

The present invention relates to a drive for a waxing device of a textile machine which has a plurality of similar waxing devices of which each possesses a rotatable polygonal pin which is connected to a drive whorl with which an endless drive belt engages, whereby the polygonal pin receives a solid waxing body against which a thread to be waxed bears.

As a rule, the solid wax body is made to rotate by the thread supplied to a winding arrangement (German Utility Model 7,611,630). Here, however, there is a danger that the thread cuts into the wax body and thus makes a uniform wearing away of the wax impossible. For this reason, an individual drive motor is frequently provided per waxing device (DE-OS 2,316,452). However, this makes such a drive very complicated.

It has also become known to drive individual drives via complicated intermediate gears with the help of a central shaft extending over a plurality of similar waxing devices, these individual drives then in turn driving the individual waxing devices (FR-PS 1,293,729, DE-PS 1,560,460, and DE-OS 2,227,308). These individual drives are complicated. In the case of a friction wheel gear, there is also the fact that the drive transmission becomes more and more unreliable as the friction wheels are increasingly worn, so that trouble-free waxing of the thread is no longer guaranteed.

The object of the invention is to provide a simple and reliable drive for a waxing device.

This object is achieved, in accordance with the invention, in that the drive belt engages with a plurality of neighbouring waxing devices. Such a drive is extremely

simple. Moreover, this drive has proved completely reliable even at the low rotational speeds desired for the wax body, so that uniform waxing of the thread is guaranteed even over a long period.

It is true that common belt drives for a plurality of similar elements of a textile machine are already known, but only for fast-running elements such as, for example, spindles, spinning rotors and opening cylinders of open-end spinning machines (DE-AS 1,818,034). With these high speeds, relatively small variations of the counter-moment acting on the driven element have no effect, so that a uniform driving is guaranteed. At low rotational speeds, on the other hand, such variations cause changes in the rotational speed. Surprisingly, however, it has been shown that, despite the possibly occurring variations in rotational speed, trouble-free waxing of the thread is ensured.

In the sense of the present invention, "drive belts" are not only understood as flat belts, but all longitudinally extended drive elements, such as round cords, V-belts, toothed belts etc., are included herein.

In order to further optimise the drive without separate belt-tensioning elements being required, in a further development of the invention, the drive belt is guided in a zigzag around the drive whorls of the neighbouring waxing devices. The drive belt associated in common with these waxing devices is thus in a drive connection with the drive whorls of these waxing devices alternately on the one side and on the other side of the common surface on which the polygonal pins of these waxing devices are located. The common surface can here be a plane or (with the inclined arrangement of the waxing

devices on round machines) also have a conical shape.

With a textile machine which is constructed as an open-end spinning machine and which has a plurality of adjacently disposed open-end spinners and a shaft for controlling the delivery of fibres into these open-end spinners, the drive belt is advantageously in drive connection with this shaft. This shaft for controlling the delivery of fibres is driven in dependence on the throughput of fibres through the open-end spinners, so that the waxing devices are matched to this throughput and are thus always driven only at the speed required for this throughput. As a result, a very long working life of the drive for the waxing devices is achieved.

An embodiment of the subject of the invention which has a particularly simple construction is made possible when the drive whorl of each waxing device is arranged between a mounting for this waxing device and the waxing body. This also results in a particularly good accessibility to this drive. A further reduction in the constructional complexity is achieved when the polygonal pin is constructed in one piece with the drive whorl. To facilitate the assembly and also to reduce the weight of the waxing devices to be driven, the polygonal pin is advantageously constructed as a hollow body which receives the bearing and fastening. In accordance with a simple constructional development of the subject of the invention, the fastening has a threaded pin which is screwed into a threaded bush provided in the mounting. Advantageously, the hollow space of the polygonal pin can be closed at its end remote from the bearing by means of a cap which projects over the outer periphery of the polygonal pin and is constructed as a stop for an elastically stressed wax support plate mounted on the

polygonal pin. Advantageously, to this end, the cap has corners which project over the polygonal pin at its chamfered edges, while the side faces of the polygonal pin and of the cap are flush, the wax support plate having guide faces closely matched to the profile of the polygonal pin. In this manner, the result is that the wax body can be pushed over the insert serving as the stop for the wax support plate onto the polygonal pin without the play between the polygonal pin and the wax body here having to be enlarged.

In a textile machine in which the drive belt is guided back again along the driven waxing devices to the drive, a support element is preferably provided for the return run of the drive belt. In the case of a machine in which the waxing device is in front of a winding arrangement, in front of which, in turn, there is a thread-tension compensation element extending from the mounting to above the drive whorl, this support element is in this case advantageously arranged immediately below this thread-tension compensation element so that the drive belt is protected by this cover. In accordance with a preferred embodiment of the apparatus according to the invention, the support element serves as a carrier for a stop limiting the feed motion of the wax body.

In a further development of such a construction, on either side of the wax body there is arranged a carrier constructed as a support element, whereby the stop extends from one of these carriers to the other carrier. Advantageously, in this arrangement, the support element which is arranged, relative to the rotational motion of the wax body acting on the stop, in front of the wax body is constructed as a pivot bearing for the stop, while the support element arranged after the wax body has on its side

remote from the waxing device a longitudinal slit for receiving the end of the stop. In this arrangement, it is ensured that in spite of the most simple mounting of the stop the latter cannot be pivoted out of the longitudinal slot serving as a receiver by the rotating wax body.

To protect and cover the return run of the drive belt, a channel which is open on its side facing the wax device can be provided for this belt run, which channel, in an advantageous embodiment of the subject of the invention, is formed by the mounting and a cover strip which is an integral component part of the thread-tension compensation element.

In order that the wax body need not always run at the highest speed, which is only necessary under very specific operating conditions, it is advantageously provided according to the invention for the speed of rotation of the wax body to be matched to the mass of fibres supplied to the open-end spinner. As already mentioned above, this is preferably achieved in that the driving of the wax body is directly taken from the shaft carrying the delivery cylinders, but another, e.g. an electrical, speed coupling is in principle also possible.

The invention provides a simple apparatus which is compact, requires little energy for driving the wax bodies and operates reliably without complicated maintenance. In spite of low costs for machinery construction, the apparatus has a long life and is easy to operate.

The invention is described below in more detail with reference to drawings, in which:

Fig.1 shows an open-end spinning machine with the

apparatus according to the invention, in front view;

Fig.2 shows a waxing device driven according to the invention, in perspective view;

Fig.3 shows a preferred embodiment of the waxing device driven according to the invention, in cross-section;

Fig.4 shows a detail from Fig. 3, in front view; and

Fig.5 shows a modification of the waxing device driven according to the invention, in cross-section.

The invention can be used with various textile machines on which thread can be waxed. Here, the textile machines can have an extended or a round shape. Moreover, it is unimportant whether the machines are yarn-producing spinning machines, yarn-treating winding machines or yarn-processing machines (knitting or hosiery machines). For the discussion below, as an example an open-end spinning machine (Fig.1) was chosen which has a plurality of spinning units 1 and, correspondingly, also of waxing devices 2. The spinning machine shown has seven spinning units 1; in practice, there are considerably more of these, however. The spinning machine itself is only shown diagrammatically, whereby all the elements not absolutely necessary for understanding of the invention have been omitted for the sake of clarity. The open-end spinning machine has at its ends a respective end section 11 and 12. Between the end sections 11 and 12 the spinning machine has one spinner, covered by a cover 10, per spinning unit 1. The spinner is supplied with fibre material 13, which is fed to it in a spinning can 14, with

the help of a delivery apparatus which is driven by a shaft 19 extending over the entire length of the machine.

The thread 15 spun in the spinner is drawn off with the help of take-up cylinders 17 and 18 and wound onto a bobbin 16, whereby the thread 15 is fed to the bobbin 16 in a transverse motion, in a manner which is conventional and thus not shown. A waxing device 2 is arranged in the path of the thread, between the take-up cylinders 17 and 18 and the bobbin 16 (or a yarn-processing unit in the case of yarn-processing machines).

Each waxing device 2 possesses a polygonal pin 4 (Fig.2) on which there is placed a wax body 21 for waxing the thread 15. The polygonal pin 4 is in drive connection with a drive whorl 20. The drive whorl 20 of the waxing devices 2 of a plurality of adjacently disposed spinning units 1 are driven by a common drive belt 3.

In principle, the drive belt 3 can always bear against the drive whorls 20 (Fig.2) of the waxing devices 2 on one and the same side, whereby the drive belt 3 is held taut by conventional tension rollers (not shown) and is kept bearing against the drive whorls 20. The wax bodies 21 are driven uniformly in this manner. Even when, because of changes in the thread tension, the moment exerted by the thread 15 on the wax body 21 changes for a short time, there is still no change achieved in the speed of rotation which is so great that trouble-free waxing of the thread 15 could be impaired. Rather, it has been shown that waxing of the thread 15 and wearing down of the wax bodies 21 takes place very uniformly.

With reference to Fig.1, a particularly advantageous embodiment of the apparatus will be described below, in

which the drive belt 3 is wound around the drive whorls 20 (Fig.2) in a zigzag manner. As indicated in the case of two spinning units 1, the axes of the waxing devices 2 are located along a common surface E, while the driving belt run 30 is in drive connection with the drive whorls 20 (Fig.2) of the waxing devices 2 alternately on the one side and on the other side of this surface E. In this manner, every second wax body 21 is driven clockwise, while the wax bodies 21 located in between are driven anti-clockwise. However, this is unimportant for the waxing of the thread 15, which is waxed equally well independently of the direction of rotation of the wax body 21.

Depending on the type of machine, this surface E is a plane (in longitudinally extended machines and round machines in which the axes of the waxing devices 2 extend exactly radially outwards) or a conical surface (in round machines in which the axes of the waxing devices 2 are arranged inclined).

The zigzag guiding of the drive belt 3 holds the latter taut and winds around the drive whorls 20 over a larger range than with conventional tangential drives, so that as a result good entrainment of the drive whorls 20 is achieved even when tension rollers are omitted.

In principle, driving of the drive belt 3 can also be effected in any desired manner. In accordance with Fig.1, the drive belt 3 is driven by the shaft 19 with which the fibre material 13 is supplied to the spinner. To this end, a drive roller 32 is arranged on the shaft 19 in the vicinity of the end section 11. Between this drive roller 32 and a deflection roller 33 for the driving belt run 30, to deflect the drive belt 3 in the direction of the

longitudinal axis of the machine, there is located a further deflection roller 34 with which the drive belt 3 is supplied to the deflection roller 33 at the optimum angle. The drive belt 3, as described above, bears against the drive whorls 20 of the waxing devices 2 alternately from above and from below. At the other end of the machine, the drive belt 3 is deflected by a further deflection roller 35 in the vicinity of the end section 12. The return run 31 of the drive belt 3 is then guided back above the waxing devices 2 to a deflection roller 36 in the vicinity of end section 11, from where the drive belt 3 again reaches the drive roller 32.

To set up the drive belt on the drive whorls 20, the procedure is as follows:

First, the drive belt 3 is placed on the drive roller 32 and on the deflection rollers 34, 33, 36 and 35, without the drive belt 3 being guided over the drive whorls 20 straight away. Then, the drive belt 3 is alternately laid over and under a polygonal pin 4 (Fig.3) connected to the drive whorl 20. Since the drive belt 3 is here only deflected to a small extent around the polygonal pins 4 of the waxing devices 2 by the zigzag position, this drive belt 3 is only held taut to a small extent. The drive belt 3 is now placed on the drive whorls 20. As a result, the zigzag path of the drive belt 3 is increased, whereby the drive belt 3 receives its operating tension.

The fact that the drive belt 3 is driven from the shaft 19 of the feed apparatus of the open-end spinning machine has the effect that the wax bodies 21 are driven at a speed matched to the fibre throughput. In particular, if a large amount of the band of fibres is

supplied to the open-end spinners, so that the throughput of fibres is high, then the speed of rotation of the wax bodies 21 is also correspondingly increased. If a smaller amount of the band of fibres is supplied to the spinners, then the speed of rotation of the wax bodies 21 is also correspondingly reduced, so that the wax bodies 21 are always only driven at the required rotational speed and not faster. This results in a longer working life of the drive of the waxing devices 2.

With reference to Figs. 2 and 3, a particularly advantageous embodiment of the drive and the correspondingly constructed waxing device 2 will be described below. Here, the latter is carried by a mounting 5 constructed as a holding plate. To this end, a threaded bush 40 is pressed into the holding plate 5 or securely connected in another manner and a threaded pin 41 is screwed into it. Two rolling bearings 42 and 43 sit on the threaded pin 41, and the polygonal pin 4 is rotatably mounted on them. The polygonal pin 4 is constructed as a hollow body, which on the one hand has the advantage that the threaded pin 41 is accessible from the front side of the polygonal pin 4 and on the other hand reduces the weight of the waxing device 2 and thus contributes to an increase in its working life.

The polygonal pin 4 has a polygonal profile 400, on which a wax support plate 44 having a guide section 440 which has a guide face 441 matched to the polygonal profile 400 is displaceably mounted. At the end remote from the drive whorl 20 of this guide section 440, the wax support plate 44 merges into a radial support face 442 which is limited by a collar 443 which projects axially over this support plate 442 on its side remote from the drive whorl 20.

The drive whorl 20 is only connected to the polygonal pin 4 by means of a radial connection face 200, so that an annular recess 45 to receive a compression spring 46 is formed between the drive whorl 20 and the polygonal pin 4. As a result of this compression spring 46, which on the one hand bears against the radial connection face 200 and on the other hand bears against the radial support face 442, the wax support plate 44 is stressed in the direction of the free end of the polygonal pin 4, and in this way ensures that the wax body 21 always projects into the plane of the path of the thread to a pre-determined extent, so that it bears against the thread 15 in the desired manner. The wax body 21 is here held in this position against the action of the compression spring 46 by a stop 6 which will be described in more detail later.

As mentioned above, the polygonal pin 4 is constructed as a hollow body. A cylindrical extension 470 of a cap 47 projects into the open end of the polygonal pin 4 remote from the drive whorl 20. This cylindrical extension 470 serves to fasten the cap 47 in the polygonal pin 4. This can be effected by cooperative latching or by a correspondingly tight fit between these parts.

The cap 47 furthermore has a stop face 471, with which it bears against the end side of the polygonal pin 4. As shown by Fig.4, the side faces 472 of the cap are flush with the side faces of the polygonal pin 4. The edges of the polygonal pin 4, in contrast to the edges of the stop face 471 of the cap 47, are provided with chamferings 401. In this manner, the corners 473 project over these chamferings 401. As mentioned above, the guide face 441 of the wax support plate 44 is matched to the polygonal profile 400 of the polygonal pin 4 and thus also possesses faces corresponding to the chamferings 401 of

the polygonal pin 4.

The corners 473 of the cap 47 thus form a stop for the wax support plate 44 and hold the latter securely on the polygonal pin 4.

Since the side faces 472 of the cap 47 end flush with the side faces of the polygonal pin 4, the cap 47 in no way prevents a wax body 21 from being pushed onto the polygonal pin 4; nor does it impair its displacement on the polygonal pin 4.

The cap 47 possesses a central bore 474 which, without the cap 47 having to be removed from the polygonal pin 4, enables access to the threaded pin 41. This facilitates rapid dismantling of the waxing device 2, should this ever become necessary.

In the apparatus whose construction has been described above, the drive whorl 20 of the waxing device 2 is located between the mounting 5 for the waxing device 2 and the wax body 21. As will be described later with reference to Fig.5, this is not a prerequisite, however.

In the exemplary embodiment shown, the drive belt 3 is guided back again along the driven waxing devices 2 to the drive (shaft 19, see Fig.1). Here, the drive belt 3 is kept so taut that the two runs 30 and 32 do not touch one another. In order to ensure this in the case of long machines, too, in which a large number of waxing devices 2 are driven using this drive belt 3, in accordance with Figs.2 and 3 support elements 60 and 61 are provided for the return run 31 of the drive belt 3 which is disengaged from the waxing devices 2. In principle, it is sufficient if only one support element 60 or 61 is provided per

waxing device 2, whereby it is not even necessary for each waxing device 2 to possess such a support element 60 or 61.

In accordance with Fig.2, the support element 60 is constructed as a carrier of the stop 6 limiting the feed motion of the wax body 21. For this, too, a single such support element 60 is sufficient per waxing device 2. However, as it has been shown that a particularly uniform wearing of the wax body 21 is achieved if the stop 6 extends transversely to the path of the thread, in accordance with Fig.2 there is provided on either side of the wax body 21 such a support element 60 and 61 constructed as a carrier for the stop 6. The stop 6 here extends from one support element 60 to the other support element 61 of such a pair of support elements.

In principle, the stop 6 can be rigidly connected to both support elements 60 and 61. In the exemplary embodiment shown, however, a clamping screw 62 is provided only for the support element 60. The support element 61, on the other hand, has on its upper side - i.e. on its side remote from the polygonal pin 4 of the waxing device 2 - a longitudinal slit 610 for receiving the other end of the stop 6. When the clamping screw 62 has been loosened, the rail-shaped stop 6 can thus be pivoted into and out of the operating position in the support element 61 which forms a pivot bearing, so that exchanging the wax body 21 and subsequently securing the latter on the polygonal pin 4 can be carried out in the simplest and most rapid manner.

In the exemplary embodiment shown in Figs. 1 and 2, the thread 15 to be waxed is moved from the bottom upwards (see arrow B in Fig.3). The stop 6 is located on the thread run-off side of the wax body 21. In the given direction of motion of the drive belt 3 (see arrow P) the

wax body 21 rotates in the direction of the arrow D, anti-clockwise. The rotational motion acting on the stop 6 is thus from right to left. With reference to this rotational motion, the support element 60, which is constructed as a pivot bearing for the stop 6, is arranged in front of this wax body. The support element 61 having the longitudinal slit 610 is correspondingly arranged after the waxing device 2. In this manner, the effect of the rotating wax body 21 is that the stop 6 is pushed into the longitudinal slit 610 and thus secures the stop 6 in its operating position. The reason for this is that, although two opposing moments M and m act on the stop 6, the moment M having the larger arm of moment (with reference to the support element 60) outweighs the moment m having the smaller arm of moment.

Since the wax bodies 21 are alternately driven clockwise and anti-clockwise with the drive belt path described, the support elements 60 constructed as pivot bearings and the support elements 61, having the longitudinal slit 610, of every second waxing device 2 are provided in the arrangement illustrated and the waxing devices 2 located in between are provided in a laterally reversed arrangement.

Above the support elements 60 and 61 there is located, in the open-end spinning machine shown, a thread-tension compensation element 7. This element partially projects over the waxing devices 2. In order to protect the drive belt 3, in accordance with Figs. 2 and 3, the mutual arrangement of thread-tension compensation element 7 and support elements 60 and 61 is such that these support elements 60 and 61 for the return run 31 of the drive belt 3 disengaged from the waxing device 2 are located immediately below the thread-tension compensation

element 7.

In the embodiment shown, the return run 31 of the drive belt 3 is guided in a channel 8 which is open on its side facing the waxing device 2. This channel 8, which can in principle be constructed in different ways, is formed, in accordance with the embodiment shown in Figs. 2 and 3, from the mounting 5 constructed as a holding plate, a bent-off section 50 thereof and a cover strip 70. The cover strip 70 is an integral component part of a metal sheet, a further section of which forms the thread-tension compensation element 7 mentioned.

As a comparison of Figs. 2 and 3 shows, it is not absolutely essential for the drive belt 3 to have a flat shape, but it can also have another, for example round, shape. However, the arrangement of the drive whorl 20 between the mounting (holding plate 5) and the polygonal pin 4 with the waxing body 21 is not a prerequisite of the drive either.

Fig.5 shows a modified drive in which the drive whorl 20 is arranged on the one side and the polygonal pin 4 with the wax support plate 44 is arranged on the other side of the mounting 5, reinforced by an additional plate 51. The polygonal pin 4, which has at its end facing the mounting 5 a support plate 48 for the compression spring 46, is here mounted fixed in rotation on a shaft 9. The shaft 9 is mounted in a bearing bush 92 with the help of two rolling bearings 90 and 91. The rolling bearings 90 and 91 are secured axially in a conventional manner by spring rings 93,94 and 95 and a spacer bush 96. The bearing bush 92 is pressed into the plate 51. At the end remote from the polygonal pin 4, the shaft 9 carries the drive whorl 20, with which the drive belt 3 is engaged.

In such an embodiment, both the driving run 30 and the return run 31 of the drive belt 3 are located - seen from the operating side of the machine - behind the mounting 5, so that the drive belt 3 is well protected.



CLAIMS

1. Drive for a waxing device of a textile machine which has a plurality of similar waxing devices (2) of which each possesses a rotatable polygonal pin (4) which is connected to a drive whorl (20) with which an endless drive belt (3) engages, whereby the polygonal pin (4) receives a solid waxing body (21) against which a thread (15) to be waxed bears, characterised in that the drive belt (3) engages with a plurality of neighbouring waxing devices (2).

2. Drive according to Claim 1, characterised in that the drive belt (3) is guided in a zigzag around the drive whorls (20) of neighbouring waxing devices (2).

3. Drive according to Claim 1 or 2 in a textile machine constructed as an open-end spinning machine, which has a plurality of adjacently disposed open-end spinners and a shaft for controlling the delivery of fibres into this open-end spinner, characterised in that the common drive belt (3) of the waxing device (2) is in drive connection with this shaft (19).

4. Drive according to one or more of Claims 1 to 3, characterised in that the drive whorl (20) of each waxing device (2) is arranged between a mounting (5) for this waxing device (2) and the wax body (21).

5. Drive according to Claim 4, characterised in that the polygonal pin (4) is constructed in one piece with the drive whorl (20).

6. Drive according to Claim 5, characterised in that the polygonal pin (4) is constructed as a hollow body and



receives the bearing (42,43) and fastening (41).

7. Drive according to Claim 6, characterised in that the fastening (41) has a threaded pin which is screwed into a threaded bush (40) provided in the mounting (5).

8. Drive according to Claim 6 or 7, characterised in that the hollow space of the polygonal pin (4) can be closed at its end remote from the bearing by means of a cap (47) which projects over the outer periphery of the polygonal pin (4) and is constructed as a stop for an elastically stressed wax support plate (44) mounted on the polygonal pin (4).

9. Drive according to Claim 8, characterised in that the cap (47) has corners which project over the polygonal pin (4) at its chamfered edges, while the side faces of the polygonal pin (4) and of the cap (47) are flush, the wax support plate (44) having guide faces (441) matched to the profile (400) of the polygonal pin (4).

10. Drive according to one or more of Claims 4 to 9, in which the drive belt is guided back along the driven waxing devices to the drive, characterised by a support element (60,61) for the return run (31) of the drive belt (3).

11. Drive according to Claim 10, whereby the waxing device is in front of a winding arrangement, in front of which there is a thread-tension compensation element extending from the mounting to above the drive whorl, characterised in that the support element (60,61) for the return run (31) of the drive belt (3) is arranged immediately below the thread-tension compensation element (7).



12. Drive according to Claim 8 or 9, characterised in that the support element (60,61) serves as a carrier for a stop (6) limiting the feed motion of the waxing body (2).

13. Drive according to Claim 11 or 12, characterised in that, on either side of the waxing body (2), there is arranged a carrier constructed as a support element (60,61) and the stop (6) extends from one of these carriers (60) to the other carrier (61).

14. Drive according to Claim 13, characterised in that the support element (60) which is arranged, relative to the rotational motion of the wax body (21) acting on the stop (6), in front of the wax body (21) is constructed as a pivot bearing for the stop (6), while the support element (61) arranged after the wax body (21) has on its side remote from the waxing device (2) a longitudinal slit (610) for receiving the stop (6).

15. Drive according to one or more of Claims 10 to 14, characterised by a channel (8), open on its side facing the waxing device (2), for the return run (31) of the drive belt (3).

16. Drive according to Claim 15, characterised in that the channel (8) is formed by the mounting (5) and a cover strip (70) which is an integral component part of the thread-tension compensation element (7).

17. Process for controlling a waxing device with the help of an apparatus according to Claim 3, characterised in that the speed of rotation of the wax body is matched to the mass of fibres supplied to the open-end spinner.