Jan. 7, 1964 E. O. DU BUIS ETAL 3,116,587

DOFFING MECHANISM

Filed Dec. 19, 1962 2 Sheets-Sheet 1

Fig. 1

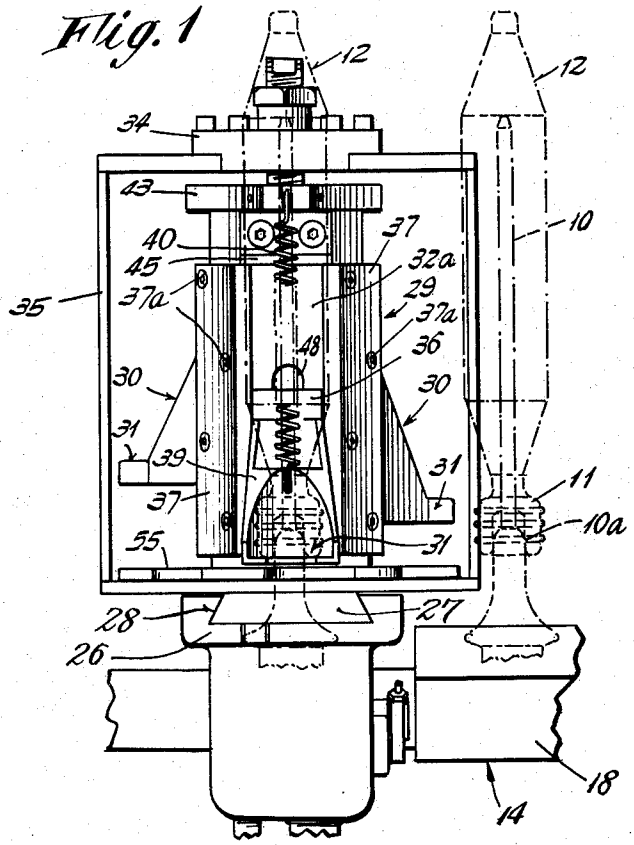
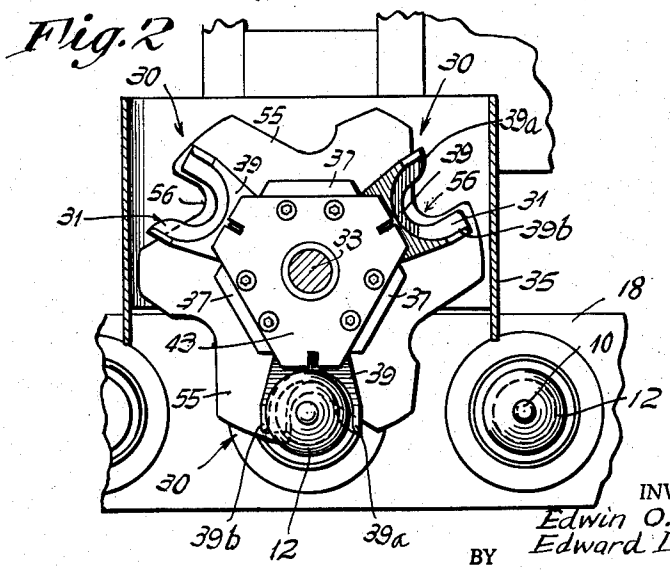


Fig. 2



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Filed Dec. 19, 1962 2 Sheets-Sheet 2

Fig. 3

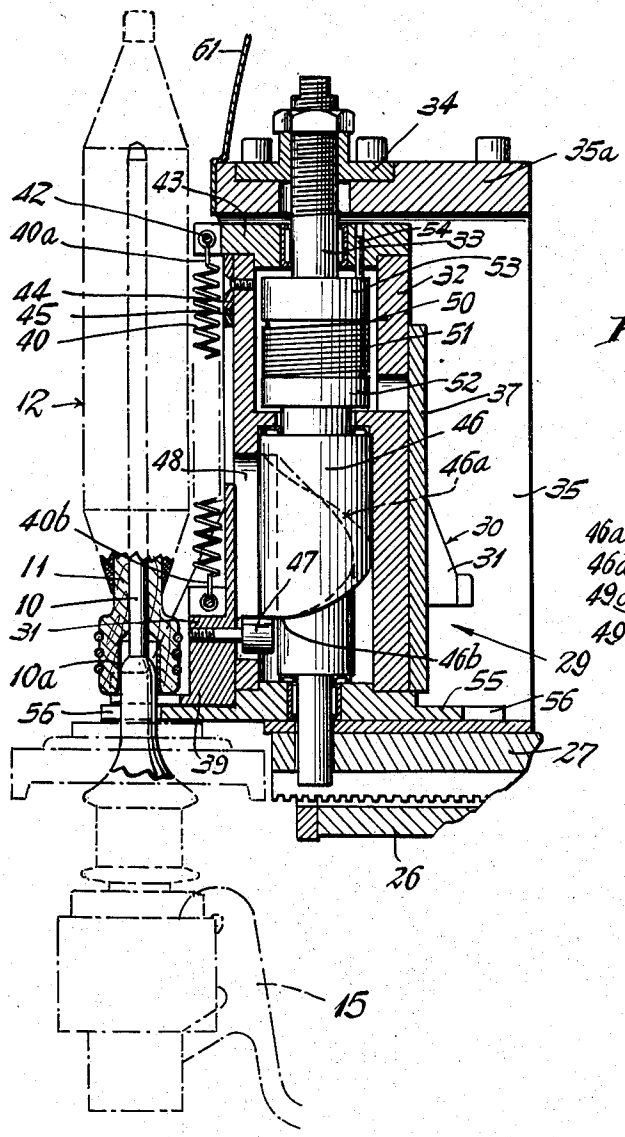


Fig. 4

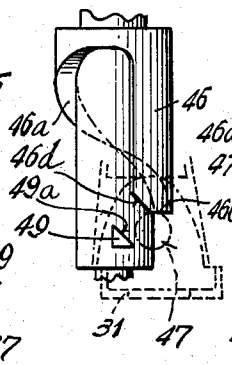
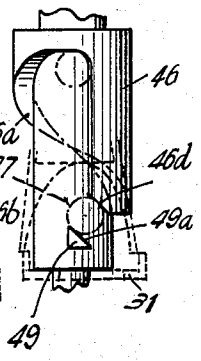


Fig. 5



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3,116,587
DOFFING MECHANISM

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6 Claims. (Cl. 57—53)

The present invention relates to doffing means and in particular to a construction having means for positively breaking the drive between the bobbin and spindle and thereafter ejecting the bobbin from the spindle by spring means.

The present invention is an improvement over the invention disclosed and claimed in our copending application, Serial No. 175,136, filed February 23, 1962, now Patent No. 3,070,949. In this application a spring-urged ejector element is employed for both breaking the drive between the spindle and bobbin and for ejecting the bobbin. With some bobbin-spindle combinations the initial impact required for breaking the driving connection was quite high. In some instances such impact caused damage to the wound bobbin. Further, to get the high impact necessitated the use of heavy springs. Since the springs are cocked by the action of the star wheel which is driven by engaging the spindles as the carriage moves along the frame, a high, sustained lateral load was placed on the spindles.

It is an object of the present invention to provide means, separate from the spring means, for breaking the spindle-bobbin driving connection whereby impact blow is eliminated and lighter springs can be used and the sustained load on the spindle reduced.

This is accomplished by providing a second cam means in the path of movement of the ejector member carried by a rotatable sleeve, when the member is in its position below the wound bobbin, which will move into engagement with and positively lift the bobbin with respect to the spindle and break the drive by the cam means in response to the rotation of the sleeve. As soon as the drive is broken, a relatively light spring will become effective to eject the bobbin from the spindle to doff the same.

A feature of the invention is the elimination of the impact of the ejector member with the wound bobbin in order to break the spindle-bobbin drive, thus removing a danger of damage to the bobbin by the doffing means.

Another feature of the invention resides in the fact that lighter springs may be employed since their only function is to move the released bobbin upwardly and eject it from the spindle. This will reduce the sustained force required to turn the sleeve by the star wheel which engages the spindle during the cocking of the springs by a first cam means.

A further feature of the invention resides in the fact that the second cam means may be relatively short and thus the higher force requirement for breaking the drive is of relatively short duration and does not have a tendency to bend or damage the spindles.

Other features and advantages of the invention will be apparent from the specification and claims when considered in connection with the accompanying drawings in which:

FIGURE 1 shows a front view of the doffing device.

FIG. 2 is a top view of FIG. 1.

FIG. 3 is a side view of FIG. 1 partly in section.

FIG. 4 is a view of the cam means showing the follower about to engage the drive breaking cam.

FIG. 5 is a view similar to FIG. 4 showing the drive breaking cam at substantially the end of the drive breaking operation.

The present invention is an improvement on the doffing

means disclosed in said application Serial No. 175,136 now Patent No. 3,070,949, and having a carriage mounted on the frame of a spinning or the like machine for movement therealong for carrying said doffing means into operative relation with the packages to doff them from parallel spindles on the frame. Reference may be made to said application for details of the device which are not necessary to an understanding of the present invention.

As shown in FIGS. 1–3, the novel doffing means is mounted on a spinning frame having a plurality of spaced spindles **10** having bobbins **11** impaled thereon and having a driving connection at **10***a* to be driven thereby to produce wound bobbins **12**. The doffing means is carried by a carriage **14** adapted to move along the side of the frame on rails (not shown) carried by brackets **15** so as to doff the bobbins from the spindles in response to movement thereof. One or more doffing units may be used. However, since they all have the same construction, only one will be described.

As shown in FIGS. 1–3, the doffing means comprises a base **26** mounted on the top of the frame **18** of the carriage **14** to extend transversely thereof. A slide **27** carrying the ejector unit is slidably mounted in ways **28** on the top of the base to a projected position in which it cooperates with the wound bobbins on the spindles. A member **29** projects upwardly from the slide and carries one or more doffing units **30** having ejector members **31** for cooperating with the wound bobbins to eject them from the spindle. While the upwardly projecting member may take many forms and positions, it is herein illustrated as a sleeve **32** mounted to rotate on a shaft **33** adapted to lie in a plane parallel to the row of parallel spindles. The shaft is locked to a timer plate **34** adjustably mounted on the transverse portion **35***a* of a bridge member **35** secured to the slide **27**. While the sleeve may be provided with any number of doffing units, in the herein illustrated form of the invention the sleeve is provided with three doffing units **30** located 120° apart as shown in FIG. 2. The doffing units have a slide member **36** mounted to slide on bearing portions **32***a* on the outer surface of the sleeve. The slide members **36** are held in position on the bearing portions by plates **37** disposed between the bearing portions and secured to the sleeve by bolts **37***a*. The plates have their edges extended to overlap the edges of the slide members **36** to form ways therefor. It will be seen, therefore, that the slide members can be readily assembled on the sleeve for rotation therewith and for sliding movement therealong.

Each slide member has an ejector member projecting therefrom for cooperating with the bobbin to move it off the spindle. While the ejector member may be a gripper or other element cooperating with the wound bobbin depending on the type of bobbin or driving connection thereto, in the herein illustrated form of the invention it comprises a bifurcated member **39** having the forks **39***a*, **39***b* thereof projecting perpendicular to the slide member at the lower end and adapted to be disposed on opposite sides of the spindle below the wound bobbin, when in cooperating relation therewith, as shown in FIGS. 2 and 3.

The slide members are normally urged to a raised position and are movable to a lower bobbin engaging position in which they are held until the bobbin drive is broken after which they are released, preferably by means controlled by the location of the spindle, to eject the freed wound bobbin from the spindle. While many mechanisms may be used for operating the slide member to eject the freed bobbin from the spindle, it is at present preferred to employ a spring **40** having one end **40***a* connected to a pin **42** carried by a cap **43** secured to the top of the sleeve and having the other end **40***b* of the spring con-

nected to the ejector slide. The spring is of such character that it normally urges the slide to an upper position wherein it engages a stop **44**. Preferably, the lower edge of the stop is provided with a resilient bumper **45** to absorb the shock of the ejector slide as it ejects bobbins from the spindles.

In order to move the ejector member from its upper position to a lower position in which it is disposed beneath the wound bobbin for cooperating therewith, the shaft has a fixed cam **46** thereon cooperating with a follower **47** on the slide member projecting through a slot **48** in the sleeve. The cam has a helical cam surface **46***a* so arranged that rotation of the unit with the sleeve will cause the follower to ride along the helical surface and be moved downwardly from the raised position. This will charge or tension the spring as it moves the slide and its ejector member to a lower position in which the ejector member is below the level of the bottom of the bobbin. When the slide reaches the lower position, the flat surface **46***b* on the bottom of the cam will hold the ejector member in this position until it has moved into cooperative relation with the wound package as shown in FIGS. 2 and 3. When the ejector element is in this position, continued rotation of the sleeve will cause the follower to engage a second cam **49** disposed on the shaft as shown in FIGS. 4 and 5. The follower will ride up the inclined surface **49***a* thereof; cam **46** being cut away at **46***d* permits and controls the rise of the ejector member. This applies a positive gradual lifting force on the bobbin rather than an impact and breaks the driving connection **10***a*. As soon as the follower leaves the surface **46***d*, the spring will rapidly move the released or freed wound bobbin upwardly along the spindle to eject it from the spindle.

To prevent the pressure of the springs against the cam surface **46** from causing a counter-rotation of the sleeve, the sleeve is connected to the shaft through a one-way clutch and brake device **50** which, as shown in FIG. 3, comprises a coil spring **51** wrapped around a portion of a collar **52** secured to the shaft and a portion wrapped around a collar **53** rotatable on the shaft and secured to the sleeve to rotate therewith through pin **54**. The spring is of the type which will permit rotation of the sleeve in an operative direction under the rotating means for the sleeve but will brake the sleeve and prevent backward or retrograde rotation thereof under the urging of the springs.

While the sleeve can be rotated by various means, it is at present preferred to rotate the sleeve by means of a star wheel **55** secured to the bottom of the sleeve and having notches **56** in its edge, as shown in FIGS. 1 to 3, which are shaped to cooperate with the row of spindles on the machine, when the ejector units are in projected position, as the carriage is moved along the frame to be rotated thereby. Thus, it will be seen that the rotation of the sleeve and operation of the ejector mechanism will be accurately controlled by the location of the spindles irrespective of variations in the spacing of the spindle.

Since the springs no longer are required to provide the impact to break the drive connection but are merely strong enough to move the freed bobbin off the spindle, lighter springs may be used so that the lateral load on the spindles necessary to turn the star wheel thereby to cock the springs is substantially reduced. Further, the second cam may be relatively short so that the period of maximum effort for the spindle to drive the star wheel is but a small part of the doffing operation whereby any danger of damage to the spindles as an incident to driving the star wheel is substantially eliminated.

The ejected bobbins can be collected in any suitable manner, as, for example, by a deflector **61**, as shown in FIG. 3, which is adapted to guide the ejected bobbin to a container therefor in a manner disclosed in said prior application.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

We claim:

1. A pop-up doffing device for breaking the driving connection to and doffing wound bobbins from a row of parallel spindles on a textile machine comprising doffing means, means mounting the doffing means to move along said row of parallel spindles to remove wound bobbins from said spindles, said doffing means including an ejector element adapted to be located below the wound bobbin and normally urged by spring means to a raised position, means holding said ejector element in said position below the bobbin and against the action of the spring means, and cam means controlled by the position of the spindle for positively moving said ejector element upwardly to break the drive between the bobbin and spindle and thereafter releasing the last-named means whereby said spring moves the ejector element rapidly upward to eject the wound bobbin from the spindle.

2. A doffing device for doffing wound bobbins from a row of parallel spindles on a textile machine comprising a carriage adapted to be mounted on the side of the machine to move along said row of parallel spindles, and doffing means mounted on the carriage to break the drive to and remove wound bobbins from said spindles as said carriage moves along the machine, said doffing means comprising an ejector element adapted to be moved into position below the wound bobbin and normally urged by operating means to rapidly move to a raised position, means holding said ejector element in said position below the bobbin and against the action of the operating means, and means controlled by the position of the spindle for positively raising the ejector element to break the drive and thereafter releasing the last-named means whereby said ejector element moves rapidly upward to eject the bobbin from the spindle.

3. A doffing device for doffing wound bobbins from a row of parallel spindles on a textile machine comprising a carriage adapted to be mounted on the side of the machine to move along said row of parallel spindles, and doffing means mounted on the carriage to break a driving connection to and remove wound bobbins from said spindles as said carriage moves along the machine, said doffing means comprising an ejector element adapted to be moved into position below the wound bobbin and normally urged by spring means to rapidly move to a raised position, means holding said ejector element in said position below the bobbin and against the action of the spring means, and cam means controlled by the position of the spindle for progressively raising the element to engage the bobbin without impact and positively move the bobbin relative to the spindle to break the driving connection and free the bobbin for movement therealong, said element being thereafter released to enable the spring means to move rapidly upward to eject the freed bobbin from the spindle.

4. A doffing means for breaking the drive connection to and ejecting wound bobbins from spindles comprising a rotatable sleeve having a plurality of doffing units slidably mounted thereon, means for rotating the sleeve to move the doffing units into operative doffing relation with the wound packages, each doffing unit comprising a wound bobbin ejector element, spring means normally urging the ejector element to a raised position on the sleeve, a first fixed cam cooperating with the ejector element and moving the ejector element against said spring means to a lower position in response to relative movement of said sleeve with respect to said cam to charge said spring means, said cam having means to hold the ejector element below the wound package, and a second cam cooperable with the ejector element in said last position to positively elevate the wound package and break the drive to the spindle, said first cam thereafter releasing said ejector element whereby said spring means rap-

idly moves said ejector element upwardly to eject the bobbin from the spindle.

5. A doffing means for breaking the drive between a bobbin and a spindle and for ejecting the bobbin therefrom comprising a sleeve rotatable on a fixed shaft having a plurality of doffing units slidably mounted thereon, and a star wheel connected to the sleeve for cooperating with said spindles for driving the sleev on the shaft as an incident to the movement of the carriage to move the doffing units into operative doffing relation with the wound packages, each doffing unit comprising a wound bobbin ejector element, spring means normally urging the ejector element to a raised position on the sleeve, a first cam on the shaft cooperating with a follower on the ejector element for moving the ejector element against said spring means to a lower position in response to relative movement of said sleeve with respect to said cam to charge said spring means, said first cam having means to hold the ejector element below the wound package, and a second cam on the shaft cooperating with the follower to positively move the ejector element and bobbin upwardly in response to actuation of the star wheel to break the drive between the spindle and bobbin, said first cam thereafter releasing said ejector element whereby said spring means rapidly moves said ejector element upwardly to eject the bobbin from the spindle.

6. A pop-up doffing device for breaking the driving connection to and doffing wound bobbins from a row of parallel spindles on a textile machine comprising doffing means, means mounting the doffing means to move along said row of parallel spindles to remove wound bobbins from said spindles, said doffing means comprising a sleeve rotatable on a fixed shaft having a plurality of doffing units slidably mounted thereon, and a star wheel connected to the sleeve for cooperating with said spindles for rotating the sleeve on the shaft as an incident to the movement of the carriage to move the doffing units into operative doffing relation with the wound packages, each doffing unit comprising a wound bobbin ejector element, spring means normally urging the ejector element to a raised position on the sleeve, a first fixed cam on the shaft cooperating with the ejector element and moving the ejector element against said spring means to a lower position in response to relative movement of said sleeve with respect to said cam to charge said spring means, said cam having means to hold the ejector element below the wound package, and a second fixed cam on the shaft for moving the ejector element upwardly to positively break the drive between the spindle and bobbin in response to rotative movement of the sleeve, said first cam thereafter releasing said ejector element when said sleeve is moved to a predetermined position by the star wheel cooperating with the spindle whereby said spring means becomes effective to rapidly move said ejector element upwardly and eject the bobbin from the spindle.

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