Sept. 24, 1968 K. NIMTZ ET AL 3,402,545

MULTIPLE TWIST SPINDLES

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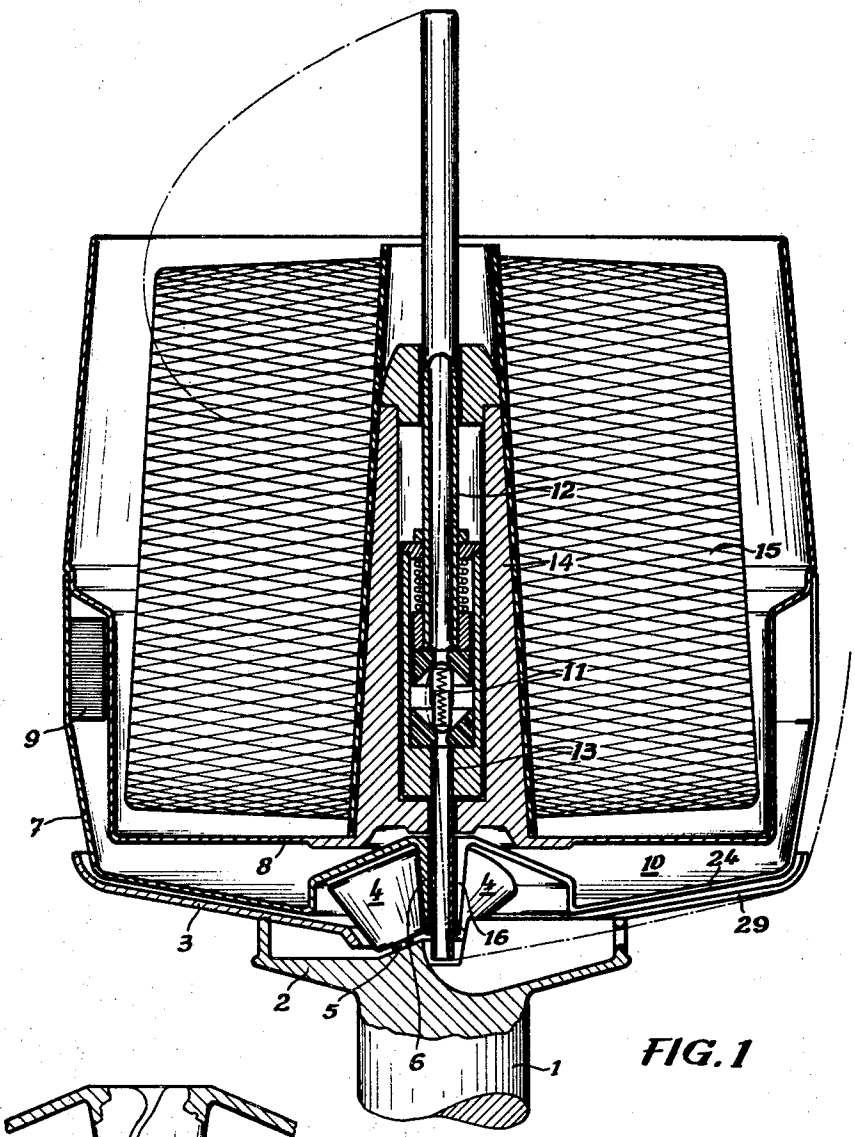


FIG. 1

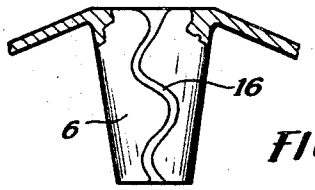


FIG. 1a

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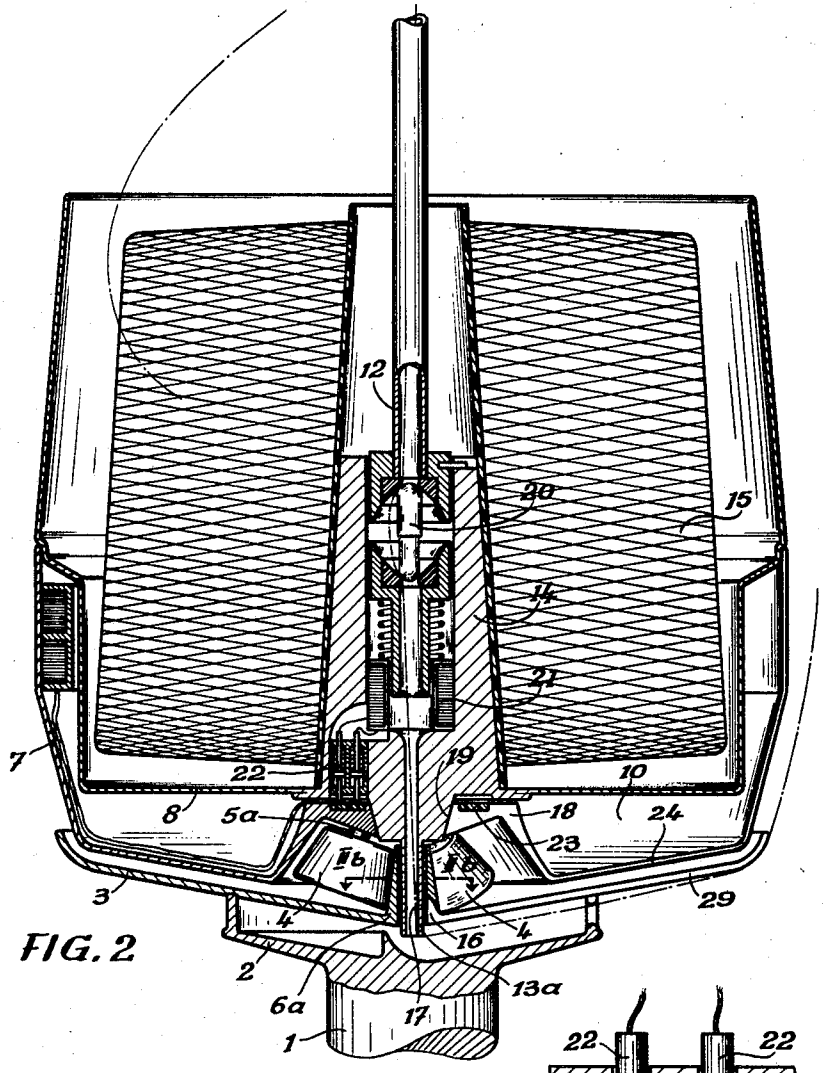


FIG. 2

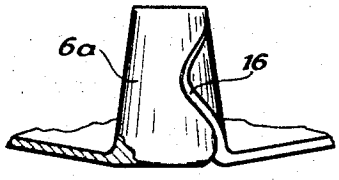


FIG. 2a



FIG. 2b

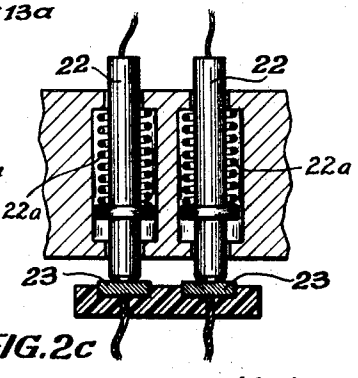


FIG. 2c

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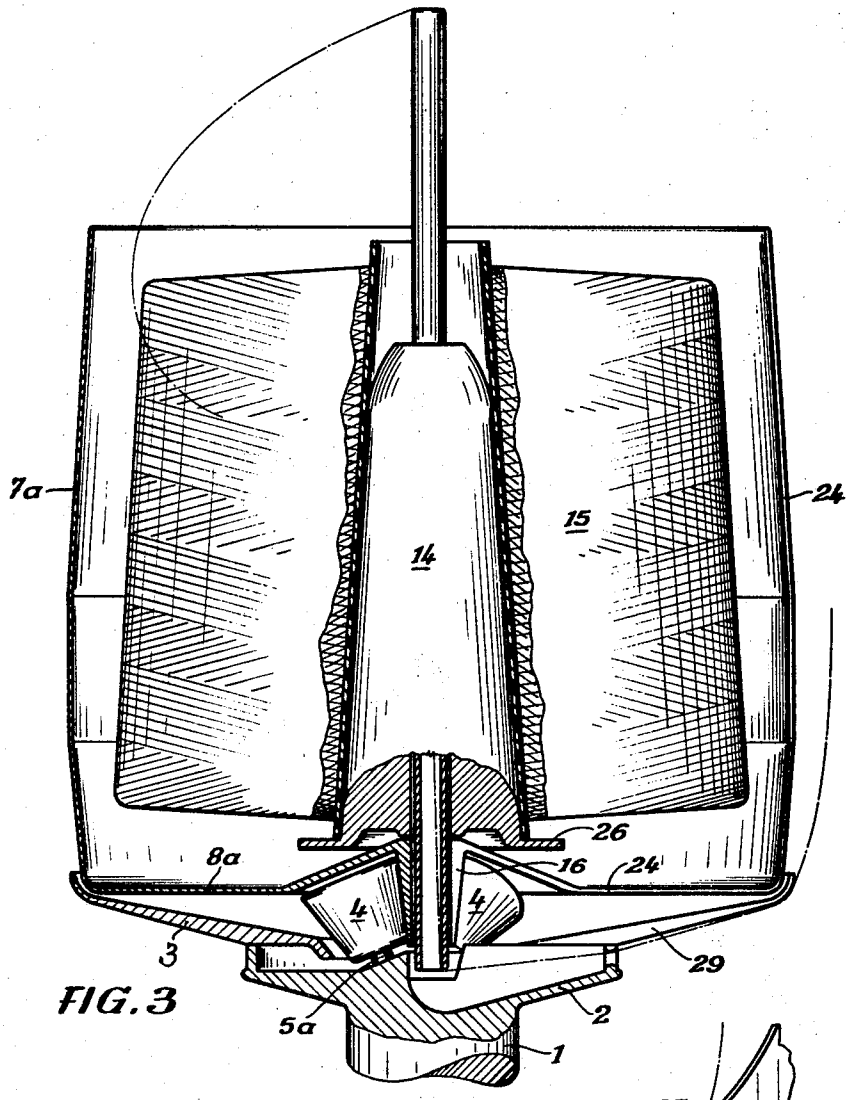


FIG. 3

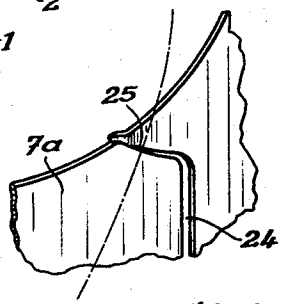


FIG. 4

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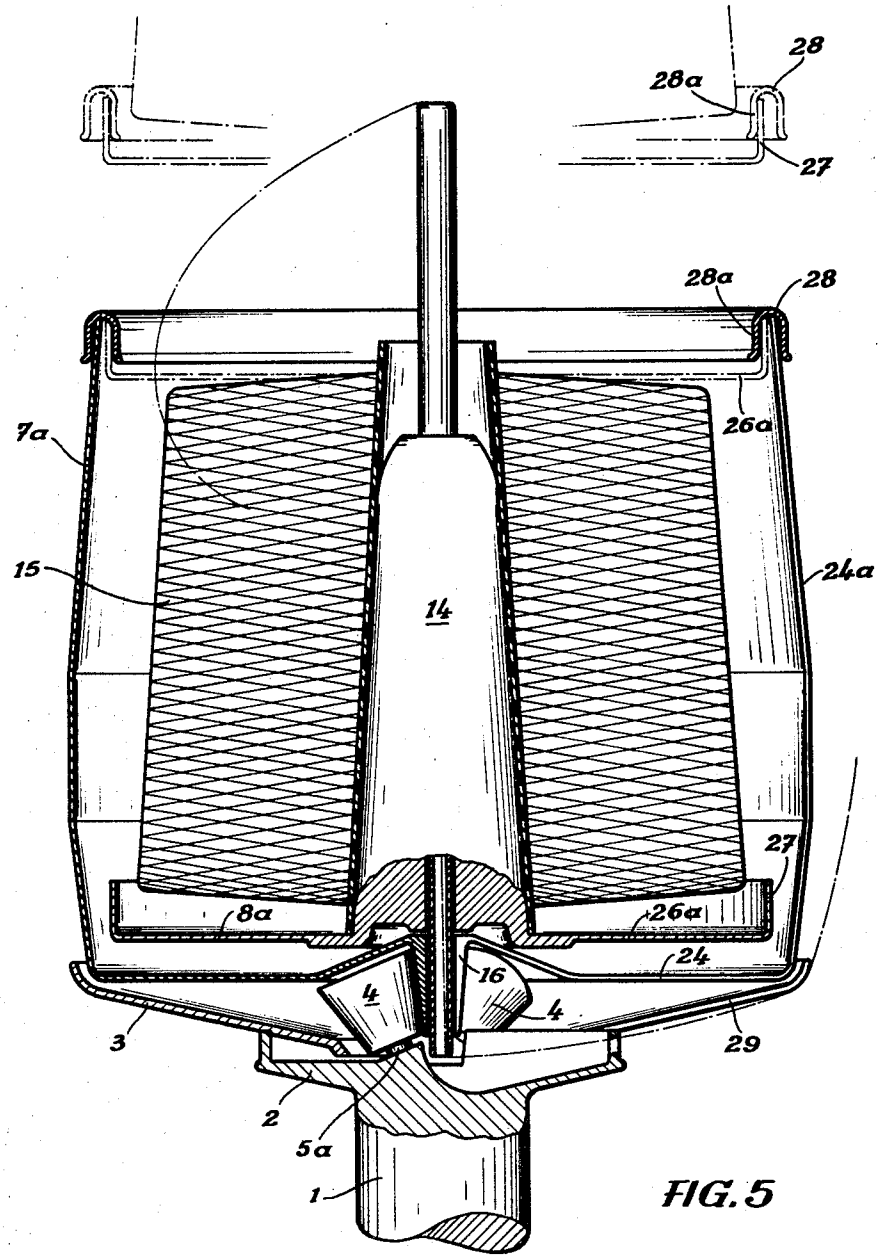


FIG. 5

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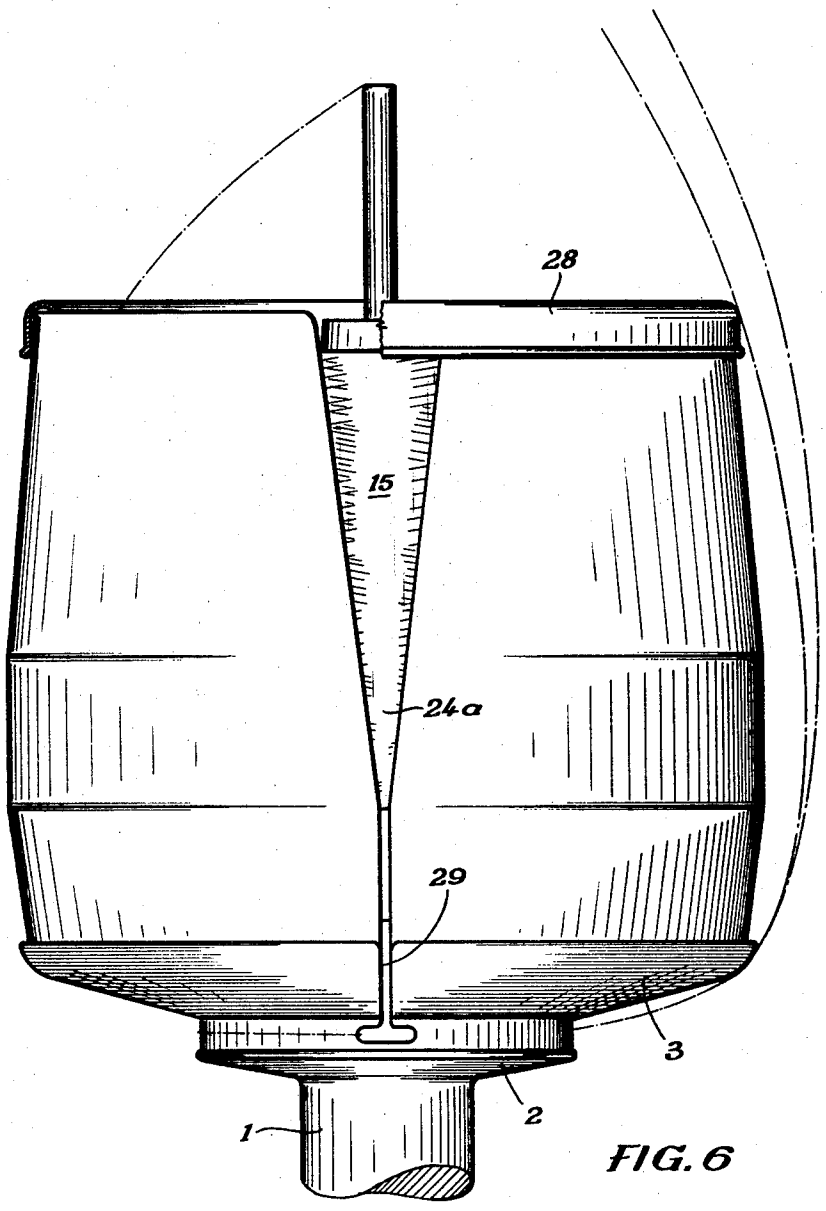


FIG. 6

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3,402,545

MULTIPLE TWIST SPINDLES

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Filed Apr. 3, 1967, Ser. No. 628,008
Claims priority, application Germany, Apr. 7, 1966, P 39,164; Mar. 15, 1967, P 41,643
6 Claims. (Cl. 57—58.49)

ABSTRACT OF THE DISCLOSURE

The present invention relates to a multiple twist spindle, especially a two-for-one twisting spindle, which comprises a spindle rotor, a bobbin carrier supported by said spindle rotor and adapted to be held stationary relative thereto and in which said bobbin carrier is composed of a lower section and an upper section adapted to be withdrawn from said lower section. The invention is characterized primarily in that the lower bobbin carrier section is provided with a hollow central bearing stud adapted detachably to receive a plug sleeve on the upper bobbin carrier section while the said hollow stud is rotatably supported by conical roller means which are upwardly and radially outwardly covered by the bobbin carrier lower section, so that the bearing means of the lower bobbin carrier section remain covered when the bobbin carrier upper section is withdrawn.

The present invention relates to multiple twist spindles, especially two-for-one twisting spindles, with a bobbin carrier which is equipped with a protective pot and which is journalled on the spindle rotor. The said bobbin carrier is adapted to be lifted off axially from the spindle rotor and is adapted to be held stationary while being journalled by means of conical rollers, the axes of which are inclined with regard to the spindle axis and which are located between a bearing stud and the spindle rotor.

Such multiple twist spindle has been disclosed in applicants' copending application Ser. No. 600,987 filed Dec. 12, 1966, and more specifically in FIGS. 2 and 4 thereof. The most important advantage of the multiple twist spindle disclosed in the said copending application consists in that the resting portion of the spindle, i.e. that portion of the spindle which does not rotate with the spindle rotor, can be lifted off the spindle rotor so that the bearing means, namely, the conical rollers are exposed and can be serviced, for instance, be lubricated without difficulties.

Moreover, the lifting of the bobbin carrier off the spindle rotor facilitates the threading of the thread, inasmuch as the threading can be carried out independently of the spindle rotor, and as the case may be, outside the machine after the bobbin carrier with the delivery bobbin has been lifted off. If, as has been suggested, the thread storage disc is slotted, the thread passed therethrough can when mounting the bobbin carrier be drawn radially outwardly and can be drawn upwardly around the delivery bobbin carrier with the delivery bobbin and can then be pieced to the winding-up bobbin.

This faciltating of the threading operation for the thread is of particular importance with such spindles with which an automation of the exchange of the delivery bobbin and the threading operation is provided.

According to the suggestion set forth in the above mentioned copending application, the portions of the bobbin carrier to be lifted off are relatively large and, furthermore, when effecting this lifting off operation, the bearing area is exposed and might get soiled.

It is, therefore, an object of the present invention

further to improve the delivery bobbin carrier of the arrangement set forth in the above mentioned copending application so that when lifting off the bobbin carrier, the bearing means stay together unchanged and remain covered.

It is another object of this invention to provide a multiple twist spindle in which that portion which is to be lifted off the spindle rotor together with the delivery bobbin will have relatively small dimensions and thus a low weight.

These and other objects and advantages of the invention will appear more clearly from the following specification, in connection with the accompanying drawings, in which:

FIGURE 1 is a partial section through a two-for-one twisting spindle with a two-part bobbin carrier.

FIGURE 1*a* illustrates partially in view and partially in section the lower portion of the bobbin carrier within the range of the bearing stud with an undulated thread passage or slot.

FIGURE 2 is a partial section through a modified two-for-one twisting spindle with a two-part bobbin carrier.

FIGURE 2*a* shows partially in section and partially in view a cutout of the overflow dish with slotted hollow bearing stud.

FIGURE 2*b* is a section along the line II*b*—II*b* of FIG. 2.

FIGURE 2*c* shows the arrangement of the contacts for the current supply to a magnetically adjustable thread brake.

FIGURE 3 is a partial section through a two-for-one twisting spindle with a two-part bobbin carrier, the lower portion of which forms a protective pot extending over the entire height of the delivery bobbin.

FIGURE 4 is a perspective view of the upper end of the thread passage or slot in the protective pot wall of the lower part of the bobbin carrier.

FIGURE 5 is a partial section through a two-for-one twisting spindle with a thread sliding ring which is placed upon the upper edge of the protective pot and which can be lifted off the upper portion of the bobbin carrier.

FIGURE 6 shows the two-for-one twisting spindle of FIG. 5 as seen from the slotted side.

The multiple twisting spindle according to the present invention is characterized in that the bobbin carrier comprises a lower part which is provided with a thread passage and covers the conical rollers toward the top and radially toward the outside, and furthermore comprises an upper part which, by means of an axially extending plug sleeve is detachably plugged into the bearing stud extending between the conical rollers, said bearing stud having a continuous thread passage slot extending in the longitudinal direction of said stud.

The problem underlying the present invention has been satisfactorily solved by the arrangement of the bobbin carrier as a two-part bobbin carrier, because the lower part of the bobbin carrier can remain on the spindle rotor when an exchange of the delivery bobbin is to be effected, while also the conical rollers forming the bearing remain surrounded and covered by the lower part of the bobbin carrier.

When during an exchange of the delivery bobbin, the upper portion of the bobbin carrier with delivery bobbin is detached from the lower part of the bobbin carrier, it is possible to withdraw the thread, for instance, outside of the machine from the slipped-on new delivery bobbin and to pass said withdrawn thread through the hollow upper part of the bobbin carrier. Thereupon, the thread is passed outwardly and around the delivery bobbin or bobbin carrier and later on after passing a thread guiding ear is pieced onto the winding up bobbin.

When placing the thus prepared upper part of the bobbin carrier onto the lower part of the bobbin carrier, the thread is pulled through the slotted bearing stud between two conical rollers toward the outside and will move also through the slotted overrunning dish of the spindle rotor toward the outside so that during a later rotation of the spindle, the thread will be in the form of a balloon to circulate about the entire unit.

More specifically, the lower part of the bobbin carrier may be designed in the form of a pot, the wall of which extends around the upper part of the bobbin carrier which is designed as a protective pot for the delivery bobbin, said pot wall extending up to a partial height of said upper part and carrying holding magnets while its marginal portion extends below a radially protruding step of the upper part of the bobbin carrier.

According to another embodiment of the invention, the reverse arrangement may be employed according to which the lower part of the bobbin carrier is designed as protective pot for the delivery bobbin whereas the thread passage slot extending along the wall of the pot will at its upper marginal portion run out at an angle, and the marginal portion of the pot wall which extends over the slot end is slightly arched and extends inwardly.

While in the first mentioned instance the upper bobbin carrier part which is formed as a protective pot has a closed round pot rim, in the second instance there is required a thread passage slot which extends to the upper marginal portion of the protective pot wall. The angle shape of the thread passage slot at the upper marginal portion in conformity with the present invention will assure that the thread when circulating in the form of a balloon, especially during the start of the spindle when the thread contacts the marginal portion of the top wall will not get snagged in the thread passage slot which might otherwise bring about a thread break.

If the upper part of the bobbin carrier of the delivery bobbin is located inside the protective pot of the lower part of the bobbin carrier, the thread sliding ring is mounted on the edge of the protective pot wall and at the top bridges the thread passage slot so that the thread rotating in the form of a balloon cannot enter the thread passage slot. Since, on the other hand, the pull through of the thread requires a continuous slot in the protective pot, the latter will when lifting off the upper part of the bobbin carrier be freed from the lower part of the bobbin carrier inasmuch as the thread sliding ring is lifted off.

Thus, when inserting the upper part of the bobbin carrier with delivery bobbin, the thread can be pulled through the slot whereup the slot is bridged at the upper marginal portion of the protective pot by mounting the thread sliding ring. It will be appreciated that the protective pot marginal portion will detach the slide ring from the marginal portion of the lower pot of the bobbin carrier upper part when the latter is inserted.

Referring now to the drawing in detail, the spindle rotor throughout the various embodiments shown in the drawings comprises a whorl **1** with a thread storage disc **2** and a slotted overflow disc **3**.

In conformity with the embodiment shown in FIG. 1, the spindle rotor comprises conical rollers **4** which by means of pivots **5** are freely rotatably journalled in said spindle rotor. It is, of course, also possible to select the reverse arrangement according to which the conical rollers are freely rotatably journalled in the bobbin carrier and more specifically in the bottom portion thereof. Such an arrangement is shown for instance in FIG. 2 of the above mentioned copending application.

The conical rollers **4** form a closed bearing for the bearing stud **6** which latter forms a part of the lower portion **7** of the bobbin carrier. Said lower part **7** has a pot shape and extends approximately up to half the height of the delivery bobbin **15**. The bobbin carrier lower part **7** at the same time surrounds the lower portion of the protective pot **8** which latter forms a part of the bobbin carrier upper part **14**. As will be seen from the drawing, bobbin carrier part **14** forms a hollow shaft. On the inner side of the protective pot of the lower part **7** there are provided holding magnets **9** which in a manner known per se, are adapted to hold the two part bobbin carrier at rest at least with regard to the rotating spindle rotor. To this end, there are provided counter magnets (not shown) for cooperation with the holding magnets **9**, said counter magnets being arranged stationarily. As will also be seen from the drawing, the bobbin carrier upper part **8** has a radially protruding step which extends over the upper rim of the lower part **7** of the bobbin carrier. Between the lower part **7** of the bobbin carrier and the protective pot **8** of the upper portion **14** of the bobbin carrier there is provided a free space or chamber **10** which is adapted to receive control means for a thread brake or a flyer brake. In the particular embodiment shown in FIG. 1, a thread brake **11** is arranged in the thread intake tube **12** which latter is axially inserted into the bobbin carrier upper part **14**. The bobbin carrier upper part **14** has slipped thereon the delivery bobbin **15** in a manner known per se.

The upper part **14** of the bobbin carrier is by means of the sleeve plug **13** inserted into the hollow bearing stud **16** and is detachably located therein.

After the thread has been withdrawn from the delivery bobbin **15** and the empty bobbin is to be replaced by a new delivery bobbin, the upper part **14** of the bobbin carrier together with the protective pot **8** and the empty delivery bobbin **15** is detached and withdrawn from the lower part **7** of the bobbin carrier to which end the sleeve plug **13** is axially pulled out of the bearing stud **6**. The bobbin carrier lower part **7** remains on the spindle rotor **1**. Thus the conical rollers **4** remain at their respective places and remain surrounded by the lower part **7** so that a soiling of the bearing cannot occur when the upper part **14** of the bobbin carrier has been lifted off.

The threading of the thread when inserting the bobbin carrier upper part **14** with a new delivery bobbin **15** requires as mentioned the slot **16** in the bearing stud **6**. This threading slot may in conformity with FIG. 1*a* be of an undulated contour in order to assure that the conical roller **6** will always find a supporting section so that during the rotation of the spindle rotor no shocks will occur when the rollers pass over the slot. It will be evident that instead of the undulated or serpentine slot **16**, a straight slot could be used which is inclined with regard to the axis of rotation of the roller **6**.

FIG. 2 shows an embodiment which corresponds as to the major details to that of the embodiment of FIG. 1. However, in contrast to FIG. 1, the plug sleeve **6***a* in FIG. 2 forms an integral part of the overflow dish **3** or the spindle rotor **1**. The lower part **7** of the bobbin carrier is again in the shape of a pot and is carried by the conical rollers **4** of the plug bearing. The pivots **5***a* of the conical rollers **4** are connected to a hub portion **18** of the bobbin carrier lower part **7**.

According to FIG. 2*b*, an annular gap **17** is provided between the hollow bearing stud **6***a* and the plug sleeve **13***a* because one part is at a standstill while the other part rotates. In order to bring about a centering, the hub portion **18** of the lower part **7** of the bobbin carrier is provided with a conical surface **19** into which fits a corresponding conical surface of the upper portion **14** of the bobbin carrier.

The embodiment of FIG. 2 comprises a thread brake **20** which is equipped with an exciting coil **21** adapted to adjust the braking force of the thread brake. The Electric conductors are connected to contacts **22** the specific design of which is shown on a larger scale in FIG. 2*c*. As will be seen from the drawing, the said contacts **22** are spring-biased by springs **22***a*. The said spring-urged contacts **22** are adapted to act through contact plates **23** which are arranged in the hub portion **18** of the lower part **7** of the bobbin carrier.

According to the embodiment of FIG. 3, the lower bobbin carrier part forms a protective pot 7*a*, 8*a* which is provided with a threading slot **24** the upper end of which ends approximately at the upper end of the angled-off portion **25** as shown in FIG. 4. The leftwardly (with regard to the drawing) directed tip of the marginal portion of the pot wall 7*a* is curved slightly inwardly and extends over the upper slot end. In this way it will be assured that the thread which when starting the spindle moves along the top edge will not slip into the slot end and thus will be unable to snag. Instead, with either direction of rotation the thread will pass over said slot end. The slot **24** in the protective pot 7*a*, 8*a* has associated therewith a slot **29** in the overflow dish **3**. The threading of the thread requires that during the standstill of the spindle the slots **24** and **29** are aligned with each other which situation can be brought about automatically by provisions on the spindle brake (not shown). This also applies to the embodiments of FIGS. 1 and 2. The protective pot forming the lower part of the bobbin carrier has its bottom 8*a* provided with an axially directed hollow bearing stud **6** similar to that of FIG. 1*a*. The hollow stud **6** is provided with a slot **16** which follows the slot **24** in the bottom 8*a* of the protective pot. By means of the outwardly conical bearing stud **6** at the bottom 8*a*, the lower bobbin carrier part extends between the three conical rollers **4** which are arranged symmetrically with regard to the spindle axis and which, similar to the embodiments described above by means of antifriction bearings (not shown) are journalled on the bearing pivots 5*a* connected to the spindle rotor.

In a nonillustrated manner but corresponding to FIGS. 1 and 2, the protective pot wall 7*a* is approximately within the range of its largest bulging area provided with holding magnets having associated therewith counter magnets arranged radially outwardly so that by means of said magnets the bobbin carrier lower part will be prevented from rotating when whorl **1** and thread storage disc **2** rotate. Also, the upper part **14** of the bobbin carrier upon which the delivery bobbin **15** is slipped and the sleeve of which rests at its lower end on the annular flange **26**, is at a standstill with the bobbin carrier lower part when the spindle rotor rotates. The upper part **14** by means of the plug sleeve **13** detachably inserted into the bearing stud **6** around which the conical rollers **4** rotate.

The bobbin carrier lower part 7*a*, 8*a* covers by means of its bottom portion 8*a* the conical rollers **4** toward the top and in cooperation with the overflow dish **3** also covers the conical rollers **4** radially outwardly. For purposes of lubricating the bearing and cleaning the same the bobbin carrier lower part together with the upper part **14** can be lifted upwardly.

If, however, it is intended merely to exchange the delivery bobbin **15** and to thread the thread, it is sufficient to lift the bobbin carrier upper part **14** alone, in which instance the plug sleeve **13** will be pulled out of the bearing stud **6**. It is possible without difficulty outside to thread the thread through the bobbin carrier upper part **14**, independently of the spindle rotor and the bobbin carrier lower part 7*a*, 8*a*.

When inserting the bobibn carrier upper part **14** with the delivery bobbin **15**, the thread is passed through slot **16** of the bearing stud **6** and through the slots **24** and **29** of the protective pot 7*a*, 8*a* and the overflow dish **3** so that the spindle is again ready for the twisting operation as soon as the thread has been passed to the winding-up bobbin (not shown).

According to the embodiments of FIGS. 5 and 6, the bobbin carrier upper part **14** instead of being provided with the annular flange **26** is provided with the lower pot 26*a*. The diameter of pot 26*a* is so dimensioned that the upper pot edge **27** will, when axially withdrawing the bobbin carrier upper part **14** from the lower bobbin carrier part 7*a*, 8*a* engage from below the thread sliding ring **28** and lift the latter off the pot wall 7*a*. This is illustrated in FIG. 5 by dot-dash lines. The thread sliding ring **28** has a U-shaped cross section while the inner leg 28*a* extends over the edge of the protective pot wall 7*a* inwardly to such an extent that the marginal portion **27** of the pot of the bobbin carrier upper part **14** will be able to extend between legs 28*a* and the upper edge of the pot wall 7*a*.

The thread sliding ring **28** which may consist of synthetic material, bridges the conically upwardly widening thread slot 24*a* in the protective pot wall 7*a* in conformity with FIG. 6 so that the thread which in the form of a balloon circulates about the bobbin carrier lower part 7*a*, 8*a* cannot snag in slot 24*a*. This conical widening of the slot 24*a* facilitates the threading operation.

When a new full delivery bobbin **15** by means of the bobbin carrier upper part **14** is placed in the protective pot 7*a*, 8*a* the thread sliding ring **28** will be seated upon the upper edge of the protective pot wall 7*a* and will bridge slot 24*a*.

The two-for-one twisting spindle as shown in the drawings, makes possible an exchange of the delivery bobbin **15** together with the bobbin carrier upper part **14** while the protective pot 7*a*, 8*a* remains at its respective place and thus the body to be withdrawn or to be inserted will not materially exceed the weight of the delivery bobbin **15**. This reduction in weight is, with the embodiments of FIGS. 5 and 6 still considerably greater than with the embodiments of FIGS. 1 and 2, according to which the entire protective pot which surrounds the delivery bobbin and pertains to the bobbin carrier upper part has to be lifted off.

The fact that the bobbin carrier is composed of two parts which are detachable from each other assures that the bearing wheel during the exchange of the delivery bobbin remains closed on all sides. On the other hand the possibility of lifting off the bobbin carrier as an entity for purposes of servicing the bearing is still maintained.

It is, of course, to be understood that the present invention is, by no means, limited to the particular embodiments shown in the drawings, but also comprises any modifications within the scope of the appended claims.

What we claim is:

1. A mutliple twist spindle, especially two-for-one twisting spindle which includes a spindle rotor, a bobbin carrier supported by said spindle rotor and adapted to be held stationary relative thereto, said bobbin carrier being provided with a protective pot and comprising a lower section with a hollow central bearing stud and with a threading slot, and conical roller means rotatably supporting said bearing stud and being upwardly and radially outwardly covered by said bobbin carrier lower section, said bobbin carrier also comprising a upper section with a plug sleeve extending in the axial direction of said upper section and adapted selectively and detachably to be inserted into said hollow bearing stud, said bearing stud having a threading slot extending in the longitudinal direction of said stud.

2. A spindle according to claim **1**, in which the protective pot of the bobbin carrier forms a part of said upper section and has its circumferential portion between the upper and lower end thereof provided with a flange-shaped step, and in which said bobbin carrier lower section is pot-shaped and has its circumferential wall extending around the lower portion of said protective pot with the upper edge of said circumferential wall in engagement with said flange-shaped step.

3. A spindle according to claim **2**, which includes holding magnet means supported by the circumferential wall of said pot-shaped lower section.

4. A spindle according to claim **1**, in which the protective pot of the bobbin carrier forms a part of the bobbin carrier lower section and has its circumferential wall provided with a threading slot extending in the longitudinal direction of said circumferential wall and having the edge at the upper end of said slot angled off, said edge

overlapping the adjacent end of said slot and being slightly curved inwardly.

5. A spindle according to claim 1, in which the protective pot of the bobbin carrier forms a part of said lower bobbin carrier section and which includes a thread sliding ring of a U-shaped cross section axially detachably mounted on the upper edge of said protective pot.

6. A spindle according to claim 5, in which the inner leg of said cross sectionally U-shaped thread sliding ring extends over the upper edge of said protective pot in radially spaced relationship thereto, and in which the lower end of said upper bobbin carrier section is provided with a flat pan having an outer peripheral wall of a diameter slightly less than the inner diameter of the outer leg of said thread sliding ring to thereby permit said pan in response to a withdrawal operation of said upper bobbin carrier section to enter said sliding ring between the inner leg thereof and the adjacent upper marginal portion of said protective pot and to withdraw said sliding ring in response to a complete withdrawal of said upper bobbin carrier section from said spindle rotor.

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