

[54] **APPARATUS FOR HANDLING
UNDRAWN SPUN YARN IN
SYNTHETIC YARN PRODUCING MILL**

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[58] Field of Search 57/1 R, 34 R, 36, 52, 53, 54,
57/90, 55.5

[56] **References Cited**

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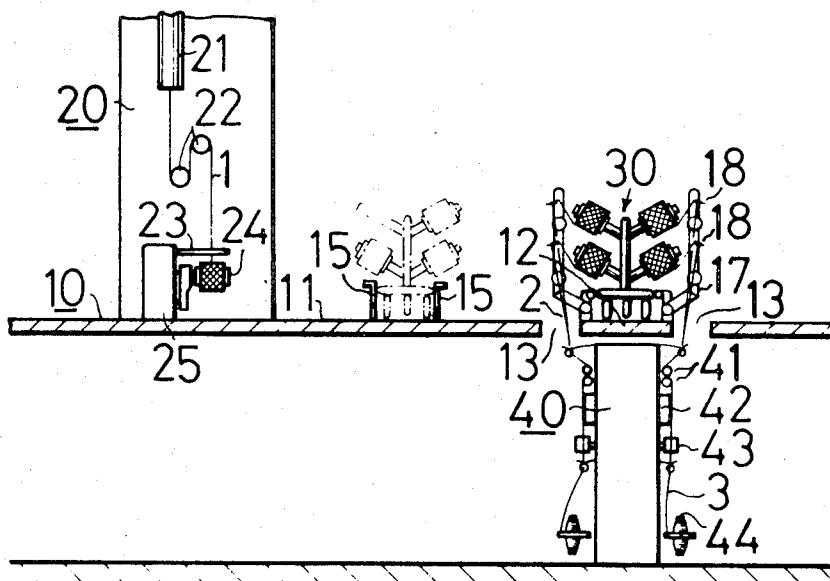
Primary Examiner—John Petrakes

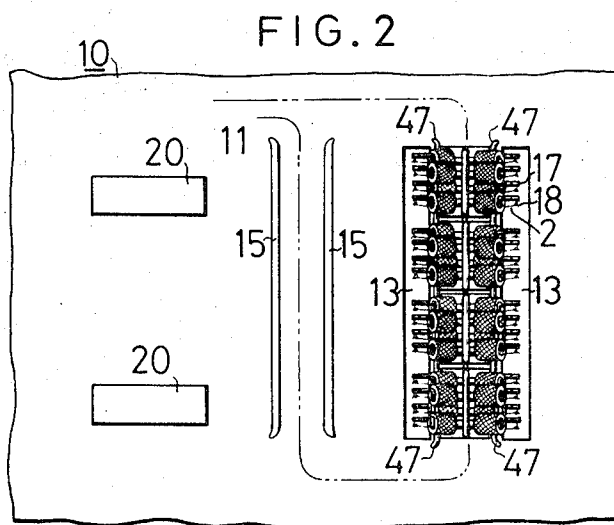
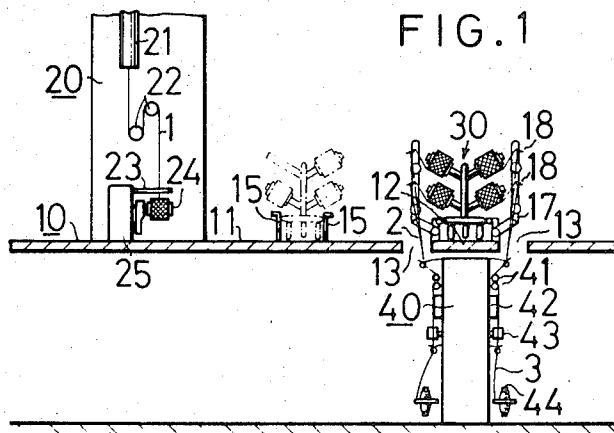
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[57] **ABSTRACT**

A take-up winder for undrawn spun yarn is set up on a floor, while a yarn-drawing machine is installed under the floor. The floor is provided with an opening through which the undrawn yarn loaded upon a creel, which is set up substantially on the same level as said floor, is supplied to the yarn-drawing machine under the floor.

9 Claims, 4 Drawing Figures





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FIG. 3

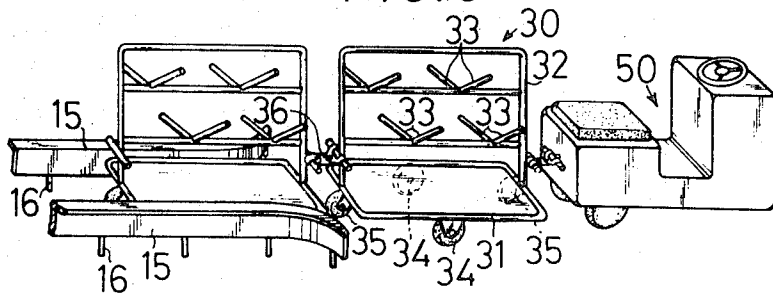
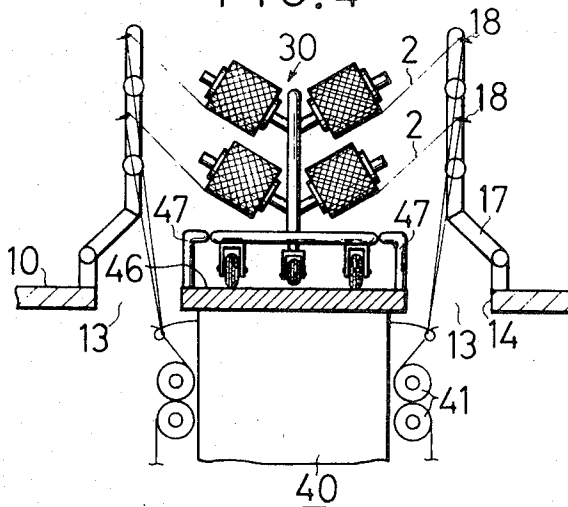


FIG. 4



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APPARATUS FOR HANDLING UNDRAWN SPUN YARN IN SYNTHETIC YARN PRODUCING MILL

This invention relates to apparatus for handling undrawn spun yarn in a synthetic yarn producing mill, and more particularly to apparatus and system for transferring and supplying undrawn spun yarn to a yarn-drawing machine.

Generally, undrawn synthetic yarn is produced by extruding molten liquid or solution of synthetic linear polymers through a spinneret having predetermined fine holes and solidifying it. Spinning method such as, for example, melt spinning, wet spinning or dry spinning is determined in accordance with characteristics of the synthetic linear polymers.

In the yarn thus spun, it is observed that molecules in the lengthwise direction thereof are not regularly oriented, so that the undrawn yarn itself is too weak against external stretching force to be put into practical use. Accordingly, in order to give valuable physical properties, the yarn is stretched to a multiple of their original length by a drawing machine.

In a known yarn-drawing machine, a number of drawing units are arranged on both sides of its frame along the lengthwise direction thereof and a creel stand adapted to load packages of the undrawn yarn is provided above the frame. Each drawing unit below the creel stand comprises feed rollers, drawing rollers, and a ring twister in that order. If needed, heating means may be provided between the feed and drawing rollers.

In order to load the packages of the undrawn yarn to the creel stand at the high upper portion of the frame of the yarn-drawing machine, conventionally, the packages have been loaded upon a truck or trucks and transferred to a place where the yarn-drawing machine is installed. Then, an operator has lifted the packages and loaded to the creel stand one-by-one. Such operations have required much the more labor of the operator as the packages become larger. Consequently, the conventional package loading operation has been extremely inefficient.

In order to eliminate such disadvantages, there have been some proposals to utilize mechanical means. For example, the packages of the undrawn yarn have been lifted close to the creel stand by an endless conveyor or the like (Japanese Patent Publication No. 42-6370) or, alternatively, the truck itself on which the packages are loaded has been lifted by a monorail or the like and transferred to the upper portion of the yarn-drawing machine (U. S. Pat. No. 2,726,505; Japanese Patent Publication Nos. 40-26,858 and 42-19,491). However, in these conventional means, it has been required to provide a relatively wide space where the means for lifting the packages to a certain level can be installed. In addition, the expenses for installing, operating and maintaining the lifting means rather are piled up.

Accordingly, an object of the present invention is to provide apparatus to be used in a synthetic yarn producing mill wherein operations for removing packages of undrawn yarn from a take-up winder and loading them to a creel to supply the yarn to a yarn-drawing machine can be effected by handlings on substantially same level.

Another object of the present invention is to provide apparatus of the kind as defined above wherein yarn drawing operations in a single yarn-drawing machine can be effected with higher efficiency.

According to the present invention, a floor on which a take-up winder of a spinning machinery for undrawn yarn is set up is provided with an opening through which the yarn unwound from packages on a creel stand set up substantially on the same level as the floor can be supplied to a yarn-drawing machine installed under the floor.

The aforementioned and other objects and features of the invention will be apparent from the following detailed description of specific embodiments thereof, when read in conjunction with the accompanying drawings, in which:

FIG. 1 is a schematic sectional view showing apparatus according to a first embodiment of the present invention;

FIG. 2 is a plan view of the apparatus shown in FIG. 1;

FIG. 3 is a perspective view showing creel trucks guided by guide rails and a tractor pulling the creel trucks; and

FIG. 4 is a sectional view showing main portions of an apparatus according to a second embodiment of the present invention.

Referring now to apparatus shown in FIGS. 1 and 2, there is provided a floor 10 on which known spinning machinery 20 having a plurality of take-up winders 25 and creel trucks 30 are set up, while a draw-twister 40 is installed under the floor.

In the spinning machinery 20, a certain measured amount of molten polymer is extruded from a spinneret (not shown) into a cooling chimney 21 and cooled therein while passing, thus producing solidified yarns 1. The yarn, then, pass through a godet rollers 22 and a traverse 23 and is wound up on a bobbin 24 of the take-up winder 25 to be a yarn package.

In the draw-twister 40, each undrawn yarn 2 unwound from the yarn package on the creel truck 30 is drawn as desired while it passes through feed rollers 41, a heater 42, and drawing rollers 43. Thus drawn yarn 3 then passes through a traveller and is wound up on a spool 44 while being twisted.

The creel truck 30 serves also as a carrier for the packages of the undrawn yarn 2 wound on the bobbins 24. The creel truck 30, as shown in FIG. 3, comprises a base frame 31 provided with rotatable wheels, an upright frame 32 connected to the base frame, and a plurality of bobbin supports 33 projected from both sides of the upright frame 32 to be shifted with each other. In order to allow the creel truck to turn in a small radius, preferably, the creel truck is a balance truck which is fitted on four wheels. One pair of these wheels 34 has bearings that are fixed upon the center part of the longer both sides of the base frame 31. The bearings of these two wheels 34 are fixed and are longer than the bearings of the other pair of wheels 35. These latter wheels 35 are swivelled in vertical bearings attached to the front and rear center parts of the base frame 31. These two swivelled wheels 35 being fixed in shorter bearings than the fixed wheels 34, oblige the truck to be supported upon two or three wheels at all times and enable same to be inclined to the front or rear and thereby facilitate maneuverability.

Usually, the number of packages of the undrawn yarn to be loaded on each creel truck is made equal to the number of drawing units provided in one span of

the draw-twister 40, and also the intervals between the adjacent bobbin supports 33 are made equal to the gauge between the adjacent drawing units in the draw-twister 40.

Preferably, each creel truck 30 has coupling means 36 by which a plurality of creel trucks 30 are aligned. The length of this coupling means 36 is such that, when a plurality of creel trucks 30 are interconnected and aligned, the intervals between the bobbin supports 33 of the adjacent creel trucks are substantially equal to the gauge of the adjacent drawing units of the draw-twister 40. In such arrangement, it becomes possible to organize a creel truck train in which the intervals between each adjacent bobbin supports 33 and the total number of the bobbin supports are substantially equal to those of the drawing units in the draw-twister 40.

The floor 10 can be separated into three sections. The first floor section 11 is close to the take-up winder 25 where the packages of undrawn yarn 1 wound on the bobbin 24 are loaded on the bobbin supports of the creel trucks 30. This first floor section 11 may be a relatively wide area where the creel trucks having been loaded with the bobbins are arranged and transferred. The second floor section 12 substantially communicates with the first floor section 11 and provides an elongated place where a plurality of the creel trucks 30 are aligned to supply the undrawn yarn 2 to the draw-twister 40. The second floor section is so arranged as to be positioned directly above the draw-twister 40 under the floor 10. The third floor section 13 consists of openings surrounded by the first and second floor sections 11 and 12, respectively, and formed in parallel to the second floor section 12 and above the drawing units. The undrawn yarns 2 unwound from the packages on the creel trucks 30 aligned on the second floor section 12 pass through the openings of the third floor section 13 and are supplied to the drawing units of the draw-twister 40 installed under the floor 10.

In the first embodiment shown in FIGS. 1 and 2, the third floor section 13 consists of a pair of elongated openings which length is nearly equal to the sum of the intervals of adjacent drawing units in the draw-twister 40.

In a second embodiment shown in FIG. 4, the floor 10 is provided with a single relatively wide opening 14 under which the draw-twister 40 is installed with its top frame surface 46 locating at the center of the wide opening and on the substantially same level as the floor, thereby providing the third floor section 13 at both sides of the top frame surface 46 of the draw-twister. The top frame surface 46 corresponds to the second floor section 12 in the first embodiment and communicates with the floor 10. Reference numeral 47 designates a pair of guide rails provided on both sides of the top frame surface 46 of the draw-twister along the lengthwise direction thereof, whereby it becomes easy to carry in and out the creel trucks to and from the top frame surface thereof and to correctly align them thereon.

In either embodiment, guide stands 17 are set up on the first floor section 11 or second floor section 12, as shown in FIG. 4 and FIG. 1, to smoothly direct the yarn 2 unwound from the packages on the creel trucks 30 to the downward openings of the third floor section 13 by means of guides 18.

Preferably, the first floor section 11 is provided with a pair of guide boards 15 which are fixed to the floor 10 by legs 16 (FIG. 3) and flared at their both ends to facilitate the creel trucks 30 to be entered therein. The guide boards are spaced from each other as much as the transverse length of the base frame of the creel trucks to force them into alignment.

In operation of the present apparatus, the packages of the undrawn yarn 1 are removed from the take-up winder 25 of the spinning machinery 20 and loaded on the bobbin supports 33 of the creel trucks 30. The creel trucks are forcedly aligned between the guide boards 15 and transferred to the second floor section 12 by way of the first floor section 11. Each undrawn yarn 2 unwound from the packages at both sides of the creel trucks 30 aligned on the second floor section 12 is supplied to the downward associated drawing unit through the openings of the third floor section 13. After the drawing operation has been completed, the creel trucks 30 with empty bobbins are carried out from the second floor section 12 and, in place of them, a new train of the creel trucks loaded with other yarn packages in the same way as mentioned above is carried therein.

Chain lines in FIG. 2 show a trace along which the creel trucks 20 are carried into and out from the second floor section 12.

The first and second floor sections 11 and 12, respectively, are communicated with each other with substantially same level, so that the handlings for removing the packages of the undrawn yarn from the take-up winder, loading them to the creel trucks, and placing them above the draw-twister to supply the yarn to the latter can be easily effected substantially on the same level. The creel trucks 30 may be carried manually one-by-one or, preferably, after forcedly inserting the creel trucks 30 between the guide boards 15, they are connected with each other so that the number of the packages thereon may be equal to that of the drawing units of the draw-twister 40 and pulled as a train by a tractor 50 shown in FIG. 3.

Though the spinning machinery 20 and the draw-twister 40 shown in the drawings are arranged at right angles in a vertically shifted relation, they may be arranged in parallel with each other.

Furthermore, the openings of the third floor section 13 may be independent holes associated with the respective drawing units instead of the elongated openings 14 such as shown in FIG. 2.

Many modifications and alternations may be made within the spirit of the present invention.

What is claimed is:

1. In apparatus for handling undrawn spun yarn in a synthetic yarn producing mill, the combination of a spinning machinery, a creel truck, a yarn-drawing machine, and a floor;

said spinning machinery having a plurality of take-up winders set up on said floor and adapted to wind up undrawn spun yarn on bobbins;

said creel truck being provided with a plurality of bobbin supports for packages of the undrawn spun yarn wound on said bobbins;

said yarn-drawing machine being installed under said floor and having a plurality of drawing units adapted to stretch said yarn on said creel truck; and

5

said floor comprising a first floor section where the packages of the undrawn spun yarn are removed from said take-up winder and loaded on said bobbin supports on said creel truck, a second floor section where said creel truck is arranged to supply the undrawn spun yarn to said yarn-drawing machine, said second floor section being substantially communicated with said first floor section and arranged along the lengthwise direction of said yarn-drawing machine, and a third floor section forming an opening surrounded by said first and second floor sections to allow the undrawn spun yarn unwound from said packages on said creel truck to pass therethrough and to be supplied to each of said drawing units of said yarn-drawing machine installed under said floor, said opening being parallel to the lengthwise direction of said yarn-drawing machine and being above said drawing units.

2. Apparatus as claimed in claim 1, wherein said opening of said third floor section consists of a pair of elongated openings the length of each of which is substantially equal to the sum of intervals between adjacent drawing units on one side of said yarn-drawing machine.

3. Apparatus as claimed in claim 1, wherein said opening of said third floor section consists of openings formed at both sides of a top frame surface of said yarn-drawing machine as said top frame surface thereof locates at the center of a relatively wide elongated opening made through said floor; and said second floor section is said top frame surface of said yarn-drawing machine.

4. Apparatus as claimed in claim 1, wherein said opening of said third floor section consists of a plurality of independent holes made through said floor.

5. Apparatus as claimed in claim 1, wherein guide stands for undrawn spun yarn unwound from said bobbin supports of said creel truck on said second floor section are provided in adjacent to said opening.

6. Apparatus as claimed in claim 1, wherein said creel truck is a balance truck which comprises said

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wheels mounted to fixed bearings and front and rear wheels mounted to swivellable bearings, said fixed bearings being longer than said swivellable bearings; and said first floor section comprises a pair of guide rails by which said creel trucks are forcedly aligned.

7. Apparatus as claimed in claim 6, wherein each of said creel trucks comprises a coupling means by which a plurality of the creel trucks are organized and aligned.

8. Apparatus as claimed in claim 7, further comprising a tractor for pulling said organized creel trucks.

9. In a system comprising a spinning machinery having a plurality of take-up winders adapted to wind up the undrawn spun yarn on bobbins, a creel provided with a plurality of bobbin supports for packages of the undrawn spun yarn wound on said bobbins, and a yarn-drawing machine having a plurality of drawing units adapted to stretch said yarn on said creel; said take-up winder being set up on a floor under which said yarn-drawing machine is installed; said creel being integral with a truck which is movable to any desired direction; said truck being transferred by a driving means to floor sections comprising a first loading floor section adjacent to said take-up winder where said packages of undrawn spun yarn are removed from said take-up winder and loaded on said bobbin supports of said creel, a second arranging floor section where said trucks are aligned to supply said undrawn yarn to said drawing machine under said floor, said second floor section substantially being communicated with said first floor section and arranged along the lengthwise direction of said drawing machine, and an opened third floor section surrounded by said first and second floor sections and allowing said undrawn spun yarn unwound from said packages on said trucks aligned on said second floor section to pass through an opening of said third floor section to be supplied to each of said drawing units of said yarn-drawing machine under said floor, said opening being parallel to the lengthwise direction of said yarn-drawing machine and being above the latter.

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