

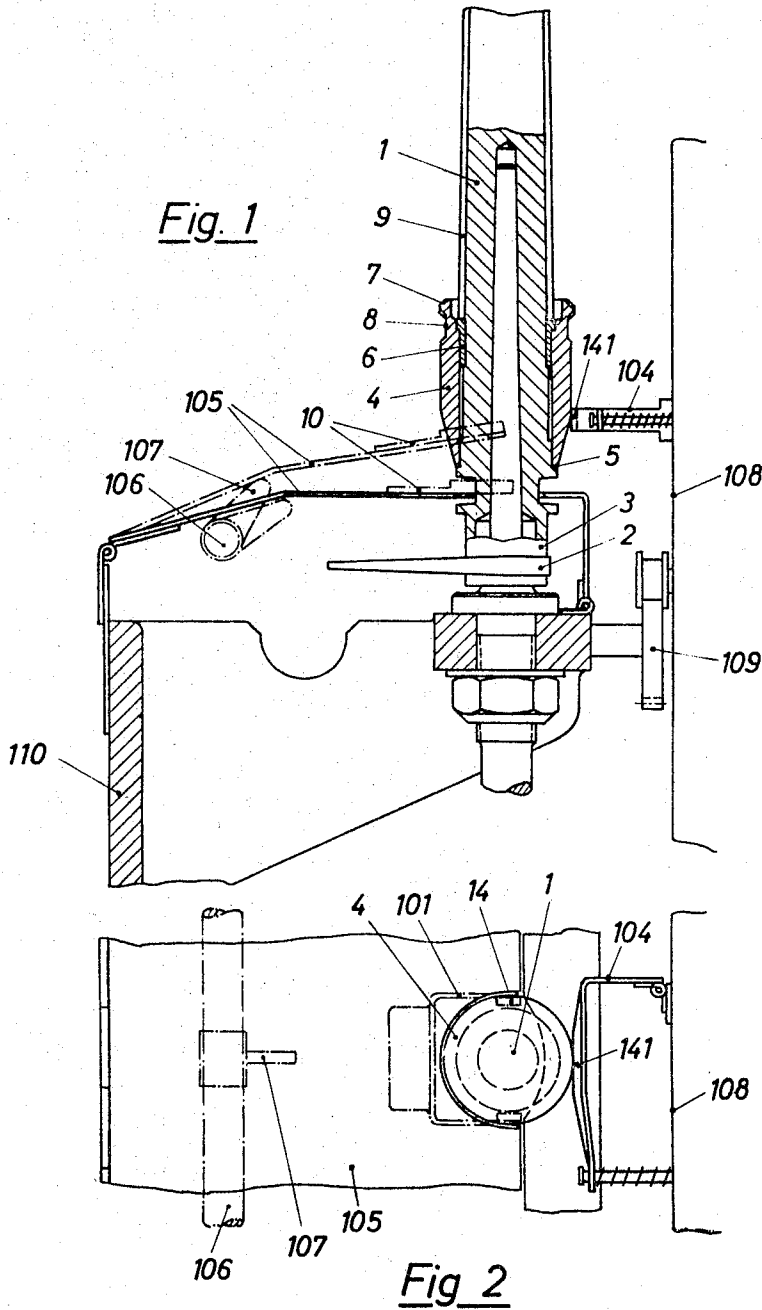
Sept. 5, 1967

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PROCESS AND DEVICE FOR THE AUTOMATIC REMOVAL OF  
UNDERWINDING THREAD REMAINERS

3,339,356

Filed Oct. 4, 1965

3 Sheets-Sheet 1



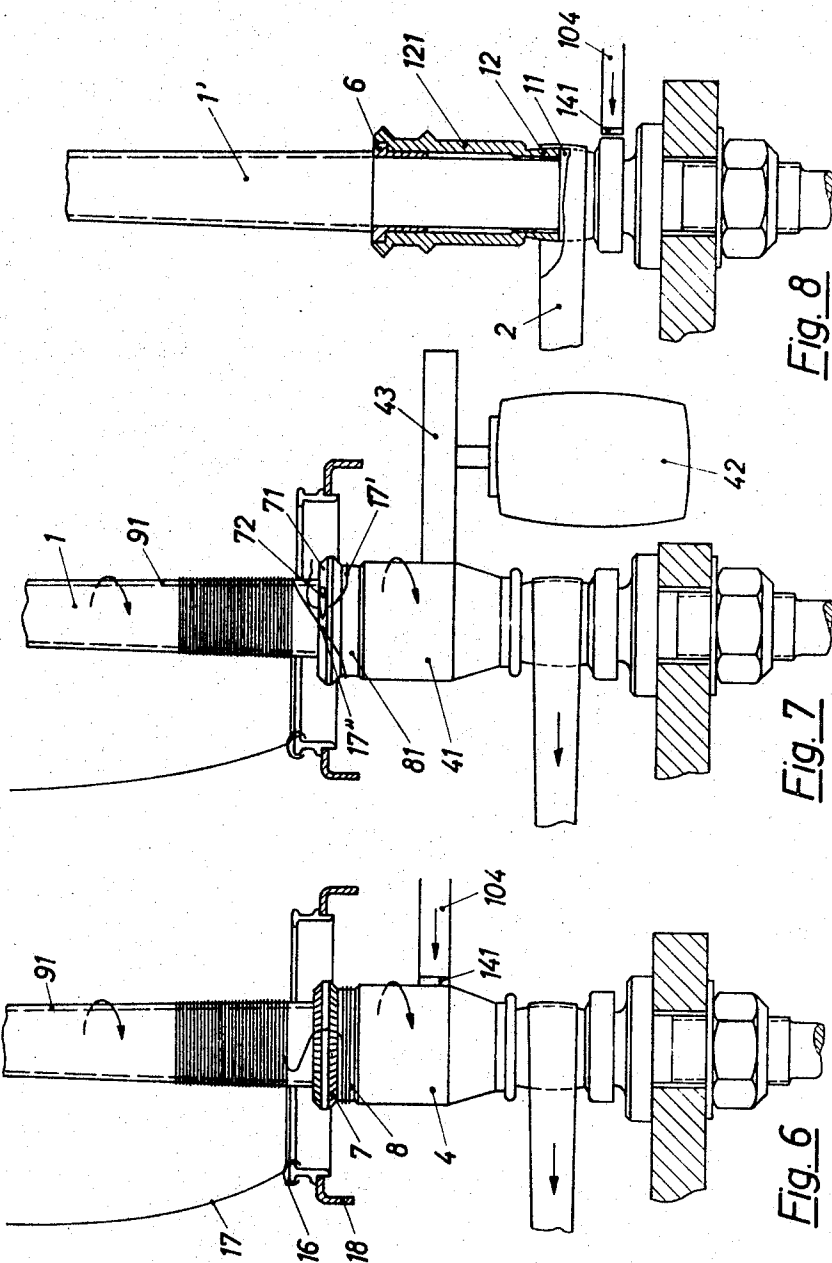
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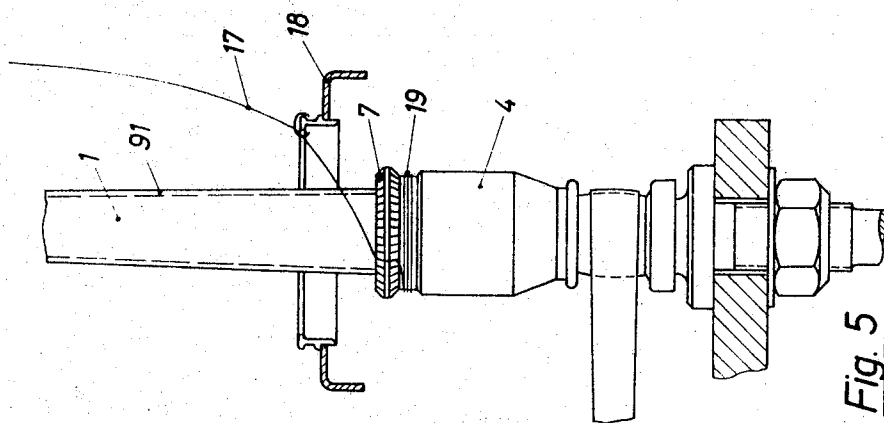


Fig. 5

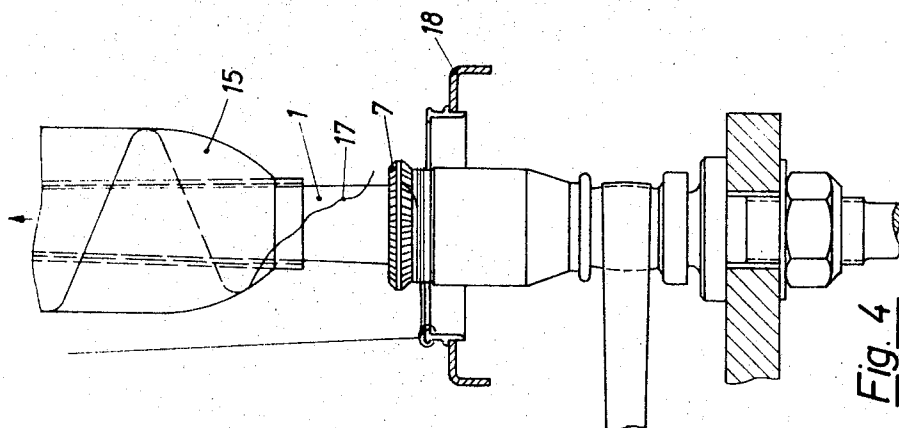


Fig. 4

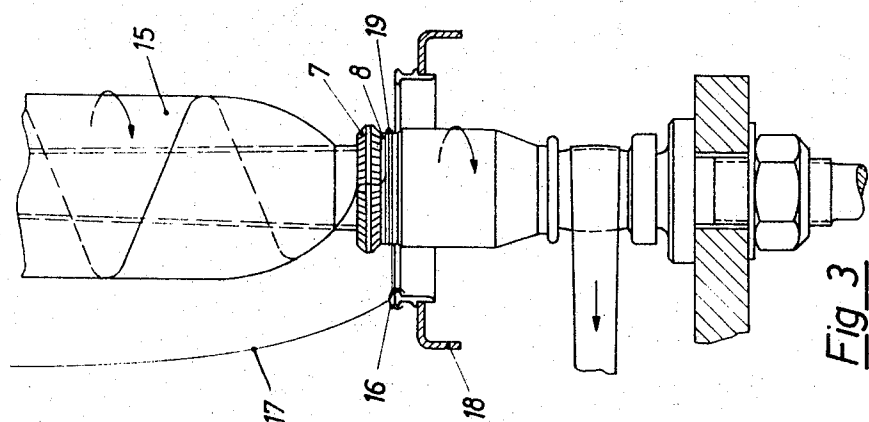


Fig. 3

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## PROCESS AND DEVICE FOR THE AUTOMATIC REMOVAL OF UNDERWINDING THREAD REMAINDERS

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5 Claims. (Cl. 57—34)

The invention refers to a process for the automatic removal of underwinding thread remainders, as well as to the devices serving for the carrying out of this process.

It is generally known to provide in spinning mills, in connection with the full spinning of a cop, an underwinding, before the full cop is removed. The underwinding has the purpose, to assure the tearing off and the clamping of the thread end, without needing to manually lay on the empty spool the remaining thread end. As well for the spinning on spool shells, as also for the automatic rewinding and replacing of cops it is necessary, to effect the underwinding not at the foot of the spinning shell, but on the spindle or respectively on a part belonging to the spindle. Therefore, it has already been proposed (German Patent 1,079,512), to provide a collar over the spindle whirl, which forms a cylindrical jacket enclosing the foot of the spool, and is connected with the spindle in rotary motion. After accumulation of a somewhat large amount of underwindings, this jacket must be pulled off and cleaned, or a new and empty jacket must be slipped on, so that this known device includes the disadvantage of a continuous manual servicing for the purpose of cleaning.

Another known device Reg. No. (utility model) 1,738,541 has as its task, to avoid the manual removal of such underwinding thread remainders thereby, that on each spindle is revolvably positioned a thread reserve tray with thread clamp for the winding up of the end threads, and thus developed, that the upper part acts as whirl-half and is driven, with equal revolutions or with lead, by the spindle hoop jointly with the spindle, over the lower whirl-half, so that the thread reserve tray through occasional brief braking of the spindle continues to run alone, or runs ahead of the spindle, whereby the thread reserves, in position of the ring rail in operating adjustment, are wound back, over the smooth edges of the thread reserve tray, onto the shell, and are wound-over through the spinning or twisting process.

On the basis of the description and of the drawings of this known device it is evident, that through the brief braking by means of a buffer, or respectively blocking of a spindle, so that the thread reserve trays continue to run alone, the spinning process is interrupted, and the thread breaks. Thus the above described device does not represent a solution of the problem in question, but contains a technical impossibility.

However, in accordance with the invention the problem at hand is solved thereby, that the underwinding takes place onto an underwinding shell, positioned loosely revolvable, over the whirl, on the spindle shaft, and that, after replacement of the cop against an empty shell, and after the thread joining has taken place, temporarily a relative speed is produced between the spindle and the underwinding shell positioned on the spindle shaft, without therein stopping the spindle. This is attained either thereby, that after the thread joining has taken place, the underwinding shell is braked down, or that to the underwinding shell is imparted a greater number of revolutions as against the spindle. Besides, after the thread

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joining has taken place, the number of revolutions of the spindle may be temporarily retarded as against the underwinding shell.

For the carrying out of the process serve various devices, wherein is provided an underwinding shell positioned loosely revolvable over the spindle whirl on the spindle shaft. This underwinding shell is entrained by its bearing friction, however, it may also be driven by the spindle hoop. The underwinding shell is thus developed that a ring groove for the underwinding, as well as at the upper rim a knurled ring padding is provided. Therein the knurled ring padding shows a sweep-back cross-section. In order to retard the spindle or respectively the underwinding shell, a suitable braking device is provided, which is either assigned to each spindle, or respectively to each underwinding shell per se, and is stationarily connected with the machine, or it is movably arranged and jointly assigned to several spindles, or respectively underwinding shells.

In the drawing are shown further details of the invention.

FIG. 1 shows a spindle with the device in accordance with the invention, in section.

FIG. 2 shows the form of execution according to FIG. 1 in top view;

FIGS. 3 to 6 show the process in accordance with the invention on the basis of the device according to FIGS. 1 and 2.

FIG. 7 shows another form of execution of the invention, wherein to the underwinding shell is imparted, after the thread joining, a greater number of revolutions as against the spindle.

FIG. 8 shows a further form of execution in cut, with divided spindle whirl.

According to FIG. 1 is driven a spindle 1 with an empty spinning shell 9 by a moving belt 2 which passes over a spindle whirl 3. In accordance with the invention, on the lower part of the spindle 1 is positioned, loosely revolvable, an underwinding shell 4. Through a buffer 5 as well as through a ring 6, pressed onto the spindle shaft, the underwinding shell 4 is secured against displacement in axial direction, and is entrained by the spindle 1 merely through the bearing friction. The underwinding shell 4 has at its upper end an annular groove 8, which is bounded along its upper side by a knurled ring portion or padding 7 that projects beyond the underwinding shell 4 diameter. This knurled ring padding 7 possesses a sweep-back cross-section and a knurled surface. It serves for the catching and holding, as well as for the separating of the thread. The ring groove 8 appropriately possesses a roughened surface. To each underwinding shell 4 a brake 10 is assigned, which, for example, is developed as a fork and directly put on the hinged cover 105 of the spindle drive housing 110. The operation of these brakes 10 occurs simultaneously through cams 107, which press against the cover 105 and urge it into the position drawn in dash and dot line. The conical part of the underwinding shell 4 is thereby clamped between the brake shoes 14 and the brake fork 10, and the rotary motion of the underwinding shell 4 is thereby retarded with respect to that of the spindle 1 and spinning shell 9. The rotation of the cam shaft 106, reaching over the entire row of spindles, may occur through an automatic device, or also manually. Instead of a mechanical braking device may of course also be used an electrical or electro-magnetical braking device. The brake means may also be developed in the form of a brake lining 141 mounted on a resilient strap 104 secured to a cop removal machine 108 arranged to travel along a guide rail 109 and during such travel to press the brake lining 141 against the underwinding shell 4

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to temporarily retard its rotary motion. (See also FIG. 2.)

FIGS. 3 to 6 show the manner of working of the device in accordance with the invention according to FIG. 1. FIG. 3 shows the cop 15 directly before the pulling-off during the underwinding. Through the ring runner 16 is therein, through lowering of the ring rail 18 over the knurled ring padding 7, the thread 17 conducted over into the groove 8 equipped with roughened surface, and wound up as underwinding reserve 19, until the machine is stopped. Therein the underwinding shell 4 has the same number of revolutions and direction of rotation because of its bearing friction as the spindle 1. FIG. 4 shows the spindle at the moment of the pulling-off of the cop 15. The thread 17 is herein pulled up with the full cop 15, drawn through the knurling of the knurled ring padding 7, so that a sliding off of the underwinding is prevented, and separated over the edge of the knurled ring padding.

In FIG. 5, an empty shell 91 is already slid onto the spindle 1. The ring rail 18 is brought into the starting position, whereby also the thread 17 is conducted over the knurled ring padding 7. Thereafter follows the joining of the thread of the new cop, wherein, again the underwinding shell 4 rotates together with the spindle. The separated thread-end is herein held fast through the underwinding, so that it is not necessary to clamp fast, as usual, the thread end remaining on the spindle, in the putting on of the empty shell. In FIG. 6 is, after restarting of the machine, the first thread layer wound up on the empty shell 91 through raising and lowering of the ring rail 18. Hereafter the braking device operates as described on the basis of FIGS. 1 and 2, so that the underwinding shell 4 is briefly braked down. Because of the now appearing relative speed between the spindle 1 and the underwinding shell 4, the underwinding thread layer 19, remained in the groove 8, is drawn off over the knurled ring padding 7, and wound on the empty shell 91. The braking down of the underwinding shell 4 may also take place at another random time. Essential for this is, that as much thread is wound up on the empty shell, that the start of the thread remains lying on the shell in the winding off of the underwinding. Since the underwinding is drawn off in the opposite direction, a thread loop is formed in the winding up onto the shell 91 which through the rigidity of the thread stands off so far, that catching at the knurled ring padding 7 is out of the question. As soon as the layer of the underwinding is wound off, the underwinding shell 4 is again released by the brake.

FIG. 7 shows a further form of execution of the invention, wherein an underwinding shell 41, in contrast to the form of execution described above, is not braked down or respectively retarded, but has imparted to it, with the aid of a motor 42, over a frictional wheel, 43 a greater number of revolutions as against the spindle 1. The upper edge of the underwinding shell 41 is not knurled, but is formed through a smooth ring padding 71, at which is attached for the catching and securing of the thread, a thread clamp 72. The thread clamp 72 consists of a catching slot or of a spring unilaterally attached. The underwinding reserve is likewise wound up, as already described, in a groove 81. Thereafter the full cop is drawn off, wherein the thread tears off between cop and underwinding shell, so that in the thread clamp 72 remains behind a thread end 17'. In FIG. 7 is shown the position just after the joining of the thread, in which after the winding up of the first thread layers the frictional wheel 43 imparts to the underwinding shell 41 an advance as against the spindle 1. Through this relative speed of the underwinding shell 41 as against the spindle 1 the underwinding thread 17'' is drawn out of the groove 81 over the smooth edge 71 and wound up on the empty shell 91 in the opposite direction, wherein the thread end 17' is finally drawn out of the thread clamp 72. After the finish of this process, the drive of the under-

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winding shell 41 is interrupted. Appropriately this drive is thus developed that the drive motor 42 with the frictional wheel 43 is guided along at the spindles with a cop removal device or with another suitable device, and thus drives one underwinding shell after another.

The device shown in FIG. 8 differs from the forms of execution already described in accordance with the invention thereby, that the spindle hoop 2 runs over a divided whirl, wherein the one whirl part 11 is connected with the spindle 1' and the other whirl part 12 with the underwinding shell 121. The underwinding shell 121 is loosely revolvable seated on the spindle 1', is, however, driven jointly with the spindle through the spindle hoop 2. The manner of working of this device is essentially the same as already described. The relative speed necessary for the winding off of the underwinding is, however, here attained through braking down of the spindle through a suitable braking device, while the underwinding shell 121 is continued to be driven by the spindle hoop 2. Therein it is necessary, to brake down the spindle 1' only so far, that the winding off of the underwinding occurs, however the spindle still maintains a number of revolutions, which permits the continuation of the spinning process. Since the winding off of the underwinding is only of very short duration, the wire change briefly occurring through the braking down of the spindle, may be put up with. Through the processes described in accordance with the invention is not only attained, that the removal of the underwinding thread remainders occurs automatically, but through the complete back winding of the underwinding on the cop yarn losses through the underwinding are completely avoided.

We claim:

1. An apparatus for the automatic removal of underwinding thread remainders, which comprises a base means, a spindle supported by said base means for rotation relative thereto, a cop shell bobbin releasably mounted on said spindle for rotation therewith to wind and accumulate a quantity of thread, an underwinding shell bobbin mounted on said spindle in frictional contact therewith to rotate with said spindle to wind and accumulate a limited quantity of thread in excess of the capacity of said cop bobbin, said underwinding bobbin and spindle being capable of differential rotation relative to each other to transfer thread accumulated on said underwinding bobbin after filling a first cop bobbin to a new cop bobbin on said spindle, and braking means supported by said base means and disposed for movement relative thereto into a position of frictional engagement with said underwinding bobbin to retard the rotation thereof with respect to the base means and thereby impart differential rotation between said underwinding bobbin and such new cop bobbin to transfer thread accumulated on the former to the latter.

2. The apparatus according to claim 1 wherein said braking means includes a brake member pivotally connected to said base means and a cam disposed for movement relative to said base means to engage said brake member and urge same into a position of frictional engagement with said underwinding bobbin.

3. The apparatus according to claim 1 wherein said braking means includes a resilient brake member mounted to a cop bobbin removal means and disposed for movement therewith along a rail supported by said base means.

4. The apparatus according to claim 1 wherein said underwinding bobbin has a knurled annular portion disposed to grip the thread portion leading from the final winding on said cop bobbin to the initial winding on said underwinding bobbin to prevent unwinding of thread accumulated on said underwinding bobbin after said thread portion is severed.

5. The apparatus according to claim 1 wherein said braking means includes a motor mounted to said base means and a wheel driven by said motor and disposed for contact with said underwinding bobbin to apply

thereto frictional forces opposing the rotation of said underwinding bobbin in the same direction as the spindle to impart differential rotation therebetween.

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