MEANS FOR MOUNTING A YARN SPOOL IN A SPINNING FRAME

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Fig. 2.

Fig. 4.

Fig. 5.

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This invention relates to the textile industry and is particularly concerned with yarn spools as used in spinning or twisting frames.

One of the objectives sought relating to the manufacture and operation of spinning frames has been the reduction of the over-all height of the spinning frame and its component parts so that the highest elements may be readily reached by the operators. If the height of the frame and its parts can be reduced sufficiently, it may become possible to eliminate the conventional step that is found running the length of the frame and on which short operators must stand to reach and piece up yarns coming from the yarn spools.

In the conventional spinning frame, the yarn spool has its shaft horizontal with the ends guided by vertical grooves in adjacent spool stands. The yarn of the spool rests on a rotatable drum positioned below and axially parallel to it. Rotation of the drum causes rotation of the yarn spool, whereby yarn may be fed to the top rolls of the spinning frame.

The drums of the prior art which support and rotate the yarn spools are carried on horizontal shafts. As the yarn on a yarn spool is unwound, the spool heads gradually descend in an overlapping relationship with the ends of the drum. Downward movement of the yarn spool is, therefore, limited by engagement of the spool heads with the drum shaft. This in turn has limited the amount of yarn that may be effectively wound on the spool. To increase the quantity of yarn on a spool so that yarn spool changes may be minimized, the spool head diameter must be increased. This necessitates increasing the radius of the drum to substantial equality with the difference between the radius of the spool barrel and the radius of the spool head. But as the radius of the drum is increased, the position of the yarn spool above the floor is correspondingly raised. Thus there are practical limits to the increase in drum radius and to the related maximum radius of the yarn spool.

With the foregoing in mind, it is an object of this invention to make possible the use of a larger yarn spool without increasing the size of the drum; or, putting it another way, for a given size drum, my invention effectively doubles the initial radial dimension of the yarn wound on the spool barrel. Thus, depending on the diameter of the barrel, up to four times as much yarn may be on the spool.

This highly desirable result is achieved by mounting and driving the drum in a novel manner which permits descent of the spool heads for about twice the distance possible by the prior practice. This in turn keeps the yarn spool at a relatively low level where it may more readily be reached by the operators.

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

FIGS. 1 to 5 show the invention in which the drum is driven by friction means;

FIG. 1 is an end elevation of a spool stand showing the initial and final positions of the descending spool head;

FIG. 2 is a front view of the lower part of the spool stand showing a full yarn spool resting on the drum;

FIG. 3 is a view similar to that of FIG. 2, showing the position of the yarn spool with relation to the drum after substantially all of the yarn has been used;

FIG. 4 is a fragmentary end view taken on the line 4–4 of FIG. 3; and

FIG. 5 is an enlarged fragmentary front view of one end of the drum, partly in vertical section, showing the relation of the drum to a driving roller.

FIG. 6 is a fragmentary plan view of one end of the drum according to an alternative embodiment of the invention in which gearing is used to drive the drum.

FIG. 7 is an end view of the drum cut away in part showing the rollers and gearing of the alternative form shown in FIG. 6.

FIG. 8 is a fragmentary view taken on the line 3–3 of FIG. 7.

Referring first to the construction shown in FIGS. 1 to 5, there is shown the upper portion of a spinning frame as at 2 which has mounted thereon a spool stand comprising a pair of spaced spool forks 4 and 6. These fork supports are conventional and have means at their outwardly extending upper arms for carrying spare yarn spools 2 and 10 which will replace the yarn spool 12 as soon as its yarn has been used.

The yarn spool 12 has a shaft 14, the ends of which are in vertically extending slots 16 in the spool forks 4 and 6. As can be seen in FIGS. 2 and 3, the yarn spool 12 also includes a pair of spool heads 18 and 20 and a barrel 22 on which the several yarn 24 are wound. In the particular embodiment shown in FIGS. 2 and 3, there are nine individual sections of yarn 24, each of which serves to feed an individual spindle (not shown).

The fully wound yarn spool 12 rests on a drum 26, which is generally of conventional construction; but instead of having it mounted on a single axially disposed shaft, I provide a pair of shafts 28 and 30 which preferably will extend the length of the spinning frame 2 to support a series of such drums 26, each of which is located between a similar pair of spaced spool forks 4 and 6.

Referring to the drawings, it will be seen that the drum 26 is elongated and cylindrical, its surface being preferably corrugated as suggested at 32 in FIG. 5 so as to minimize slippage between the drum 26 and the yarn spool 12. At each end of the drum 26 is a head 34 which is turned down as at 36 to fit within the said end of the drum 26 (see FIG. 5). The drum 26 may be secured to the head 34 by a plurality of screws as indicated at 38. The outer end of the head 34 is recessed as at 48 to reduce its over-all weight. A groove 42, preferably V-shaped as shown, extends circumferentially about the head 34. The opposite end of the drum 26 carries a similar head 34 having a corresponding groove 44, as can be seen in FIGS. 2 and 3.

On the shafts 28 and 30 are mounted four small rollers, there being two rollers 46 and 48 on the shaft 28 and two similar rollers, one of which is shown at 50 in FIGS. 1 and 5, mounted on the other shaft 30. As can be seen in FIGS. 1 and 4, the center 52 of drum 26 is located above and midway between the shafts 28 and 30; and the said four small rollers 46, 48, 50 and the other roller (not shown) on shaft 30, rest in the respective grooves 42 and 44 at positions sufficiently spaced both laterally and longitudinally so that the drum 26 will be securely maintained in the frame 2.

One or both of the rollers 46 and 48 are pinned in fixed position on the shaft 28, while the other rollers may be freely to rotate on shaft 30. Thus as the shaft 28 is rotated, it will cause rotation of the drum 26, and this in turn will cause rotation of the yarn spool 12 in the desired manner.

The advantages of the present invention will now be explained in more detail. As the yarn from the several sections 24 is consumed by the spinning operation, the
radius of the remaining unused yarn will steadily decrease. As this occurs, the spool heads 18 and 20 will descend in overlapping relationship with the drum heads 24. However, since there is no axil shaft through the drum 26, it follows that the spool heads 18 and 20 can continue descending until either they engage the shafts 14 and 30 or the bare spool barrel 22 comes to rest on the drum 26. In the presently preferred embodiment, the spool heads 18 and 20 engage the shafts 28 and 30 just as the yarn 24 on the barrel 22 is exhausted.

When the yarn 24 on the spool 12 has been wound off, the spool shaft 14 will have descended to the position shown at 14A in FIG. 1, after which the empty spool 12 is removed from the spool forks 4 and 6 by lifting it so that the ends of shaft 14 pass laterally through a by-pass gate 54. The next yarn spool 8, for example, may then be rolled down the arms of the spool frames to the position shown at 14 in FIGS. 1 and 2, where it will be ready for operation.

Precise dimensions of the rollers 46, 48 and 50 and the grooves 42 and 44 will result in identical rotational speeds of all the drums in a spinning frame, thus giving uniform yarn delivery to all of the spindles.

An alternative drive for the drum 26 is shown in FIGS. 6, 7 and 8. In this construction, the drum is gear driven. The drum 26 is rotatably supported by four cylindrical rollers, two of which are shown in FIGS. 6 and 7 at 56 and 57. The other two rollers are at the other end of the drum. These rollers cooperate with cylindrical bearing surfaces 58 on the ends of the drum. A gear 59 fixed on shaft 30 and mounted adjacent roller 56 positively drives drum 26 through a drum gear 60 positioned next to surface 55.

Roller 57 is carried by a bearing with inner end outer races 58 and 60. The shaft 26 is stationary. The rollers at the other end of the drum are similar to rollers 56 and 57.

Flanges 61 on the rollers 56 and 57 prevent axial shifting of drum 26.

Since all the drums 26 in a spinning frame are simultaneously driven by identical gearing, it follows that the drums will rotate at uniform speeds to cause a uniform rate of yarn delivery to the spindles.

The invention herein disclosed thus provides novel means accomplishing the objects set forth above and, while primarily for use in the textile industry, it may be applied elsewhere where similar conditions exist. Forms of this invention, while differing from those herein described, will also be within the scope of the present disclosure.

I claim:

1. In a spinning frame, a shaftless drum with its axis horizontal, a yarn spool comprising a barrel with the yarn of said spool wound on said barrel and resting on said drum, yarn spool heads closely straddling the ends of said drum, rotatable means below and inboard of the ends of said drum for supporting and rotating said drum, means for maintaining said yarn spool and drum in vertical and endwise alignment, the radius of each said head less the radius of said barrel being greater than the radius of said drum, whereby when the yarn on said spool is exhausted and said barrel rests on said drum, the lower edge of said head will be below the axis of said drum.

2. In a spinning frame including spaced spool forks, a pair of parallel horizontal shafts whose axes lie in the same horizontal plane, at least two rollers on each of the said shafts, a shaftless drum having a circumferential surface about each end, the said rollers engaging said surfaces and supporting said drum, means actuated by one of said shafts whereby rotation of that shaft causes rotation of the said drum, a yarn spool comprising spaced heads and a barrel therebetween and having a shaft extending from said spool at each end, said shaft guided vertically by the said spool forks, the said heads on the said yarn spool being longitudinally spaced to extend respectively beyond the radii of the respective ends of the said drum and within the confines of adjacent spool forks, the difference between the radius of the barrel of the said yarn spool and the radius of the said yarn spool heads being greater than the radius of the said drum and less than the diameter of the said drum, whereby as yarn is unwound from said yarn spool, the lower edge of said spool heads will drop below the axis of said drum with downward movement of said spool limited by engagement of said spool heads with one or both of said roller shafts or by contact of said barrel with said drum.

3. In a spinning frame, a yarn spool having a head at each end, spaced spool forks mounted on the said frame supporting the said spool, a drum for causing rotation of the said spool and means for rotating the said drum, the said drum comprising a horizontal cylindrical element located between adjacent spool forks, the said element having a circumferential groove at least two of the said means for rotating said drum comprising first and second parallel shafts mounted longitudinally on the said frame, said drum being above and parallelly said shafts, at least four small rollers mounted on said shafts and spaced longitudinally and supporting the said drum so that at least two of the said rollers reside in the said groove at one end of the said drum and on opposite sides of its axis and at least two of the other rollers support the other end of the said drum, one of the rollers residing in the said groove being fixed to the first shaft, and means for rotating the said first shaft and the said roller fixed thereto, thereby to cause rotation of the said drum, the ends of the said drum being spaced from the said adjacent spool forks sufficiently so that the respective heads of each yarn spool rotated by the said drum may, as the yarn therefrom is consumed, descend in overlapping relation with the respective ends of the said drum, the downward movement of the said spool being limited potentially by the engagement of the spool with the drum.

4. The construction as set forth in claim 3, the said circumferential groove on the said drum being in the V-form, the said rollers on the said shafts residing in the said groove having a corresponding configuration yielding good frictional engagement therewith, thereby to provide an effective driving connection.

5. A drum for use in a spinning frame, the said drum comprising a shaftless elongated tubular element fluted on its exterior, heads at both ends of the said drum and secured thereto, smooth circumferential surfaces extending about each of the said heads, the said surfaces being adapted to rest on spaced supporting rollers, and a ring gear adjacent one of said surfaces and recessed into the related head.

6. In a spinning frame, a shaftless drum for causing rotation of a yarn spool, means located at the lower periphery of the said drum for supporting it on said frame, means for rotating said shaftless drum, a yarn spool comprising a barrel, a pair of spaced heads at the ends of the said barrel and a shaft having its ends extending through and beyond said heads, the said heads being adapted to handle the ends of the said drum as the yarn spool descends therefrom upon the unwinding of the yarn thereon, the radius of the yarn spool heads being of the order of twice the radius of the said drum, and spaced spool forks on the said frame at the ends of the said yarn spool cooperating with said shaft ends for maintaining the said yarn spool on top of the said drum as yarn is unwound therefrom.

7. The structure defined in claim 6, said means for rotating said shaftless drum including a geared member on said drum and a driving gear in engagement therewith.

8. The structure as defined in claim 7, said driving gear
being coaxial with said means for supporting said drum on said frame.

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