

Sept. 26, 1967

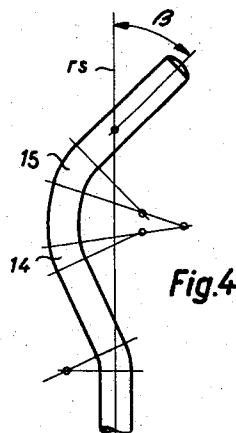
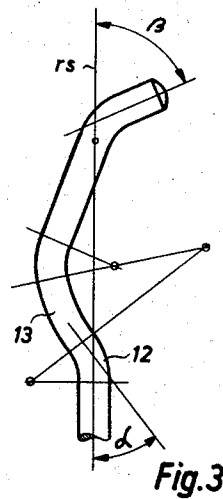
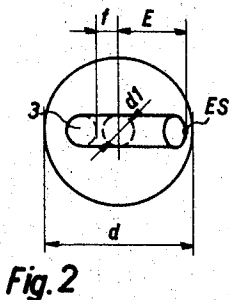
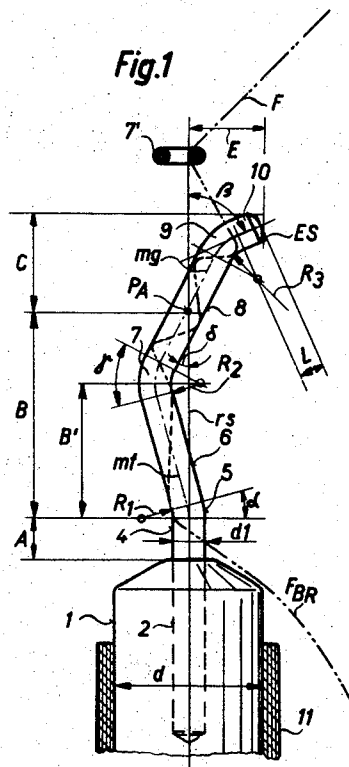
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3,343,361

SPINDLE ATTACHMENT FOR SPINNING WITH REDUCED BALLOON

Filed April 21, 1966

3 Sheets-Sheet 1



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SPINDLE ATTACHMENT FOR SPINNING WITH REDUCED BALLOON

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3 Sheets-Sheet 2

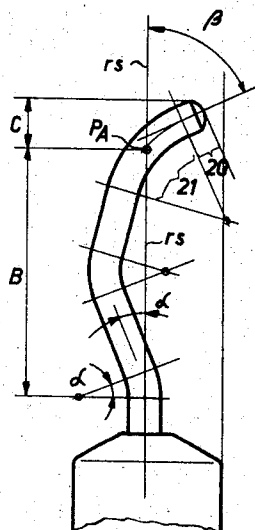
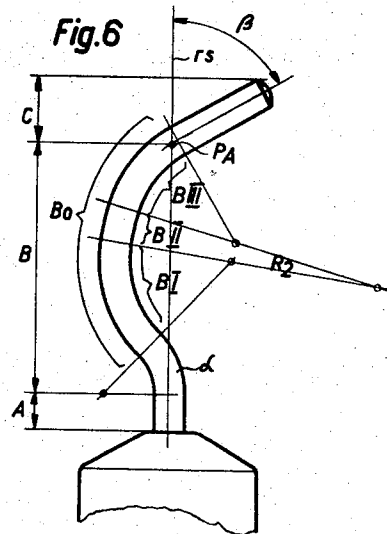
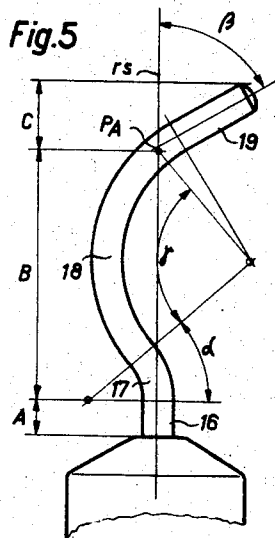


Fig.7

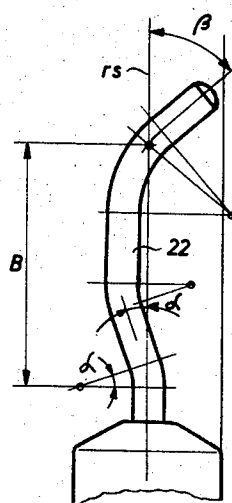


Fig.8

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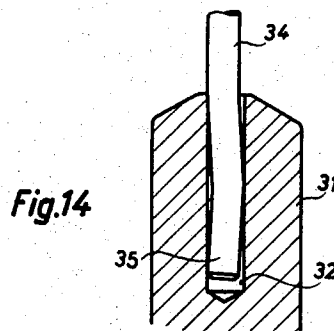
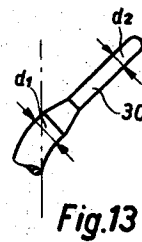
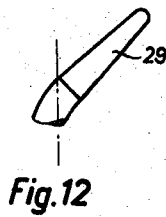
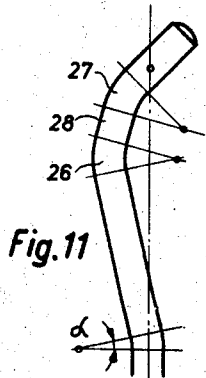
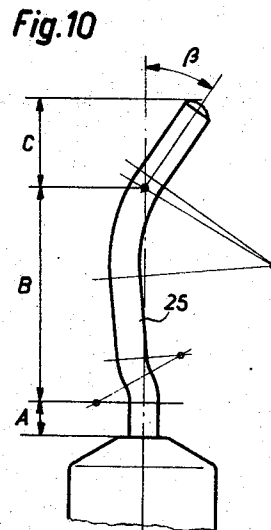
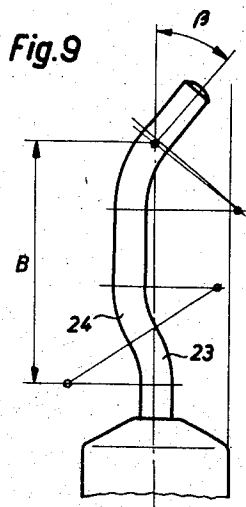
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3 Sheets-Sheet 3



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SPINDLE ATTACHMENT FOR SPINNING WITH REDUCED BALLOON

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21 Claims. (Cl. 57—73)

The present invention relates to an attachment for the spindles of a ring spinning frame for spinning with reduced balloon.

Heretofore, the spindles of ring spinning frames have been provided with spindle attachments for spinning with reduced balloon. The spindle attachments have been formed to extend from the top of the spindles and to bend twice in opposite directions. Further, the spindle attachments have been rotatably mounted on the spindles so that the rotation of the attachments have depended on rolling frictional engagement of the attachments with the spindles. However, these heretofore conventional arrangements have been objectionable because the frictional conditions between attachment and spindle change due to wear and exposure to dust and fly, etc.

Accordingly, it is an object of this invention to provide a spindle attachment for spinning with reduced balloon.

It is another object of this invention to provide a spindle attachment which is rigidly mounted in a spindle.

It is another object of this invention to provide a spindle attachment for spinning with reduced balloon which is formed as a finger like extension having a plurality of bends.

It is another object of this invention to provide a spindle attachment for a spindle for spinning with reduced balloon which has a foot portion coaxial with the longitudinal axis of the spindle and a continuing mid-portion extending from the spindle axis for stabilizing a reduced thread balloon.

Generally, the invention provides a spindle attachment for a spindle which permits spinning with reduced balloon. The spindle attachment is rigidly mounted in the top of the spindle and thus eliminates the heretofore used attachment mountings which relied on friction to impart a rotational force from the spinning spindle to the attachment.

The spindle attachment is formed as a fingerlike extension of the spindle including a foot portion which is coaxial with the longitudinal axis of the spindle and a continuous series of bent portions which extend from the longitudinal axis of the spindle. One of these bent portions positioned near the middle of the attachment acts to stabilize a reduced thread or yarn balloon and continues into an end portion which deviates upwardly from the spindle axis in a direction opposite to the direction of the extension of the middle portion away from the spindle axis.

These and other objects and advantages of the invention will become more apparent from the following detailed description and appended claims taken in conjunction with the accompanying drawings in which:

FIG. 1 is a part sectional elevation of an attachment mounted on a spindle head according to the invention;

FIG. 2 is a plane view of the attachment and spindle head shown in FIG. 1;

FIGURES 3 to 11 are elevations of modifications of an attachment according to the invention;

FIGURES 12 and 13 show modifications of upper ends of attachments according to the invention;

FIG. 14 is a longitudinal section of the upper end of a spinning spindle with the foot portion of an attachment connected thereto according to the invention.

2

Referring more particularly to FIGURES 1 and 2, the top portion 1 of a spindle has a diameter d and a bore 2 concentric with the rotation axis rs of the spindle. A fingerlike attachment 3 having a diameter d_1 is inserted in the bore 2. The attachment 3 is provided with an oblong foot portion 4 placed immediately above and coaxial with the top portion 1 of the spindle which extends through a short zone A and continues upwardly into a first or lower bend 5 on a radius R_1 extending through an angle α and continues into a straight portion 6 which deviates upwardly and outwardly from the rotation axis rs of the spindle. The radius R_1 of the first bend 5 is preferably greater than the diameter d_1 and the angle α formed by the center line mf of the attachment portion 6 with the rotation axis rs is preferably between 10° and 20° .

The bend 5 having the small radius R_1 and extending through the angle α effects stabilization of the reduced thread balloon F_{BR} , indicated by a dash-dot line, in the transition zone between the foot portion A and the middle zone B thereabove. This is of great importance for maintaining a constant thread tension. During a spinning operation the small angle α forces the thread or yarn F to be laid in windings of great pitch extending from an eye 7' around the attachment 3 as well as in the lower portion B' of the middle portion B thereof to avoid lapping.

The straight portion 6 continues into a counterbend 7 on a radius R_2 extending through an angle γ so that the center line mg of a following straight portion 8 intersects the spindle axis rs at P_A ; the radius R_2 preferably being between $2d_1$ and $8d_1$. The entire middle portion B between the zone A and the point P_A is located at one side of a vertical plane through the spindle axis rs and develops a centrifugal force urging the attachment to the left as viewed in FIGURES 1 and 2 when the spindle rotates. The distance f (FIG. 2) of the portion B from the axis rs at the location where the bend 7 is farthest away from the rotation axis rs corresponds approximately to the thickness of the attachment 3, i.e. $f \approx d_1$. The diameter d_1 of the attachment 3 should be made as small as possible in order to assure formation of a balloon at the beginning and at the end of the spinning operation and to reduce the shock acting on the thread F and the traveller (not shown) whenever a loop jumps off. In addition, the minimal thickness of the attachment 3 should be such that individual fibres cannot extend around it. This condition is satisfied in the simplest manner by making $d_1:d$ approximately equal to between 1:3 to 1:7. If $d_1:d$ is greater than 1:3 there is no satisfactory balloon formation and if this ratio is smaller than 1:7 laps are likely to be formed.

The straight portion 8 continues at the right side (in FIGURES 1 and 2) of the spindle axis rs into an end portion C comprising a bend 9 and a straight portion 10. The length of the straight portion 10 is usually less than twice the thickness d_1 of the attachment 3 and the end ES is spaced from the spindle axis rs a distance E which allows a tube 11 sitting on the spindle to be freely axially upwardly removed, i.e. E should be smaller than $d/2$ (FIG. 2). The end portion C makes an angle β with the spindle axis rs which angle β may be between 15° and 75° and is preferably made small so that the loops of the thread or yarn are laid around the attachment at a great pitch and do not come too close to each other so as to avoid lapping which is assisted by projecting fibers. The angle β should always be greater than the angle α which, as specified above, is preferably between 10° and 20° . The angle δ made by the axis rs with the upper part of the straight portion 8 should also be greater than the angle α .

The entire length or height of the attachment ($A+B+C$) is preferably between about $8d_1$ and $20d_1$, depending on the choice of the diameter d_1 and the angle β . The length or height of the attachment must be such that the desired relief of thread tension caused by the thread loops is effected between the attachment and delivery cylinders (not shown).

As illustrated in FIG. 3 the straight portion B' shown in FIG. 1 may be replaced by a bend 13 which is curved counter to a bend 12 at the foot of the attachment.

Further, the portion of the attachment extending from the bend 7 in FIG. 1 or from the bend 13 in FIG. 3 back to the spindle axis rs which portions are straight in FIGURES 1 and 3 may be curved as shown at 15 in FIG. 4, if this is desired to facilitate manufacture.

Referring to FIG. 5, a modified form of the attachment has a foot portion 16 which continues into a bend 17 extending through an angle α which is followed by a counterbend 18 extending through an angle δ . In this modification, the middle portion consists of the bends 17 and 18. The bend 18 continues slightly beyond the point P_A into a straight end portion 19 which is tangential of the bend 18 and forms an angle β with the spindle axis rs .

Referring to FIG. 6, another modified form of the attachment has an upper bend B_0 which corresponds to the bend 18 in FIG. 5 consisting of three partial bends BI, BII and BIII, the bend BII having a much greater radius R_2 than the bends BI and BIII.

Referring to FIG. 7, an attachment similar to that shown in FIG. 1 has a top bend 21 which continues into a short straight end portion 20 and which extends into the middle zone B which ends at P_A .

The modification shown in FIG. 8 differs from that shown in FIG. 7 in that the middle zone B comprises a straight central portion 22 which is parallel with the spindle axis rs .

Referring to FIG. 9, a modified attachment has the foot portion connected to the straight paraxial central portion by two oppositely curved bends 23, 24, whereas in the attachment shown in FIG. 8 a straight portion is provided between the foot portion and the central portion 22.

In the attachment shown in FIG. 10 a straight portion 25 of the middle zone B deviates slightly outwardly from the rotation axis of the spindle.

FIG. 11 shows the upper portion of an attachment which has two upper bends 26 and 27 connected by a straight portion 28; both bends being on the left side of the spindle axis as viewed in the drawings in contradistinction to the attachment shown in FIG. 1 wherein the uppermost bend 9 is on the right side of the spindle axis.

FIG. 12 shows a conical straight end portion 29 which may be used with any of the modifications shown in FIGURES 1 to 11.

FIG. 13 shows a top end portion having a straight cylindrical portion 30 of reduced diameter d_2 which may also be used in combination with the attachments shown in FIGURES 1 to 11.

Referring to FIG. 14, a cylindrical foot portion 34 has a slightly bent lower extension 35 which is forced into a cylindrical bore concentric with the spindle thereby securing the attachment of the invention in a simple manner on the top portion 31 of the spindle. The tensioning effect produced thereby suffices to hold the attachment, which can easily be inserted into and removed from the spindle.

Having thus described the invention, it is not intended that it be so limited as changes may be readily made therein without departing from the scope of the invention. Accordingly, it is intended that the subject matter described above and shown in the drawings be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. In combination with a spindle of a spinning frame, a fingerlike attachment for spinning with reduced balloon, said attachment comprising an oblong foot portion mounted on top of the spindle coaxially with the longitudinal axis thereof and extending therefrom, a middle portion extending from said foot portion and deviating from the longitudinal axis of the spindle to one side of a plane passing therethrough, and an upper end portion extending from said middle portion to the opposite side of the plane passing through the longitudinal axis of the spindle.

2. The combination defined in claim 1 wherein said attachment further comprises a first bend connecting said foot portion and said middle portion, and a second bend connecting said middle portion and said end portion, said second bend being curved oppositely to said first bend and extending through an angle greater than the angle through which said first bend extends.

3. The combination defined in claim 1 wherein said attachment further comprises a first bend connecting said foot portion and said middle portion, said middle portion having a second bend curved oppositely to said first bend, said second bend continuing into a straight portion, and a third bend connecting said straight portion to said upper end portion, said third bend being curved in the same sense as said second bend.

4. The combination defined in claim 3 wherein said straight portion is parallel with the longitudinal spindle axis.

5. The combination defined in claim 3 wherein a straight portion is interposed between said first and said second bend.

6. The combination defined in claim 1 wherein said attachment further comprises a first bend connecting said foot portion and said middle portion, a second bend connecting said middle portion and said end portion, said second bend being curved oppositely to said first bend and extending through an angle greater than the angle through which said first bend extends, and a straight portion interposed in said second bend.

7. The combination defined in claim 1 wherein said attachment further comprises a first bend connecting said foot portion and said middle portion, said middle portion comprising a second bend curved oppositely to said first bend, said second bend continuing into a third bend curved in the same sense as said second bend, and an upper bend following said third bend and curved in the same sense as said third bend and continuing into said upper end portion.

8. The combination defined in claim 7 wherein a straight portion is interposed between said first and said second bend.

9. The combination defined in claim 1 wherein said attachment further comprises a first bend connecting said foot portion and said middle portion, a second bend connecting said middle portion and said end portion, said second bend being curved oppositely to said first bend and extending through an angle greater than the angle through which said first bend extends, and a straight portion interposed in said second bend, said second bend continuing into said upper end portion, said end portion being straight and beginning at the side of the longitudinal spindle axis to which side said middle portion deviates.

10. The combination defined in claim 9 wherein said end portion diverges outwardly from the longitudinal axis of the spindle at a greater angle than the angle at which said middle portion deviates from said spindle axis.

11. The combination defined in claim 1 wherein said attachment further comprises a first bend connecting said foot portion and said middle portion, said middle portion including a plurality of bends, each of said plurality of bends being curved oppositely to said first bend.

12. The combination set forth in claim 1 wherein said attachment further comprises a first bend connecting said

5

foot portion to said middle portion, said first bend extending through an angle of substantially between 10° and 20°.

13. The combination set forth in claim 1 wherein said upper end portion forms an angle of 15° to 75° with the longitudinal axis of the spindle, said upper end portion having an end which is laterally spaced from the longitudinal axis of the spindle a distance less than a half of the diameter of the spindle.

14. The combination set forth in claim 1 wherein said attachment is a rod having a substantially circular cross-section, the ratio between the diameter of said rod and the diameter of the spindle being between 1:3 and 1:7.

15. The combination set forth in claim 1 wherein said attachment is a rod having a substantially circular cross-section, the height of said attachment being substantially between 8 and 20 times the diameter of said rod.

16. The combination set forth in claim 1 wherein said attachment is a rod having a substantially circular cross-section, said rod comprising a bend connecting said foot portion to said middle portion and extending through an angle of substantially between 10° and 20°, the radius of said bend being greater than the diameter of said rod.

17. The combination set forth in claim 1 wherein said attachment is a rod having a substantially circular cross-section, said rod having a bend connecting said foot portion to said middle portion and extending through an angle substantially between 10° and 20°, the radius of said bend being greater than the diameter of said rod,

6

said middle portion comprising a plurality of bends having radii between 2 times and 8 times the diameter of said rod.

18. The combination set forth in claim 1 wherein said attachment is a rod having a substantially circular cross-section, the length of said upper end portion being between 0.5 and 2.5 times the diameter of said rod.

19. The combination defined in claim 1 wherein said attachment further comprises a bend connecting said foot portion to said middle portion, said upper end portion forming an angle with the longitudinal axis of the spindle greater than the angle through which said bend extends.

20. The combination set forth in claim 1 wherein said attachment is a rod having a substantially circular cross-section and having a uniform diameter therethrough.

21. The combination set forth in claim 1 wherein said attachment is a rod having a substantially circular cross-section, the diameter of said upper end portion being smaller than the diameter of said rod.

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