

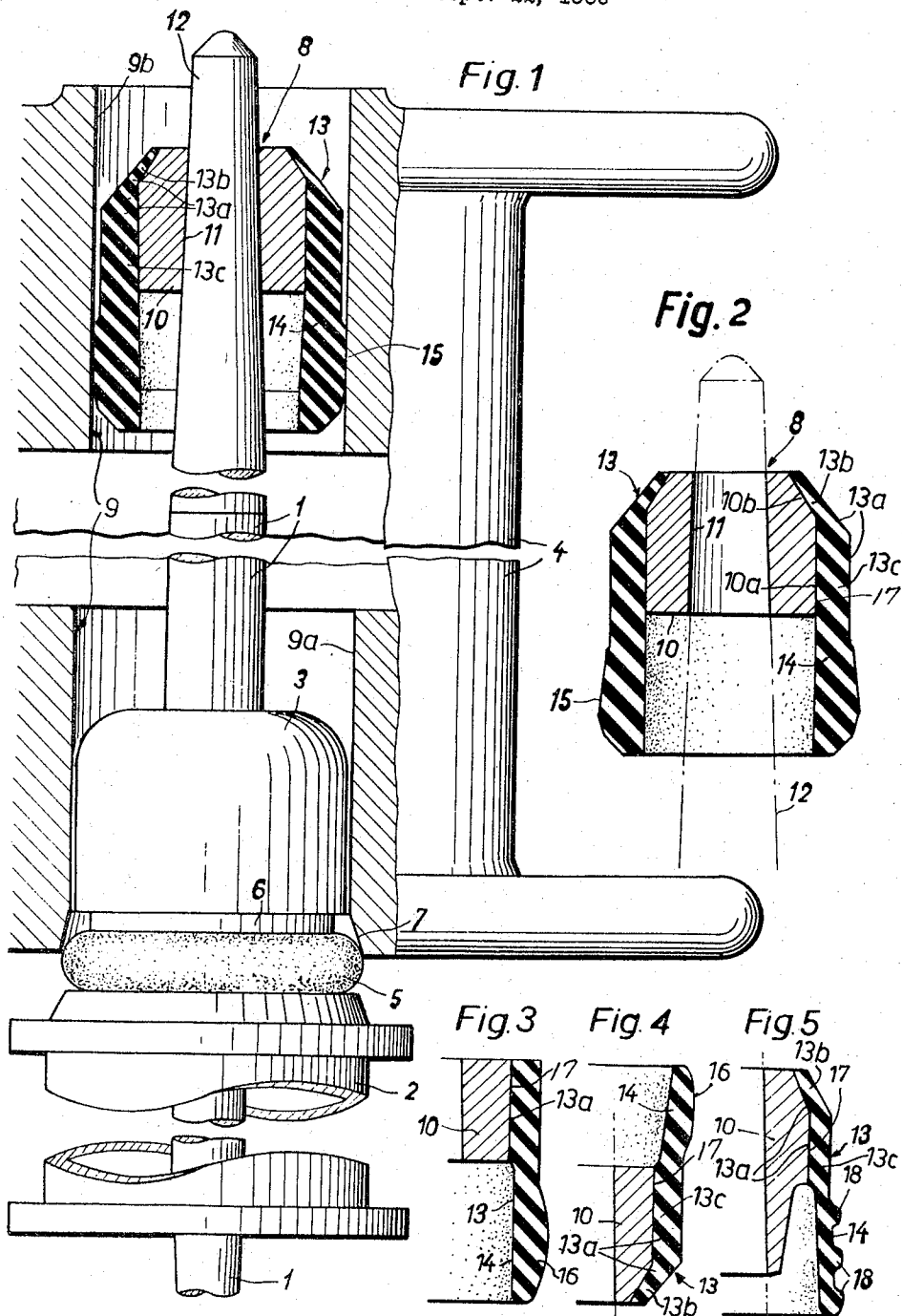
Feb. 28, 1967

K. BEERLI

3,306,543

YARN CARRIER MOUNTING DEVICE

Filed Sept. 22, 1965



INVENTOR:

KARL BEERLI

By Wenderoth, Lind &
attorneys Ponack

1

3,306,543

YARN CARRIER MOUNTING DEVICE

Karl Beerli, Niederuster, Zurich, Switzerland, assignor to Spindel-Motoren- und Maschinenfabrik A.G., Uster, Zurich, Switzerland

Filed Sept. 22, 1965, Ser. No. 489,197

Claims priority, application Switzerland, Aug. 21, 1962, 9,976/62

5 Claims. (Cl. 242—46.6)

The present application is a continuation-in-part of my former application Serial No. 302,667, filed August 16, 1963, and entitled, "Yarn Carrier Mounting Device," now abandoned.

This invention relates to a device for removably mounting a tubular yarn carrier such as bobbin, cop or the like, on a rotatable spindle in a textile machine such as a spinning, twisting, doubling or other textile machine.

In machines of this kind in which such yarn carriers of comparatively light construction but carrying a heavy weight of yarn are to be removably mounted on spindles which in operation will be accelerated to high angular speeds within a short time, reliable angular coupling of each yarn carrier to its spindle is a problem difficult to solve. It has been attempted to provide angular coupling between a spindle and the yarn carrier by placing on the whirl which drives the spindle and supports the bobbin or other yarn carrier, an annular rubber disc having integral coupling pins projecting in an axial direction and adapted to engage corresponding holes or recesses in the bottom face of the yarn carrier. However, slipping of such a rubber disc on the top face of the whirl cannot be prevented entirely. Moreover, the required holes or recesses are missing in the bottom face of the conventional bobbins or other yarn carriers, so that such holes must be bored by the user before placing the bobbin on the spindle. In mills to which large quantities of yarn are currently supplied on bobbins, such boring of holes involves extra work which does not fit into the normal running of the mill.

It is therefore one of the objects of the present invention to provide a device whereby no modification of conventional tubular yarn carriers is necessary for establishing a driving connection between a spindle on which the yarn carrier is to be mounted, and the yarn carrier itself.

Another object of the invention is to provide a device whereby the placing of a tubular yarn carrier on the spindle and its angular coupling thereto requires only little time, skill and effort.

Further objects and advantages of the invention will appear from the description now to follow, of a preferred embodiment and several modifications thereof, as represented by way of example in the accompanying drawing in which:

FIGURE 1 represents, partly in elevation and partly in axial section, a textile machine spindle assembly with its bobbin centering and driving device and a bobbin placed thereon,

FIGURE 2 represents separately, in axial section, the spindle head of the assembly shown in FIGURE 1, with its resilient sleeve in the shape it has in the absence of external forces, and

FIGURES 3 to 5 represent, in partial axial section, some modifications of the spindle head shown in FIGURE 2.

2

Referring to FIGURE 1, a textile machine spindle 1 is rotatably supported in a bearing sleeve (not shown) by means of an axial bearing at its lower end and of a radial bearing at the upper end of the said bearing sleeve. The bearing sleeve in turn is swingably supported in a housing and this is mounted in a spindle rail or fly frame. The whole spindle supporting means are no part of the present invention and are not shown in the drawing.

A whirl 2 is fixed on the spindle 1 for driving the latter by means of a belt in any usual manner, and this whirl carries an integral centering head 3 which extends into the lower part 9a of the axial bore 9 of a bobbin 4.

The diameter of the centering head 3 is very slightly smaller than the diameter of the said lower part 9a of the bobbin bore, whereby the bobbin 4 can be easily slid on the head 3 but is centered on it and on the spindle 1 with sufficient accuracy to limit to a very small value the amplitude of any lateral vibration or oscillation of the lower part of the bobbin.

A rubber ring 5 is lodged in an annular groove 6 of the whirl 2 and is radially compressed by a conical portion 7 of the wall of the said bore of the bobbin 4, so that it resiliently maintains the bobbin against radial displacement, even within the said limited amplitude, on the whirl and thereby on the spindle.

At its upper end, the bobbin 4 extends over a spindle head 8 which is carried by the spindle 1. The spindle head 8 fits the upper part 9b of the cylindrical axial bore 9 of the bobbin 4. This spindle head is to serve two purposes, namely to center the bobbin 4 at its upper end on the spindle 1, and to ensure angular coupling of the bobbin 4 with the said spindle.

In FIGURE 2, the spindle head 8 is shown in the shape which it assumes in the absence of external forces. It comprises a steel core 10 the outer surface of which comprises a cylindrical lower portion 10a and a conical upper portion 10b, and which has a slightly conical axial bore 11 whereby it fits the similarly conical upper portion 12 of the spindle 1. A sleeve 13 made from rubber or a similarly elastically compressible and flexible material which has a portion 13a overlying the outer surface of the steel core, and an internally unsupported lower portion 14 extending axially below the steel core 10, is vulcanized to the latter at the surface of contact 17 of its upper portion 13a with the core 10. The outer surface of the upper sleeve portion 13a comprises a conical part 13b overlying the conical upper portion 10b of the outer surface of the steel core, and a cylindrical part 13c overlying the cylindrical lower portion 10a of the said core surface. The diameter of the cylindrical part 13c of the sleeve surface is very slightly smaller than the diameter of the bobbin bore 9, so that the bobbin 4 can be easily slid over that upper portion 13a of the sleeve 13 but is properly centered thereby. The outer surface of the said lower portion 14 of the sleeve comprises a zone 15 which in the absence of external forces (FIGURE 2) is conical and the diameter of which increases downwardly. Still in the absence of external forces, the outer diameter of the rubber sleeve 13 is largest at the lower boundary of the conical zone 15, where it is larger than the diameter of the cylindrical bore 9 of the bobbin 4. This zone 15 is to make a tight fit with the wall of the said bore 9 in the upper part of bobbin 4 when the latter is placed on the spindle 1 as shown in FIGURE 1, the

3

internally unsupported lower portion 14 of the sleeve being then deflected radially inwards.

Due to the elastic forces raised in it by this deflection, the lower portion 14 of the sleeve exerts a pressure on the wall of the bore 9. By an appropriate design of the spindle head 8, this pressure can be adapted to a wide range of requirements. Since the lower portion 14 of the sleeve 13 is supported internally neither on the spindle 1 nor on the steel core 10, this pressure does not depend on the radial compressibility of the rubber. Moreover, a substantial overall force holding the sleeve portion 14 and the bobbin 4 in mutual contact and frictional engagement can be obtained due to the comparatively large area of the conical surface 15, even though the local contact pressure between that surface and the bobbin is small enough not to damage the material of the bobbin. The frictional moment thus maintained between the sleeve portion 14 and the bobbin permits transmitting a large driving torque from the spindle head to the bobbin, thus ensuring that the bobbin is reliably driven as the spindle is rotated and accelerated. The spindle head 8 of course is reliably coupled to the spindle 1 since a high contact pressure exists between the spindle 1 and the steel core 10.

The bobbin also is well centered at its upper part due to the insertion of cylindrical part 13c of the outer surface of the centering portion 13a of sleeve 13, into the bore 9 of bobbin 4. The play between them is exaggerated in FIG. 1 of the drawing and is to be small enough to prevent undesirable oscillation or vibration of the bobbin on the spindle 1. Such oscillations or vibrations are effectively damped by the centering portion 13a of sleeve 13. Since that portion is internally supported by the steel core 10, it cannot be deflected inwards as can the unsupported lower portion 14, and since its thickness is limited, it cannot be much compressed. Therefore only very small lateral displacement of the upper part of the bobbin 4 with reference to the spindle is permitted by the sleeve 13 in spite of the above-mentioned deformability of its lower portion 14.

To state a practical example, a bobbin 4 may be used the bore 9 of which in its lower part 9a engaging the centering head 3 has a nominal diameter of 27 mm., with a tolerance range between -0.02 and $+0.04$ mm., while the diameter of the centering head 3, although nominally 27 mm. as well, is comprised between 26.89 mm. and 26.95 mm., that is, between 0.05 and 0.11 mm. less than the nominal diameter. Accordingly, the diametral play of the centering head 3 in the lower part 9a of the bobbin bore will be comprised between 0.03 and 0.15 mm. which ensures good centering but no effective angular coupling between the centering head 3 and the bobbin 4. This play is strongly exaggerated in FIG. 1 of the drawing to make it visible.

In that same example, the uppermost portion 9b of the bore 9 of bobbin 4 has a nominal diameter of 24 mm., with a tolerance range between 0 and $+0.08$ mm., while the diameter of the cylindrical part 13c of the rubber sleeve 13 is comprised between 23.86 and 23.90 mm. and therefore is smaller by between 0.10 and 0.14 mm. than the nominal diameter of 24 mm. Accordingly, the diametral play between the cylindrical part 13c of the rubber sleeve 13 and the bobbin 4 in the upper part 9b of the latter's bore 9 is comprised between 0.10 mm. and 0.22 mm. Taking into account a slight swelling of the rubber during use, this again ensures good centering but no effective angular coupling between the cylindrical portion 13c of the rubber sleeve 13 and the bobbin 4. In FIG. 1 of the drawing, this play as well is grossly exaggerated to make it visible.

At the lower end of the conical zone 15 where its diameter is largest, the unsupported lower portion 14 of the sleeve 13 exceeds by 0.60 to 0.70 mm. its nominal diameter of 24 mm. and therefore is larger by 0.52 to 0.70 mm. than the corresponding actual diameter of the upper

4

portion 9b of the bobbin bore 9. Accordingly, that unsupported lower portion 14 is in frictional engagement with the wall of the bobbin bore 9 while at a standstill, and it is an important teaching of my present invention that this ensures angular coupling between the sleeve 13 and the bobbin 4 at all angular accelerations of the spindle 1 which may occur from such standstill.

It will be understood that the above indicated tolerance and play values are given by way of example only, for the purpose of illustration, and that for obtaining the best result as to centering and angular coupling they could be departed from depending on the configuration and dimensions of the parts and the materials from which they are made in each specific embodiment.

The modification represented in FIGURE 3 differs from the device shown in FIGURES 1 and 2 in that the outer surface of the sleeve portion 14 which extends downwardly beyond the steel core 10 has a spherically bulged zone 16 also comprising the place of largest outer diameter of the sleeve. When the bobbin 4 fits the head 3, a part of this bulged zone 16 is flattened into an annular cylindrical surface which contacts the wall of the bore 9 of the bobbin.

The modification according to FIGURE 4 differs from that according to FIGURE 3 in that the portion 14 of the sleeve 13 which has a bulged surface zone 16 extends upwardly rather than downwardly beyond the steel core 10.

In the modification according to FIGURE 5, the rubber sleeve 13 is vulcanized to the surface of the steel core 10 only over part of the height thereof. The sleeve 13 again comprises an internally unsupported portion 14 which extends downwardly in the axial direction beyond the surface 17 at which the rubber sleeve is in contact with, and vulcanized to, the steel core 10. In the outer surface of this portion 13, three circumferential ribs 18 are formed on which the diameter of the sleeve 13 is largest as measured in the absence of external forces. When the bobbin 4 has been placed on this spindle head, the portion 14 of the sleeve which extends downwardly beyond the contact surface 17 becomes radially deflected inwardly and the ribs 18 contact the wall of the bobbin bore 9 under pressure, thus ensuring that the bobbin will be rotated along with the spindle.

While the ribs 18 are shown in this modification as extending circumferentially, they could also have been disposed to extend parallel to the axis of the sleeve.

I claim:

1. A device for removably mounting a tubular yarn carrier on a rotatable spindle in a textile machine, comprising a metal core adapted to be secured to a spindle adjacent the outer end thereof for rotation therewith, and a sleeve of elastically compressible and flexible material surrounding said core and secured thereto at an annular surface of angularly coupling contact therewith, said sleeve having an annular centering portion overlying said surface of coupling contact, and an internally unsupported continuous annular portion axially offset from said centering portion and surface of coupling contact with said core, the outer diameter of said sleeve on said internally unsupported annular portion, as measured in the absence of external forces, being larger than the internal diameter of a yarn carrier mounted onto a spindle so that an immediate positive coupling is secured.

2. A device as claimed in claim 1 in which in the absence of external forces the outer surface of the said sleeve is conical in the said internally unsupported annular portion thereof.

3. A device as claimed in claim 1 in which in the absence of external forces the outer surface of the said sleeve is bulged in the said internally unsupported annular portion thereof.

4. A device as claimed in claim 1 in which the outer surface of the said sleeve is ribbed in the said internally unsupported annular portion thereof.

5. A device as claimed in claim 1 in which in the absence of external forces at least part of the outer surface of said annular centering portion is cylindrical.

References Cited by the Examiner

UNITED STATES PATENTS

1,075,461	10/1913	Chapman	-----	242—46.6
1,238,353	8/1917	Smith	-----	242—46.2

2,136,073	11/1938	Cooper	-----	242—46.5
2,755,027	7/1956	Jones et al.	-----	242—46.5

FOREIGN PATENTS

5	222,438	2/1925	Great Britain.
	606,555	7/1960	Italy.

STANLEY N. GILREATH, *Primary Examiner.*