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BOBBIN

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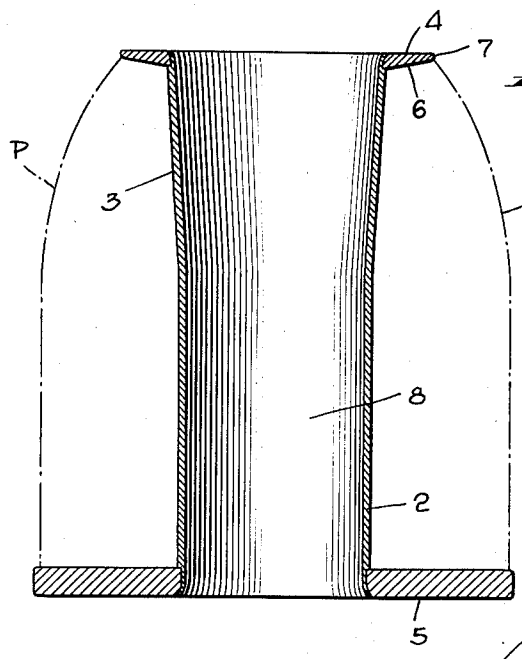
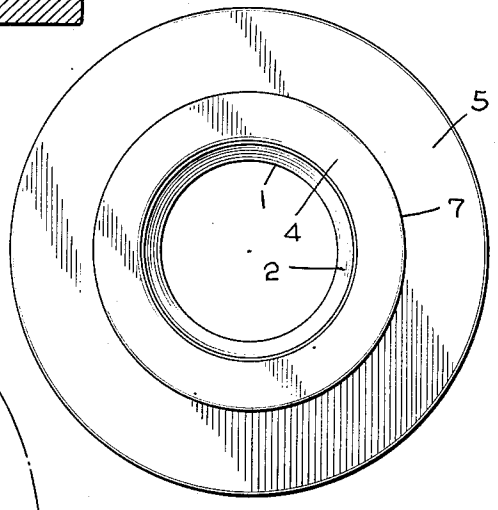


Fig. 1.

Fig. 2.



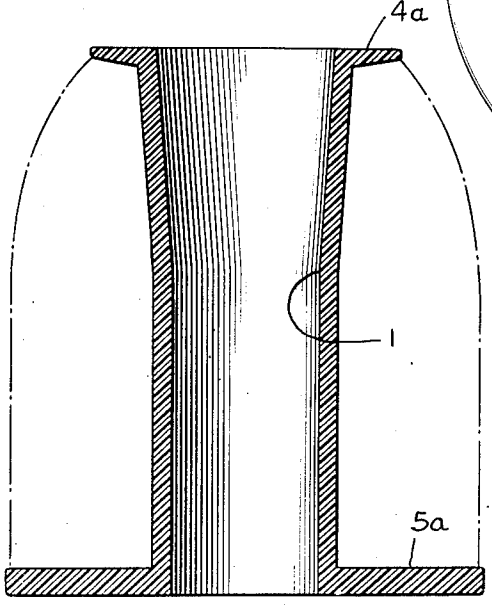


Fig. 3.

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BOBBIN

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6 Claims. (Cl. 242—118)

1

The present invention relates to a bobbin especially adapted for tapered packages for use with two-for-one twisters.

In such twisters, the yarn from a supply bobbin is passed upwardly over the top end of the bobbin, over a yarn guide and downwardly through the center of the bobbin, thence laterally by way of a passage through the spindle to a flyer, and finally upwardly to a take-up means. The rotation of the flyer causes the yarn to balloon about the supply bobbin between the flyer and take-up means. One rotation of the spindle in such two-for-one twisters imparts at least two twists in the yarn.

The bobbin comprising the present invention is especially adapted for such twisters, and particularly for such twisters as disclosed in applications of Norman E. Klein, Ser. No. 133,047, filed December 15, 1949, and Ser. No. 179,069, filed August 12, 1950, and an application of John W. May, Ser. No. 184,611, filed September 13, 1950, entitled "Spindle."

The new bobbin holds a large amount of yarn thereby minimizing down time for doffing, utilizes the space inside the yarn balloon economically by permitting the yarn package carried thereby to conform closely with the shape of the balloon described by the yarn rotated about it, reduces friction in over-end unwinding of the yarn and provides free over-end unwinding.

In general the bobbin comprises a hollow central core member provided with an annular top flange member and an annular bottom flange member, said core member being of uniform diameter along a major part of its length extending from the bottom flange member, then flaring outwardly for the remaining or minor portion of its length to the top flange member. The ratio of the outside diameter of the top flange member to the outside diameter of the core is critical and does not exceed 1.73 to 1 at any point throughout the length of the core. This upper limit is important since its permits the apex angle, that is, the included angle drawn from the outside diameter of the top flange member to the yarn guide to be large, about 80°. Thus the distance of the yarn guide from the bobbin may be small, thereby affecting economy in the space required by the twister.

Reduction of the top flange to core ratio which is provided by the flare of the core also improves functioning of the twister, since the wrap around angle at the edge of the top flange is reduced. This decreases friction in the yarn as it unwinds over the edge of the top flange. By placing the

2

flare in the core near the top flange, the flange to core ratio is minimum where the yarn wrap around angle at the edge of the flange is greatest. Thus, the function of the core flare compensates substantially for the wrap around angle. Also, by increasing the diameter of the core, the loss of volume of yarn that can be carried by the bobbin per unit increase in diameter of the core, is considerably reduced compared with the loss if the flange diameter were reduced in order to obtain the maximum reduction in ratio between top flange diameter and core diameter. This is due to the fact that the rate of change of volume of yarn at the smaller radius is much less since the volume of yarn varies as the square of the diameter or radius. Thus the advantages of the new bobbin are readily apparent.

In the drawings:

Fig. 1 is a vertical sectional view of one construction of the bobbin of the invention.

Fig. 2 is a top view of the bobbin of Fig. 1.

Fig. 3 is a vertical sectional view of an alternative construction of bobbin embodying the invention.

As shown in Figs. 1 and 2, the bobbin comprises a hollow central core or barrel member 1, the major portion 2 of its length being of uniform diameter, and the remaining minor portion 3 of its length being outwardly flared. The core is provided with an annular top flange member 4 attached to the widest end of the flared portion of the core, and a bottom flange member 5 attached to the end of the uniform portion of the core. The inner face 6 of the top flange may be flared outwardly and the rim 7 smoothly contoured to facilitate over-end unwinding. The passage 8 in the core 1 is adapted to permit passage of the bobbin over the yarn guide and yarn tension device of a two-for-one twister spindle. The shape of the completed package of yarn on the bobbin is shown in dotted lines P—P'.

The bobbin shown in Figs. 1 and 2, may be manufactured simply and economically by first forming discs the size of the top and bottom flange members, punching in the center of the top flange member a hole slightly smaller than the maximum diameter of the end of the flared portion 2 of the core, and in punching in the center of the bottom flange member a hole slightly smaller than the diameter of the uniform portion 2 of the core, turning down the annular members on a lathe to the desired flare, chamfering one surface of the annular members at the edge of the hole, and then rolling the ends of the core into this chamfer in each annular

member. By forming the core out of a light aluminum alloy, and the flange members out of synthetic plastic or resin, the top flange member, for example, being made from paper base Bakelite and the bottom member, out of Bakelized linen, the over-all weight of the empty bobbin is kept to a minimum. Thus the weight of the bobbin when packaged with yarn is correspondly reduced, thereby permitting attainment of maximum speed of rotation of the spindle of the two-for-one twister.

In the bobbin shown in Fig. 3, the core *1a*, top flange *4a*, and bottom flange *5a* are molded in one piece out of a light weight, strong plastic or synthetic resin, such as Bakelite.

As has been pointed out above, it is necessary that the ratio of the over-all diameter of the top flange member to the outside diameter of the core does not exceed 1.73 to 1. For example, if the top flange is 2⅞ inches in diameter, the outside diameter of the core portion **2** may be 1¾ inches and outwardly taper to a maximum diameter of 2 inches in the tapered portion **3** of the core. A bobbin highly satisfactory and efficient in the twisting devices of the aforesaid applications of Norman E. Klein and John W. May has the following dimensions: outside diameter of top flange member 2⅞ inches, outside diameter of uniform portion of core 1¾ inches and maximum outside diameter of flared portion 2 inches, inside diameter of core not less than 1⅜ inches, outside diameter of bottom flange $4\frac{5}{16}$ inches, length of portion of core of uniform diameter between bottom flange and start of flared portion 2⅝ inches, length of flared portion to top flange 1⅞ inches and over-all height of bobbin $4\frac{15}{16}$ inches. Such a bobbin has a 4½ inch traverse, between the bottom and top flanges, and holds about 1.2 lbs. of rayon yarn. The distance between the flanges is small enough to permit a woman operator to lift a wound bobbin by grasping the flanges between her thumb and fingers, thus avoiding contact with the yarn and consequent danger of soiling or otherwise damaging the yarn.

A further advantage of the new bobbin, and particularly one dimensioned as above described, is that it may be readily wound by the method on the redraw frame disclosed and claimed in a pending application of Norman E. Klein, Ser. No. 131,538, filed September 7, 1949.

The following is claimed:

1. A bobbin comprising a hollow tubular core member of uniform diameter for a portion of its length and flaring outwardly for the remainder of its length, an apertured annular top flange member mounted with its aperture in registry with the outwardly flared end of the core member, an apertured bottom flange member mounted with its aperture in registry with the end of the portion of the core which is of uniform diameter, the ratio of the outside diameter of the top flange member to the outside diameter of the core being such as not to exceed 1.73 to 1 at any point throughout the length of the core.

2. A bobbin as in claim 1 in which the core member is formed of aluminum alloy and the top and bottom flanges are formed of a synthetic resin.

3. A bobbin in accordance with claim 2 in which the annular top and bottom flange members are chamfered at a surface adjacent their central aperture, and the ends of the tubular core member are rolled respectively into the chamfer in the aperture of each annular member.

4. A bobbin in accordance with claim 1 in which the core and flange members are formed in one piece from a synthetic resin.

5. A bobbin as in claim 1 wherein the tapered portion of the core comprises the minor portion of the entire core and is positioned so as to provide minimum flange to core ratio where the wrap around angle at the edge of the top flange member is greatest.

6. A bobbin as in claim 1 in which the outside diameter of the top flange member is about 2⅞ inches and that of the bottom flange $4\frac{5}{16}$ inches, the uniform portion of the core extends 2⅝ inches from the bottom flange and has an outside diameter of 1¾ inches, the flared portion of the core extends 1⅞ inches and flares outwardly to a maximum outside diameter of 2 inches at the top flange, the inner diameter of the core is not less than 1⅜ inches, the over-all height of the bobbin being $4\frac{15}{16}$ inches with a 4½ inch length of traverse between the flanges.

NORMAN E. KLEIN.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
164,062	Wattles	June 1, 1875
1,516,002	Curry	Nov. 18, 1924
1,662,238	Davis	Mar. 13, 1928
1,704,151	Simpson	Mar. 5, 1929
1,869,408	Bungay	Aug. 2, 1932
2,166,243	Elvin	June 18, 1939

FOREIGN PATENTS

Number	Country	Date
2,079	Great Britain	Sept. 27, 1854