April 12, 1955 E. J. GRISET, JR 2,706,089

METHOD OF DOFFING

Filed Aug. 29, 1951

Fig. 1.

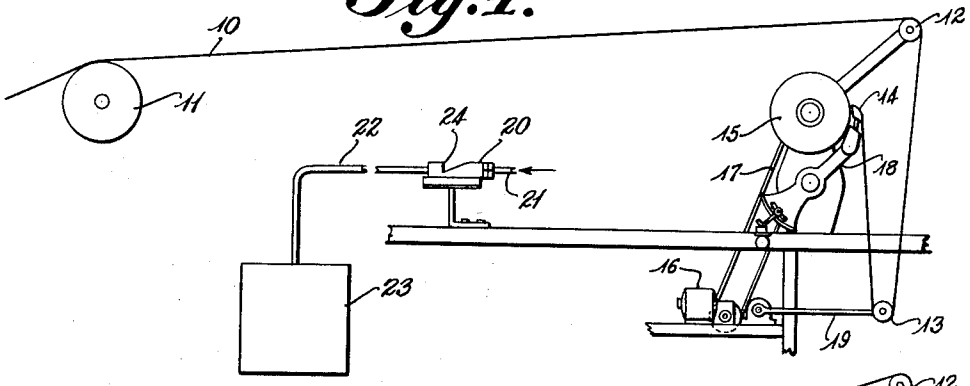


Fig. 2.

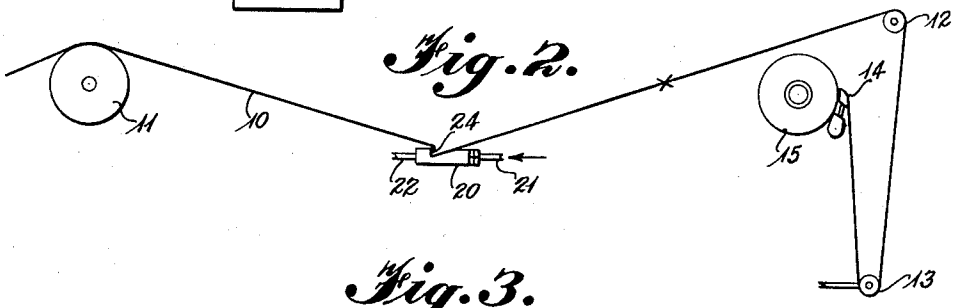


Fig. 3.

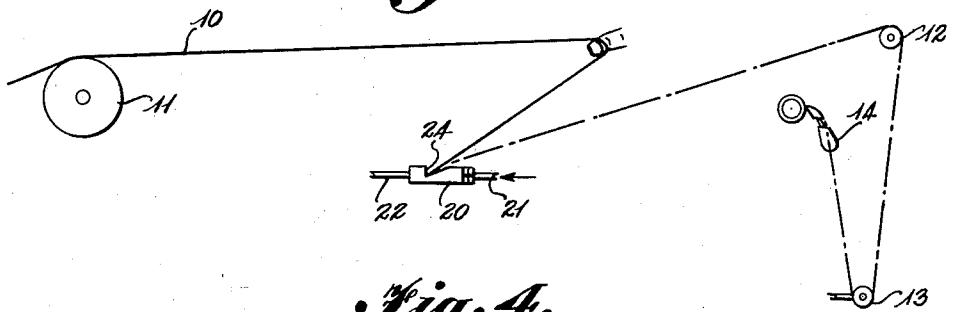
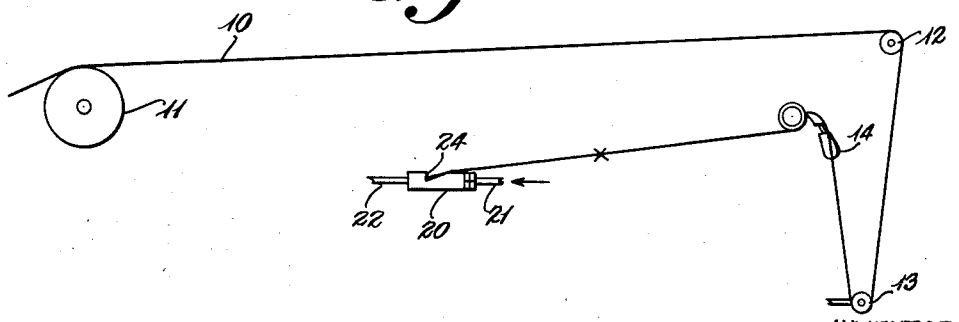


Fig. 4.



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United States Patent Office 2,706,089 Patented Apr. 12, 1955

2,706,089

METHOD OF DOFFING

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Application August 29, 1951, Serial No. 244,114

3 Claims. (Cl. 242—18)

This invention relates to the threading of winding machines and more particularly to the doffing operation involved when such machines are supplied from thread issuing from a continuous source of supply.

In the continuous spinning of rayon yarn it is quite often possible to spin for several weeks without interruption. The yarn so produced is, of course, wound into packages of one sort or another and, to prevent the packages from becoming prohibitively large, it is necessary to doff at about eight-hour intervals. Since the doffing must be accomplished without interruption in the thread supply, it can be seen that a problem is presented in temporarily disposing of the newly-finished yarn during the period while the operator is removing the full package from the collecting device such as a coning machine and restoring to that machine a new tube on which succeeding lengths of yarn may be wound.

When the art of continuous spinning was first developed, and the problem expressed above was first encountered, a good many devices were developed with a view to collecting temporarily as waste the thread issuing from the continuous source while the operator was doffing the full package and placing a spool or tube in position to receive the next package to be wound. A good many of these devices were expensive to construct and install and so difficult to use as to cause excessive time to be consumed in doffing with resulting thread waste and waste of operator time. More recently, a suction type waste collecting device has been developed by the present inventor and the present invention involves that type of waste collecting device in combination with a thread winding device and a continuous source of thread to be wound. The details of the suction device referred to above are shown in Patent No. 2,661,588.

It is an object of the present invention to provide for doffing winding machines which are supplied with a continuously running thread at a speed as high as 150 meters per minute and to accomplish this doffing nearly automatically with resulting savings in operator time and thread waste.

Other objects and advantages of the invention will be apparent upon consideration of the following detailed description thereof in conjunction with the annexed drawings wherein:

Figure 1 is a schematic view in side elevation of a single coning machine, waste collecting device and yarn supply, all arranged according to the present invention, the yarn being shown in its normal running position just prior to the doff;

Figure 2 is a view similar to Figure 1 showing the effect of stopping the coning machine at the beginning of the doff;

Figure 3 shows the first step in re-threading the coning machine after removal of the fully-wound package; and,

Figure 4 shows the re-threaded coning machine in operation just before thread to the waste collecting device is severed.

Referring now to Figure 1 in greater detail, thread **10** is shown issuing from a source, not shown, and passing over a guide roller **11** which may conveniently be the last roller of a series of drying rollers which have dried the thread as the last step in its manufacture. The thread runs from the roller **11** over a receiving guide roller **12** associated with a coning machine of conventional design, under a dancer roll **13** to a traverse guide **14** and thence onto a cone support or tube **15**. The cone support **15** is placed over a rotating spindle which is part of an entirely

conventional coning machine that also includes a drive motor **16** which drives the cone spindle through a belt **17**, an adjustable follower mechanism **18** associated with the traverse guide **14** and suitable means acting on an arm **19** to control the position and the tension imparted by the dancer roll **13**. The features of the coning machine are entirely conventional and the coning machine per se forms no part of the present invention.

At the rear of the coning machine and in the same vertical plane as the run of the thread between the rollers **11** and **12**, but slightly nearer the roller **11** than the roller **12**, there lies a suction type waste collecting device of the type shown in Patent No. 2,661,588. Air under pressure is supplied to the housing **20** of this device through a conduit **21** and a waste conduit **22** leads to a waste storage container **23** disposed at any convenient position near the waste collector. Between the tubes **21** and **22** there is a small space and the notch **24** in the housing **20** leads to that space, which, when air is supplied through the conduit **21**, becomes a low pressure or suction zone.

As has been stated above, Figure 1 represents the normal operating position of the apparatus and it is to be understood that under these conditions no air is supplied to the conduit **21** so that the waste collecting device is not even in operation.

Now, as the package **15** gradually builds up over a period of hours to the appropriate size and weight, it eventually becomes necessary to place a new tube **15** on the spindle of the winding machine so that a new package can be wound. On the other hand, the supply of the thread **10** will continue during this doffing operation and it is to the handling of the yarn during and after the doff that this invention is addressed.

The first step, once the cone or package on tube **15** is complete, is to turn on the air supply to the conduit **21** and to shut off the coning machine so that the spindle on which the cone is mounted ceases to turn. Since the yarn **10** continues to be supplied over the roller **11**, a slack occurs between guides **11** and **12**, and since the yarn in its normal run is vertically above the suction device, it can be seen that the slack eventually falls into the notch **24** in the suction device, whereupon a loop is sucked into the device and delivered to the container **23**. As soon as the operator observes this to be happening, he cuts the yarn at the point *x* indicated in Figure 2 and doffs the package, replacing it with a new package support **15**, a matter which consumes, from the standpoint of time, about three seconds. He then draws a loop between the roller **11** and the suction device with his finger, as shown in Figure 3, or with a hook, and draws that loop over the guide roller **12**, the dancer roll **13** and drops it into the traverse guide **14**. At this point, the coning machine is started, a few wraps are taken around the cone support, and the thread is cut at point *x* in Figure 4 to start the operation anew.

It will be understood that the thread running between the rollers **11** and **12** will describe a catenary curve and that the bottom of that curve will lie on a vertical axis coincident with every catenary curve that the thread **10** can describe between the rollers **11** and **12**, the magnitude of the curve varying with the tension of the thread. Consequently, the housing **20** is preferably disposed on the vertical axis that intersects the bottom of the normal catenary curve of the thread running between the rollers **11** and **12**. When slack is produced, the bottom of the curve falls on the vertical axis and eventually touches the notch **24** in the housing **20** whereby the loop between the rollers **11** and **12** is collected by suction. The importance of this is apparent for it is an automatic way of subjecting a running thread to temporary collection and it leaves the operator free for quick thread cutting and removal of the wound package from the coning machine.

It is, of course, possible to arrange the suction device to intersect parts other than the bottom of the catenary curve, but at the bottom the automatic operation has been found to be most reliable. It is, of course, possible to dispose the suction device anywhere below the thread path between the rollers **11** and **12** and to have the operator guide the sagging loop into the suction device with his hand.

What is claimed is:

1. The method of doffing which comprises initially establishing a running thread from a point of continuous delivery to a first point of collection, stopping the collection at the first point to porduce a sagging loop between said points, collecting the loop so produced at a second point by means of suction, severing the thread between the first and second points of collection while continuing to collect the running thread at said second point of collection, drawing a loop between the delivery point and the second point of collection, re-establishing collection at said first point therewith and finally severing the thread between said first and second points of collection.

2. The method of doffing that comprises establishing a running thread from a point of continuous supply to a point of collection, winding succeeding lengths of thread at the point of collection, then establishing a suction zone for temporary collection of thread below the bottom of the catenary curve between said points, stopping the winding operation while continuing to supply thread so that a loop is formed which falls into said suction zone for temporary collection, severing the thread between said zone and said point of collection, removing the wound body from the point of collection, drawing a loop between said point of supply and said suction zone, re-establishing winding at said point of collection with said loop and finally cutting the thread between said suction zone and said point of collection.

3. The method of doffing a cone winding machine including a receiving guide, and a winding spindle that comprises continuously delivering thread to a point of supply, drawing succeeding lengths of said thread in a catenary curve from said supply point to said receiving guide onto a package support rotating on said spindle until a package is wound, then establishing a suction zone vertically below the bottom of said catenary curve and stopping said spindle to cause the thread between said point of supply and said receiving guide to sag until the loop is sucked into the suction zone, severing the thread between said suction zone and said receiving guide, removing the wound package from the spindle, placing a package support over the spindle, drawing a loop between the point of supply and the suction zone and passing that loop to said winding machine, restoring rotation of the spindle and severing the thread between the suction zone and the spindle.

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