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SPINNING AND TWISTING SPINDLE STRUCTURE

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Fig. 1.

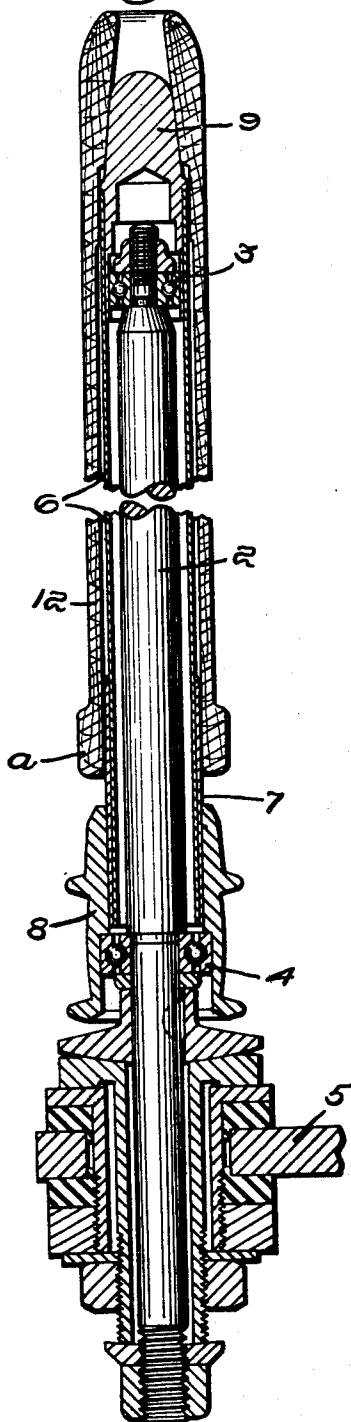
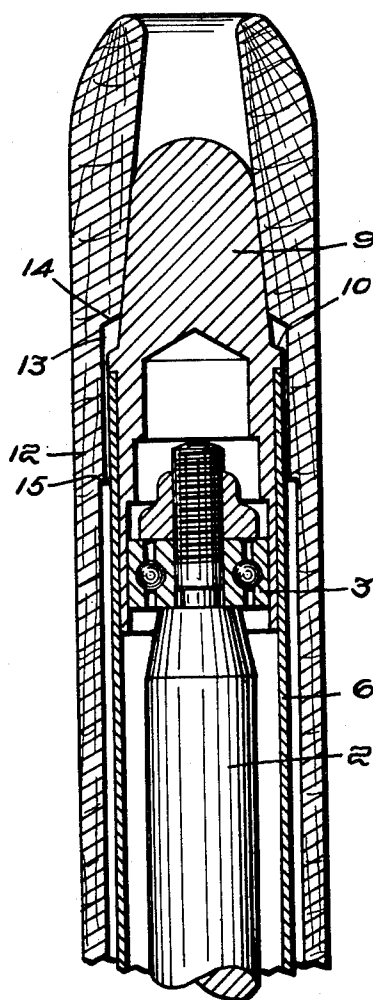


Fig. 2.



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SPINNING AND TWISTING SPINDLE
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8 Claims. (Cl. 242—46.2)

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In a United States Letters Patent No. 2,331,611, based on an invention made jointly with another, we have disclosed a novel spindle and bobbin combination in which the bobbin, contrary to the prior universal practice, is supported on a spindle solely at its upper end and is driven by torque applied to the bobbin at said upper end. This construction has proved very satisfactory, especially in connection with the production of large yarn packages. Occasionally, however, it has happened that when the bobbin is subjected to excessive vibration, due for example to a badly unbalanced load, it works loose. Once loosened, the tapered seat tends to work upwardly on the outer taper of the spindle tip and into inoperative relationship to the spindle. While these occurrences are rare, they are nevertheless extremely annoying and the present invention aims to devise a simple but thoroughly practical remedy for this condition.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings.

In the drawings:

Fig. 1 is a vertical sectional view illustrating a bobbin and spindle combination constructed in accordance with this invention; and

Fig. 2 is a similar view showing on a larger scale the details of construction at the upper end portion of the bobbin and spindle.

The drawings illustrate the invention as applied to a spindle structure of the revolving sleeve type; that is, the rotating element or spindle consists of a sleeve revolving around a stationary blade or shaft 2 and supported on said shaft by upper and lower ball bearings 3 and 4 respectively. The shaft 2 is mounted on a spindle rail 5 by means of a base assembly of known construction, which facilitates the centering and plumbing operations and provides a resilient support for the shaft.

In the particular construction shown, the sleeve consists primarily of a metal tube 6, of uniform diameter throughout its length, and rigid with a reinforcing sleeve section 7, which is pressed in to the acorn section of the whirl 8 and thus is rigidly secured to it. Closing the upper end of this tube is a tip 9, the top of which is solid, while its lower portion is hollowed out to form a skirt which has a pressed fit with the top of the tube, and these parts are so joined together that the outer surface of the spindle between the reinforcing sleeve 7 and the abrupt

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shoulder 10 at the base of the tapered portion of the tip 9 is smooth and of cylindrical form.

The bobbin 12 which cooperates with this spindle structure is in most respects manufactured in accordance with the teaching of the patent above referred to, that is, it is made of wood or equivalent material and has an outer surface of generally cylindrical shape which may be modified to suit special conditions. Also, as in the construction shown in the patent, it has a cylindrical bore extending from its lower end up nearly through the bobbin body, and is provided just below its tip with a tapered seat, fitting the taper of the spindle tip 9. Immediately below the seat, the bobbin bore is made somewhat larger in diameter than the outside diameter of the sleeve 6 and is further widened below this area so that it has sufficient clearance with the sleeve to adjust itself to the running requirements of its load. As in the case of the patented construction, the tapered bobbin seat fits the taper of the bobbin 9 with sufficient tightness to transmit the torque necessary to drive the bobbin and its load without slip, while still avoiding a degree of tightness that would interfere materially with the doffing of the bobbin. If the taper of these two cooperating surfaces is made in the neighborhood of eighty to two-hundred thousandths of an inch per inch of length, and the diameter of the tapered seat is made large enough, preferably at least one-half to three-quarters of an inch, and a minimum length in the neighborhood of one-half to three-quarters of an inch, then the desired conditions for producing the necessary transmission of torque will be satisfied.

I have found that the tendency of these bobbins to work loose under excessive vibration can be effectually overcome by providing the spindle with a straight cylindrical section, preferably larger in diameter than the base of the tapered part of the tip 9, and extending downwardly from the said base for a substantial distance. This difference in diameter results in the formation of the shoulder 10. Cooperating with this change in construction is the formation in the bobbin of a cylindrical section of the bore which surrounds this enlargement of the spindle with a very close clearance. This is best shown in Fig. 2 where the cylindrical surface just referred to is illustrated at 13 and extends for a distance of in the neighborhood of half an inch from the upper shoulder 14 on the bobbin bore to a lower shoulder 15, where the bore is widened out to provide the greater clearance desired

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with the sleeve throughout most of its length. In this upper section of the bore, a clearance of between two and six-thousandths of an inch is provided between the bobbin and the upper cylindrical end portion of the spindle, and this internal diameter of the section 13 is maintained both above and below the shoulder 10.

It has been found in actual operation that this departure in construction from that shown in the patent above mentioned, completely eliminates the troublesome tendency of the bobbin to climb under an unbalanced load. Apparently the reason for this favorable result is that if the spindle vibrates violently, tending to produce a movement of the bobbin toward the smaller end of the tip 9, this vibration also is sufficient to make the bore section 13 of the bobbin bear against the outer surface of that portion of the spindle which it encircles. While no lateral movement of the bobbin relative to the sleeve having any great amplitude is permitted since the clearance between the bobbin at its base and the sleeve customarily is only about ten thousandths of an inch, and in any event is between four and fifteen thousandths, the clearance here and that at the surface 13 are so related as to permit the action just described above. So long as the spindle runs smoothly the fit of the tapered seat of the bobbin on the tip 9 holds the surface 15 spaced slightly from the adjacent surface of the spindle, but if the spindle vibrates sufficiently to loosen the bobbin even very slightly from the tip 9, then the bobbin begins to vibrate relatively to the spindle which produces friction between the surface 13 and the spindle. The friction so created in this area just below the base of the tapered tip is sufficient to overcome those forces which tend to make the bobbin rise on said tip. In fact, even if a bobbin is not properly seated after a doff it will promptly work down to its proper position when the frame is started up. The clearance in this area 13 need be merely sufficient to ensure easy doffing.

Because it is desirable to have all of the bobbins in a spinning frame located on a common horizontal level so that the yarn bodies built up on them will all be in the same relative positions on the bobbins, the taper of the tip 9 and the cooperating bobbin seat should be maintained within very close dimensional limits. However, some variation will occur, and the surface 13 therefore is extended somewhat above the base of said tapered tip. The bobbin preferably is made with an enlargement *a*, Fig. 1, at the lower end of its skirt.

While I have herein shown and described a preferred embodiment of my invention, it will be evident that the invention is susceptible of embodiment in other forms without departing from the spirit or scope thereof. The invention is especially useful in the tubular types of bobbins made of wood and non-metallic substitutes therefor for use on spindles of the revolving sleeve type.

Having thus described my invention, what I desire to claim as new is:

1. The combination with a spindle mounted for rotation about an upright axis, of a tubular bobbin removably supported on said spindle, said spindle having a tapered tip and said bobbin having a bore tapered adjacent to its upper end to form a seat fitting on said tip with sufficient friction to drive said bobbin in unison with the spindle, the section of said bobbin bore immediately below and closely adjacent said seat hav-

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ing a close circumferential clearance with the portion of the spindle which it encircles, and the entire portion of said bore below said section having a greater circumferential clearance with the spindle, so as to provide a limited lateral freedom of movement of this part of the bobbin relatively to the spindle, the first named clearance between the portion of the bobbin bore and the part of the spindle encircled by said bore being so limited that when vibration of said tubular bobbin occurs during operation, side friction will be created between the bobbin bore and the portion of the spindle which it encircles to thereby overcome the tendency of the bobbin to work upwardly on the spindle.

2. The combination with a spindle mounted for rotation about an upright axis, of a tubular bobbin removably supported on said spindle, said spindle having a tapered tip and said bobbin having a bore tapered adjacent to its upper end to form a seat fitting on said tip with sufficient friction to drive said bobbin in unison with the spindle, said spindle including a cylindrical section immediately below and closely adjacent said tapered tip and said bobbin having an interior wall section encircling said cylindrical section closely but with a clearance so limited that when vibration of said tubular bobbin occurs during operation, side friction will be created between said interior wall section and the portion of the spindle which it encircles to thereby overcome the tendency of the bobbin to work upwardly on the spindle, the entire portion of said bore of said bobbin below said section having a larger clearance with said spindle, and such clearance at the lower end portion of the bobbin being between four and fifteen thousandths of an inch.

3. A combination according to preceding claim 1 in which said close circumferential clearance is between two and six thousandths of an inch.

4. A combination according to preceding claim 1, in which the diameter of said tapered seat at its larger end is at least half an inch.

5. A combination according to preceding claim 2, in which the upper part of the spindle body is of cylindrical form with said tip projecting above it and the portion of said bobbin bore immediately below said tapered seat is also of cylindrical form and encircles both the lower part of said tapered spindle tip and also a portion of said upper cylindrical part of the spindle body from which said tip projects.

6. A combination according to preceding claim 1, in which the tapered portion of said spindle on which the bobbin is seated has a maximum diameter of between one-half and three-quarters of an inch, a length of at least a half inch, and a taper of between eighty and two hundred thousandths of an inch per inch of length.

7. A tubular bobbin having a bore provided with a tapered seat at the upper end portion thereof, said seat being at least a half inch in diameter and having a taper of between eighty and two hundred thousandths of an inch per inch of length, said bore below said tapered seat including a main cylindrical portion extending from the lower end of the bobbin upward nearly to said seat, and an intermediate cylindrical section between said seat and the upper end of said main cylindrical section, said intermediate section being of larger diameter than said seat and said main cylindrical section being larger in diameter than said intermediate section, said main cylindrical section being of substantial length as compared to said intermediate section.

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8. A textile spindle adapted for rotation about a vertical axis, including a spindle blade provided with a tapered tip at least one-half inch long adapted for driving engagement with a bobbin having a correspondingly tapered seat to fit frictionally on said tip with sufficient firmness to transmit the entire torque required to drive the bobbin and its load without abnormal slippage, said tip having a diameter of at least one-half inch at its base and a taper of from eighty to two hundred thousandths of an inch per inch of length, and the section of said spindle immediately adjacent to and below said tip being of cylindrical form and having a diameter at least as large as that at the base of said tip, said

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spindle section being of substantial length as compared with the tapered tip.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
192,493	Draper	June 26, 1877
515,301	McCausland	Feb. 20, 1894
1,957,860	Stone	May 8, 1934