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(54) **Bobbin and bobbin support for a roving frame.**

(57) A bobbin (18) for receiving roving has an internal shoulder enabling it to seat on a surface (22) provided at the upper end of a spindle (10). The bobbin hangs from this shoulder and the bobbin foot is received in a resilient clamp device (36) provided on the spindle for clamping a roving end against the bobbin.

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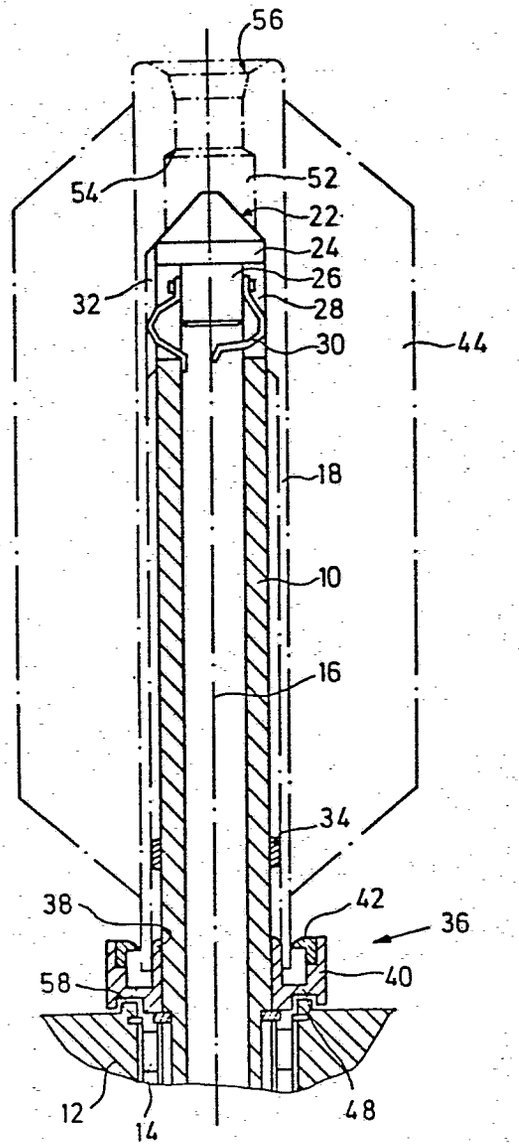
Fig. 1



Bobbin and Bobbin Support for a Roving Frame

The invention relates to bobbins for receiving a package of roving in a roving frame, and to the bobbin support structure for receiving and rotating such bobbins in a frame. The invention is intended particularly, but not exclusively, for use in a roving frame with an automatic doffer as described in our Swiss Patent Application No. 6420/79.

It is known to provide a roving frame with a bobbin support structure in the form of a spindle mounted upright in a spindle bolster and provided at or near the bolster with a pedestal fitted with a drive dog or detent mechanism to engage and drive a bobbin mounted over the spindle and supported by the pedestal - see for example Swiss Patent No. 236 212 and Japanese Published Patent Application No. 53/41414. This implies that the bobbin foot is formed both to rest on the pedestal and to have externally open drive openings, e.g. teeth, in the bobbin foot. This makes it difficult to use the foot region of the bobbin for any other purpose.

It is an object of the invention to enable design of a roving bobbin and a roving frame bobbin support to enable incorporation of additional functions in the bobbin.

The invention provides a bobbin for use on a roving frame, comprising a tubular body having an internal shoulder for engagement with an upwardly facing bobbin support surface on a bobbin support structure in the roving frame.

The bobbin may have a head portion located above said shoulder and a depending portion located below said shoulder in use. The head portion may be provided with means co-operable with a doffing element of an automatic doffing system on the roving frame; for example, the head portion may have an internal abutment, preferably another shoulder, engageable by fingers on a doffer element capable of extending into the head portion. The mouth of the bore of the bobbin head portion may be frusto-conical to facilitate insertion of the doffer element. The depending portion may be provided with means for facilitating clamping of a tail of roving to the bobbin at the start of winding thereon; for example, the end of the bobbin on the depending portion thereof may have an array of teeth.

In principle, the bobbin support shoulder can be provided at almost any location along the length of the bobbin; however, it is preferably adjacent the head portion of the bobbin since this enables use of the upper end of the support structure to provide the supporting surface. The internal shoulder is not necessarily at right angles to the bobbin axis; preferably it is frusto-conical, converging towards the head portion. The support surface on the support structure should be correspondingly formed. The internal bore of the depending portion may be designed to co-operate with the support structure below the shoulder to align the bobbin vertically in use.

The interior of the bobbin may also be formed with means for releasably connecting the bobbin to the support structure for rotation therewith. In principle, the connection means may be

provided at any position along the length of the bobbin, but preferably it is provided adjacent the support shoulder therein. The connection means may comprise one or more generally circumferentially facing surfaces e.g. on an internal projection, co-operable with a drive transmitting projection on the bobbin support structure.

The bobbin may be made in a plurality of parts secured together to give the required construction. A synthetic plastics material will generally be suitable.

The invention further provides a spindle for use in a bobbin support structure for a roving frame, the spindle being adapted to be mounted in an upright disposition in the frame and having a bobbin support surface adapted to engage an internal shoulder in a hollow bobbin mounted over the spindle.

The bobbin support surface may be provided by an end surface of the spindle which is uppermost when the spindle is mounted in the roving frame. In any event, the bobbin surface may be frusto-conical.

The spindle may also have means for establishing a releasable rotary drive connection with the interior of the bobbin. This means may comprise an element projecting radially outwardly from the spindle to make a positive drive connection with a generally circumferentially facing surface in the interior of the bobbin. The element may be resilient, and/or resiliently mounted, and biased radially outwardly from the spindle. The element may be located adjacent the upper end of the spindle.

The invention further provides a bobbin support structure for a roving frame comprising bobbin engaging means for (a) engaging an internal shoulder in a tubular bobbin to locate the bobbin

against axial movement and (b) engaging the bore of the bobbin to locate its axis in a desired disposition, said structure further comprising means co-operable in use with the external surface of a portion of the bobbin below said shoulder to clamp a tail of roving presented thereto.

The clamping means may comprise a resilient element which preferably encircles said portion of the bobbin in use, and a holder for the resilient element. The latter may be a ring-like element which may be slightly expanded by the bobbin on mounting of the bobbin on the structure. The holder may be an annular,trough-shaped member adapted to receive said portion of the bobbin in use, the resilient element being carried by the outer wall of the holder.

The bobbin engaging means preferably comprises a spindle as described above, and the clamping means is preferably secured to the spindle for rotation therewith.

The bobbin and the bobbin support structure are preferably so formed in relation to each other that the end of the bobbin below the shoulder in use does not engage any surface on the support structure.

By way of example, one embodiment of a bobbin in accordance with the invention, and a support structure for use therewith, will now be described with reference to the accompanying drawings, in which

Figure 1 is a sectioned side elevation of the bobbin support structure, with a bobbin and roving package thereon being indicated in shadow line, and

Figure 2 is a sectioned side elevation of the bobbin ends.

Figure 1 shows a hollow metal spindle 10 and a small part only of a conventional spindle bolster 12 in which the spindle is mounted by suitable bearings including rollers 14. Below this bolster, the spindle is provided in known fashion with a drive whorl for rotating it, but since this is conventional and forms no part of the invention, it is not illustrated.

The bolster is mounted in known fashion in a spindle carrying beam of a spinning preparatory machine for preparing textile fibre for a spinning frame, e.g. a roving frame. Suitable roving frames are described in our Swiss Patent Application No. 6420/79. However, the present invention is not limited to use with such frames.

Spindle 10 is mounted with its axis 16 upright and it receives in use over its upper end a hollow bobbin 18. The bobbin is passed down over the spindle until a frusto-conical shoulder 20 on the bobbin engages a frusto-conical end surface 22 on the upper end of the spindle. The bobbin rests on the surface 22 alone. Surface 22 is formed on an endcap 24 having a shank 26 screw-threaded into the open upper end of the spindle. The material of this endcap may be different from that of the remainder of the spindle, being suitably hardened if requred to form an accurate resting surface for the bobbin.

Just below the endcap, the spindle has two diametrically opposite grooves 28 passing completely through its wall. Secured to the shank 26 are two leaf springs 30 projecting through respective grooves 28 so that portions of the springs extend radially outwardly beyond the external surface of the spindle. When a bobbin is mounted on the spindle, the outwardly extending portions of the springs pass into grooves formed between longitudinal, internal ribs 32 in the interior of the bobbin and form a positive driving connection with the bobbin - as seen on

the left hand side of Fig. 1. Should the springs be initially aligned with ribs instead of grooves, they will be pressed inwardly against their own resilience (as seen on the right hand side of Fig. 1) and will spring outwardly again as soon as the spindle has rotated slightly relative to the bobbin at the start of winding. The different disposition of the springs in Fig.1 is for purposes of illustration of the two conditions only - in practice both springs align either with grooves or with ribs.

Below shoulder 20, the internal diameter of the bobbin is larger than the external diameter of the spindle, and a centralising ring 34 is provided on the spindle below the centre of gravity of the bobbin. Just above bolster 12, the spindle has an annular member 36 of trough section secured thereto, the open side of the trough facing upwardly and receiving the lower end of the bobbin. The inner wall 38 of the trough both secures it to the spindle and acts as a centering ring for the bobbin. The outer wall 40 of the trough has an inwardly projecting lip provided by a resilient ring 42 secured to wall 40 in any convenient manner.

The construction and dimensions of the ring are such that it is slightly expanded by the bobbin as the latter passes into the trough. Thus, the ring presents a resilient socket to receive the lower end of the bobbin. A roving tail suitably presented to the bobbin and support structure can be clamped between the outer cylindrical surface of the bobbin and the resilient lip 42 and is thereby secured to the bobbin for winding of a package 44 thereon. A suitable flyer for presenting the tail to the spindle/bobbin is described in our Swiss Patent Applications No. 6377/79 and 12089/79.

Waste material can collect in the trough, which thereby protects the bearings in the bolster 12. It is to be particularly noted that the lower end face, that is the axially facing surface, 46

of the bobbin does not contact the bottom wall 48 of the trough so that the portion of the bobbin below shoulder 20 is dependent from the shoulder and does not provide support for the weight of the bobbin or package. Thus, accumulated waste in the trough does not adversely affect the disposition of the bobbin. As best seen in Figure 2, the lower end of the bobbin is provided by an array of teeth 50 which are evenly distributed around the full periphery of the bobbin. The roving tail passes into one of the gaps between the teeth when the bobbin first engages the ring 42, and the roving tail is thereby gathered together and supported and held in good condition for clamping. It will be noted that since clamping occurs between the lip 42 and an outwardly facing surface on the bobbin, i.e. a surface which does not produce any substantial force component support the bobbin, there is again no risk of disturbance of the disposition of the bobbin due to accumulated waste on the clamping surfaces.

The head portion of the bobbin projects above the spindle and comprises a chamber 52 between the shoulder 20 and a second internal shoulder 54 which also faces the dependent end of the bobbin. The mouth of the bobbin bore at the head thereof is formed with an inwardly convergent frusto-conical surface 56. The head thus formed facilitates automatic doffing of the bobbin with a completed package, since a doffer element with spring or gravity loaded, radially outwardly projecting fingers can push into the bobbin head so that the fingers can engage under the shoulder 54 and lift the bobbin off the spindle. A so-called Casablanca connector is suitable for this purpose.

The bobbin is made of synthetic plastics material. Preferably, the outer wall of the bobbin is made as a generally uniform section tube (but formed with the ribs 32) and the shoulders at the head are provided by an additional part inserted into the outer wall and welded thereto.

The invention is not limited to details of the illustrated embodiment. In principle, the bobbin support surface in the support structure may be on an element separate from the spindle which is required to hold the bobbin upright. However, it is clearly simpler to integrate the support and alignment functions in the one element. The internal shoulder which rests on the spindle is not necessarily continuous around the inner periphery of the bobbin. It could, for example, be provided by an array of sub-shoulders formed on the individual ribs 32, which can extend further upwards into the chamber 52. The position of the shoulder along the length of the bobbin can be varied, but preferably it is such as to enable use of the upper end of the spindle as the bobbin supporting surface thereon. The holder for the lip 42 is not necessarily formed as a trough, but it preferably has an undersurface protecting the bolster bearings. This can provide a labyrinth seal as seen at 58 in Figure 1.

Figure 2 illustrates the preferred form of the teeth 50, although this form is also not essential. As shown, the teeth have flanks disposed at an angle α, preferably about 60 degrees although 50 to 70 degrees is acceptable. Each tooth is short - about 3 mm is preferred, but 2 to 5 mm is acceptable. The spacing of the teeth at the lower edge of the bobbin may be about 5mm, although 4 to 7 mm is acceptable. Finally, the outside of each tooth is preferably chamfered, as indicated at B in Figure 2, to facilitate insertion into the lip clamp. A chamfer angle B of about 6 degrees is preferred although 4 to 8 degrees is acceptable.

The overall dimensions of the bobbin will depend upon the size of package to be produced, the dimensions of the roving machine, the design of automatic doffer and a variety of other factors. An important feature is the selection of the length of the dependent portion of the bobbin, i.e. the distance between the shoulder 20

and the end surface 46 of the teeth 50, so that this portion will hang from the endcap 24 and will not rest on the base of the trough 36.

Claims

1. A bobbin for use on a roving frame comprising a tubular body (18) having an internal shoulder (20) for engagement with an upwardly facing bobbin support surface on a bobbin support structure in the roving frame characterised in that the end of the bobbin towards which the shoulder faces is provided with means (50) to gather and hold a roving tail for clamping between the bobbin and a clamping element provided on the frame.

2. A bobbin as claimed in claim 1 characterised in that said means comprises an array of teeth (50).

3. A bobbin as claimed in claim 2 characterised in that said teeth are evenly distributed around the whole periphery of the bobbin.

4. A bobbin as claimed in claim 1, 2 or 3 characterised in that said shoulder (20) is located adjacent but below a head portion which is formed with means (54) co-operable with a doffer element.

5. A bobbin as claimed in claim 4 further characterised by means (32) immediately adjacent the shoulder (20) for releasably connecting the bobbin to a support structure for rotation therewith.

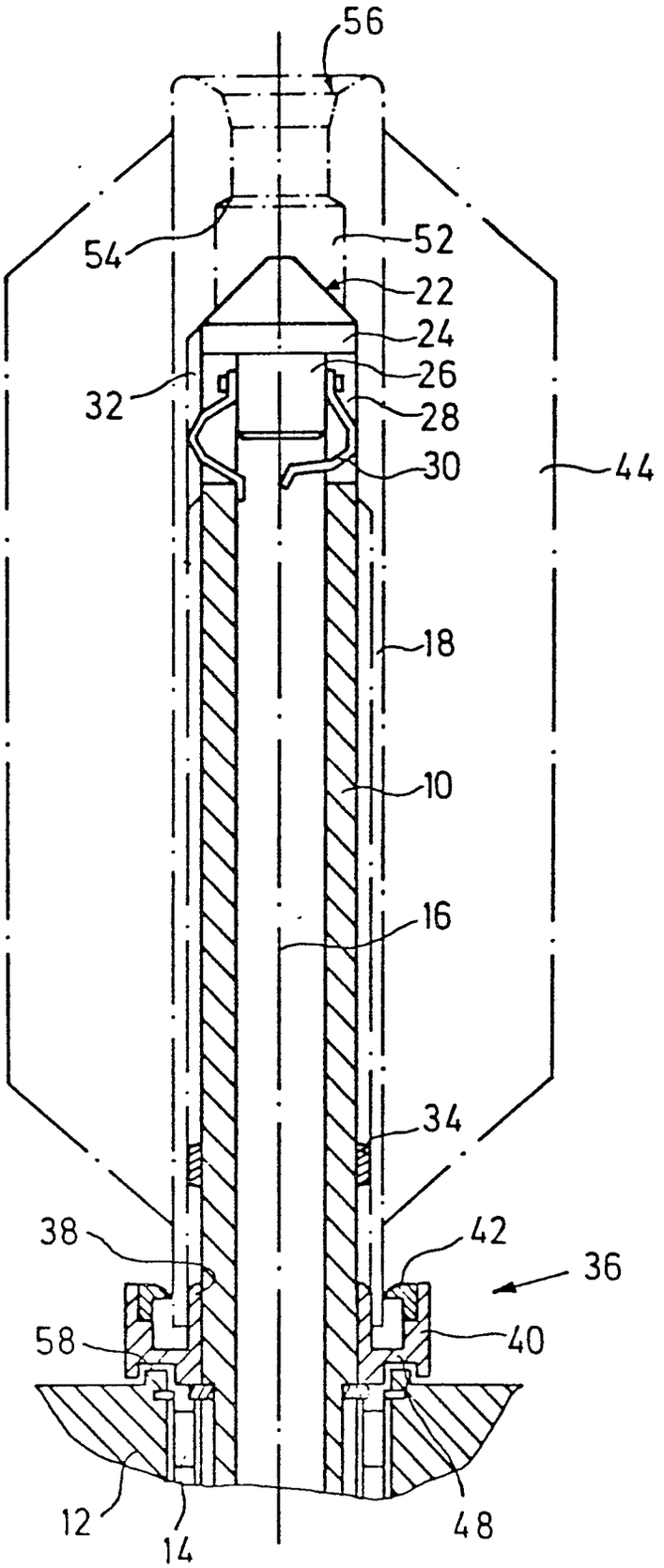
6. A bobbin support structure for a roving frame comprising bobbin engaging means (22) adapted to engage an internal shoulder in a tubular bobbin to support the bobbin characterised by means (42) co-operable in use with an outwardly facing surface of a portion of the bobbin below the shoulder to clamp a roving tail presented thereto.

7. A structure as claimed in claim 6 characterised in that the clamping means (42) comprises a resilient socket adapted to encircle said portion of the bobbin.

8. A structure as claimed in claim 6 or 7 characterised in that the clamping means (42) is secured to the spindle (10) for rotation therewith.

9. A structure as claimed in claim 6, 7 or 8 characterised in that the clamping means is provided on a trough (40) adapted to receive fibres separated from the roving tail.

Fig. 1



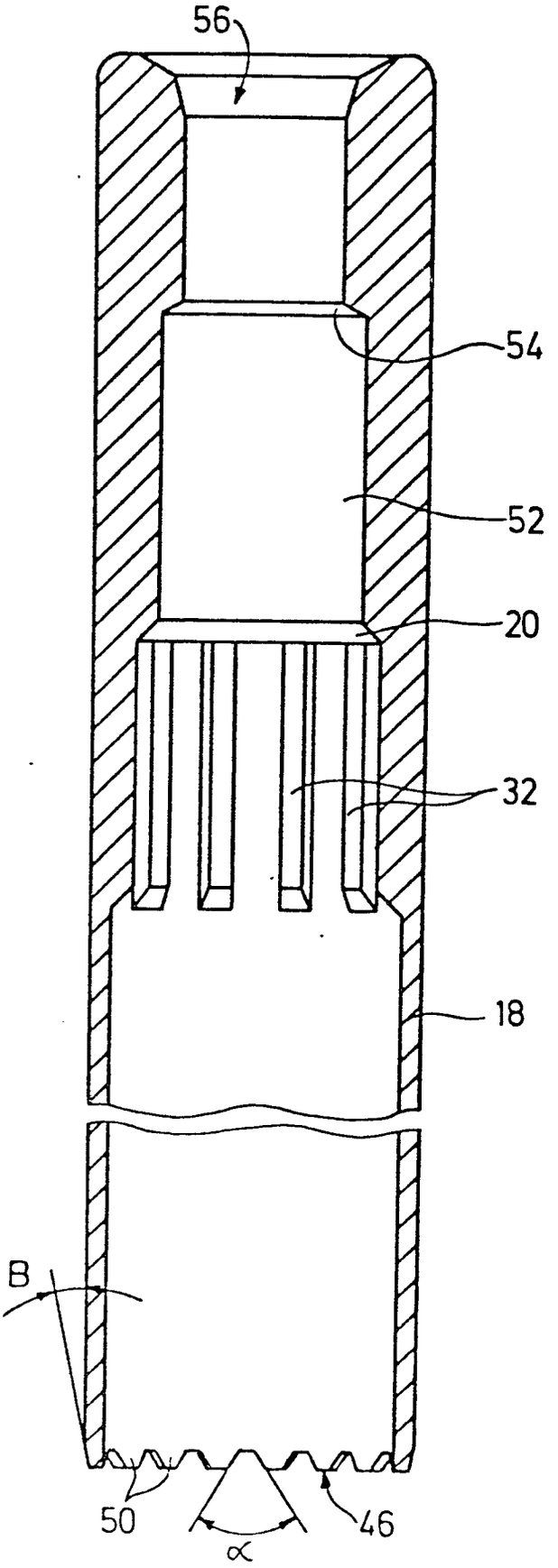


Fig. 2