

Jan. 9, 1962

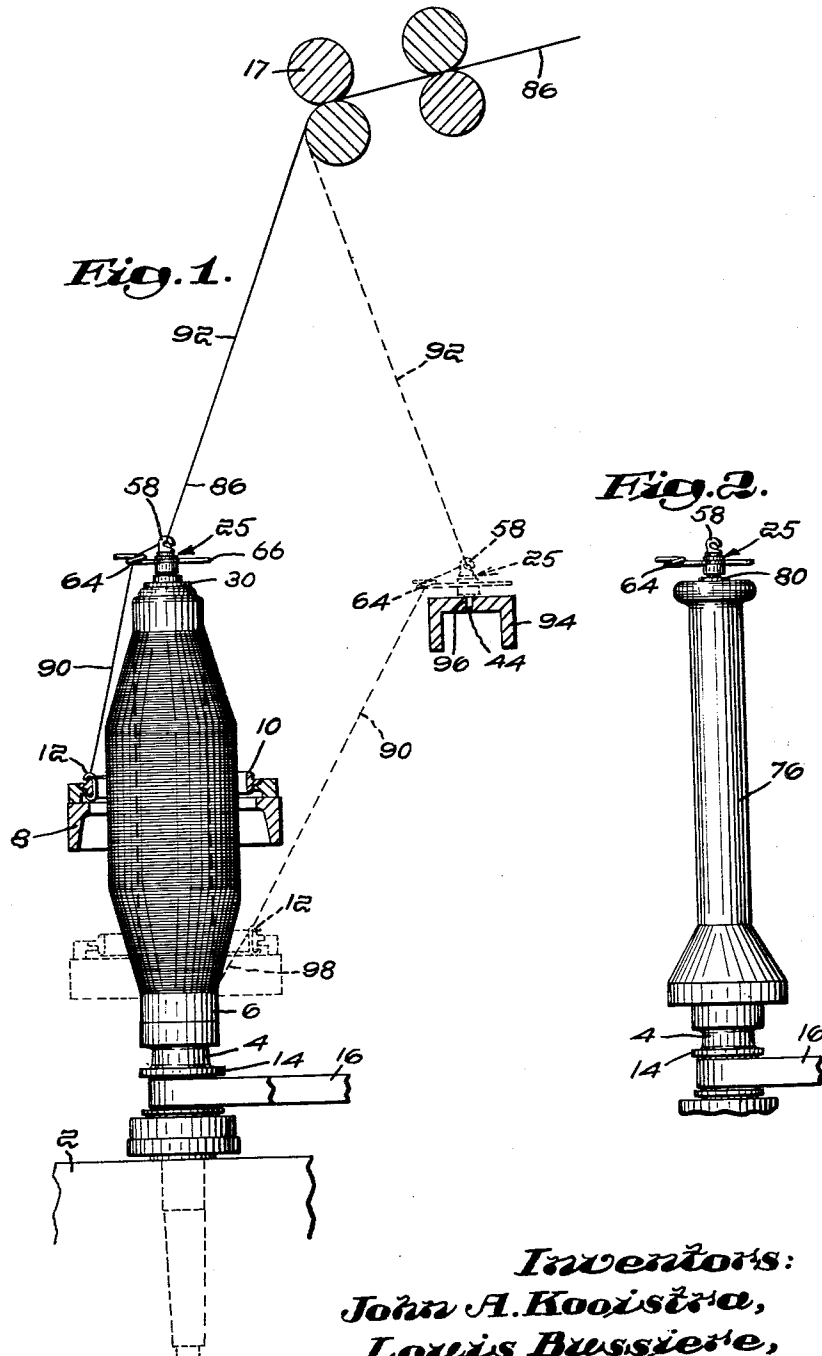
J. A. KOOISTRA ETAL

3,015,931

COMBINED BOBBIN AND FLYER ASSEMBLY

Filed Sept. 14, 1960

3 Sheets-Sheet 1



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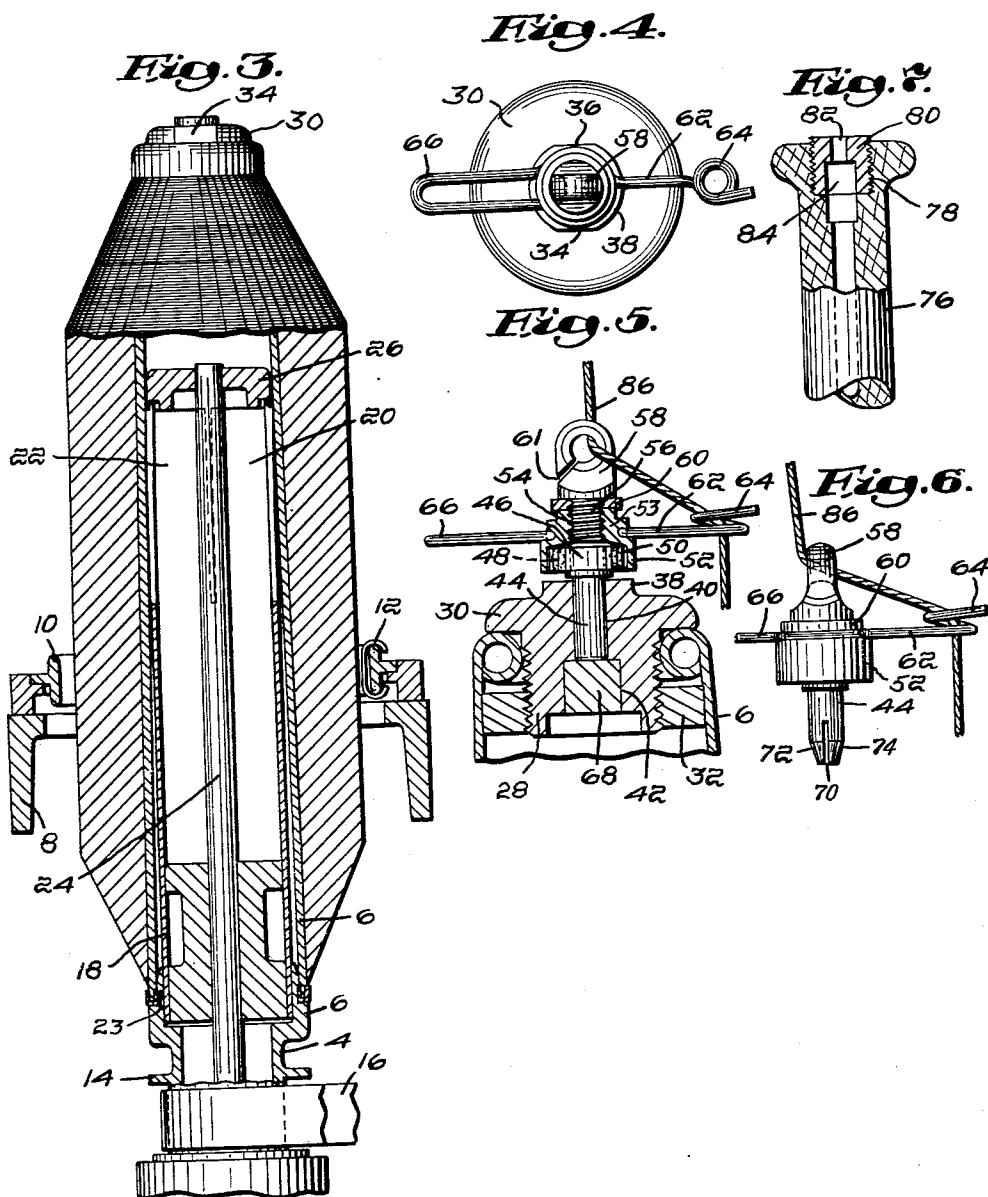
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3 Sheets-Sheet 2



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Fig. 8.

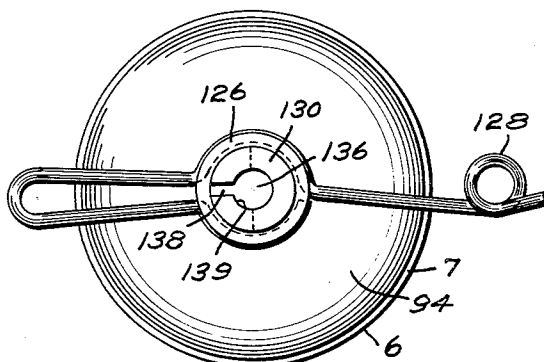
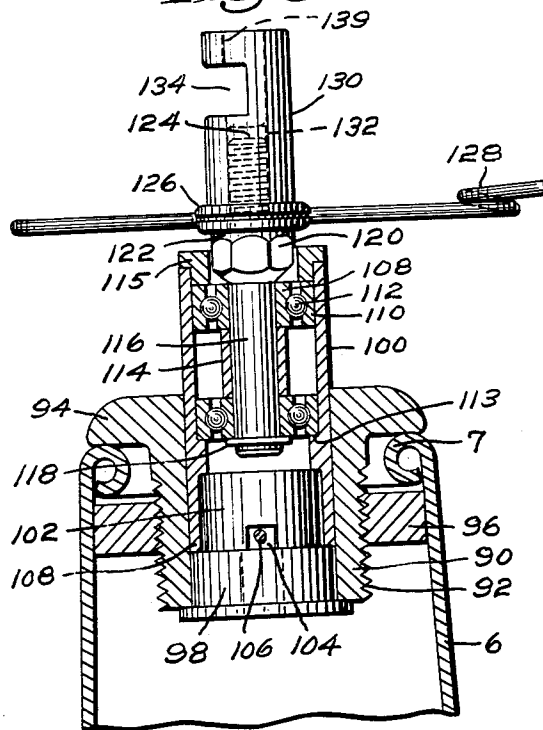


Fig. 9.



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COMBINED BOBBIN AND FLYER ASSEMBLY

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Filed Sept. 14, 1960, Ser. No. 56,057
17 Claims. (Cl. 57—73)

This invention relates to the art of spinning and twisting and is particularly concerned with a new and novel means for increasing the output of spinning frames while at the same time reducing yarn breakage. When reference hereinafter is made to spinning frames, it will be understood the term encompasses twisting frames, which are substantially identical in operation.

This application is a continuation-in-part of the application of John A. Kooistra and Louis E. Bussiere, filed July 29, 1959, Serial No. 830,315, now abandoned.

In the typical ring spinning operation of the prior art with which our invention may be used, the yarn or roving which is to be spun is fed to the spindle from a suitable yarn source by feed rolls at the desired rate. The yarn customarily then goes through a fixed eye located directly above the spindle, thence through the traveler of the spinning ring and from the traveler is wound on the bobbin on the spindle. As the spindle driven bobbin revolves, twist is applied to the yarn throughout its length between the traveler and the front feed rolls with the rate of twisting being somewhat greater at the traveler end than at the feed roll end. The tension on the yarn between the traveler and the feed rolls is generally uniform, but since there is always less twist in the yarn close to the feed rolls most yarn breakage occurs there. This is particularly true when the yarn is composed of short fibers, as is the case when it is made of low quality stock or from waste. Such breakage reduces production and necessitates the stopping of the bobbin and piecing up the yarn. If the breakage is not noted promptly by the operator, the resulting package on that bobbin will be smaller than normal. The foregoing is all well understood in this art.

We propose to place a flyer unit of novel construction on the upper end of the bobbin. This unit, which is removable from the bobbin, is induced to rotate by the rotation of the traveler and acts to frictionally restrain the yarn as it is being drawn through the traveler to the bobbin. Numerous advantages flow from this arrangement, among which are the following: The simultaneous rotation of the flyer and traveler causes the twist to be introduced into that part of the yarn between the feed rolls and the flyer. Since this short section is under little or no tension (it being drawn through the friction elements of the flyer at the same rate as it comes from the feed rolls) and is immediately strengthened as it leaves the feed rolls by being twisted, breakage at the feed rolls is substantially eliminated. The yarn passing through the flyer unit is by this time at full strength so that more tension than is customary may be applied to that part of the yarn between the flyer and bobbin. This results in a more compact package on the bobbin, test runs showing that the weight of yarn on the bobbin may be increased 40 to 50 percent without increasing the size of the package. At the same time, the rate of feed of the front rolls and the r.p.m. of the spindle may be increased upwards of 100 percent without any increase in the breakage of the yarn. Thus not only is the rate of spinning greatly increased but also because of the increase in weight of yarn placed on the bobbin without increasing the size of the package the number of doffings per pound of yarn is appreciably decreased. This results in a very substantial increase in efficiency of the spinning frame.

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A further advantage obtained by the present invention is that when the spinning frame is to be doffed, the flyer assembly may be removed from the bobbin and placed temporarily in an adjacent holder on the spinning frame. When in such position the yarn remains undisturbed, still running directly from the front rolls through the flyer assembly and thence through the traveler on the spinning ring. With the flyer assembly out of the way, the bobbin may then be removed without interfering with the yarn.

The bobbins with which we propose to use the flyer assembly may readily be converted to such use by the introduction in the upper ends thereof of a removable flyer supporting element. Thus if a bobbin becomes damaged or unusable the support may be removed and applied to a new bobbin. The bobbin which we have found most useful in this connection are of the pressed paper type or the wooden type, but it will be understood that the invention contemplates the use of the flyer unit with any type of bobbin. In any case, the flyer unit support is affixed to the upper end of the bobbin concentric with the spindle. The flyer unit and support are dynamically balanced so that no vibrational forces or unbalanced loads have to be overcome. That is to say, spinning proceeds in normal fashion as far as the introduction and removal of the bobbins is concerned.

The flyer unit is carried by an anti friction bearing permitting it to rotate freely with respect to the bobbin on which it is mounted. If the spindle speed, for example, were 5000 r.p.m., the traveler and flyer unit speeds with respect to the frame might be about 4950 r.p.m. to give a relative speed between bobbin and flyer of 50 r.p.m. The traveler and flyer speed will, of course, be the same, both lagging behind the bobbin speed an amount to permit winding on the bobbin the quantity of yarn being fed by the feed rolls.

These and other objects of the invention will become more apparent as the description proceeds with the aid of the accompanying drawings in which

FIG. 1 is an elevation showing the general arrangement of the parts with the flyer assembly mounted on the upper end of a bobbin of the pressed paper type.

FIG. 2 shows the flyer assembly mounted on the upper end of a conventional wooden bobbin.

FIG. 3 is an enlarged view of the spindle, bobbin, package and spinning ring, partly in section, with the flyer assembly removed therefrom, permitting doffing without unthreading the yarn from the flyer unit and traveler.

FIG. 4 is a plan view of the flyer assembly positioned on one form of mounting means that is affixed to the upper end of the bobbin.

FIG. 5 is a vertical section showing the construction of the upper end of the bobbin of FIG. 3 with the mounting means affixed thereto and the flyer assembly mounted thereon.

FIG. 6 is a side elevation of the flyer assembly in which the eye has been rotated 90 degrees with respect to its position as shown in FIG. 5.

FIG. 7 shows one type of supporting means for the flyer assembly which may be used in connection with a wooden bobbin.

FIG. 8 is a plan view of a modified flyer assembly.

FIG. 9 is a vertical section showing the details of the construction shown in plan view in FIG. 8.

Referring first to FIG. 1, there are shown the basic elements of a conventional spinning frame which comprise a spindle rail 2 carrying a spindle 4 on which is mounted bobbin 6. The ring rail 8 carries the spinning ring 10 and traveler 12. The spindle includes a whorl 14 which is driven by the spindle band 16. Feed rolls 17 feed the yarn to the spindle at the desired rate.

The bobbin 6 disclosed in FIG. 1 and in more detail in FIGS. 3 and 5 is made of pressed paper and is a type

now in common use in the industry. The spindle assembly includes a conventional tubular bobbin positioning element 18 which is split at its upper end into four spring segments, two of which are shown at 20 and 22. These segments and the short cylindrical sleeve 23 act to frictionally engage the interior of bobbin 6 to hold it securely on the spindle blade 24. The upper ends of the segments 20 and 22 are protected by a circular cap 26.

The invention which is about to be described in detail resides in the combination of the bobbin with a flyer unit which is affixed to the upper end of the bobbin in axial alignment with the spindle blade. The flyer unit acts to put the twist into the upper part of the yarn while the yarn is straight and under negligible tension and to provide resistance to yarn movement so that it must be drawn through the traveler under greater tension.

The flyer unit 25 and support therefor is best shown in FIGS. 4, 5 and 6. The structure for mounting the flyer on the upper end of bobbin 6 comprises a cylindrical exteriorly threaded element or support 28 having on its upper end a circumferential flange 30 which rests on the upper cylindrical surface of the bobbin 6. A nut 32, having a cylindrical perimeter of such diameter as to fit tightly against the inner circumference of bobbin 6 near the upper end thereof, is in threaded engagement with element 28. By rotating element 28 by means of any suitable wrench acting on the flat opposed surfaces 34 and 36 (FIG. 4) of the short upward extension 38, the nut 32 may be drawn up tightly against the interior of bobbin 60 so that the flyer support is in secure engagement with the upper end of the bobbin. Support 28 has therein an axial hole 40 to receive the flyer shaft, which hole merges with a larger hole 42 therebelow in which in the preferred form is placed a shaft holding magnet.

The flyer comprises an axially positioned supporting member in the form of a short cylindrical element 44 having on its upper end the interior race 46 of an anti-friction bearing which includes balls 48 and an exterior race 50. A cylindrical housing 52 encompasses race 50 and extends upwardly forming a short rotatable shaft 53 with an interiorly threaded axially aligned hole 54 which is adapted to receive the threaded shank 56 of eye 58. A lock nut 60 is positioned on the threaded shank 56 so that eye 58 may be locked in any selected angular position with respect to housing 52. Shifting the angular position of eye 58 changes the frictional drag effect on the yarn passing therethrough. A slot 61 in the lower quadrant of eye 58 allows the yarn to be readily introduced into the eye.

Extending radially from shaft 53 is a guide arm 62 having on its outer end a loop 64 which acts as a thread guide. Diametrically opposite arm 62 is a counterweight 66 of such mass as to statically and dynamically counter-balance arm 62.

The supporting member 44 fits closely but not tightly within hole 40 in a manner permitting ready removal by the spinning frame operator. In order to prevent the flyer assembly from becoming accidentally dislodged from the supporting structure, a cylindrical magnet 68 may be placed in forced fit engagement with the wall of the circular hole 42. This magnet exerts sufficient pull on member 44 to maintain the latter securely in position during operation, but the flyer unit may be manually withdrawn from the support when the bobbin is to be doffed.

An alternative way of securing member 44 in hole 40 is shown in FIG. 6, in which the lower end of the shaft is split as at 70 with the ends 72 and 74 bent apart sufficiently to provide frictional engagement with the interior of hole 40.

When the flyer is used with a wooden bobbin, the construction shown in FIG. 7 has been found convenient. Here the bobbin 76 has been bored out at its upper end

as at 78 and a cylindrical threaded element 80 has been screwed tightly into the bobbin. The hole 82 acts to receive member 44 of the flyer in the same way that hole 40 of the element 28 of FIG. 5 receives member 44. A magnet 68 may be placed in the cylindrical cavity 84 if member 44 is to be secured in this fashion, or a split member like that shown in FIG. 6 may be used if preferred.

In the operation of the present invention, the yarn 86 is fed by the feed rolls 17 to the eye 58, thence through the thread guide 64 to the traveler 12 and onto bobbin 6. The yarn 86 in being drawn through eye 58 and guide 64 moves against appreciable friction at these points. Since the rate at which the yarn is wound on the bobbin is substantially the same as that at which it is supplied by feed rolls 17, it follows that the tension on section 92 of the yarn between rolls 17 and eye 58 will be very small and the tension on section 90 between guide 64 and the bobbin considerably greater. However, since the flyer 25 revolves at the same speed as the traveler 12, it is believed apparent that the twist will be entirely applied to section 92, which is at all times under low tension and in a substantially straight line. Thus the yarn 86 is immediately strengthened as it emerges from rolls 17 with substantially the full twist being continually put in in moving section 92. This, of course, very materially minimizes the yarn breakage which in the prior practice generally occurred close to the rollers 17.

Section 92, having been strengthened in the manner just explained, is then strong enough to stand the increased tension that is necessarily present in section 90 to overcome the frictional resistance to passage through eye 58, guide 64 and traveler 12 onto the bobbin.

Because the section 90 is relatively short and under relatively high tension, the extent of the ballooning is greatly reduced. Experiments have shown that in the identical spinning frame the feed roll speeds can be increased from the prior practice of 180 r.p.m. to 360 r.p.m., increasing the rate of feed of yarn from 19 yards to 38 yards per minute and with corresponding increases in the speed of the spindle. Since the twist applied to section 92 has brought the yarn up to full strength, the increased tension possible in section 90 results in the yarn package of the same final dimension containing approximately 35 percent more yarn than was possible by the prior practice.

A further major advantage of the present invention is that the frame may be doffed without having to remove the yarn from the flyer or traveler. This is illustrated in FIG. 1. Adjacent each spindle and on a suitable part of the frame 94 is a hole 96 adapted to receive the flyer supporting member 44. To doff the bobbin, the operator transfers the flyer from its normal operating position on the upper end of the bobbin to its temporary position on frame 94. In so doing, the yarn continues in its threaded relation through eye 58, guide 64 and traveler 12. In accord with common practice, the terminal end of the yarn as at 98 will be twisted around the lower end of the spindle after the filled bobbin has been removed. After the new bobbin has been placed on the spindle and flyer 25 returned to its position on the upper end of the bobbin, starting up of the spindle will cause the yarn to commence being wound on the bobbin.

The tension in section 90 may be increased or reduced by varying the angular position of eye 58 with respect to guide 64. The friction of the yarn in passing through eye 58 set as in FIG. 5 is greater than in the case of FIG. 6. By rotating eye 58 further to the right beyond the position of FIG. 5, the tension could be further increased.

A modification of the invention is shown in FIGS. 8 and 9. In this embodiment the same principles are present as in the other construction heretofore described. The main differences are found in an improved bearing

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structure, giving greater rigidity to the flyer unit, and a modified magnet means for maintaining the unit in position in the retaining socket in the upper end of the bobbin.

As shown in FIGS. 8 and 9, the bobbin 6 has a rolled upper end 7 designed to support a cylindrical tubular element 90 of non-magnetic material exteriorly threaded at 92 and having an upper flange 94, the under side of which rests on the upper end of the bobbin. A nut 96 with a circular exterior acts to draw the flange 94 down against end 7 so that the parts are maintained in tight frictional engagement with the bobbin. The lower end of the tubular element 90 is closed by a short cylindrical steel keeper 98 which is in forced fit engagement therewith.

The flyer unit comprises a non-magnetic, preferably metallic, axially positioned supporting member in the form of a sleeve 100 having a cylindrical magnet 102 loosely positioned in the lower end thereof. The magnet, having a flat bottom surface, is cut away across a diameter as at 102 to produce a slot through which extends a retaining pin 106, the ends of which reside in the lower cylindrical wall 108 of sleeve 100. The magnet may be said to be freely floating within the lower end of sleeve 100 and held from escape by the pin 106.

A pair of ball bearing anti friction devices comprising inner and outer races 108 and 110 with balls 112 therebetween are positioned within the upper end of sleeve 100 and held apart by a cylindrical spacer 114. The lower outer race 110 rests on sleeve shoulder 113. Both outer races 110 are in tight engagement with the inner wall of sleeve 100. The upper end of sleeve 100 is closed by the flange ring 115.

A shaft 116 fits closely within the inner races 108 and is held against upward removal by means of a snap ring 118 which resides in a suitable circumferential groove at the lower end of the shaft. The upper end of shaft 116 is enlarged as at 120 to terminate in a shoulder 122 and a threaded upper end 124. Enlargement 120 is free of engagement with ring 115. A pair of clamping washers 126 have positioned therebetween a thread guide 128, which washers and thread guide are securely maintained in position on shaft 116 by a cylindrical element 130 interiorly threaded at 132 which is screwed down on the upper threaded end 124 of shaft 116. The upper end of element 130 is cut away transversely as at 134 and is axially apertured at the upper end at 136 and radially cut away as at 138 to produce an eye 139 through which the yarn may be introduced and held on its way to the thread guide 128. By this construction the shaft 116, flyer 128 and eye 139 are free to revolve as a unit with respect to sleeve 100 and bobbin 6.

The angular position of thread guide 128 to the eye 139 may be changed by loosening element 130 and shifting the thread guide position on shaft 116. In this way the yarn tension can be changed.

Sleeve 100 fits closely but slidably within tubular element 90, and when so positioned therein, the magnet 102 by its attraction to keeper 98 holds the flyer unit securely in position on the bobbin. Since the magnet is an integral part of the flyer unit and not of the bobbin, as distinguished from the construction shown in FIG. 5, it reduces the number of magnets required to one per spindle.

The operation of the flyer unit of FIGS. 8 and 9 is the same as that heretofore described with respect to the constructions shown in FIGS. 4 to 7 inclusive. When it is desired to remove the flyer unit, the operator, by use of sufficient but slight force, can cause separation of the magnet from keeper 98, permitting sleeve 100 and associated parts to be removed from the bobbin. This allows the bobbin to be doffed in the normal manner. The flyer unit may then be inserted in the upper end of the next bobbin put on the spindle. When the

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flyer unit is used with a wooden bobbin, the steel keeper unit will be inserted in a suitably axially located cavity in the upper end of the spindle.

It is our intention to cover all changes and modifications of the example of the invention herein chosen for purposes of the disclosure which do not constitute departures from the spirit and scope of the invention.

We claim:

1. In combination, a bobbin, said bobbin having an axially disposed opening in the upper end thereof, a flyer unit removably secured to the upper end of said bobbin, said unit comprising an axially disposed member non-rotatably positioned in said opening, a shaft and associated yarn guide arm rotatably mounted on said axially disposed member, and means for preventing vertical dislodgement of said shaft from said axially disposed member during normal operation of said bobbin.

2. In combination, a bobbin, said bobbin having an axially disposed opening in the upper end thereof, a flyer unit removably secured to the upper end of said bobbin, said unit comprising an axially disposed member non-rotatably positioned in said opening, a shaft and associated yarn guide arm rotatably mounted on said axially disposed member, and separable magnetically attracted elements, one of which is positioned at the lower end of said opening, holding said unit in operative position in said bobbin.

3. For use in a spinning frame, a bobbin adapted to be removably positioned on a spindle and having an axially aligned opening in its upper end, a flyer unit support on the upper end of said bobbin, said support comprising a threaded element positioned within said upper end and in fixed engagement therewith, said threaded element having a vertical aperture therethrough aligned with said bobbin axis, a flyer unit removably carried by said support, said flyer unit comprising a supporting element positioned within said aperture, means mounted on said supporting element for rotation about a vertical axis, a yarn guide arm extending laterally from said means, an eye connected to said means in axial alignment with said supporting element, and other means for varying the frictional drag effect of yarn passing through said eye.

4. For use in a spinning frame, a bobbin adapted to be removably positioned on a spindle and having a circular axially aligned opening in its upper end, a flyer unit support on the upper end of said bobbin, said support comprising a threaded element positioned within said upper end and in fixed engagement therewith, said threaded element having a vertical aperture therethrough aligned with said bobbin axis, a flyer unit removably carried by said support, said unit comprising an axially disposed member positioned within said aperture, a bearing associated with said member, a shaft carried by said bearing for rotation about said bobbin axis, a yarn guide arm extending laterally from said shaft, an eye connected to said shaft in axial alignment therewith, and magnetic means for holding said axially disposed member against upward movement with respect to said support during normal operation of said bobbin.

5. For use in a spinning frame, a bobbin adapted to be removably positioned on a spindle, a flyer unit support fixed on the upper end of said bobbin, said support having an aperture in alignment with the axis of said bobbin, a flyer unit carried by said support, said unit comprising a member positioned within said aperture, a bearing associated with said member, a shaft carried by said bearing for rotation about said bobbin axis, a yarn guide arm extending laterally from said shaft, an eye connected to said shaft in axial alignment therewith, means for varying the frictional drag effect of yarn passing through said eye, and means for holding said member against upward movement with respect to said support during normal operation of said bobbin.

6. For use in a spinning frame, a tubular tapered bobbin adapted to be removably positioned on a spindle,

said bobbin having an inwardly turned upper end, a flyer unit support on the upper end of said bobbin, said support comprising a threaded element positioned within said upper end, a flange extending outwardly from said element and resting on the top of said upper end, a nut threaded on said threaded element below said inwardly turned upper end, said nut having a circular exterior of suitable dimension to tightly engage the interior tapered surface of said bobbin when screwed upwardly on said threaded element and with said flange drawn down in tight engagement with said upper end, said threaded element having a vertical aperture therethrough aligned with said bobbin axis, a flyer unit removably carried by said support, said flyer unit comprising a supporting member positioned in said aperture, thread guiding and friction producing means rotatably mounted on the upper end of said supporting member, and means for preventing vertical dislodgement of said supporting member from said support during normal operation of said bobbin.

7. The combination of a bobbin having a steel keeper positioned near the upper end of said bobbin, said bobbin having a cylindrical axial opening above said keeper, a removable flyer unit positioned in said opening, said flyer unit comprising a cylindrical sleeve fitting closely within said cylindrical opening, a magnet at the bottom of said sleeve secured against vertical displacement with respect to said sleeve, the lower surface of said magnet being in engagement with the upper surface of said keeper to hold said sleeve in operative relationship with said bobbin, bearing means within the upper portion of said sleeve, said bearing means comprising inner and outer races with rolling elements therebetween, a shaft carried by said inner race in axial alignment with said sleeve, and an eye and thread guide mounted on the upper end of said shaft.

8. A flyer unit for use with a bobbin, said unit comprising a cylindrical sleeve, a magnet in the lower end of said sleeve, an anti friction bearing in said sleeve, a shaft carried by said bearing in axial alignment with said sleeve, and an eye and thread guide mounted on the upper end of said shaft.

9. A flyer unit for use with a bobbin, said unit comprising a cylindrical sleeve, a magnet in the lower end of said sleeve, means securing said magnet against vertical displacement with respect to said sleeve while permitting slight angular movement of said magnet whereby the lower surface of said magnet may align itself with the upper surface of a keeper in the bobbin, a pair of vertically spaced bearings comprising inner and outer races positioned in said sleeve, a shaft carried by said inner races in axial alignment with the axis of said sleeve, and an eye and thread guide on the upper end of said shaft.

10. A flyer unit for attachment to the upper end of a bobbin and acting to retard the movement of yarn passing therethrough, said unit comprising a supporting member, an anti friction bearing rotatable about a vertical axis and mounted on said member, a shaft carried by said bearing and rotatable with respect to said member, a yarn receiving eye carried by the said shaft in axial alignment therewith, a thread guide attached to said rotatable shaft and laterally disposed with respect to said eye, and means for changing the angular position of said eye with respect to said thread guide by rotation of said eye about its vertical axis, whereby the frictional effect on yarn passing through said eye and guide may be varied.

11. For use with a bobbin having an axially aligned opening at its upper end, a combined support and flyer unit carried thereon, said support comprising means for attachment to said bobbin within the bobbin opening, said support having a cylindrical axial aperture therethrough, said support having an enlarged space directly below said aperture, a magnet in said space, said flyer unit comprising a member partially positioned in said

aperture with its lower end engaging said magnet in holding relation, a bearing unit comprising a pair of anti friction races, one of which is mounted on the upper end of said member, an internally threaded upwardly extending shaft mounted on the other of said races, an eye with a threaded shank screwed into said shaft, and means for locking said shank in selected angular relation to said shaft.

12. For use in a spinning frame, a tubular tapered bobbin adapted to be removably positioned on a spindle, said bobbin having an inwardly turned upper end, a flyer unit support on the upper end of said bobbin, said support comprising a threaded element positioned within said upper end, a flange extending outwardly from said threaded element and resting on the top of said upper end, a nut threaded on said threaded element below said inwardly turned upper end, said nut having a circular exterior of suitable dimension to tightly engage the interior tapered surface of said bobbin when screwed upwardly on said element and with said flange drawn down in tight engagement with said upper end, said threaded element having a vertical aperture therethrough aligned with said bobbin axis, a flyer unit removably carried by said support, said unit comprising a member positioned in said aperture, thread guiding and friction producing means rotatably mounted on the upper end of said member, and means for preventing vertical dislodgement of said member from said support during normal operation of said bobbin.

13. For use in a spinning frame, a bobbin adapted to be removably positioned on a spindle and having a circular axially aligned opening in its upper end, a flyer unit support on the upper end of said bobbin, said support comprising a threaded element positioned within said upper end and in fixed engagement therewith, said threaded element having a vertical aperture therethrough aligned with said bobbin axis, a flyer unit removably carried by said support, said unit comprising a member positioned within said aperture, a bearing and bearing housing mounted on said member for rotation about a vertical axis, a yarn guide arm extending laterally from said bearing housing, a counterweight extending in the opposite direction from said guide arm, an eye connected to said housing in axial alignment with said member, and means for varying the frictional drag effect of yarn passing through said eye.

14. For use in a spinning frame, a bobbin adapted to be removably positioned on a spindle and having a circular axially aligned opening in its upper end, a flyer unit support on the upper end of said bobbin, said support comprising a threaded element positioned within said upper end and in fixed engagement therewith, said threaded element having a vertical aperture therethrough aligned with said bobbin axis, a flyer unit removably carried by said support, said unit comprising a member positioned within said aperture, a bearing and shaft supported by said bearing mounted on said member for rotation about a vertical axis, a yarn guide arm extending laterally from said shaft, a counterweight extending in the opposite direction from said guide arm, an eye connected to said shaft in axial alignment with said shaft, and a magnet located within said threaded element below said aperture for holding said member against upward movement with respect to said support during normal operation of said bobbin.

15. For use in a spinning frame, a bobbin adapted to be removably positioned on a spindle, a flyer unit support fixed on the upper end of said bobbin, said support having an aperture therethrough in alignment with the axis of said bobbin, a flyer unit carried by said support, said unit comprising a member positioned within said aperture, a bearing and shaft supported by said bearing mounted on said member for rotation about a vertical axis, a yarn guide arm extending laterally from said shaft, a counterweight extending in the opposite direc-

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tion from said guide arm, an eye connected to said shaft in axial alignment with said shaft, means for varying the frictional drag effect of yarn passing through said eye, and a magnet located within said support below said aperture for holding said member against upward movement with respect to said support during normal operation of said bobbin.

16. A flyer unit for attachment to the upper end of a bobbin and acting to retard the movement of yarn passing therethrough, said unit comprising a supporting member, an anti friction bearing having a part rotatable about a vertical axis and mounted on the upper end of said member, a yarn receiving eye carried by the rotatable part of said bearing in axial alignment therewith, a thread guide attached to said rotatable part and laterally disposed with respect to said eye, a counterbalance for said thread guide, and means for changing the angular position of said eye with respect to said thread guide by rotation of said eye about its vertical axis, whereby the frictional effect on yarn passing through said eye and guide may be varied.

17. For use with a bobbin having an axially aligned opening at its upper end, a combined support and flyer

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unit carried thereon, said support comprising means for attachment to said bobbin within the bobbin opening, said support having a cylindrical axial aperture therethrough, an enlarged space in said support directly below said aperture, a magnet in said space, said flyer unit comprising a member positioned in said aperture with its lower end engaging said magnet in holding relation, a bearing unit comprising an interior race mounted on the upper end of said member, an exterior race and rolling elements therebetween, a housing on said exterior race and having an internally threaded upwardly extending shaft, an eye with a threaded shank screwed into said shaft, means for locking said shank in selected angular relation to said shaft, and a counterbalanced guide arm extending radially from said shaft below said eye and above said support.

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