Nov. 29, 1966 H. P. FRY, JR 3,288,514

YARN PACKAGE EXTRACTING APPARATUS

Filed April 7, 1965

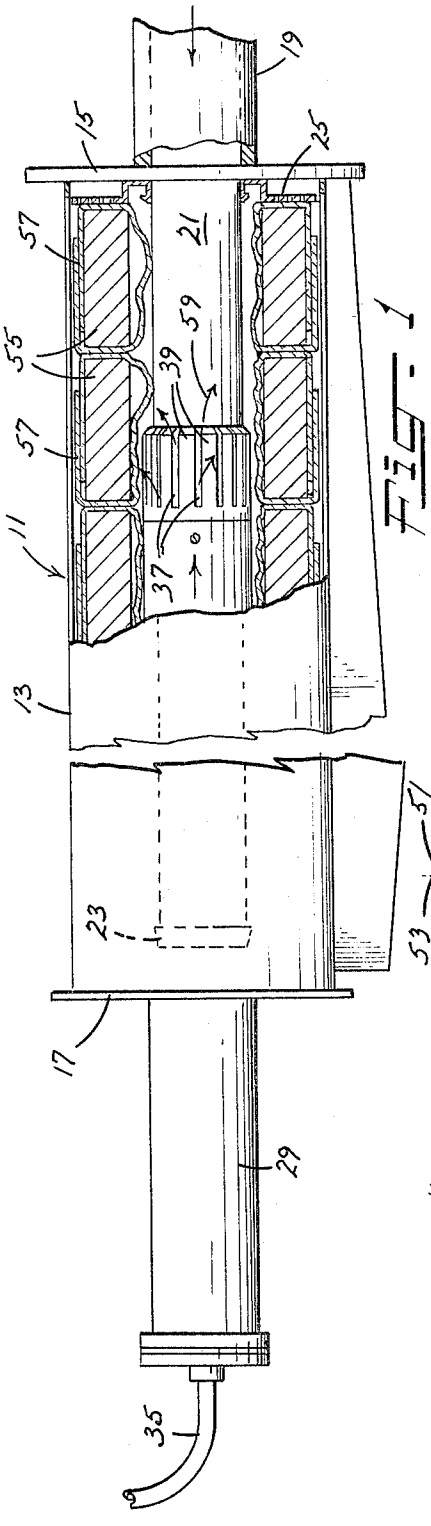


Fig. 1

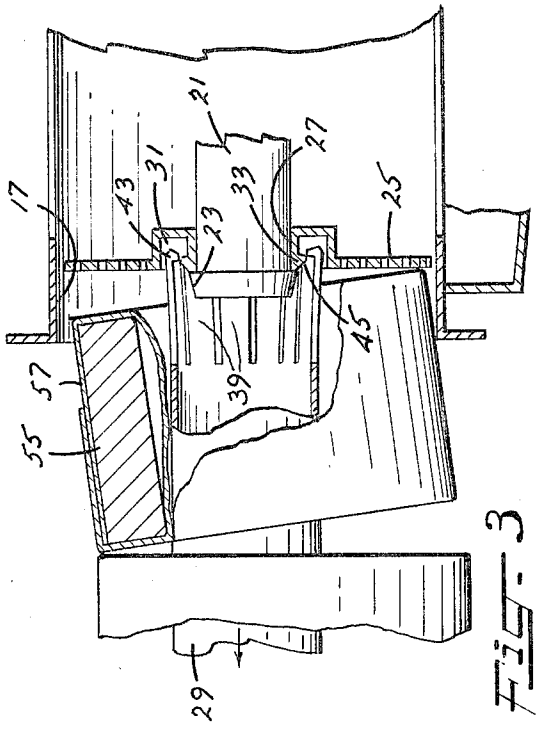


Fig. 3

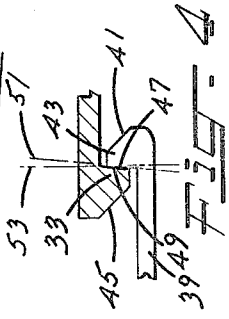


Fig. 4

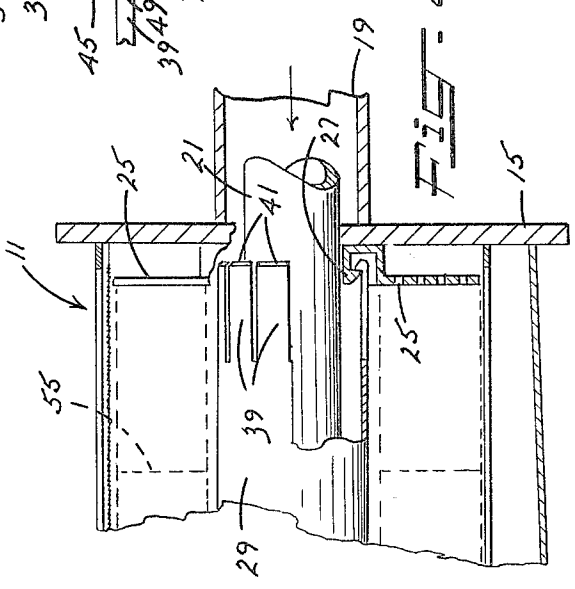


Fig. 2

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3,288,514

YARN PACKAGE EXTRACTING APPARATUS

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7 Claims. (Cl. 294—87.2)

This invention relates to an apparatus for removing annular packages of filamentary material or yarn from liquid treating equipment.

In my copending United States patent application Serial No. 446,182 filed April 7, 1965, there is described and claimed an apparatus for liquid treating annular wound packages of filamentary material or yarn which includes, broadly, a tubular enclosure within which a plurality of yarn packages are rather snugly contained and a liquid distributor which extends longitudinally of the enclosure and substantially centrally of the contained yarn packages. A suitable treating liquid delivered through the distributor is caused to flow radially through the contained yarn packages and then circumferentially thereof to suitable drainage openings.

The tubular enclosure employed is only slightly larger than the annual yarn packages which it is intended to contain so as to assure proper package support and to permit the use of a minimum of treating liquid yet provide for a desired flow of the same during the liquid treatment. However, once liquid treatment is completed some difficulty is generally encountered when attempting to remove the treated and perhaps swollen packages without damaging the yarn or distorting the package windings. Accordingly, a primary object is to provide a new or generally improved and more satisfactory apparatus for extracting packages of filamentary material from liquid treating apparatus.

Another object of this invention is the provision of an improved apparatus for removing annular wound yarn packages from liquid treating equipment without damaging the yarn or package configuration.

Still another object is an apparatus for rapidly extracting a plurality of liquid treated yarn packages from a tubular package treating enclosure.

A further object is to provide an apparatus which is simple in construction and easy to use in removing liquid treated yarn packages from a generally tubular enclosure.

Still further objects will appear from the following description.

The apparatus of the present invention is adapted for removing annular wound yarn packages from a tubular treating enclosure having a wall disposed across one end thereof, a removable cover at its opposite end, and an elongated liquid distributor which projects through the end wall and extends longitudinally of the enclosure and substantially centrally of annular yarn packages which may be contained therein.

Broadly, the apparatus includes an annular disk which is normally positioned adjacent to the enclosure end wall and a hollow arm which is designed to telescope over the liquid distributor as it is inserted into a series of annular yarn packages contained within the enclosure. The leading end of the hollow arm includes a plurality of resilient fingers having hooked ends which are adapted to extend over and lock with a flange which forms a part of the disk. Withdrawal of the hollow arm after it has been locked to the disk causes the disk to move relative to the distributor and thereby urge the liquid treated yarn packages toward and outwardly of the uncovered end of the enclosure.

Preferably, the free end of the liquid distributor is formed with a projecting abutment which serves to engage

with the disk and arrest its movement as it approaches the uncovered end of the enclosure. The disk flange and the hooked ends of the resilient fingers of the hollow arm are provided with mating cam surfaces which cause the resilient fingers to be disengaged from the disk flange once the disk has been arrested and while the hollow arm continues its withdrawal movement.

In many instances the annular wound yarn packages are provided with protective covers or sleeves of flexible sheet material, as for example in the case of freshly spun rayon cakes. Since these covers may often droop or sag toward the center of the enclosure and thereby obstruct the movement of the hollow arm as it is inserted into the contained yarn packages, means are provided for introducing a fluid under pressure, as for example compressed air, into the hollow arm so as to deflect any such obstructions from its path.

The invention is hereafter described as employed in extracting treated regenerated filamentary materials or yarn from liquid treating equipment which is more fully described in my above-noted pending application. It should be understood that the invention is in no way limited by the particular yarn packages or the specific liquid treating equipment which is being employed.

In the drawing, FIGURE 1 is a side view of a yarn package liquid treating enclosure, with a portion thereof being broken away to illustrate the apparatus of the present invention;

FIGURE 2 illustrates a portion of the apparatus of FIGURE 1 on an enlarged scale and showing parts of the apparatus of the present invention at the start of yarn package extracting operations;

FIGURE 3 is a view similar to FIGURE 2 showing the parts of the apparatus of the present invention near the end of a package extracting operation; and

FIGURE 4 is an enlarged view partially in section, of a detail of the apparatus of the present invention.

Referring now to the drawing the numeral **11** designates a liquid treating equipment as more fully described in my copending United States patent application heretofore noted. This equipment includes a tubular body **13**, a wall **15** which is disposed across one end of the body **13**, and a cover, not shown, for sealing off the opposite end **17** of the body. The enclosure is attached to a carriage or other structure, not shown, by a tubular arm **19**, with its longitudinal axis extending at an angle to a vertical plane and preferably in a horizontal direction.

A liquid distributor **21** is disposed longitudinally of the enclosure **11** and extends through the arm **19** where it is connected to a suitable source of treating liquid, not shown. This distributor **21** may be of any desired construction but is preferably of the type as disclosed in my copending application Serial No. 446,175 filed April 7, 1965, entitled, "Fluid Distributor." Regardless of the type of liquid distributor which is employed, its free end is provided with an abutment **23** which projects outwardly beyond the surface of the remainder of the distributor for reasons as more fully described hereafter.

The apparatus of the present invention includes a perforated disk **25**, having a central opening **27**, which permits the disk **25** to slide along the distrbutor **21**, and a hollow package extracting arm **29**. The disk is recessed at **31** in the area of its central opening **27** and includes a flange **33**.

One end of the arm **29** is connected by a hose **35** to a source of fluid under pressure, such as compressed air, while its opposite end is slotted at **37** to provide a plurality of resilient fingers **39**. The leading ends of the fingers **39** are inclined at **41** for purposes as hereafter described and are hooked at **43** so as to extend over and lock with the disk flange **33**.

As best shown in FIGURE 4, the disk flange **33** is provided with an inclined surface **45** to permit the hooked ends **43** of the fingers **39** to easily ride thereover for locking the disk **25** and the hollow arm **29** together. For purposes as more fully described hereafter, mating surfaces **47** and **49** on the disk flange and resilient fingers, respectively, extend along planes **51** which are inclined relative to a similar plane **53** disposed at substantially right angles to the axis of the hollow arm **29**.

In preparing the above described apparatus for use, the disk **25** is first positioned adjacent to the enclosure end wall **15** after which annular wound yarn packages or cakes **55**, having conventional cake covers or sleeves **57**, are inserted into the enclosure through its uncovered end. After the enclosure is filled and covered, a suitable treating liquid is discharged through the liquid distributor **21** in a manner as more fully described in my pending application Serial No. 446,182 filed April 7, 1965.

Upon completion of the liquid treatment and drainage of the free treating liquid, the enclosure cover is removed and the hollow arm **29** of the extracting apparatus is inserted into the contained yarn packages and telescoped over the liquid distributor **21** in a manner as shown in FIGURE 1. In the event portions of the cake covers **57** should droop or sag into the path of the distributor, making its advancement difficult or impossible, compressed air or other fluid is delivered through the hose **35** and discharged from the leading end of the arm **29**, as indicated by arrows **59**, to at least temporarily remove or deflect such obstruction. As heretofore mentioned, the leading ends of the fingers **39** are inclined at **41** to prevent the same from catching onto a yarn package or cake cover. The advancement of the hollow arm **29** into the enclosure body **13** is continued until its resilient fingers **39** are cammed outwardly, as they ride along the inclined surface **45** of the disk flange **33**, and the hooked ends **43** of the fingers **39** extend over and lock with the disk flange itself, as shown in FIGURE 2.

The hollow arm **29**, along with the attached disk **25**, is now retracted from the enclosure, causing the yarn packages **55** to be moved toward and outwardly of the uncovered end of the enclosure body **13**. As the innermost yarn package approaches the uncovered end of the enclosure body **13**, the movement of the disk **25** is arrested by the abutment **23** which projects outwardly from the free end of the liquid distributor **21**. However, the retracting movement of the hollow arm **29** is continued to thereby effect the release of the resilient fingers **39** from the disk flange **33**, as shown in FIGURE 3. In view of the inclination of the surface **47** on the disk flange **33**, and the mating surfaces **49** on the resilient fingers **39**, as illustrated in FIGURE 4, the hooked ends of the resilient fingers are cammed radially outward and thereby released from the disk **25**.

The treated yarn packages may then be removed from the hollow arm **29** on which they have been collected after which the apparatus is made ready for receiving a new series of yarn packages for liquid treatment.

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. Apparatus for removing annular yarn packages from a tubular package treating enclosure having a wall disposed across one end thereof and an elongated liquid distributor projecting through said wall and extending substantially centrally of the contained yarn packages, said apparatus including an annular disk normally positioned adjacent to the wall of the enclosure and adapted for movement longitudinally of the enclosure and along the liquid distributor, a hollow arm adapted to telescope over the liquid distributor as it is inserted into annular yarn packages contained within the enclosure, and cooperating means on said disk and hollow arm for locking the same together whereby withdrawal of said hollow arm from the enclosure causes the disk which is locked thereto to urge the annular yarn packages from the enclosure.

2. Apparatus as defined in claim **1** wherein said means for locking said disk and hollow arm together includes a flange on said disk and a plurality of resilient fingers on the end of said hollow arm which are adapted to lock onto said disk flange.

3. Apparatus as defined in claim **1** further including means for delivering a fluid under pressure into said hollow arm.

4. Apparatus for removing annular yarn packages covered with flexible sheet material from a tubular package treating enclosure having a wall disposed across one end thereof and an elongated liquid distributor which projects through said wall and extends substantially centrally of covered packages contained within the enclosure, the free end of the distributor which is located within the enclosure having an outwardly projecting abutment, said apparatus including a disk having a central opening through which the distributor extends and being normally positioned adjacent to the enclosure end wall, said disk opening being larger than the cross-section of the distributor but smaller than the abutment on the free end thereof, a hollow arm adapted to telescope over the liquid distributor as it is inserted into covered yarn packages contained within the enclosure, a flange on said disk projecting in a direction radially of the distributor, a plurality of resilient fingers formed on the leading end of said hollow arm, said fingers each having a hooked end which is adapted to extend over and lock with said disk flange whereby withdrawal of said hollow arm from the enclosure causes the disk to urge the yarn packages from the enclosure until the disk engages with the distributor abutment.

5. Apparatus as defined in claim **4** wherein the disk flange and the hooked ends of the resilient fingers are provided with mating cam surfaces whereby the resilient fingers are released from the disk flange with continued withdrawal of the hollow arm after the disk engages with the distributor abutment.

6. Apparatus as defined in claim **4** for further including means for introducing a fluid under pressure into said hollow arm for deflecting obstructions in the path of said arm as it is telescoped over the distributor.

7. Apparatus as defined in claim **5** further including means for introducing a fluid under pressure into said hollow arm for deflecting obstructions in the path of said arm as it is telescoped over the distributor.

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