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3,119,224

PLURAL-SPOOL SPINDLE

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2 Sheets-Sheet 1

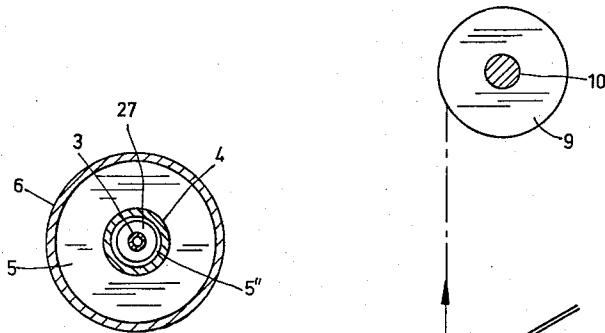


Fig. 2

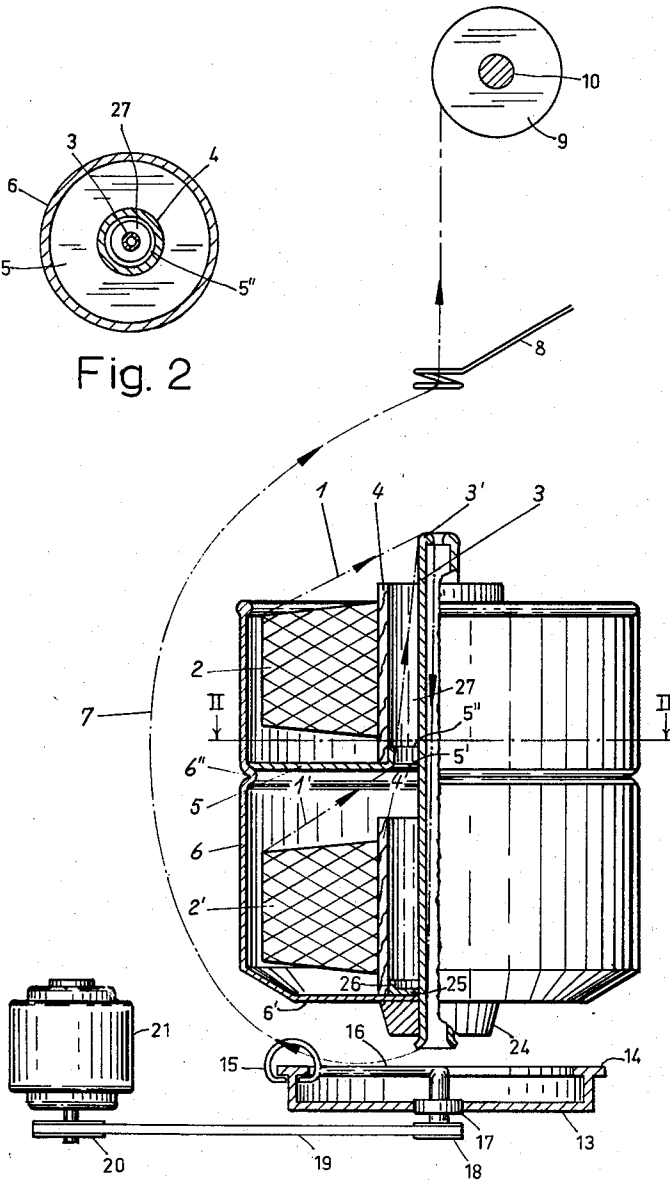


Fig. 1

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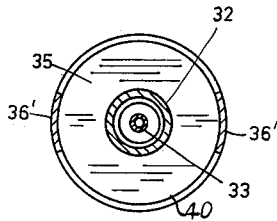


Fig. 5

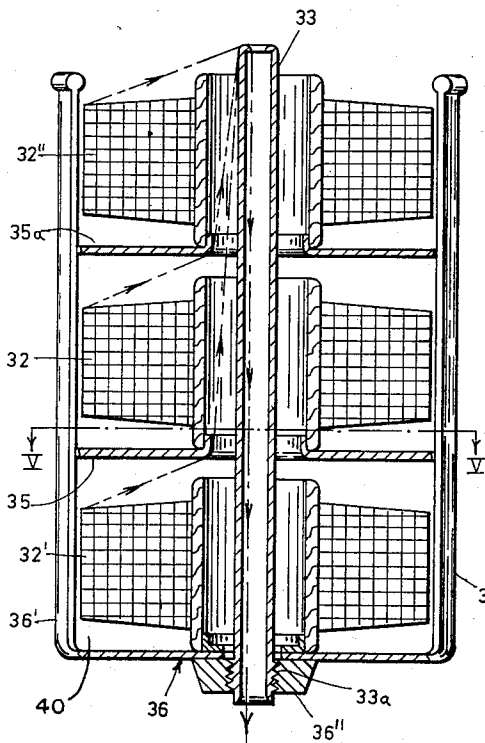


Fig. 3

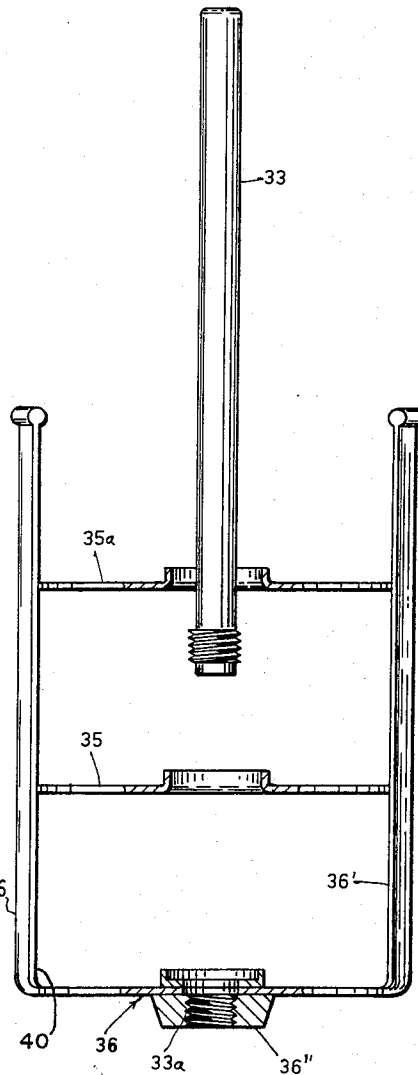


Fig. 4

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PLURAL-SPOOL SPINDLE

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12 Claims. (Cl. 57—58.52)

The present invention relates to supply devices for twining and spinning apparatus of the type described in U.S. Patent No. 2,972,856, issued February 28, 1961, and co-pending application Ser. No. 211,301, filed July 20, 1962.

Heretofore, spinning and twining apparatus of this type were generally provided with a plurality of spools, each having a respective spindle, from which a thread, roving or sliver was unwound for subsequent blending or gathering into a yarn. The latter is twisted, generally with many turns per unit length, although a preliminary twist may be imparted in the same or opposite direction prior to the main twisting operation as described in the aforementioned patent and application.

Other supply spools for the fiber filament or thread have been disposed generally coaxially as a space-saving arrangement. These constructions, however, had the disadvantage that the thread carried upon the lower spool was forced to pass the upper spool and an outer wall of the spool housing thus requiring complex arrangements for guiding the thread as well as special means for blending them together. It should be noted that the term "thread" as used hereinafter is intended to refer to all elongated flexible members which can be blended by the aforementioned twisting operation to produce a yarn or multi-thread member of increased thickness, strength or density. Such threads include, in addition to rovings and sliver, other animal and vegetable fibers as well as synthetic fibers and filaments.

It is an object of the present invention to provide a spool arrangement adapted to obviate the aforementioned disadvantages and afford improved twisting of threads in a simple and an inexpensive manner.

Another object of the invention is to provide an improved twisting or spinning device incorporating such a supply-spool arrangement.

These objects are attained, in accordance with the invention, in a plural-spool supply device wherein a plurality of spools are disposed substantially coaxially upon a common support and a hollow thread-guiding spindle passes axially through the spools with annular clearance between the spindle and the superimposed spools. The thread drawn from a lower spool thus passes through the clearance between a spool axially spaced therefrom along the spindle and the latter. Threads from all of the spools can thus be drawn axially through the interior of the spindle to the spinning or twining devices which can include the usual fly frame, a high-speed driven traveler or other twisting means disposed axially beyond the tubular spindle in the direction of travel of the thread.

While the invention is described hereinafter with respect to a vertical-spool device, it should be noted that this disposition is generally arbitrary and other orientations of the spindle axes and the spools will be suitable as long as the spools are axially spaced along the spindle and one or more of the spools form an inner annular clearance therewith through which the thread of an adjacent spindle can pass. Advantageously a transversely extending guide plate is disposed between these adjacent spools and has a rounded edge forming an annular gap with the spindle which is aligned with the aforementioned clearance. This rounded edge thus constitutes guide means for the thread passing through the clearance and has a diameter less than that of the lower spool.

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The guide plate, according to a more specific feature of the invention, is removable from the support to permit replacement of a spool disposed behind this plate. In accordance with this principle a plurality of such plates may be provided, in axially spaced relationship along the spindle, to define between them compartments for the spools. Each of the plates and, advantageously, the transversely extending base of the support, may be provided with axially extending annular flanges which serve to hold the spools whose core or mandrel is, of course, tubular to fit over the respective flange. The core, of course, has an inner diameter in excess of the outer diameter of the spindle so that the annular clearance between them extends over the entire length of the spool.

While it may be advantageous to enclose the coaxial coils in a generally cylindrical shell or housing, it is also possible to form the support with a lateral opening dimensioned to admit the spools. In the latter case, the spindle may be provided with means for removably affixing it to the support whereby it can be withdrawn. Thus the transverse guide plates may, in this instance, be permanently emplaced. It should be noted that the aforementioned lateral opening may be provided within an otherwise cylindrical shell or between a plurality of angular spaced axially extending support strips upon which the plates are mounted.

The above and other object features and advantages of the invention will become more readily apparent from the following description, reference being made to the appended drawing in which:

FIG. 1 is an axial-cross-sectional view, partly in elevation, illustrating a twisting mechanism embodying the present invention;

FIG. 2 is a cross-sectional view drawn to reduced scale taken along the line II—II thereof;

FIG. 3 is an axial-cross-sectional view of a plural-spool supply device according to another embodiment of the invention;

FIG. 4 is a view similar to FIG. 3 showing parts thereof in another position; and

FIG. 5 is a cross-sectional view drawn to reduced scale, taken along line V—V of FIG. 4.

In FIGS. 1 and 2 of the drawing, there is shown a plural spool arrangement wherein a cylindrical housing or support 6 has a base 6' which extends transversely to the axis of the housing and has a boss 24 within which a tubular spindle 3 is rigidly mounted. Base 6' is also provided with a centering disc 25 whose axially extending annular flange 26 is adapted to fit into the interior of the core 4' of a spool 2' whose thread 1' passes into an annular clearance 27 between the core 4 of a second spool 2 disposed thereabove. The spool 2 is carried by a transverse plate 5 which rests removably upon an internal rib 6'' formed annularly in the wall of shell 6. This plate is formed with a curved edge 5' surrounding the spindle 3 which serves to guide the thread 1'. The thread passes through this clearance into the interior of the spindle 3 over its curved reentrant edge 3'. In addition, guide plate 5' is provided with an axially extending annular flange 5'' serving to center the core 4 of spool 2 whose thread 1 blends with the thread 1' as they both pass into the interior of the spindle. The threads emerging from the spindle at its lower end are twisted by a conventional twisting means such as a fly frame of the type shown in U.S. Patent No. 2,260,229 to Nutter et al. or a driven traveler 15 through which the threads pass jointly. This traveler is shown to be guided upon a circular track 14 coaxial with the spindle 3 and having a T-shaped cross-section and to be displaceable by a radial arm 16 of a shaft 17 whose pulley 18 is driven by the belt 19 from the drive pulley 20 of the motor 21. It should be noted, however, that other twisting or spinning

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means conventional in the art may be employed. Upon emerging from the twisting means, the loosely or tightly entwined threads form a yarn 7 which whirls about the support 6 as it passes through an eye 8 to a take-up reel 9 which is rotated in the usual manner upon its shaft 10. The spools may be changed simply by their removal from the plate 5 or the removal of this plate to expose the lower spool 2'.

In FIGS. 3 through 5 are shown another arrangement wherein removal of the spools can be effected in a somewhat different manner. In this embodiment the support 36 comprises a pair of axially extending strips 36' which are diametrically oppositely located with respect to the axis of the spindle 33. Thus a lateral opening 40 is formed between the strips through which the spools 32, 32' can be removed upon axial withdrawal of spindle 33. To this end the latter is formed with a threaded extremity 33a which is removable from the complementarily threaded boss 36'' of the support. Plates 35, 35a for the spools 32 and 32' may thus be rigid with the strips 36'. It will be readily apparent that the spindle 33 need only be partially withdrawn in an axial direction (FIG. 4) to enable the spools to be removed through the lateral openings formed between the strips. It should be noted that, in both embodiments, the plates 5, 35 etc. can be provided with detent means releasable securing them with respect to the support while other detent means (e.g. ball-and-recess connections, bayonet couplings or the like) can be formed between the spindle and the support to enable ready release of this spindle. Moreover, the plate 5 may be affixed to housing 6 if a sufficiently wide lateral opening is provided in the lower portion thereof to enable removal of the core 4' prior to reinsertion of spool 2' therein. The compartment formed between the plates 35 and 35a is generally representative of any number of such compartments that can be formed in accordance with the invention. It is thus apparent that many modifications and variations are, consequently, deemed to be included within the spirit and scope of the appended claims.

What is claimed is:

1. A supply device for feeding a plurality of threads to a twining mechanism, comprising a housing having an axis, said housing being provided with a base generally transverse to said axis and at least one annular support plate axially spaced from said base while extending transversely to said axis; means in said housing for supporting a first spool centrally on said base and a second spool centrally upon said plate, said second spool having a central passage extending along said axis coaxially with said plate; a tubular spindle coaxial with said housing and extending axially through said passage with annular clearance from said second spool and said plate; and guide means including an upper edge of said plate surrounding said spindle with clearance for guiding a thread from said first spool through said clearance and into said spindle, said spindle having a discharge aperture proximal to said base through which said thread emerges.

2. A supply device for feeding a plurality of threads to a twining mechanism, comprising a housing having an axis, said housing being provided with a base generally transverse to said axis and at least one annular support plate axially spaced from said base while extending transversely to said axis; means in said housing for supporting a first spool centrally on said base and a second spool centrally upon said plate, said second spool having a central passage extending along said axis coaxially with said plate; a tubular spindle coaxial with said housing and extending axially through said passage with annular clearance from said second spool and said plate; and guide means including said plate surrounding said spindle for guiding a thread from said first spool through said clearance and into said spindle, said spindle having a discharge aperture proximal to said base through which said thread emerges, said base and said plate being each

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provided with a respective axially extending annular flange engageable with the respective spools over only a fraction of their axial length for centering them with respect to said spindle.

3. A supply device for feeding a plurality of threads to a twining mechanism, comprising a housing having an axis, said housing being provided with a base generally transverse to said axis and at least one annular support plate axially spaced from said base while extending transversely to said axis; means in said housing for supporting a first spool centrally on said base and a second spool centrally upon said plate, said second spool having a central passage extending along said axis coaxially with said plate; a tubular spindle coaxial with said housing and extending axially through said passage with annular clearance from said second spool and said plate; and guide means including said plate surrounding said spindle for guiding a thread from said first spool through said clearance and into said spindle, said spindle having a discharge aperture proximal to said base through which said thread emerges, said housing being provided with at least one inwardly extending formation, said plate removably resting upon said formation.

4. A device as defined in claim 3 wherein said housing is of generally cylindrical configuration substantially surrounding said spools over their entire axial lengths.

5. A supply device for feeding a plurality of threads to a twining mechanism, comprising a housing having an axis, said housing being provided with a base generally transverse to said axis and at least one annular support plate axially spaced from said base while extending transversely to said axis; means in said housing for supporting a first spool centrally on said base and a second spool centrally upon said plate, said second spool having a central passage extending along said axis coaxially with said plate; a tubular spindle coaxial with said housing and extending axially through said passage with annular clearance from said second spool and said plate; and guide means including said plate surrounding said spindle for guiding a thread from said first spool through said clearance and into said spindle, said spindle having a discharge aperture proximal to said base through which said thread emerges, said housing being formed with at least one lateral opening adapted to pass said spools.

6. A device as defined in claim 5 wherein said spindle is removably mounted upon said base and is capable of at least partial withdrawal from said housing in the generally axial direction to pass said spool upon insertion thereof through said opening.

7. A device as defined in claim 6 wherein said housing includes a plurality of angularly spaced axial strips extending from said base and defining said opening between them.

8. A device as defined in claim 7 wherein said plate is secured to said strips.

9. A supply device for feeding a plurality of threads to a twining mechanism, comprising a housing having an axis, said housing being provided with a base generally transverse to said axis and at least one annular support plate axially spaced from said base while extending transversely to said axis; means in said housing for supporting a first spool centrally on said base and a second spool centrally upon said plate, said second spool having a central passage extending along said axis coaxially with said plate; a tubular spindle coaxial with said housing and extending axially through said passage with annular clearance from said second spool and said plate; and guide means including said plate surrounding said spindle for guiding a thread from said first spool through said clearance and into said spindle, said spindle having a discharge aperture proximal to said base through which said thread emerges, said guide means including an edge of said plate confronting said base and surrounding said spindle, said edge having a diameter less than substantially the diameter of said first spool.

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10. In an apparatus for twining threads, in combination, a twining mechanism rotatable about an axis, and a supply device for feeding a plurality of thread through said mechanism, said device comprising a housing centered upon said axis and provided with support means for a plurality of axially spaced spools, at least one of said spools having a central passage extending along said axis; a tubular spindle coaxial with said housing and extending axially through said passage with annular clearance from said one of said spools while terminating at said mechanism; and guide means at said clearance for guiding a thread from another of said spools adjacent said one of said spools through said clearance and thereafter into said spindle together with a thread from said one of said spools at an extremity of said spindle remote from said twining mechanism, said support means including an annular plate extending generally transversely to said axis and carrying said one of said spools, said plate being formed with an axially extending flange for centering said one of said spools with respect to said spindle.

11. A supply device for feeding a plurality of threads each derived from a respective spool to a twining mechanism and wherein said spools are disposed coaxially one above the other and a tubular thread-guiding spindle passes axially through all of said spools, said spindle having an inlet opening at one end thereof through which said threads are drawn from said spools through the interior of said spindle, said supply device comprising, in combination, a housing having a base generally transverse to said thread-guiding spindle; a tubular supporting flange for the one of said spools furthest from said inlet opening, said flange coaxially surrounding said spindle and fixed to said base; and a further tubular supporting flange for each of the others of said spools, each of said further flanges coaxially surrounding said spindle with annular clearance and being formed on a respective support plate extending outwardly therefrom and carried by said housing, said other flanges having rims at the respective plates axially spaced from an adjacent spool, the thread drawn from each of the spools remote from said inlet opening passing upwardly through the annular clearance surrounding said spindle at each of the other flanges interposed

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between the respective spool and the opening for combination at said opening with the thread drawn from the spool proximal thereto.

12. A supply device for feeding a plurality of threads each derived from a respective spool to a twining mechanism and wherein said spools are disposed coaxially one above the other and an upright tubular thread-guiding spindle passes axially through all of said spools, said spindle having an inlet opening at the upper end thereof through which said threads are drawn from said spools through the interior of said spindle, said supply device comprising, in combination, a housing having a base generally transverse to said thread-guiding spindle; a tubular supporting flange for the lowermost one of said spools, said flange coaxially surrounding said spindle and being fixed at the bottom to said base; and a further tubular supporting flange for each of the others of said spools, each of said further flanges coaxially surrounding said spindle with annular clearance and being fixed at a lower rim to a respective support plate extending outwardly therefrom and carried by said housing, the rims on each of the respective plates being axially spaced from the subjacent spool, the thread drawn from each lower one of said spools passing upwardly through said annular clearance of each overlying spool and being combined at said opening with the thread drawn from the uppermost one of said spools.

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