front elevation partially in section illustrating a modified cover in place on the bucket;

Fig. 4 is a fragmentary top view of the cover illustrated in Fig. 3;

Fig. 5 is a fragmentary sectional view in elevation illustrating a bucket having a modified rim section;

Fig. 6 is a fragmentary plan view of a modified spinning bucket rim section;

Fig. 7 is a fragmentary sectional elevation view of the rim section illustrated in Fig. 6 with a modified bucket cover in place; and

Fig. 8 is a sectional elevation view of still another modified bucket lid showing a portion of the bucket in section.

Briefly, the invention is an arrangement for securing a cover in the rim of a spinning bucket comprising a cover of larger diameter than the cylindrical cake forming surface of the bucket and having a resilient ring or a series of ring segments at least half submerged and secured within a circumferential groove or series of segmental grooves within its peripheral surface, a cylindrical surface in the rim of larger diameter than the cover but of a slightly smaller diameter than the extreme diameter of the resilient ring or a ring formed by separated

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arcuate portions, and a seat for the cover formed by an annular surface or shoulder extending between adjacent concentric ends of the cylindrical surfaces.

Fig. 1 illustrates an embodiment of the invention wherein a cover 8 is supported on an annular shoulder 9 extending between the cylindrical cake forming surface 11 of the bucket 10 and the inner peripheral cylindrical surface 12 of the bucket rim 14. The lower surface 15 of the cover 8 and the surface of the annular shoulder 9 are in continuous contact when in the operating position so as to prevent the formation of a cake having loose strands around one end thereof. The extreme diameter of the cover 8 is such as to provide a small annular space between it and the inner periphery of the bucket rim of perhaps a few hundredths of an inch. The outer peripheral surface 17 of cover 8 is annular, and preferably approximately cylindrical, and contains a circumferential groove 18 for supporting a ring 20 of a resilient material. In the embodiment illustrated by Fig. 1, the ring 20 is round in cross section and is supported in the groove 18 so that an outer circumferential section protrudes from the groove and the submerged section extends into the groove to a depth greater than the radius of the cross section, that is to say, the thickness of the cross section measured radially of the ring is one to two times the depth of the groove. The groove is preferably narrower near the periphery of the cover than at an intermediate depth so that the ring after being forced into place within the groove, is trapped therein by the inwardly-flared sides and constricted entrance sides of the groove. The extreme diameter of the ring 20 is such that the ring is under slight compression when the cover is forced into position within the bucket rim. The diameter of the ring 20 may be greater than the inner diameter of the bucket rim on the order of several thousandths of an inch for example, 0.001 to 0.010 of an inch; a difference of five thousandths has been found quite satisfactory.

The cover 8 may be slightly recessed along the outer annular margin of the lower surface 15 to provide a surface which engages the annular supporting surface 9 of the bucket and also to provide a shoulder 22 on the cover which slightly overlaps the surface 11 of the bucket. The shoulder 22 more positively centers the cover within the bucket and tends to eliminate the possibility of a gap forming between the cake forming surfaces of the cover and the bucket. Any yarn

getting into the opening between the lid and the inner surface of the bucket rim would wind unevenly off the end of the cake and interfere with later processing of the cake. In order that the cover may be light in weight, its upper surface **24** may be recessed as shown to reduce the thickness of the center section while leaving an outer annular section to accommodate the groove ring **20**. The upper edge of the rim **14** has a rounded surface **26** contiguous with the surface **12** of the ring which facilitates introduction of the cover into the rim portion of the bucket. Fig. 2 shows in top view a portion of the cover **8** and a continuous construction of the ring **20**.

Fig. 3 illustrates a modified bucket cover **28** of simple flat disk construction provided along its periphery with an annular ring **29** of modified design. As in the earlier described embodiment, the ring **29** is held within a constricted groove **30** which tends to trap the ring and prevent it from being pushed from the groove in the event that it loses its adhesive contact with the walls of the groove such as from swelling and stretching of the resilient materials comprising the ring. As in the embodiment shown in Fig. 1, the cover **28** has a smaller diameter than the inner surface of the rim **14** whereas the ring **30** has a slightly larger outside diameter than the inner rim surface so that the ring engages the rim surface when the cover **28** is placed in operating position. The ring **29** may be of continuous ring structure similar to the ring **20** of Figs. 1 and 2 or it may comprise a number of segments such as segmental elements or arcuate sections **32** disposed along, and having a thickness of from one to two times the depth of, the groove **30** of Fig. 4. Adjacent ends of each of the elements **32** may be spaced to provide gaps through which liquids carried into the bucket by the yarn may escape from the bucket during a spinning operation. In this event, several notches such as the notch **33** are provided in a radial direction across the shoulder **34**.

Fig. 5 illustrates in fragmentary section view, portions of a modified spinning bucket **10***a* and a cover **28***a*. The bucket is distinguishable from previously described buckets by a rim section **14***a* having a tapered inner surface **12***a*. The surface **12***a* varies with respect to a true cylindrical surface to the extent that it is tapered in a range of one to five degrees from a direction parallel to the axis of the bucket. This slightly tapered surface improves retention of the cover within the rim and resists the small axial pressure exerted by the cake and liquids carried into the bucket during the spinning operation while subjected to centrifugal force. The taper is such that it is hardly noticeable to the eye; it does not increase the force needed to insert the cover into the bucket or to extract it therefrom to any substantial extent. As in the previously described bucket **10**, the rim **14***a* of the bucket **10***a* is provided with a rounded edge **26***a* to facilitate insertion of the cover **28***a*.

The escape of liquids from the spinning box carried thereinto by the freshly extruded yarn, may be obtained in a conventional manner through holes **35** in the wall of the bucket **10** intersecting the upper margin of its cake collecting surface. Figs. 6 and 7 illustrate another arrangement whereby liquid may escape through a channel **37** extending vertically along the inner peripheral surface of the bucket rim **36** and radially across the bucket cover seating surface **38**.

If three such channels are formed in the bucket rim 120° apart, a channel depth of approximately 0.04 of an inch is adequate to remove the undesired liquid from a bucket for producing cakes 7 inches in diameter or larger. However, the number of channels **35** and their depth may be varied as desired. The channels are conveniently formed by a drilling or cutting operation with, for example, a 0.25 inch drill bit, or they may be molded in place, especially if the bucket is formed from a resinous and/or fabric material. Fig. 7 illustrates also a modified bucket cover **40** having a flange **41** of sufficient diameter to extend over at least a portion of the upper surface **43** of the rim **36**; such construction prevents any material or dirt that may fall upon the cover from being thrown into the gap between the inner surface of the rim **36** and the adjacent peripheral surface of the cover. It also permits easy washing away of any salt crystals that might form on top of the lid or cover.

The material used to form the resilient rings or ring segments used to hold bucket covers in place may be of any resilient material which is resistant to fatigue and to the acids or other solutions encountered in processes such as the spinning of viscose rayon filaments. Such materials include natural rubber and such synthetic rubbers as polymerizates of chlorobutadiene, butadiene and styrene, and butadiene and acrylonitrile, or non-corrosive metallic springs. The ring member may be formed in accordance with any cross section desired but preferably is contained in a groove which may substantially enclose it leaving a smaller circumferentially extending portion protruding from the rim to contact the bucket rim.

Fig. 8 illustrates a cover **45** of unitary structure in place within the rim of the bucket **10**. The cover, when removed or not otherwise subjected to constriction or deformation, has an extreme diameter of a few thousandths of an inch greater than the inner diameter of the flange **14** of the bucket. The lid is formed from a slightly resilient material such as a hard natural or synthetic rubber vulcanizate which permits the rim of the lid **45** to undergo sufficient deformation to accommodate to the smaller diameter of the bucket rim when urged into place by moderate manual effort. To obtain the resiliency and rigidity required in the cover to impart the desired shape to the cake, and to provide a cover which exerts sufficient pressure against the bucket rim surface for holding the cover in place, consideration is given to such factors as thickness of the body portion of the cover, composition of the vulcanizate, and degree of vulcanization. The cover is formed with sufficient thickness to prevent deformation of its body portion from the constriction imposed on the peripheral portion **46** by the bucket rim, and/or the pressure exerted on it by the end of the cake during the building thereof. The thickness of the rim or peripheral section is proportioned with respect to the body portion of the cover so that the deformation caused by forcing the cover into the bucket occurs substantially within the peripheral section. Proportions may be adopted substantially as shown in Fig. 8 although many refinements and alternatives are available to those skilled in the art of curing and molding vulcanizable materials. The cover **45** may be molded or otherwise formed with a plurality of slots or grooves extending in a generally axial direction along

its peripheral surfaces such as the groove 47 which permit the escape of liquid carried into the spinning box by the strand.

The bucket and cover assembly provided by this invention makes possible more rapid doffing of cakes than when cakes are doffed from the conventional buckets and covers. It is possible to remove and insert covers of the type herein described in a matter of two to five seconds. Moreover, on account of the extreme simplicity of the cover and rim section of the bucket, the bucket and cover may be more lightly constructed thereby reducing the cost and the weight of the assembly and giving greater freedom from vibration at high speed rotation. Since the surface of the various parts are concentric with respect to the bucket axis, the bucket and cover assembly is easily manufactured to close specifications. The provision of a resilient ring on the cover causes the cover to fit tightly and become accurately centered when placed in a bucket. If the ring is substantially enclosed or trapped within the groove on the cover as illustrated and hereinbefore explained, it is prevented from separating from the cover during the doffing operation and becoming lost or having to be replaced. Moreover because of the tightness and resiliency with which such a cover is supported in a bucket, the cover has greater freedom from chattering resulting from looseness between the cover and the bucket encountered in other types of equipment.

While a preferred embodiment of the invention has been described and shown, it is 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. Apparatus for collecting a strand material comprising a spinning bucket having a rim portion and a body portion, an interior cylindrical surface within the rim portion of a slightly larger diameter than the cake forming surface of the body portion, an annular surface extending between adjacent ends of the surfaces, a cover for the bucket of smaller diameter than the inner diameter of the rim portion, a groove along the peripheral surface of the cover, and a plurality of resilient arcuate members occupying the groove having a thickness in the range of from one to two times the depth of the groove and such that portions of the resilient members protrude exteriorly of the groove to engage the cylindrical surface of the rim portion.

2. Apparatus for collecting a strand material comprising a spinning bucket having a body portion and a rim portion, an interior cylindrical surface within the rim portion of slightly larger diameter than the cake forming surface of the body portion, an annular surface extending between adjacent ends of the surfaces, a cover for the bucket of smaller diameter than the inner diameter of the rim portion, a groove along the peripheral surface of the cover having a greater width in an axial direction inwardly of the peripheral surface than at the surface thereof, and a resilient ring member having a radially inner annular portion which fits tightly within the groove against the bottom and inwardly-flared side surfaces thereof and an annular outer portion extending exteriorly of the groove having a normal outer diameter slightly greater than the inner surface of the rim portion.

3. Apparatus for collecting a strand of material comprising a spinning bucket having a rim portion and a body portion, an interior cylindrical surface within the rim portion tapered to a slightly larger diameter toward the body portion, a cylindrical cake forming surface within the body portion of smaller diameter than any portion of the inner rim surface, an annular surface extending between adjacent ends of the inner surfaces of the rim portion and the body portion, a cover for the bucket of smaller diameter than any portion of the inner rim surface, but greater than the diameter of the inner body portion surface, a groove along the peripheral surface of the cover having a circumferentially extending portion inwardly of the surface of greater width than a circumferential portion of the groove nearer the surface, a plurality of resilient segmental ring members extending through substantially the entire length of the groove having portions thereof contoured to fit and be secured within the groove, and other portions of the ring members extending exteriorly of the groove to engage the inner surface of the rim.

4. Apparatus for collecting a strand material comprising a spinning bucket having a body portion and a rim portion, an interior cylindrical surface within the rim portion of slightly larger diameter than the cake-forming surface of the body portion, an annular surface extending between adjacent ends of the surfaces, a cover for the bucket of smaller diameter than the inner diameter of the rim portion, a groove along the peripheral surface of the cover having a greater width measured in an axial direction inwardly of the peripheral surface of the cover than that measured along the surface, and a resilient ring member having a radially inner annular portion fitting tightly against the bottom and the inwardly flared side surfaces of the groove, the ring member also having an outer annular portion extending exteriorly of the groove, the outside diameter of the ring member being 0.001 to 0.010 inch greater than the inner surface of the rim portion when not in place within the rim portion.

5. Apparatus for collecting a strand material comprising a spinning bucket having a body portion and a rim portion, an interior cylindrical surface within the rim portion of slightly larger diameter than the cake-forming surface of the body portion, an annular surface extending between adjacent ends of the surfaces, a cover for the bucket having a smaller diameter than the inner surface of the rim portion of the bucket, a groove along the peripheral surface of the cover having a greater width with respect to an axial direction inwardly of the peripheral surface of the cover than that measured along the surface, and resilient arcuate means having radially inner arcuate portions which fit within the groove against the bottom and the inwardly flared side surfaces thereof, and outer arcuate portions not contained within the groove which resiliently engage the inner surface of the rim portion.

6. Apparatus for collecting a strand material comprising a spinning bucket having a body portion and a rim portion, an interior cylindrical surface within the rim portion of slightly larger diameter than the strand-receiving surface of the body portion, an annular surface extending between adjacent ends of the surfaces, a cover for the bucket comprising one portion having a diameter smaller than that of the strand-receiving surface of the bucket and a second portion having a diameter greater than that of the strand-receiving surface and less than that of the inner surface of the rim portion, a circular

groove extending along the peripheral surface of the second-named portion of the cover having a greater width, as measured in an axial direction inwardly of the peripheral surface, than that measured along said peripheral surface, and resilient arcuate means having radially inner arcuate portions which fit tightly within the groove against the bottom and the inwardly flared surfaces thereof, and outer arcuate portions not contained within the groove which resiliently engage the inner surface of the rim portion.

7. Apparatus for collecting a strand material comprising a spinning bucket having a rim portion and a body portion, an interior cylindrical surface within the rim portion tapered to a slightly larger diameter toward the body portion, a cylindrical strand-collecting surface within the body portion of smaller diameter than any portion of the inner rim surface, an annular surface extending between adjacent ends of the inner surfaces of the rim portion and the body portion, a cover for the bucket of smaller diameter than any portion of said tapered rim surface but greater than the diameter of the strand-collecting surface, resilient arcuate means having at least one radially outer surface of a diameter

slightly larger than the inner diameter of substantially all of the tapered rim surface, and a circular groove for receiving the arcuate means extending inwardly of the peripheral surface of the cover at a depth less than the thickness, but greater than half the thickness, of the arcuate means, the inner diameter of the groove being substantially equal to the inner diameter of the arcuate means, said arcuate means fitting tightly against the bottom and side surfaces of the groove.

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