Nov. 7, 1967 N. WINTER 3,350,868

AUTOMATIC DOFFING APPARATUS

Original Filed Sept. 17, 1963 5 Sheets-Sheet 1

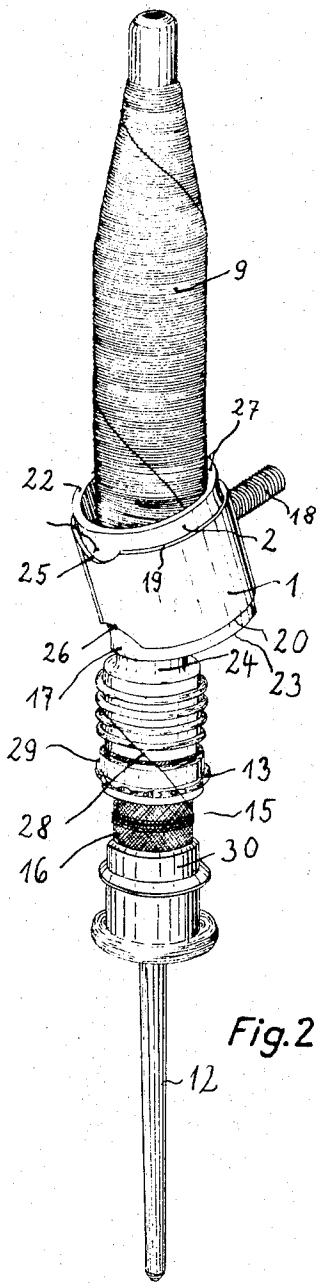

Fig.2

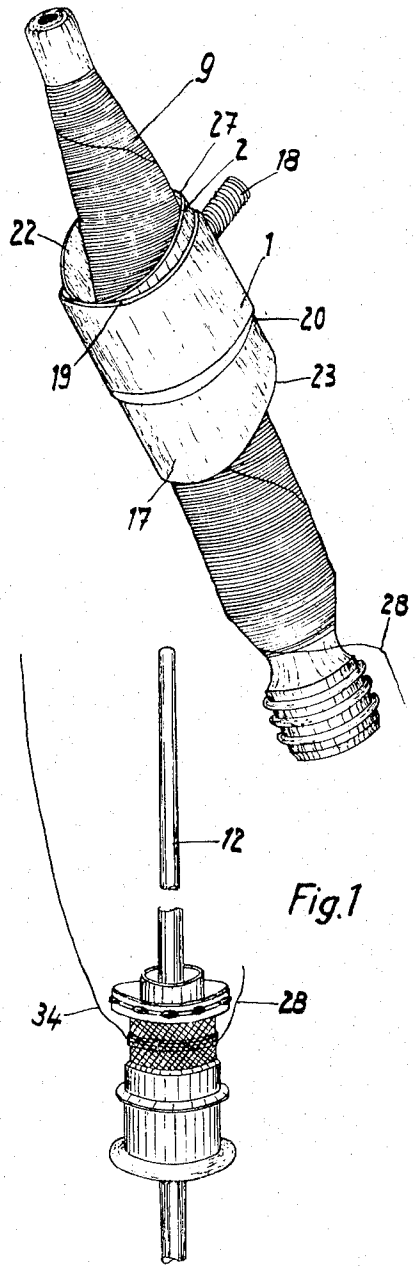

Fig.1

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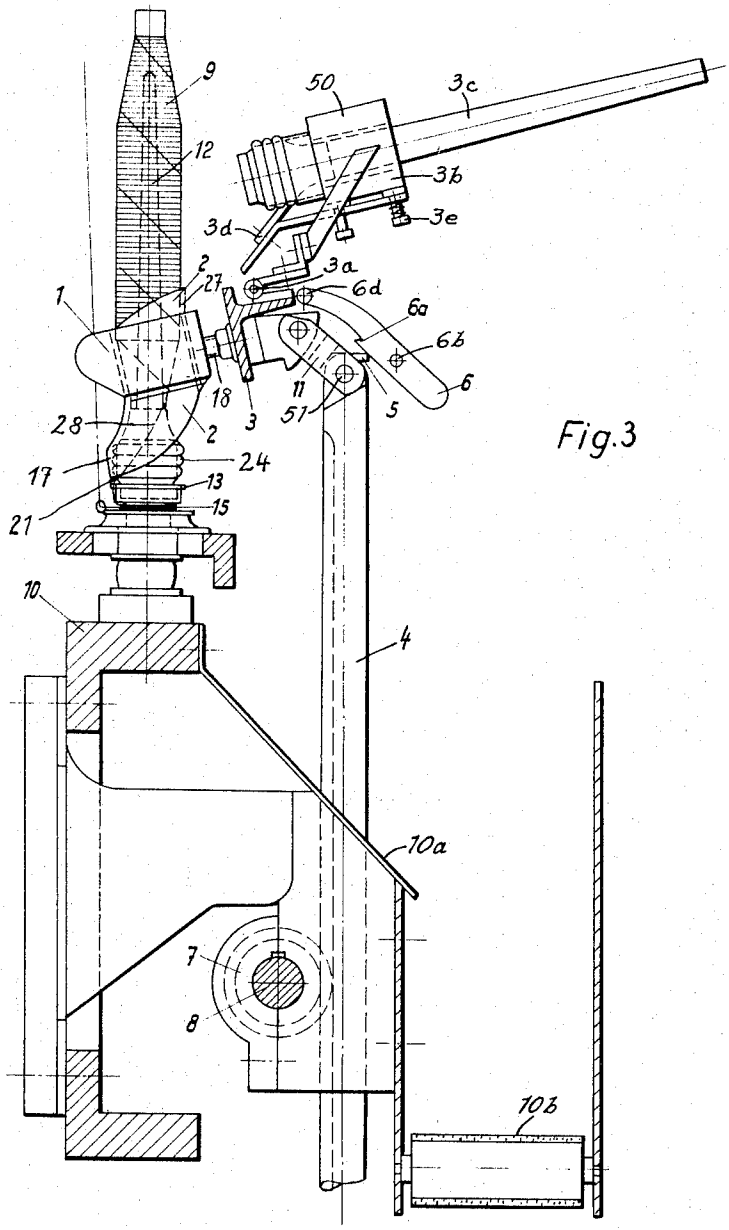

Fig.3

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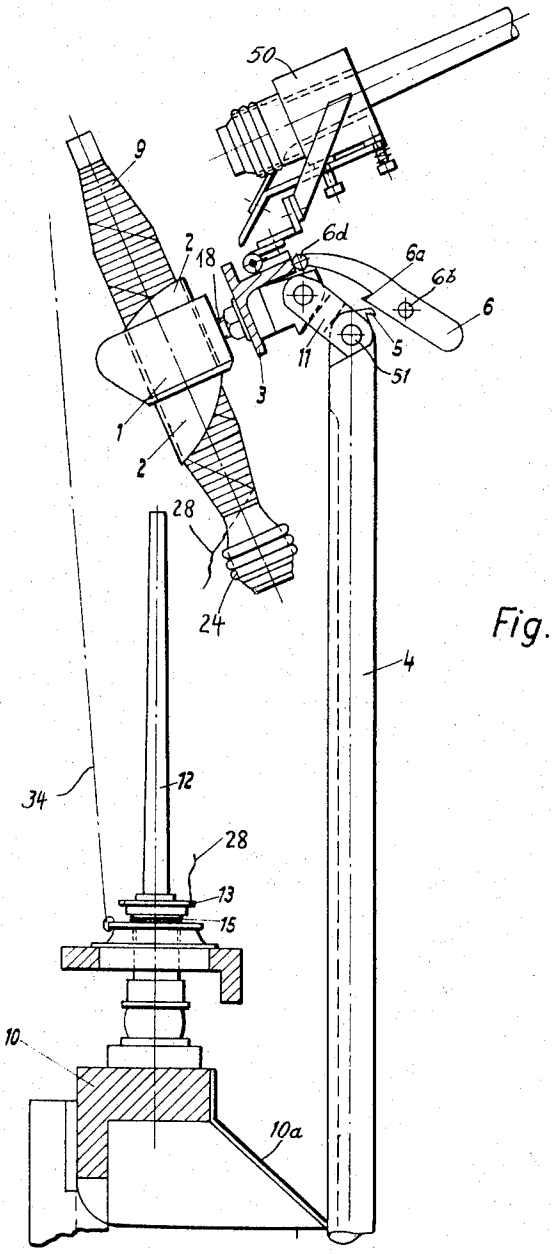

Fig. 4

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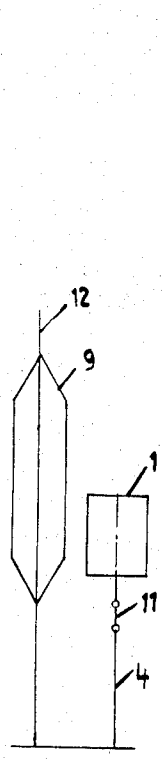

Fig. 5a

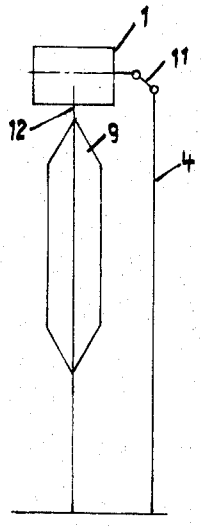

Fig. 5b

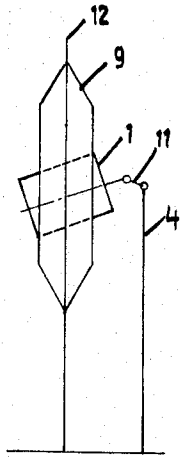

Fig. 5c

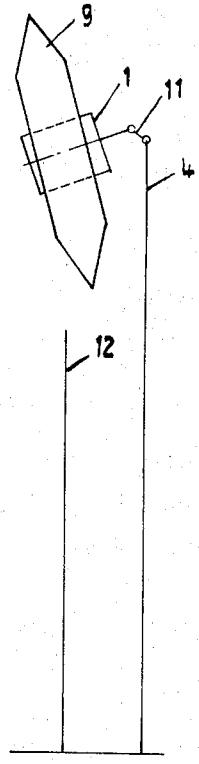

Fig. 5d

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Fig. 6

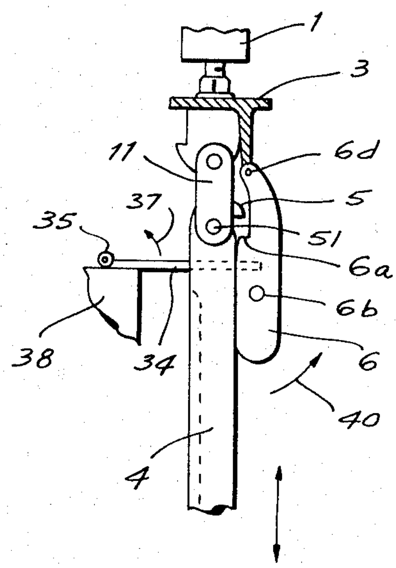
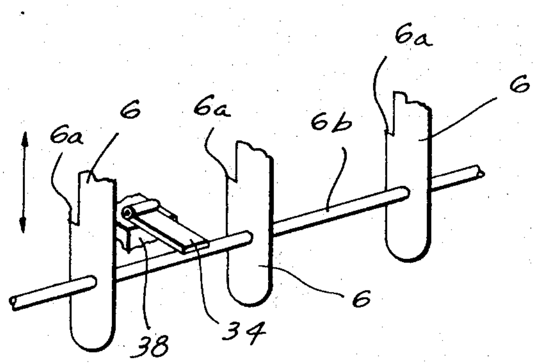


Fig. 7



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AUTOMATIC DOFFING APPARATUS

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Continuation of application Ser. No. 309,575, Sept. 17, 1963. This application Sept. 15, 1966, Ser. No. 579,787
Claims priority, application Germany, Feb. 9, 1963, M 55,737
10 Claims. (Cl. 57—52)

ABSTRACT OF THE DISCLOSURE

An at least partly resilient doffing ring is lowered into a position surrounding a cop on a spindle, and then tilted to clamp the cop by pressing the same against the spindle whereupon the doffing ring is raised with the cop above the spindle where the cop falls out of the doffing ring.

This application is a continuation of application Ser. No. 309,575, filed Sept. 17, 1963, now abandoned.

The invention concerns apparatus for the doffing, particularly automatically, of cops from the spindles of spinning frames, twisting machines and the like.

Apparatus for doffing spinning cops have become known in which the doffing process takes place by means of claws, clamp springs, balls or the like, which are secured internally of an annular body, which is adapted to be positioned around a cop on the spinning machine when doffing is required.

When using apparatus of the kind referred to above, it is necessary to grip the cop firmly and this may result in damage to the thread on the cops.

In yet a further apparatus, the cop is lifted off the spindle by means of a lever which engages the lower end of the tube of the cop. This apparatus may result, when used, in damage to the tube.

The present invention obviates these disadvantages in that the doffing member has an inner diameter which is perceptibly greater than the diameter of the cop and that for the production of a grip between the doffing member and the cop, the doffing member is placed on the cop in a position which can be adjusted aslant the main axis of the cop.

Further characteristics of the invention can be observed from the following description and from the drawings, which explain, by way of example only, doffing apparatus made in accordance with the invention.

In the drawings:

FIG. 1 illustrates a doffing apparatus according to one form of the invention;

FIG. 2 shows a doffing apparatus of modified form;

FIG. 3 illustrates doffing apparatus in the doffing position;

FIG. 4 illustrates doffing apparatus in the position assumed after the cop has been removed from a spindle;

FIGS. 5*a* to 5*d* illustrate diagrammatically the individual stages of the doffing process; and

FIGS. 6 and 7 are fragmentary views illustrating details of means for tilting the doffing means.

FIGS. 1 and 2 illustrate two doffing arrangements according to the invention.

An annular doffing means includes a rigid annular metal holder **1**, which is of circular or oval shape. The holder **1** can be rigid or flexible and may be made of rubber or plastic. If the holder is rigid, then a sleeve **2**, which preferably consists of resilient material such as rubber or plastic, may be secured in the holder **1**.

The sleeve **2** shown in FIG. 1 is a type of tube-shaped body, the upper face edge **22** or the lower face edge **23** can be chamfered angularly so that a substantially rhombic contour in side elevation results.

The sleeve **2** projects from the top and bottom of the holder **1**, the lower projection being preferably longer than the upper projection.

The inner diameter of the doffing member **1** and the sleeve **2** is preceptibly greater than the outer diameter of the cop **9**, so that, as will be described later, by locating the doffing member angularly relative to the cop **9** a gripping effect is exerted on the cop (FIG. 3).

In FIG. 2 like parts are identified by like reference numerals. The holder **1** in this case is made of metal and its face edges **19**, **20** are provided at intervals with cut-outs **25**, **26**, the transition places between the cut-outs **25**, **26**, and the flat face edges **19**, **20** are conveniently in the form of smooth curves.

If a cut-out **25** or **26** is provided on the upper and lower face edges **19**, **20**, then when wear takes place on the lower area **17** of the sleeve **2** the holder can be rotated through 180° so that nearly double the life span of the sleeve **2** results.

It is further of advantage that the sleeve **2** which is firmly secured in the holder **1** can have flat face edges **22** and **23**. Cut-outs **25**, **26** in the holder **1** are located in the region **17** and also if necessary the region **27** of the sleeve **2**, where, in use, the greatest flexion of the sleeve **2** takes place. The sleeve **2** on being placed angularly relative to the cop lies in the doffing position adjacent the foot of the cop or on the body of the yarn, and, due to the resilience thereof, engages the surface of the yarn over a considerable area to ensure efficient doffing and avoid damage to the yarn. This effect is improved in that the sleeve **2** is upwardly extended in the area **27**. The depth of the cut-outs **25**, **26** of the holder of FIG. 2 is approximately equal to the amount by which the sleeve **2** projects beyond the face edges **19**, **20** of the holder **1**.

The sleeve **2** according to the embodiment shown in FIG. 2 is also advantageously made of rubber or plastic and thus has the advantages referred to in relation to the arrangement of FIG. 1.

According to FIGS. 3 and 4 the holder **1** is secured on a rail **3** by a foot **18**. The rail **3** also carries a device **50**, not described in detail, for placing empty tubes onto the spindle **12**. The rail is pivotally connected to an intermediate link **11** which is pivotally mounted on a rack rod **4**.

The upper part of the rack rod **4** carries a nose-shaped projection **5**, which a stop-lever **6** pivotally attached to the rail **3** is adapted to engage.

The rack-rod **4** is driven by a pinion **7** which is secured to a shaft **8** carried on the machine. The apparatus co-operates with a spindle **12**, which is arranged on the spindle rail **10**. Apparatus can be arranged next to one another on the rail **3**.

In the position of rest of the apparatus the holder **1** and the rail **3** are in the position shown in FIG. 5*a*.

Rotation of the shaft **8** causes the rack-rod **4** to be moved upwardly thereby to carry the holder from the

position shown in FIG. 5*a* to a position located above cop **9**. As shown in FIG. 5*a*, the axis of holder **1** is horizontal in these positions. A pin **6***b*, which extends through several levers **6** of adjacent doffing devices as best seen in FIG. 7, passes during the upward movement a push rod **34** which is turnable about a pivot **35** in the direction of the arrow **37** in FIG. 6, but is blocked against turning movement in the opposite direction by its stationary support **38**. In the highest position, pin **6***b* is located above push rod **34**, and when shaft **8** is reversed and rack rod **4** moves downward with rail **3** and levers **6**, pin **6***b* engages push rod **34** which is blocked in this direction so that pin **6***b* slides outwardly on push rod **34**, turning levers **6** in counterclockwise direction as viewed in FIG. 6. Thus, the tilting of the holder **1** is brought about by a push rod **34** or the like which engages pin **6***b* of levers **6** and imparts to the same an impulse which is transmitted to the rail **3** over the bearing **6***d* of lever **6**. The tilting movement of the rail **3** is restricted by the locking nose **5** which latter engages in a cut-out of hook **6***a* of the lever **6** so that the holder is locked. In this first horizontal position, shown in FIG. 5*b*, the holder **1** lies co-axially above the cop **9**. Downward movement of the rack rod **4** which is also controlled by the shaft **8** and the gear wheel **7**, causes the holder **1** and sleeve **2** to be moved downwardly co-axially to the cop **9**, to a position in which the lower end of the sleeve **2** is at a position corresponding to the start of the lower cone of the yarn. In the horizontal position of FIG. 5*b*, levers **6** are turned to a position in which pin **6***b* is located outward of the free end of push rod **34** so that pin **6***b* passes push rod **34** during the downward movement.

In this operational position the stop lever **6** is freed from locking nose **5** by a push rod, not shown, or the like, similar to push rod **34** and engaging pin **6***b* during downward movement so as to provide a further impulse on levers **6** which act on rail **3**, and the holder **1** pivots, preferably by its own weight, to a tilted gripping position in which diametrically disposed engaging portions **17**, **27** press against the cop **9** and exert a gripping effect on the cop **9** (FIGS. 2, 3 and 5*c*) whose tube is pressed against the spindle **12**. In the gripping position the thread **28** lying spirally wound on the cop **9** is firmly gripped by the engaging portions of sleeve **2**, or if it is not gripped it cannot become located in the area **17**, as can be seen from FIGS. 2 and 3. The sleeve **2** becomes deformed by the foot **24** of the cop or on the body of yarn on the cop **9** in the areas **17** and **27**. The area **17** can preferably grip on the lower cone of the body of yarn.

After gripping the cop the holder **1** is moved upwardly by the rack-rod **4**.

Due to the grip exerted between the cop **9** and the holder **1**, of the sleeve **2** upon upward movement of the rack-rod **4** the cop **9** is doffed from its spindle **12** and carried upwardly beyond the spindle (FIG. 5*d*), the cop **9** being guided on the spindle until it leaves the same.

As soon as the cop **9** has become free from the spindle **12** (FIGS. 1 and 4), the pressure which caused deformation of the resilient sleeve **2** is relieved and, since the weight of the cop is insufficient to clamp it in sleeve **2** and holder **1**, the sleeve returns to its normal shape thereby slightly shaking the cop and causing it to slide from the sleeve **2** and fall away from the spindle rail, onto a downward slanted plate **10***a* secured to spindle rail **10**, and to slide on the plate **10***a* until falling onto a conveyor **10***b*, as shown in FIG. 3, provided on the machine.

A new empty tube **3***c* is placed in a donning ring **3***b* which is pivoted about a pivot means **3***a* on rail **3** to a position in which the tube is located above the spindle. A tongue **3***d* is held by spring **3***e* to lock the tube until engaged by rail **3** to release the tube which drops onto the spindle.

The apparatus according to the invention may be employed in the same manner for weft cops and for warp cops.

I claim:

1. A doffing apparatus for doffing a cop from a spindle, comprising, in combination, a doffing means having diametrically disposed engaging portions spaced from each other in longitudinal and transverse directions in relation to said spindle and consisting of a flexible resilient material, said engagng portions beng spaced in said transverse direction a distance greater than the diameter of said cop to form an opening for said cop on said spindle; operating means for moving said doffing means between a first position spaced from the end of said spindle and a second position in which said engaging portions are located on opposite sides of said cop spaced from the same in said transverse direction; and means for causing tilting of said doffing means in said second position to a tilted position in which said engaging portions engage and slightly tilt the cop to press the same against said spindle whereby the cop is gripped by said engaging portions of said doffing means, and doffed from said spindle when said doffing means is moved to said first position by said operating means so that the cop releases said spindle whereby the counterpressure exerted by the cop against the gripping pressure of said engaging portions ceases and the cop is released by said doffing means.

2. A doffing apparatus according to claim **1**, wherein said doffing means is annular and has an inner diameter greater than the outer diameter of the cop on said spindle; and wherein said engaging portions are located at opposite ends of said annular doffing means.

3. A doffing apparatus according to claim **2**, wherein said annular doffing means includes a resilient tubular sleeve having annular end portions; and wherein in said tilted position of said annular doffing means, diametrically disposed circumferentially extending portions at opposite ends of said sleeve resiliently engage opposite sides of said cop.

4. A doffing apparatus according to claim **2**, wherein said annular doffing means includes an annular rigid holding member and a resilient tubular sleeve mounted in said annular holding member and having end portions projecting from the same; and wherein in said tilted position of said doffing means, diametrically disposed circumferentially extending engaging portions of said end portions of said resilient tubular sleeve engage said cop.

5. An apparatus according to claim **4**, wherein said annular rigid holding member has annular edges formed with at least one cutout in the region of at least one of said engaging portions of said tubular sleeve and permitting flexing of the same.

6. An apparatus according to claim **4**, wherein at least one of said annular end portions of said resilient tubular sleeve has annular curved edges slanted in relation to the adjacent edge of said annular rigid holding member so that at least one of said engaging portions projects farther from said annular holding member than the remainder of said one annular end portion of said sleeve.

7. An apparatus according to claim **6**, wherein the engaging portion located near the free end of said spindle projects a shorter distance from said annular rigid holding member than the engaging portion near the base of said spindle.

8. An apparatus according to claim **4**, wherein said annular rigid holding member has annular edges; and wherein at least one of said annular end portions of said resilient tubular sleeve has an annular edge parallel to the adjacent annular edge of said annular rigid holding member.

9. An apparatus according to claim **1**, and comprising a rail adapted to extend along a row of spindles including said spindle; an arm connecting said rail with said doffing means; a support movable in longitudinal direc-

tion of said spindles; means for mounting said rail for pivotal movement of said support; wherein said operating means moves said support with said rail and said doffing means between said first and second positions; and wherein said means for causing tilting of said doffing means to said tilted position, are connected with said rail.

10. An apparatus according to claim **1**, wherein said means for causing tilting of said doffing means include means for locking said doffing means in said first position, and for releasing said doffing means in said second position for causing tilting movement of said doffing means by the force of gravity to said tilted position.

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