

Feb. 23, 1960

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2,925,961

PACKAGE-DOFFING MECHANISM FOR TEXTILE WINDING APPARATUS

Filed March 24, 1958

4 Sheets-Sheet 1

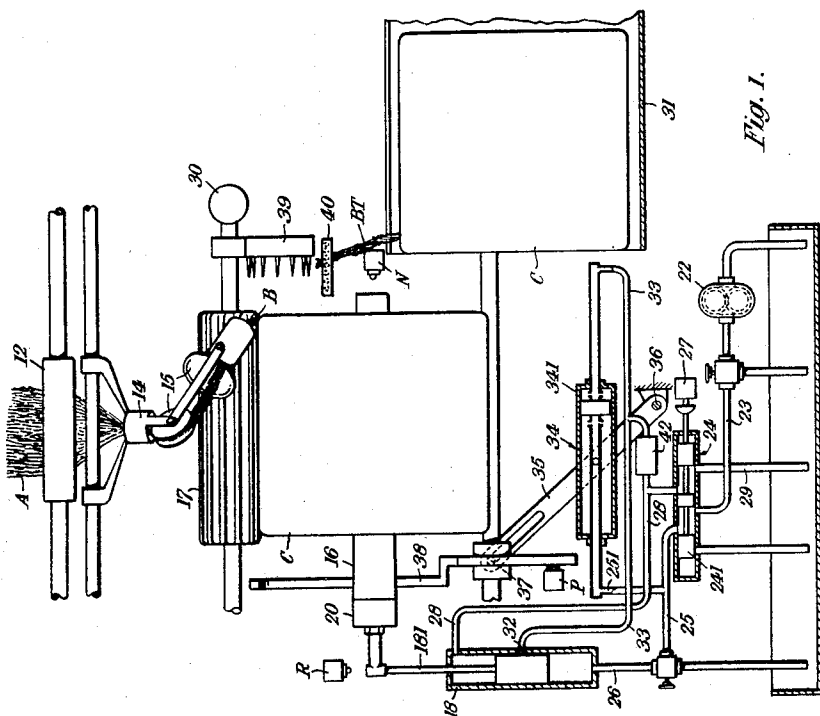


Fig. 1.

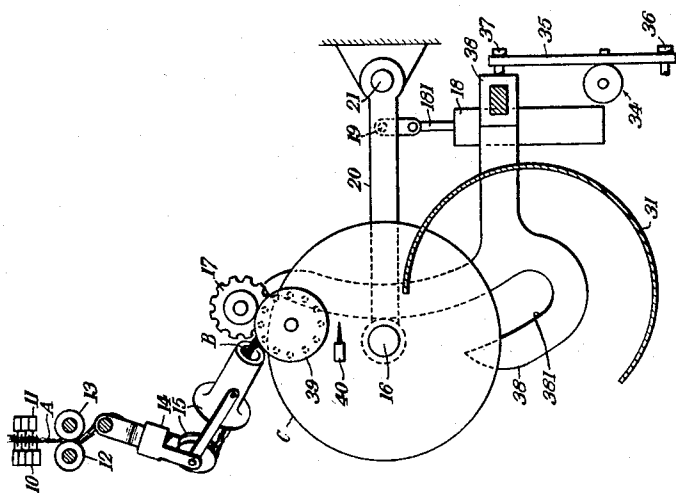


Fig. 2.

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4 Sheets-Sheet 2

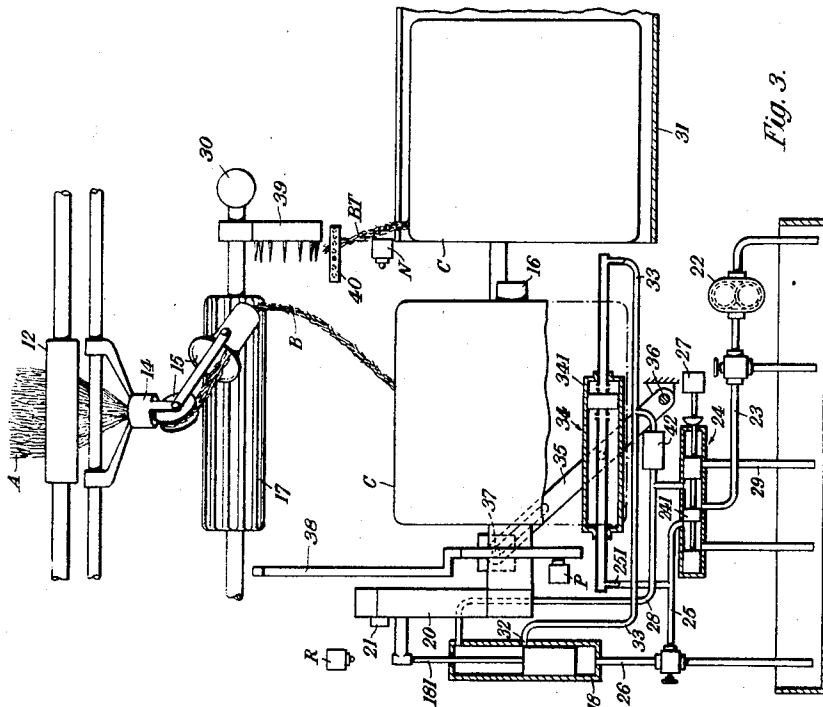


Fig. 3.

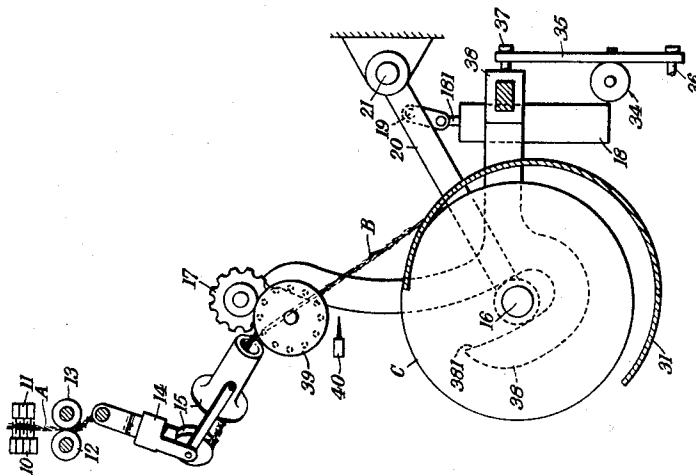


Fig. 4.

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4 Sheets-Sheet 3

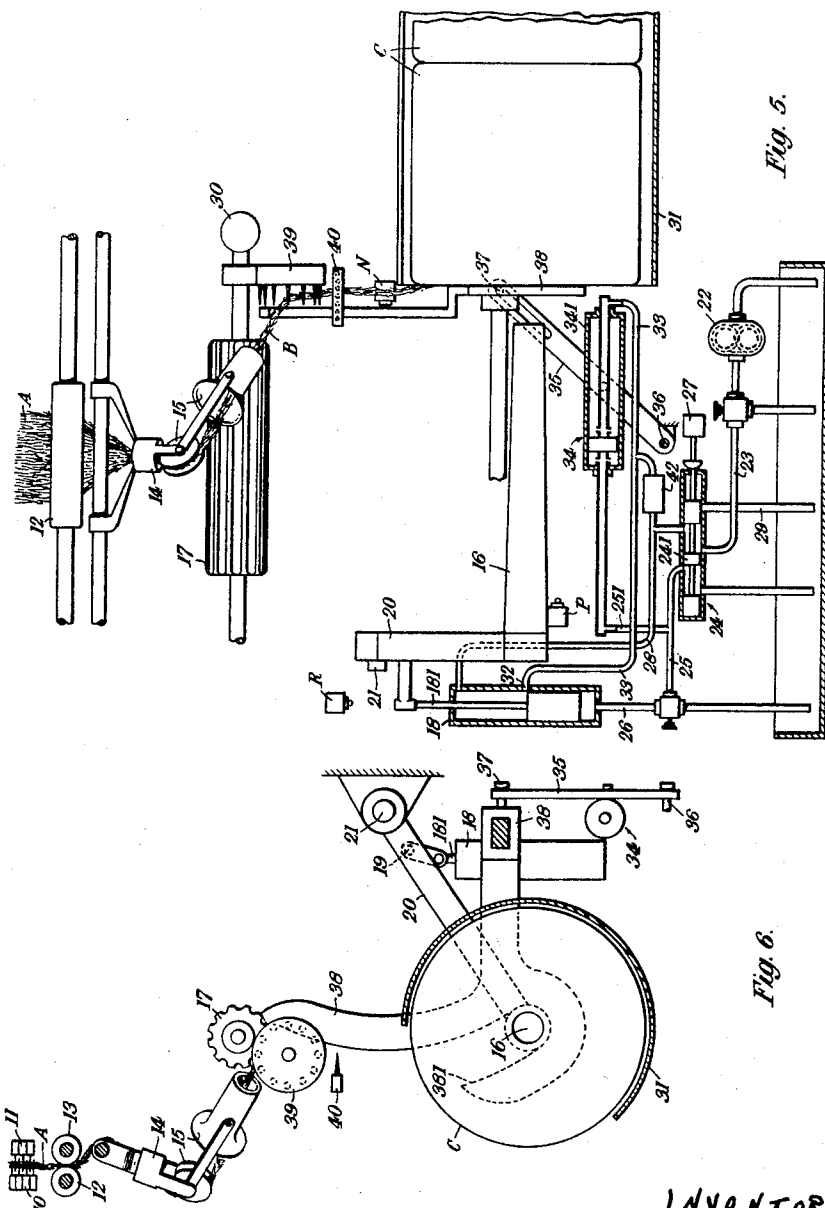


Fig. 5.

Fig. 6.

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4 Sheets-Sheet 4

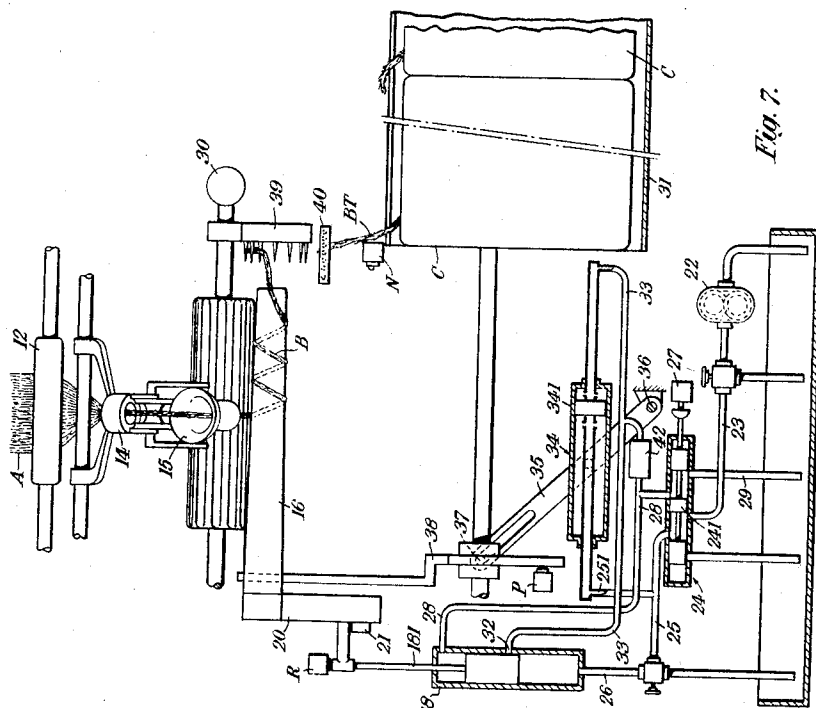


Fig. 7.

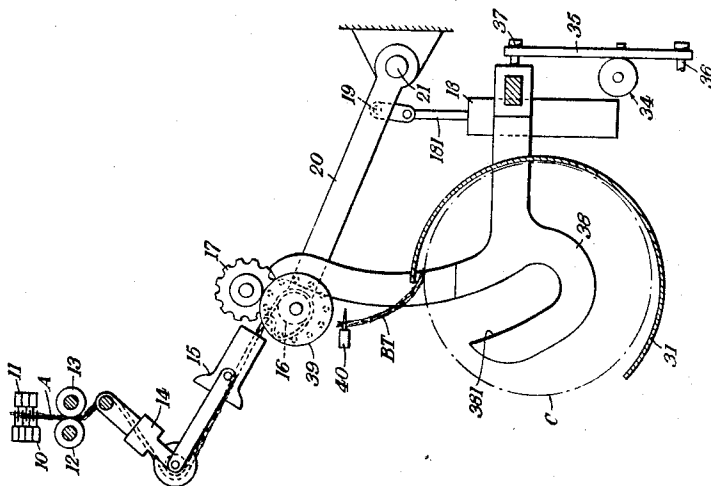


Fig. 8.

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PACKAGE-DOFFING MECHANISM FOR TEXTILE WINDING APPARATUS

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9 Claims. (Cl. 242—54.4)

The invention is concerned with package-doffing mechanism for textile winding apparatus of the type in which a continuous sliver, yarn or the like is wound into a ball or cheese upon a freely rotatable spindle supported in contact with a revolving roller (hereinafter referred to as the "driving roller"), the material being fed through a guide which is traversed to and fro along the spindle in known manner to produce a cross-wound package. The object of the invention is to provide, in apparatus of such type, automatic mechanism for doffing each package as and when a predetermined length of material has been wound thereon.

An apparatus of said type, according to the invention, comprises in combination means for measuring the length of material wound on a package, means for interrupting the feed of material to the winding point when such length attains a predetermined value and for causing the spindle support to move the spindle and package to a doffing position, a member operable to doff the package from the spindle, said doffing member being automatically operated when the spindle reaches the doffing position, separate means automatically operated when the package is doffed for actuating the spindle support to return the empty spindle to the winding position and for returning the doffing member to the initial or inoperative position, and means automatically actuated when winding conditions are restored for re-starting the feed of material to the empty spindle to commence a new winding cycle.

In a preferred apparatus in accordance with the invention the spindle support is motivated by a fluid-pressure motor selectively controlled by a valve which is operated electrically at the appropriate stages by the length-measuring means and a trip-switch associated with the doffing mechanism, and the doffing member is operated by a second fluid-pressure motor arranged to come into operation to doff the package when the latter reaches the doffing position and to retract the doffing member when the empty spindle is returned to the winding position.

The invention also provides automatic mechanism for storing the tail of material extending between the feed mechanism with the doffed package, and for rupturing said tail, and for wrapping the leading end about the empty spindle when a fresh winding cycle is initiated.

The invention is particularly (though not exclusively) applicable to worsted gill-box drawing frames, and its application to such a machine is hereinafter described in greater detail with reference to the accompanying diagrammatic drawings, in which Fig. 1 is a plan of the apparatus, including the hydraulic operating mechanism, and Fig. 2 is a side elevation of some of the parts of the apparatus, the positions of the parts shown in these figures being those occupied on completion of the wound package, immediately prior to doffing. Figs. 3 and 4 are similar views to Figs. 1 and 2, in which the parts are shown in the first stage of the doffing operation. Figs. 5 and 6 are views similar to Figs. 1 and 2 respectively,

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showing the positions of the parts on completion of the doffing operation, and Figs. 7 and 8 are views similar to Figs. 1 and 2 respectively, showing the mechanism when restored in readiness to commence a fresh winding cycle.

In the drawings, the strands of fibres passing through the final sections 10, 11 of the faller assembly and between the draw rolls 12, 13 are shown at A. From the nip of the draw rolls the material is conducted to a funnel 14, where it is condensed into a sliver B, which is delivered by a swinging traverse guide 15 and thereby cross-wound in known manner upon a spindle 16 to form the cylindrical package C, the rotation of the spindle and package being brought about by frictional contact with the revolving driving roller 17 as the winding proceeds. The package is pressed against the driving roller 17 by the constant pressure exerted by a hydraulic jack 18, the ram 181 of which is linked at 19 to an arm 20 pivoted to the machine frame at 21 and upon the extremity of which the spindle 16 is mounted with capability of free rotation.

Hydraulic fluid is fed by a pump 22 through a pipe 23, a piston-valve 24 and pipes 25, 26 to the cylinder or the jack 18, pressure being maintained in the ram to hold the package in the winding position when the spool 241 of the valve 24 occupies the position shown in Fig. 1. Said valve spool 241 is operated by a solenoid 27 which is controlled in the manner hereinafter described. The jack cylinder is connected at its end remote from the pipe 26 with a pipe 28 which, in the position shown in Fig. 1, communicates through the valve with a discharge pipe 29.

Associated with the driving roller is a length-measuring instrument 30. When this instrument registers a predetermined length of sliver B as having been wound upon the package C, electrical switches are thrown to break a circuit governing the feed of material through the gill-box and also to energise the solenoid 27 of the valve 24, causing the valve-spool 241 to be moved as shown in Fig. 1 to the position in which the hydraulic supply between the pipes 23 and 26 is interrupted, fluid pressure being now fed through the pipe 28 to the other end of the jack 18 which is thus reversed. The retractive movement of the ram 181 rocks the arm 20, carrying the spindle 16 and the package C into the doffing position opposite a stationary tray 31.

As the ram 181 of the jack 18 passes the position shown in Fig. 2, the port 32 of the pipe 33 is uncovered, permitting hydraulic fluid to flow under pressure through the pipe 33 into a second jack 34, the sliding cylinder 341 or ram of which is connected to a lever 35 which is pivoted at 36 and which is connected to a lever 35 which is pivoted at 36 and coupled at 37 to a reciprocally mounted doffing plate 38. Said plate 38 is provided with an arcuate slot 381 which embraces the spindle 16 when this is moved into the doffing position; said plate 38 partakes of the movement of the jack ram 341 and traverses along the spindle 16, shutting against the end of the package C and pushing the latter before it in an axial direction so that it leaves the spindle 16 and is received on the tray 31. The parts have now reached the position shown in Figs. 5 and 6.

As the package C leaves the spindle 16, the length of sliver B which extends between the traverse guide 15 and the end of the package is drawn into a position in which it is engaged by a spiked wheel 39 and drawn over a spiked bar 40 by which the sliver B is temporarily held. At the end of its stroke the doffing plate 38 trips a switch N by which the solenoid 27 is de-energised and the valve member 241 resumes its initial position, so that the spindle holder jack 18 is again reversed. The arm 20 is again moved to press the now empty spindle 16 into contact with the driving roller 17 and in doing so one of two

switches in the feed motor circuit, viz. the switch R, is closed. The switch N also serves to operate means (not shown) for re-setting the counter 30, so that when winding conditions are re-established the next cycle may be commenced without operating the solenoid 27.

At the same time, the doffing plate jack 34 is reversed by admission of pressure fluid thereto through the pipe 251 and the connection of the pipe 33 to exhaust (Fig. 4), so that the doffing plate 38 is returned to its initial inoperative position (Figs. 7 and 8), and the second switch in the feed motor circuit, viz. the switch P is closed, causing delivery of sliver to the winding point to be resumed. Simultaneously, the spiked wheel 39 by which the sliver B is held is caused to rotate, wrapping the sliver around the end of the empty spindle 16 and breaking it off from the tail end DT which is held by the spiked bar 40. The full package C upon the tray 31 is now free for removal, and a new winding cycle has commenced.

The numeral 42 indicates a non-return valve through which fluid may flow from the pipe 33 to discharge when the jack 34 is reversed from the position of Fig. 6 to that of Fig. 8.

What I claim as my invention and desire to secure by Letters Patent is:

1. A package doffing mechanism for a textile winding apparatus comprising a movable spindle support member, a spindle rotatably mounted on said spindle support member and movable therewith between a winding position and a doffing position, means for winding material into a package on said spindle, means for measuring the length of material being wound upon said package, first pressure means connected to said spindle support member for movement of said member between said winding and doffing position, valve control means for said pressure means connected to said measuring means for moving said spindle support member in accordance with the length of material which has been wound, winding control means connected to said measuring means and said spindle to stop said material winding means when a predetermined length of material has been fed, means to doff said package from said spindle at said doffing position connected to said valve control means, a second pressure means connected to said doffing means and said valve control means and effective to doff said package from said spindle at said doffing position, said valve control means being effective to move said spindle support member with said spindle back to a winding position after said package has been doffed, said valve control means being connected to said winding means to start said means for winding material on said spindle after said spindle has been returned to a winding position.

2. A package doffing mechanism according to claim 1, wherein the tail of material being fed by said winding means is brought across a cutting station, means to cut said tail at said cutting station, and means to wrap the leading end of material which is cut around said spindle when the latter is returned to said winding position.

3. A package doffing mechanism according to claim 1, wherein said winding means includes a driving roller

arranged to contact said material to rotate said package and said spindle, and means to bias said package against said roller.

4. A package doffing mechanism according to claim 1, wherein said first pressure means includes a hydraulic jack member, said jack member being connected to said second pressure means to actuate the latter upon predetermined movement of said jack member.

5. A package doffing mechanism according to claim 1, wherein said doffing means includes a plate member having an arcuate slot arranged to embrace said spindle when said spindle is moved into a doffing position.

6. A package doffing mechanism according to claim 1, including a spiked wheel arranged between said winding position and said doffing position, spike bar means being positioned to hold the tail of material extending from a package which has been doffed, and means to rotate said spiked wheel when said spindle is returned to a winding position whereby to rupture the tail of the doffed package and to wrap the tail around the empty spindle.

7. A package doffing mechanism for a textile winding apparatus comprising a rotatable spindle movable between a winding position and a doffing position, spindle transport means for moving said spindle between said winding and doffing position, means for winding material upon said spindle into a package, means for measuring the length of material being wound upon said package, winding control means connected to each of said measuring means, said spindle transporting means, and said winding means and effective to stop said material winding means when a predetermined length of material has been fed, said spindle transport means being effective to move said spindle to a doffing position after said winding means is stopped, means to doff said package from said spindle at said doffing position, said spindle transport means being effective after said package is doffed to return said spindle to a winding position, and control means connecting said transport means and said winding means to start said winding means when said spindle is returned to a winding position.

8. A package doffing mechanism according to claim 7, wherein said spindle transport means includes a movable spindle support member, pressure means connected to said movable spindle support member to move said support between a winding position and a doffing position, and valve control means for said pressure means connected to said measuring means for operating said spindle transport means in accordance with the length of material which has been wound.

9. A package doffing mechanism according to claim 7, including pressure means connected to said spindle doffing means, and control means connected to said pressure means and to said spindle transport means whereby to doff said package when said transport means presents said spindle at said doffing position.

References Cited in the file of this patent

UNITED STATES PATENTS

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