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Davis

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[54] **TWO-FOR-ONE TWISTER**

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[52] **U.S. Cl.**..... **57/58.83,** 57/58.49, 57/58.84

[51] **Int. Cl.**..... **D01h 7/86**

[58] **Field of Search**..... 57/58.49. 58.52, 58.7, 57/58.72, 58.83, 58.84, 58.86

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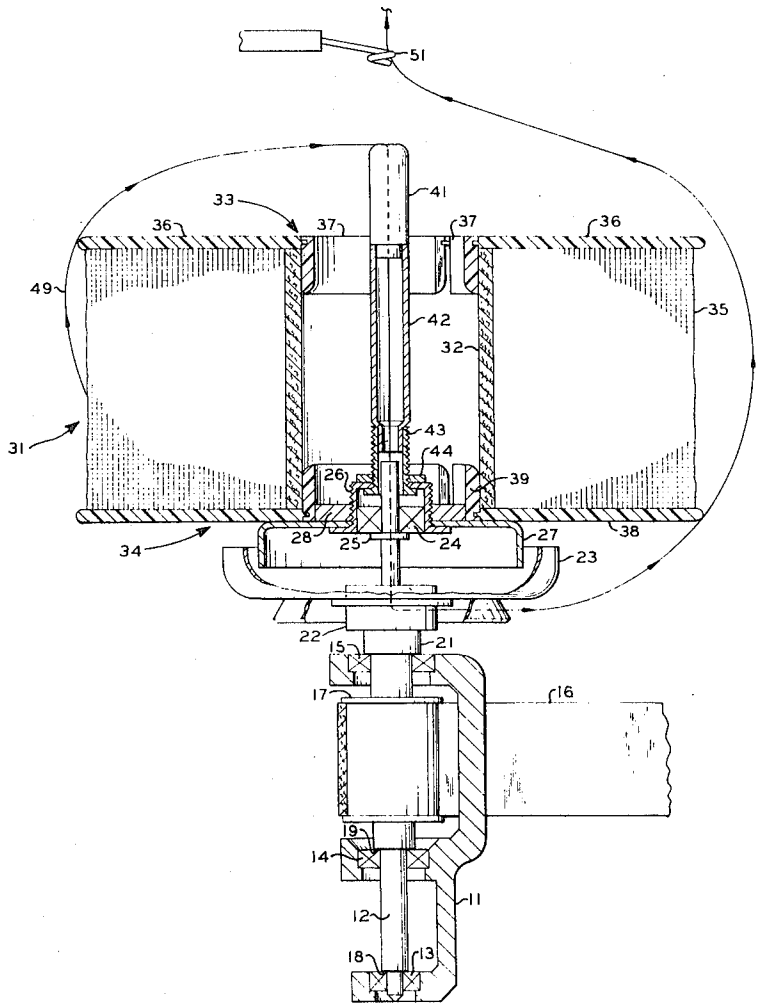
Primary Examiner—John Petrakes

[57] **ABSTRACT**

The capacity of a two-for-one twister is increased by eliminating the cover and utilizing caps on the ends of the bobbin, the diameter of the caps being greater than the diameter of the body of wound yarn, and the lower bobbin cap having a diameter greater than the diameter of the rotor so that the yarn emerging from the spindle and passing through a yarn guide on the rotor makes contact with the outer periphery of the lower bobbin cap during the initial portion of the time required to bring the spindle from rest to the desired rate of rotation.

6 Claims, 2 Drawing Figures



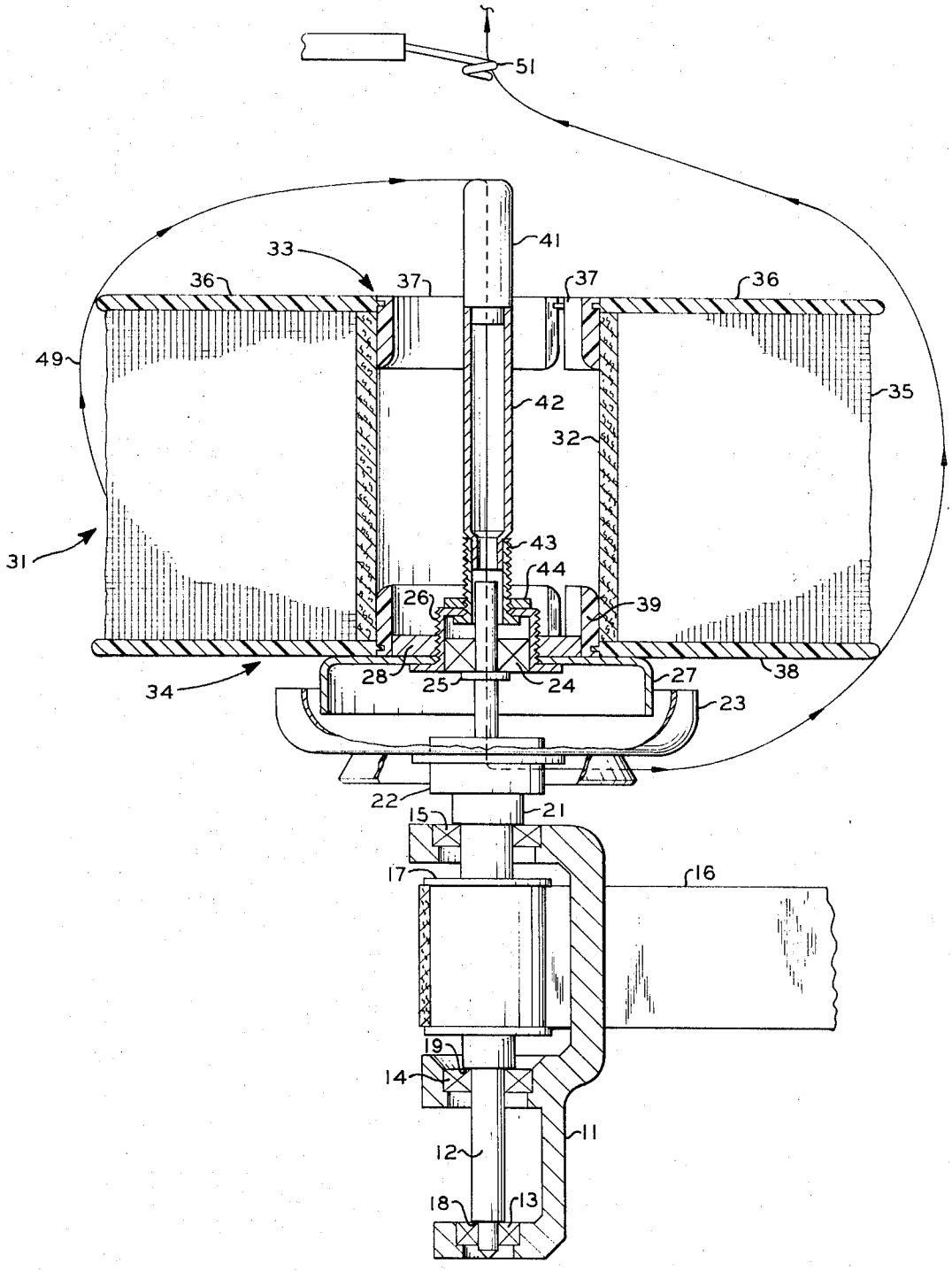

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FIG. 1

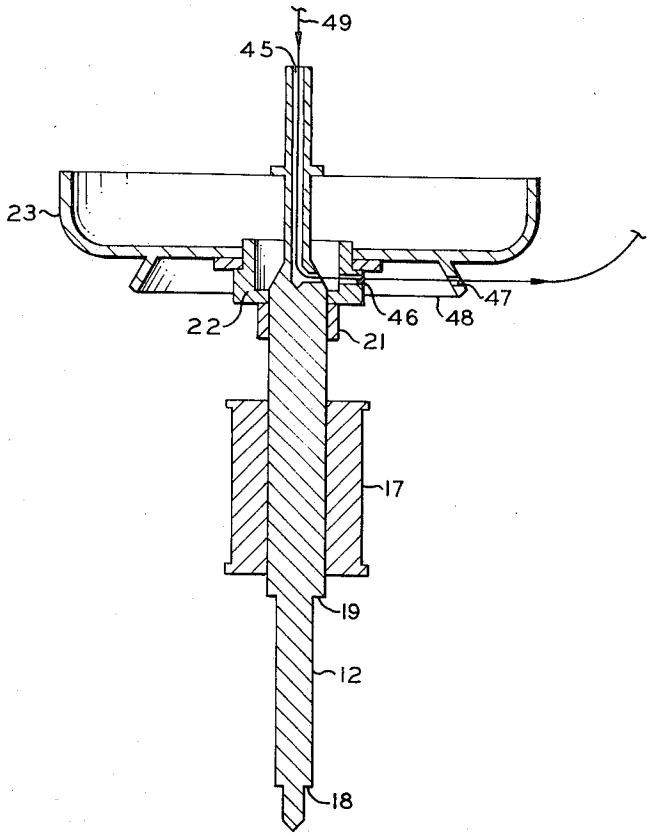

FIG. 2

TWO-FOR-ONE TWISTER

The invention relates to an improved spindle apparatus for introducing true twist into yarn.

The utilization of two-for-one twisters for imparting true twist to yarn is well established. These twisters generally employ a spindle pot or cover to contain the feed yarn and to provide a smooth rubbing surface for the yarn during start-up of the spindle and initial formation of the balloon. The use of such covers obviously limits the diameter of the feed package to sizes smaller than the internal diameter of the cover. Even in those instances where a cover has not been employed, the diameter of the feed package has been limited to sizes which are smaller than the spindle rotor and the diameter of the spindle rotor is only slightly larger than the diameter of the cover, if employed. Thus, the capacity of such two-for-one twisters has been limited.

Accordingly, it is an object of the present invention to provide a new and improved two-for-one twister system which can process feed yarn packages having significantly larger diameters. Another object of the invention is to reduce the doffing time per pound of feed yarn in the production of the feed yarn packages. Yet another object of the invention is to reduce the set-up time per pound of yarn processed through a two-for-one twister. other objects, aspects and advantages of the invention will be apparent from a study of the specification, the drawings and the appended claims to the invention.

In accordance with the present invention, it has been discovered that the foregoing objectives can be achieved by eliminating the cover and utilizing bobbin caps, at least the lower one of which has a diameter greater than the diameter of the rotor so that the yarn emerging from the spindle and passing through a yarn guide on the rotor makes contact with the outer periphery of the lower bobbin cap during the initial portion of the time required to bring the spindle from rest to the desired rate of rotation.

IN THE DRAWINGS:

FIG. **1** is an elevational view, partly in cross section, of a two-for-one twister in accordance with the present invention; and

FIG. **2** is a fragmentary view, in cross section, of the spindle and rotor components of FIG. **1**.

Referring now to the drawing in detail, the illustrated coverless two-for-one yarn twister has a support bracket **11** and a spindle **12**. Bearing means **13, 14** and **15** are positioned in support bracket **11** to mount spindle **12** for rotation of spindle **12** about its longitudinal axis. The axis of rotation will generally be vertical, but can be inclined at an acute angle to the vertical, generally less than about 30° to the vertical. A belt **16** is passed in frictional contact with the periphery of pulley **17**, mounted on spindle **12** between bearings **14** and **15**, to effect the rotation of spindle **12** about its longitudinal axis. Spindle **12** is provided with annular shoulders **18, 19** and **21** which rest on bearings **13, 14** and **15**, respectively.

A rotor support hub **22** is secured on spindle **12** at a location above shoulder **21** for rotation with spindle **12**. A rotor **23** is mounted on hub **22** for rotation therewith. The inner ring of bearing **24** is mounted on spindle **12** at a location above hub **22** and is supported by shoulder **25**. The stator hub **26** is mounted on the outer ring of bearing **24**, and thus is free of the rotative effect of spindle **12** and accordingly does not rotate with the spindle **12**. An annular bobbin support plate **27** is mounted on stator **26** and extends outwardly in a plane perpendicular to the longitudinal axis of spindle **12**. An annular disc **28** is mounted on hub **26** coaxially with spindle **12** to serve as a stabilizing weight and as a centering means for positioning the yarn package **31** coaxially with spindle **12**. The outer diameter of disc **28** is slightly smaller than the internal diameter of the yarn package **31**.

Yarn package **31** comprises a cylindrical bobbin **32**, an upper bobbin cap **33**, a lower bobbin cap **34**, and a body **35** of wound yarn. The bobbin **32** is sometimes called a tube, pirn, or cop. Bobbin cap **33** comprises an annular flange **36** and a split-ring retention clasp **37**. Clasp **37** releasably grasps the end of bobbin **32**, and is provided with a groove in the outer periphery thereof to support flange **36**. Similarly, bobbin cap **34** comprises an annular flange **38** and split-ring retention clasp **39** which is releasably secured to the lower end of bobbin **32**. Flanges **36** and **38** extend radially outwardly from bobbin **32** in respective planes which are perpendicular to the longitudinal axis of spindle **12**.

A yarn tensioning device **41** is mounted on the upper end of tube **42**, which is supported by externally threaded sleeve **43** and nut **44** on stator hub **26**. Spindle **12** is provided with a yarn passageway **45** extending axially downwardly from the upper end thereof to a point adjacent rotor **23** and then radially outwardly. A yarn passageway **46** is provided in rotor hub **22** and a yarn guide passageway **47** is provided in a flange **48** which extends downwardly from the lower side of rotor **23**. As yarn **49** is unwound from the body **35**, it passes outwardly and upwardly past the outer periphery of flange **36** and then downwardly through yarn tensioning means **41**, tube **42** and passageway **45**, and then outwardly through passageways **46** and **47**. The yarn **49** then balloons outwardly as it passes from contact with the outer periphery of flange **38** to yarn guide **51** positioned above the two-for-one twister and in coaxial alignment with spindle **12**.

In accordance with the present invention, the outer diameters of flange **38** is greater than the maximum diameter of the body **35** of wound yarn, and is also greater than the maximum diameter of rotor **23** in or above the path of the yarn so that the yarn emerging from the yarn passageway **45** of spindle **12** and passing through the yarn guide **47** on rotor **23** makes contact with the outer periphery of flange **38** during the initial portion of the time required to bring the spindle **12** from rest up to the desired rate of rotation about the longitudinal axis of spindle **12**. The outer diameter of flange **36** is significantly greater than the maximum diameter of the body **35** of wound yarn so that the yarn being unwound from the yarn package **31** makes contact with the outer periphery of flange **36** before entering yarn tensioning means **41** and yarn passageway **45** during the time required to bring spindle **12** from rest up to the desired rate of rotation about the longitudinal axis of spindle **12**, and preferably during operation at the desired rate of rotation of spindle **12**.

In one embodiment the caps **33** and **34** are secured to the bobbin **32** at the time the body **35** of yarn is wound onto bobbin **35**, permitting the formation of a cylindrical body of wound yarn extending from one bobbin cap to the other bobbin cap. This provides the

maximum amount of yarn for a given maximum diameter of body **35**, a significant increase over tapered packages wound on bobbins not having caps.

Reasonable variations and modifications are possible within the scope of the foregoing disclosure, the drawings and the appended claims to the invention.

That which is claimed is:

1. A coverless two-for-one yarn twister comprising a support bracket, a spindle, means mounting said spindle in said support bracket for rotation about the longitudinal axis of said spindle, a rotor means mounted on said spindle above said bracket for rotation with said spindle, said spindle being provided with a yarn passageway extending axially from the upper end thereof to a point adjacent said rotor means and then radially outwardly, said rotor means being provided with yarn guide means, bearing means mounted on said spindle above said rotor means and having an outer member which does not rotate with said spindle, bobbin support means mounted on said outer member of said bearing means and having a bobbin support surface extending outwardly in a plane perpendicular to said longitudinal axis of said spindle, a cylindrical bobbin, centering means on said bobbin support means for positioning said bobbin in a position coaxial with said spindle, a first annular bobbin cap adjacent the end of said bobbin closest to said rotor means and extending radially outwardly from said bobbin in a plane perpendicular to said longitudinal axis of said spindle, a second annular bobbin cap adjacent the other end of said bobbin and extending radially outwardly from said bobbin in a plane perpendicular to said longitudinal axis of said spindle, the diameter of said first and second bobbin caps being greater than the diameter of the yarn package formed on said bobbin, the diameter of said first bobbin cap being significantly greater than the maximum diameter of said rotor means above the path of the yarn so that the yarn emerging from the yarn passageway of said spindle and passing through said yarn guide means on said rotor means makes contact with the outer periphery of said first bobbin cap during the initial portion of the time required to bring said spindle from rest to the desired rate of rotation about said longitudinal axis, the diameter of said second bobbin cap being significantly greater than the diameter of the yarn package formed on said bobbin so that the yarn being unwound from said yarn package and entering the yarn passageway of said spindle makes contact with the outer periphery of said second bobbin cap during the initial portion of the time required to bring said spindle from rest to the desired rate of rotation about said longitudinal axis.

2. Apparatus in accordance with claim **1** wherein said bobbin support means comprises an annular support plate and means for coaxially mounting said annular support plate on said outer member of said bearing means in a plane perpendicular to the longitudinal axis of said spindle, and wherein said centering means comprising an annular disc have an external diameter slightly smaller than the internal diameter of said bobbin and means for coaxially mounting said annular disc on said outer member of said bearing means in a plane perpendicular to the longitudinal axis of said spindle.

3. Apparatus in accordance with claim **1** wherein the diameter of said second bobbin cap is sufficiently great to cause the yarn being unwound from said yarn package and entering the yarn passageway of said spindle to contact the outer periphery of said second bobbin cap during operation of said spindle at said desired rate of rotation.

4. Apparatus in accordance with claim **1** wherein said first and second bobbin caps are secured to said bobbin.

5. Apparatus in accordance with claim **4** wherein the yarn package formed on said bobbin in a cylindrical body extending from the first bobbin cap to said second bobbin cap.

6. Apparatus in accordance with claim **1** wherein said first and second bobbin caps are releasably secured to said bobbin.

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