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Sakurai et al.

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[54] **APPARATUS FOR DOFFING WITHOUT INTERRUPTING SPINNING OPERATION IN AN OPEN END SPINNING MACHINE**

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[30] **Foreign Application Priority Data**

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[51] **Int. Cl.²** **B65H 67/04**

[58] **Field of Search** ..... 242/18 A, 18 DD, 18 R, 242/35.5 R, 35.5 A

[56] **References Cited**

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[57] **ABSTRACT**

A doffing device is used in an open end spinning machine having a plurality of spinning units arranged side-by-side at a predetermined interval, a withdrawing roller for withdrawing a spun yarn from each spinning unit, and a split drum for traversing the withdrawn spun yarn for winding it on a bobbin. The doffing device includes a plurality of arms arranged along the machine, at such interval, between the withdrawing roller and the split drum. Each arm has at an intermediate portion thereof an empty bobbin supporting roller and at a free end thereof a plate spring with an empty bobbin pressing roller mounted on each plate spring. Each empty bobbin supporting roller has an intermediate flange to position end portions of two adjacent empty bobbins supported in adjacent empty bobbin receiving spaces formed by respective supporting rollers and pressing rollers in cooperation with the split drum.

2 Claims, 4 Drawing Figures

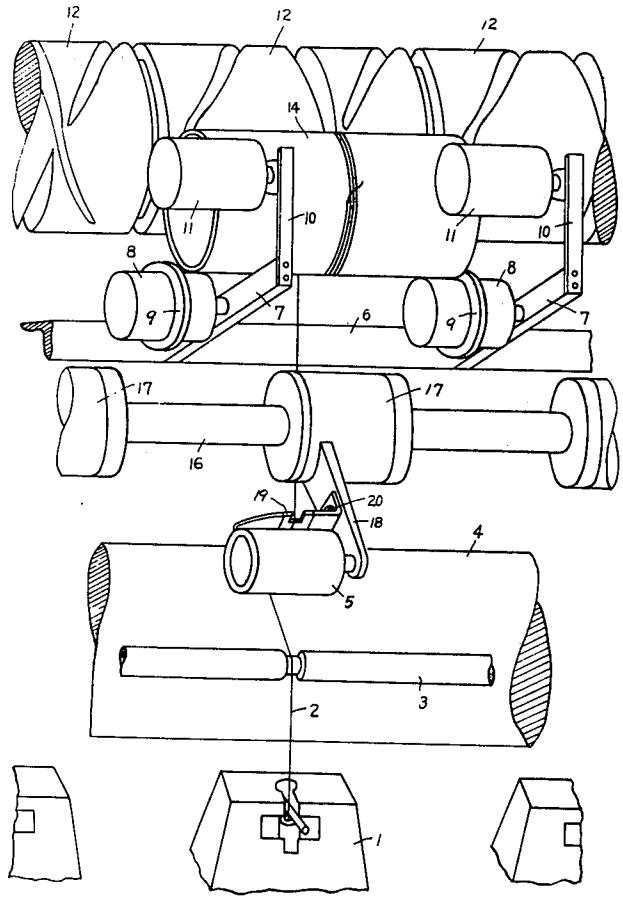


Fig. 1

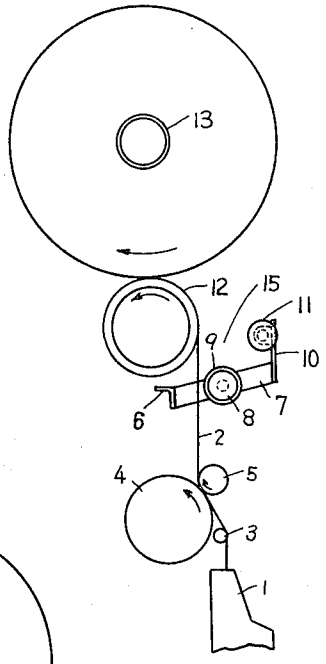


Fig. 2

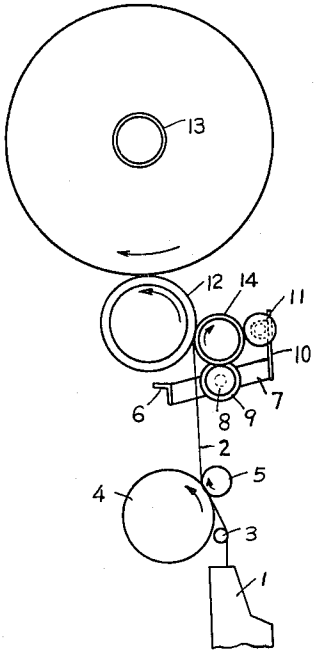


Fig. 3

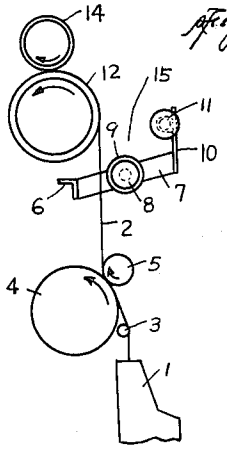
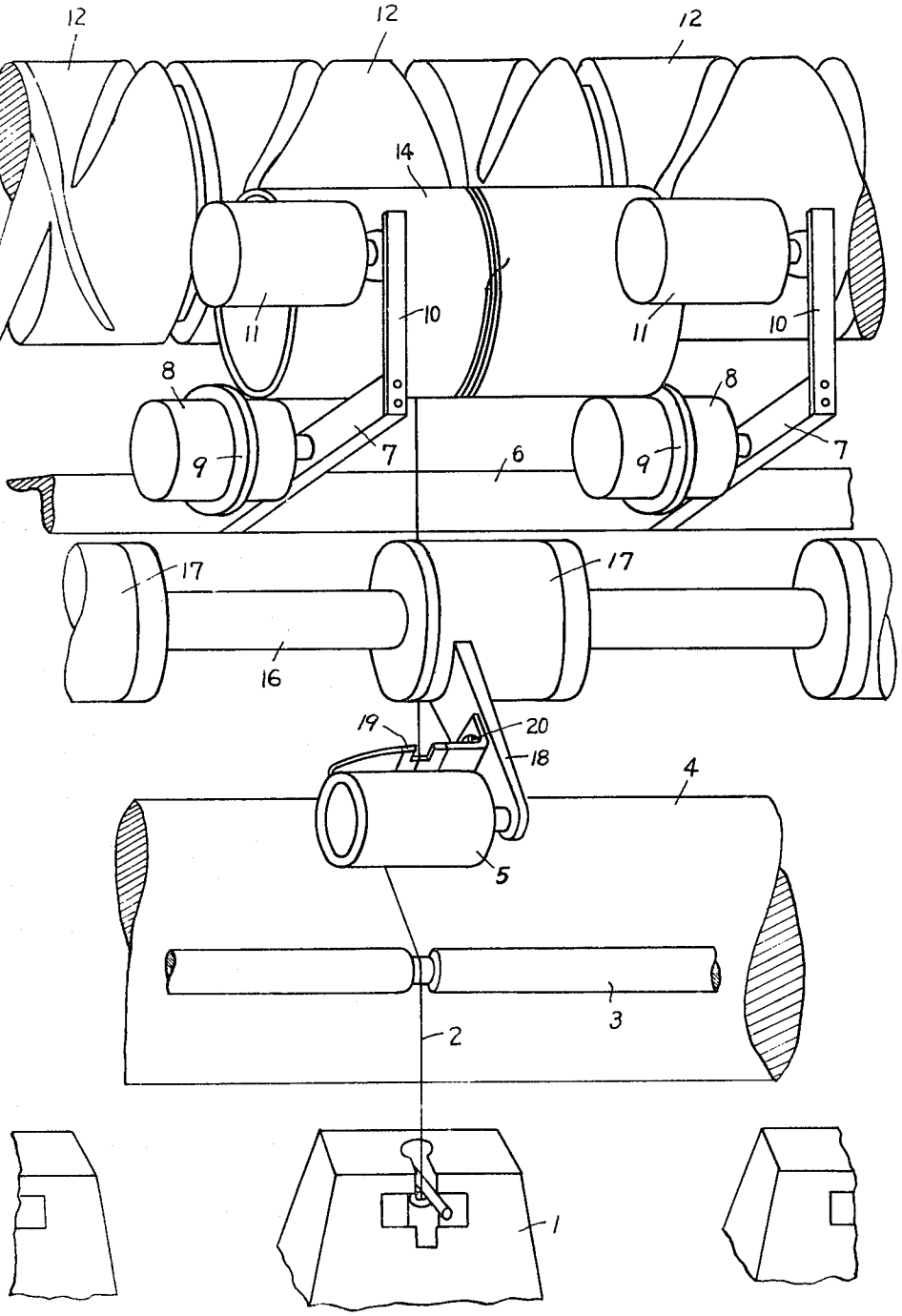


Fig. 4



APPARATUS FOR DOFFING WITHOUT INTERRUPTING SPINNING OPERATION IN AN OPEN END SPINNING MACHINE

BACKGROUND OF THE INVENTION

The present invention relates to a method of and apparatus for performing a doffing operation without interrupting a spinning operation in an open end spinning machine.

The doffing method heretofore practiced in an open end spinning machine requires a pair of workers to cooperate with each other in such a manner that while one of them is removing a full bobbin from the cradle, the other cuts the spun yarn at a point between the withdrawing roller and the split drum in timed relation to the removing of the full bobbin and winds the end of the yarn on the spinning unit side around an empty bobbin held in his hand whereupon he mounts the empty bobbin on the holder by pushing the cradle open and moves the cradle to its normal position to bring the empty bobbin into contact with the split drum to continue the winding operation.

This method, however, entails the use of two workers for doffing, which has been a great bottleneck in the utilization of personnel for an open end spinning machine.

As for a method and a device which enable a single worker to perform the doffing operation in an open end spinning machine, there has been contemplated an arrangement comprising a temporary winding roller disposed between a yarn withdrawing mechanism and a winding roller, such temporary winding roller being directly or indirectly contactible with the peripheral surface of the winding roller, and the temporary winding roller being supported so that it is resiliently pressed against the peripheral surface of the winding roller. With such arrangement, however, the end of the yarn on the spinning unit side cut at a point between the yarn withdrawing mechanism and the winding roller is cut again after being wound on the temporary winding roller and it is then wound on a fresh empty bobbin. Thus this necessitates taking the trouble of cutting the yarn twice and, due to the special construction of the arrangement, requires considerable labor to wind the yarn on the temporary winding roller by hand. Moreover, the yarn wound on the temporary winding roller becomes waste yarn, the disposal of which requires additional labor. Thus, it cannot be said that efficiency of the doffing operation has been fully achieved by such arrangement.

SUMMARY OF THE INVENTION

The object of the present invention is to provide a method and device which eliminate the drawbacks of the prior art described above and which enable the exchange of bobbins to be effected easily and efficiently by a single worker without interrupting the spinning operation.

According to the present invention, there is provided a method of doffing without interrupting the spinning operation in an open end spinning machine and including the steps of cutting a spun yarn between a withdrawing roller and a split drum, winding the spun yarn which is being withdrawn by means of the withdrawing roller by a fresh empty bobbin which is pressed against said split drum and rotated thereby, removing a full bobbin from its winding position, and then transferring the fresh bobbin to the normal winding position.

According to another aspect of the present invention, there is provided a device for doffing without interrupting the spinning operation in an open end spinning machine of the type including a frame, a plurality of spinning units arranged side-by-side at a predetermined interval, each spinning unit having a withdrawing roller for withdrawing a spun yarn from the spinning unit and a split drum for traversing the withdrawn spun yarn and winding it on a bobbin. The doffing device includes a plurality of arms arranged along the frame at such interval, each arm located between the withdrawing roller and the split drum and extending forwardly of the machine frame. An empty bobbin supporting roller is rotatably mounted on an intermediate portion of each arm, the supporting roller having at an intermediate portion thereof a flange. A plate spring is secured to the free forward end of each arm. An empty bobbin pressing roller is rotatably mounted on each plate spring. Each supporting roller and respective pressing roller are located so as to define a separate empty bobbin receiving space in cooperation with the split drum. Each plate spring is adapted to resiliently urge the respective pressing roller in a direction in which an empty bobbin is pressed against the split drum by means of the pressing roller when the empty bobbin is placed in the respective empty bobbin receiving space. Each empty bobbin supporting roller and respective empty bobbin pressing roller are arranged so that they straddle the adjacent end portions of two adjacent empty bobbins when such bobbins are placed in respective adjacent empty bobbin receiving spaces. Each supporting roller flange operates to position adjacent end portions of such adjacent empty bobbins.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and features of the present invention will be better understood upon consideration of the following detailed description and the accompanying drawings in which:

FIGS. 1 through 3 are schematic side elevational views of the device according to the present invention and showing various steps of the operation of the device;

FIG. 4 is a perspective view of the device according to the present invention which is incorporated with an open end spinning machine.

DETAILED DESCRIPTION OF THE INVENTION

With reference now to the drawings and more particularly to FIG. 1 thereof, there is illustrated the device according to the present invention in a condition immediately before the exchange of bobbins.

In FIG. 1, a spun yarn 2 from a spinning unit 1 passes over a traverse rod 3 and is withdrawn by a withdrawing roller 4 and a top roller 5 toward a split drum 12 and is finally wound on a bobbin 13.

According to the present invention, a supporting bracket 6 is provided, for example one for each 10 spinning units. The supporting bracket 6 is disposed between withdrawing roller 4 and split drum 12, is extended in parallel with the spinning machine and is fixed to the machine frame.

On the supporting bracket 6 there are mounted arms 7, at least one arm 7 being provided for each spinning unit, and each arm 7 projecting forwardly of the ma-

chine frame. In the intermediate portion of each of the arms, there is rotatably mounted an empty bobbin supporting roller **8**. The roller **8** extends in parallel with the split drum **12** and is provided with a flange **9** in the middle portion of the length thereof for positioning an empty bobbin **14** in opposed relation to the split drum **12**.

A plate spring **10** is secured to the free forward end of the arm **7** and an empty bobbin pressing roller **11** is rotatably mounted on the plate spring **10** in parallel with the split drum **12**. The empty bobbin supporting roller **9** and the empty bobbin pressing roller **11** are located so as to define an empty bobbin receiving space **15** in cooperation with split drum **12**, and plate spring **10** is adapted to resiliently urge empty bobbin pressing roller **11** in a direction in which an empty bobbin is pressed against split drum **12** by means of the pressing roller when the empty bobbin is placed in empty bobbin receiving space **15**.

Thus, when the bobbin **13** becomes full, as shown in FIG. **2**, a worker takes in his one hand a fresh empty bobbin **14** prepared at each spinning unit and cuts by the other hand the spun yarn **2** at a point between the withdrawing roller **4** and the split drum **12** and winds the end portion of the yarn at the spinning unit side around the empty bobbin **14**. Then the worker pushes fresh bobbin **14** into empty bobbin receiving space **15** defined by the rollers **8** and **11** and split drum **12**. The pushed-in empty bobbin **14** is positively held by the three members **8**, **11** and **12** and pressed against the split drum **12** by the elastic action of the plate spring **10** so that it is frictionally rotated by means of the split drum **12** in the direction designated by the arrow to wind the spun yarn **2** thereon.

The worker with his hands made free now takes off the full bobbin **13** from the cradle and transfers, as shown in FIG. **3**, the fresh bobbin **14** which is winding the spun yarn **2** thereon in the empty bobbin receiving space, into the normal winding position, i.e. the position which had been occupied by the full bobbin **13**. Since the time taken for this operation can be very short, even if the spun yarn **2** was being wound on the fresh bobbin **14** in the empty bobbin receiving space without traversing, it can thenceforth be wound in a regular proper pattern in its normal winding position while being traversed.

FIG. **4** is a perspective view showing a device according to the present invention installed on an open end spinning machine, such device being shown in its operating condition.

In the embodiment shown in FIG. **4**, one arm **7** is provided for each spinning unit **1**. The empty bobbin supporting roller **8** is rotatably mounted on the intermediate or middle portion of the arm **7** and extended in parallel with the split drum at one side of the arm **7**. The arm **7** and the supporting roller **8** are so located that the supporting roller **8** straddles the adjacent end portions of two adjacent empty bobbins **14** when such bobbins are placed in respective empty bobbin receiving space **15**, and the flange **9** is provided on the intermediate portion along the length thereof so that the flange **9** serves as a positioning means common to the adjacent end portions of the two adjacent empty bobbins **14**. In the same way, the empty bobbin pressing roller **11** straddles the adjacent end portions of two adjacent empty bobbins.

In the arrangement described above, the empty bobbin **14** is positively held and positioned against the split drum **12** by providing only one arm **7**, one supporting roller **8** and one pressing roller **11** for each spinning unit **1**. This arrangement simplifies the entire construction of the device according to the present invention and permits easy access to the empty bobbin **14**.

However, it is also possible to provide a pair of arms **7** for each empty bobbin **14** in opposition to the opposite ends of the empty bobbin **14**. In this case, each arm **7** carries the rollers **8** and **11**, and each empty bobbin **14** is supported and positioned by a pair of supporting rollers **8** and a pair of pressing rollers **11** provided exclusively for that empty bobbin **14**.

Incidentally, in FIG. **4**, the reference numeral **16** designates a stationary rod on which a housing **17** is mounted for each spinning unit **1**. The reference numeral **18** designates a lever having its one end connected to the housing **17** and on the other end thereof the top roller **5** is rotatably mounted. On the intermediate portion of the lever **18**, there is mounted a yarn guide **19** by means of a screw **20**. In the housing **17** there is provided a spring means for resiliently urging the lever **18** to press the top roller **5** against the withdrawing roller **4** at a substantially constant pressure. Such elements **16**, **17**, **18**, **19** and **20** do not constitute a part of the present invention, and, therefore, are not shown in FIGS. **1** through **3** for the simplicity of the drawings. In FIG. **4**, the bobbin **13** is not shown for the same purpose.

As is apparent from the above description, the present invention enables a single worker to efficiently perform a doffing operation at the time of bobbin exchange without stopping the spinning operation of the spinning unit, thereby contributing much to the utilization of personnel.

What we claim is:

1. A device for doffing a wound bobbin without interrupting the spinning operation in an open end spinning machine of the type including a frame, a plurality of spinning units arranged in side-by-side relation at a predetermined interval, each said spinning unit having a withdrawing roller for withdrawing a spun yarn from the spinning unit, and a split drum for traversing the withdrawn spun yarn for winding it on a bobbin; said device comprising:

a plurality of arms arranged along the machine frame at said interval, each of said arms being located between said withdrawing roller and said split drum and extending forwardly of said machine frame;

an empty bobbin supporting roller rotatably mounted on an intermediate portion of each of said arms;

a plate spring secured to a free forward end of each of said arms;

an empty bobbin pressing roller rotatably mounted on each of said plate springs;

each said supporting roller and respective pressing roller being located so as to define a separate empty bobbin receiving space in cooperation with said split drum;

each said plate spring comprising means to resiliently urge said respective pressing roller in a direction in which an empty bobbin is pressed against said split drum by means of said pressing roller when such empty bobbin is placed in said respective empty bobbin receiving space;

each said empty bobbin supporting roller and said respective empty bobbin pressing roller being arranged so that they respectively straddle the adjacent end portions of two adjacent empty bobbins when such bobbins are placed in respective adjacent empty bobbin receiving spaces; and

each said empty bobbin supporting roller having a flange at an intermediate portion thereof, said flange comprising positioning means common to said adjacent end portions of said two adjacent empty bobbins.

2. A device as claimed in claim **1**, wherein said arms are supported from a bracket extending parallel with and fixed to said machine frame.

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