Sept. 27, 1938. W. SIEGENTHALER 2,131,148

WINDING DEVICE FOR WINDING MACHINES

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Fig. 1

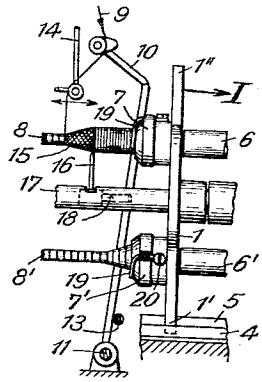


Fig. 2

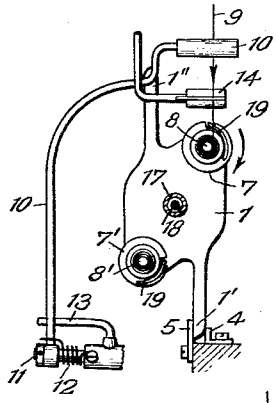


Fig. 3

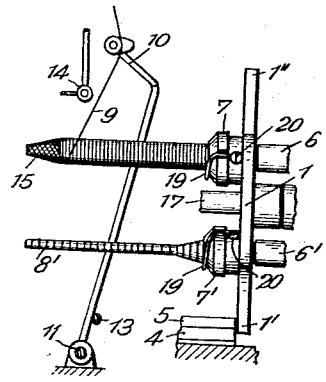


Fig. 5

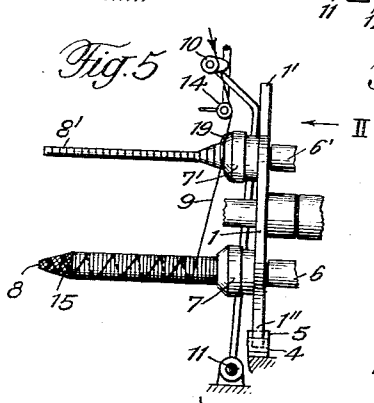


Fig. 6

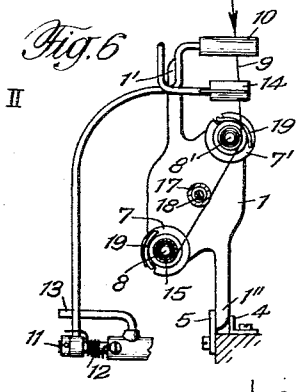


Fig. 4

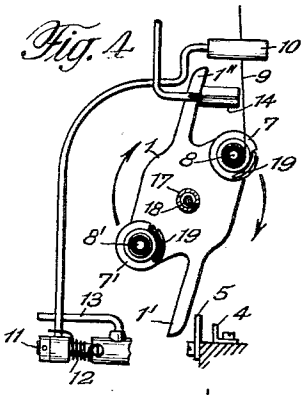


Fig. 7

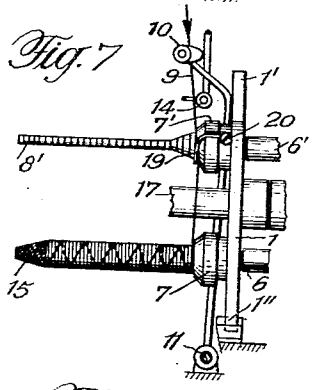


Fig. 8

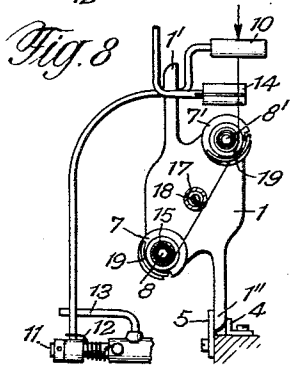


Fig. 9

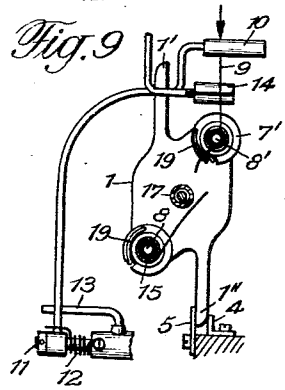


Fig. 10

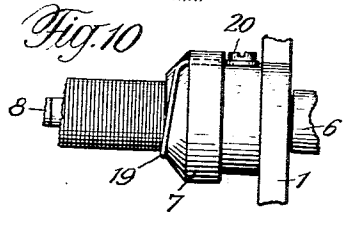
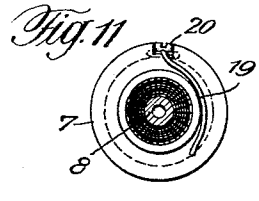


Fig. 11



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Fig. 12

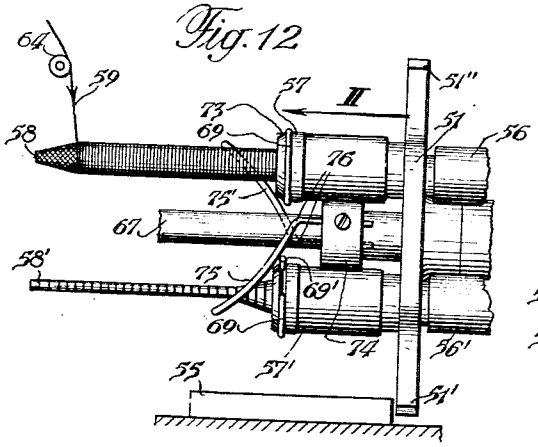


Fig. 13

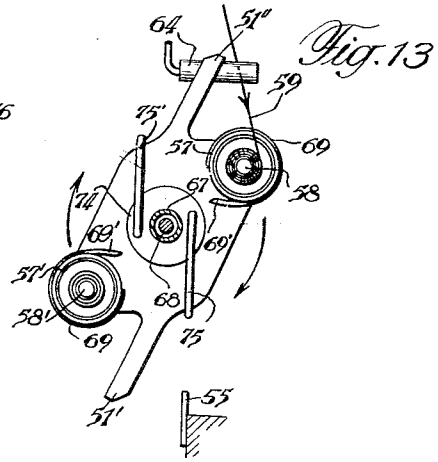


Fig. 14

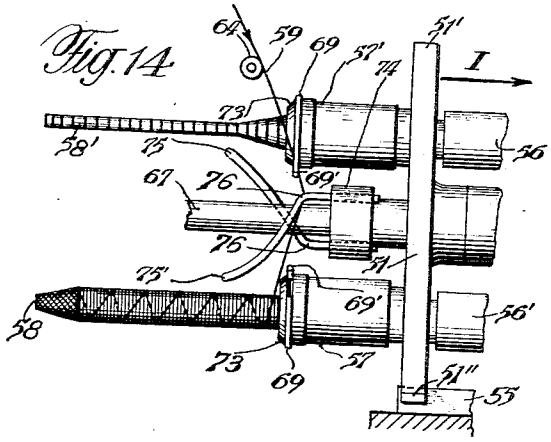


Fig. 15

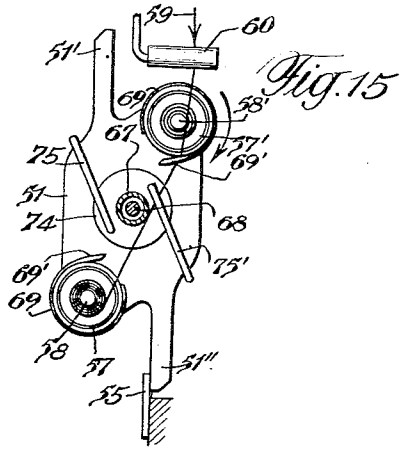


Fig. 16

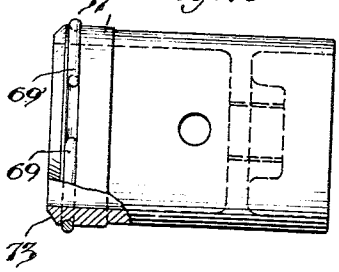
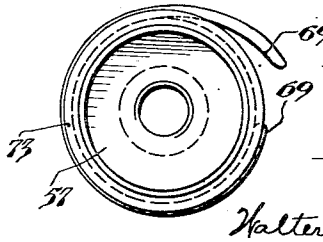


Fig. 17



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Fig. 18

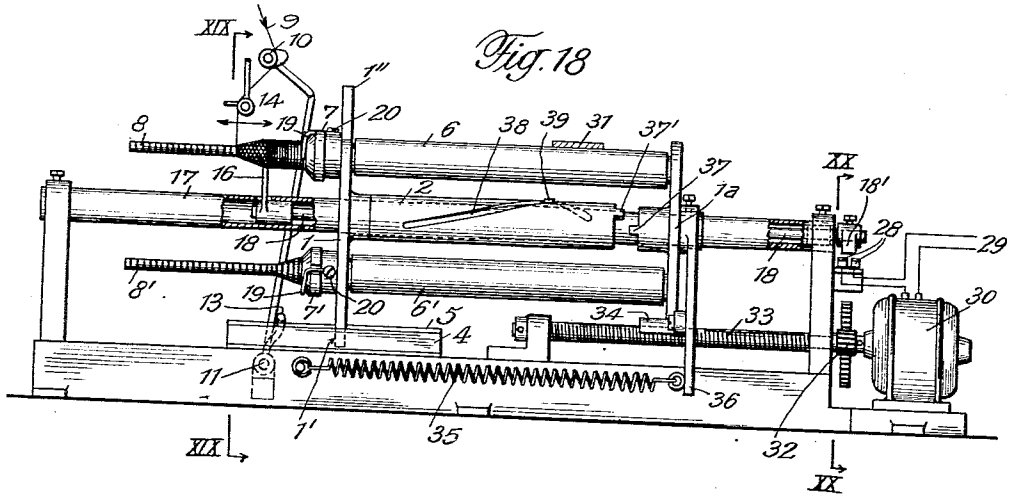


Fig. 19

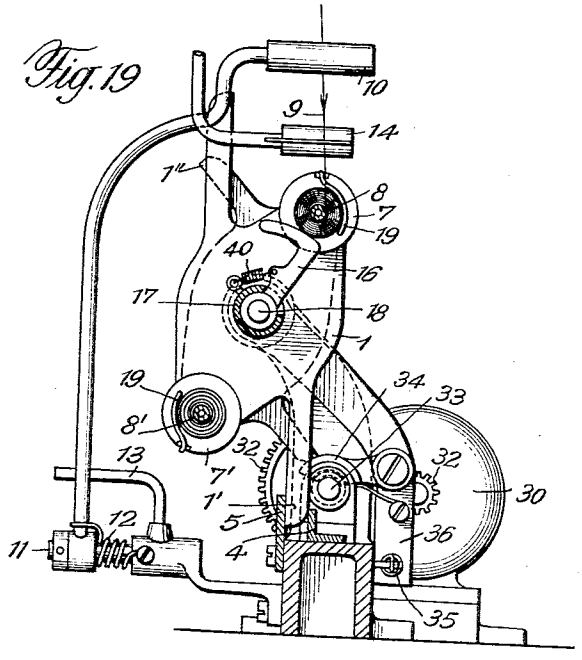
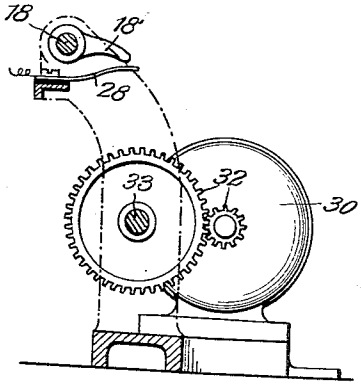


Fig. 20



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Patented Sept. 27, 1938

2,131,148

UNITED STATES PATENT OFFICE

2,131,148

WINDING DEVICE FOR WINDING MACHINES

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Application December 11, 1936, Serial No. 115,420
In Switzerland December 28, 1935

8 Claims. (Cl. 242—27)

This invention relates to winding devices particularly for initiating the winding operation in winding machines wherein the empty winding carriers are successively moved into winding position.

According to the present invention, in the device for initiating the winding operation in winding machines the end portion of the winding thread on the winding carrier leaving the winding position is moved, for being caught, on the path of a moving thread catch, by cooperation of a movable thread guide with a movable thread deflector, whereupon the thread is directed onto the next succeeding winding carrier to be wound. By this means it is rendered possible to automatically transfer the winding operation, in a perfect manner, from the spool leaving the winding position to the empty spool arriving at this position.

In the accompanying drawings two embodiments of the device according to the invention are illustrated by way of example only, in which

Fig. 1 shows a side elevation of a first embodiment shortly after the beginning of a new winding;

Fig. 2 is a front elevation of Fig. 1;

Fig. 3 shows a side elevation similar to Fig. 1 with the winding completed;

Fig. 4 is a front elevation of Fig. 3;

Figs. 5 and 6 show in a side and a front elevation respectively the manner in which the winding thread is changed over from the finished to the empty spool;

Figs. 7 and 8 show in a side and a front elevation respectively the manner in which the winding thread is caught for being passed over to the empty spool;

Fig. 9 is a front elevation illustrating the manner in which the winding thread is severed in the space between the finished and the empty spool;

Figs. 10 and 11 show on a larger scale in a side and a front elevation respectively the spindle head receiving the spool to be wound and carrying the thread catch;

Fig. 12 is a side elevation of a second embodiment on the termination of the winding;

Fig. 13 is a front elevation of Fig. 12;

Figs. 14 and 15 show a side and a front elevation respectively after the thread is passed over from the completed winding to the empty spool;

Fig. 16 is an elevation partly in section of the head of a winding spindle provided with the thread catch, on a larger scale;

Fig. 17 is a front elevation of Fig. 16;

Fig. 18 is an organization drawing of the winding machine to which the winding device according to the invention is applied;

Fig. 19 is a section on the line XIX—XIX in Fig. 18, and

Fig. 20 is a section on the line XX—XX in Fig. 18.

Let it be assumed that the winding machine is a cop winding machine the frame of which is shown in Fig. 18 and which, in the first embodiment of the invention, is provided with a face plate 1 with which, by means of a hollow spindle 2, a second face plate 1a is connected. This supporting carriage frame 1, 1a, 2 is mounted, by means of its hollow spindle 2, on a stationarily arranged hollow carrier spindle 17 longitudinally of which the supporting carriage frame is fed by steps in the direction indicated by arrow I in Fig. 1 during the cop building operation in dependence of this operation. The face plate 1 is provided with two arms 1' and 1'' projecting from the plate in the plane thereof, the former arm entering between two guide rails 4, 5 (Fig. 2) so that the supporting carriage frame is accordingly steadied. In the supporting carriage frame, two diametrically opposed winding spindles 6, 6' are mounted which at their working ends each carry a spindle head 7 and 7' respectively. These heads serve for receiving spools or cop tubes 8 and 8' respectively in such a way that the individual spool is removably inserted in the respective head, the latter being provided with holding means for the tubes. The winding spindle 6 occupying the winding position is driven by a driving belt 31 which may suitably pass across a series of winding devices as individually shown in the drawings and mounted side by side on one and the same machine frame.

The winding thread 9 passes across a thread guide 10 which is mounted on a stationary bolt 11 and is acted upon by a torsion spring 12 by which the thread guide 10 is maintained in engagement with a stationary stop 13 (Figs. 1, 3, 18 and 19). The winding thread 9 passes in addition across a thread deflector 14 which reciprocates, as indicated by the double arrow in Fig. 1, during the operation of the machine, at a constant throw corresponding to the traverse at the winding cone. As is evident from Fig. 1, a thread feeler member 16 cooperates with the winding 15 being formed and projects through a slot of the hollow spindle 17 and is secured to a spindle 18 mounted in the hollow spindle 17 by means of roller bearings. The thread feeler member 16, which is rockably mounted by means

of its carrier spindle 18 against spring action, can be rocked by contact with the winding 15, thereby each time initiating the feed movement of the supporting frame one step with the aid of the means shown by way of example in Figs. 18 and 20. This means comprises, in the present instance, a contact arm 18' secured to the end of the spindle 18 remote from the feeler member 16 for cooperation with two contact blades 28 each of which is connected to one of the leads 29 of an electric motor 30. Thus, when the feeler member 16 is rocked against its loading spring 40, the arm 18' bears against the two contact blades 28, thereby closing a circuit through the motor 30 for operating the same. The running motor turns, through the intermediary of a gearing 32, a revolubly mounted screw spindle 33 disengageably intermeshing with a screw threaded clutch member 34. In this way the supporting carriage frame is moved towards the motor, until the contact arm 18' recedes from the contact blades again by action of the feeler member and the motor circuit is thereby broken. The motor is thus stopped and the supporting frame, after having completed a feed step, is set at rest.

When the winding 15 has attained the desired length, the face plate 1 passes with its arm 1' beyond the respective end of the guide rails 4, 5, as shown in Fig. 3. At this time, the supporting frame is rocked, advantageously automatically, about its carrier spindle 17 for half a revolution in the direction of the arrow shown in Fig. 4. This rocking movement of the supporting frame, which is then no longer guided by the rails 4, 5, is initiated by the turning belt 31 imparting a driving impulse to this frame by the tension and driving traction of the belt. Incidental thereto the clutch member 34 is moved out of mesh with the screw spindle 33, so that a tension spring anchored at its ends to the machine frame and a non-revoluble arm 36 of the supporting frame respectively becomes operative to return the latter into initial position. During the initial stage of this return movement dogs 37 on the hub of plate 1a engage with mating dogs 37' on the sleeve 2. As the supporting frame returns bringing with it sleeve 2, the latter is simultaneously rocked through 180° by reason of the engagement of its helically curved slot 38 and a guide roller 39 mounted on the stationary hollow shaft 17, all as more explicitly explained in my cognate application Ser. No. 115,419, filed of even date herewith.

During this rocking movement the winding spindle 6 is bodily rocked away from the winding position with the completed cop 15 mounted thereon and in its place the winding spindle 6' carrying the empty winding spool or cop tube 8' is placed into winding position and this spindle is automatically engaged with the driving belt 31 and, consequently, is turned.

The rocking movement of the supporting frame is limited by the arm 1'' of the face plate 1 hitting the guide rail 5. During the supporting member being thereupon again fed by steps, the arm 1'' of the face plate 1 arrives at the guide rail 4, so that from there on it enters between the two guide rails 4 and 5, as indicated in Fig. 6, and is thus locked against further rocking in either direction in the new position of adjustment. At the beginning of the said turning movement of the supporting carriage frame the winding thread 9 is retracted from the respective side of the thread deflector 14 by the gyrating cop 15, as shown in Fig. 4, and is thereby temporarily moved out of the path of this deflector.

During the longitudinal displacement of the supporting frame into its initial position, in the direction of arrow II in Fig. 5, the face plate 1 of the carriage frame hits the thread guide 10 which is then rocked away from its stop 13, this being permitted by yielding of the torsion spring 12, so as to change its relative position to the reciprocating thread deflector 14. Thereupon, the winding thread 9 is contacted against the opposite side of the thread deflector 14, as shown in Fig. 5. The winding thread 9, which during the said displacement of the supporting frame (in the direction of arrow II in Fig. 5) is wound about the windings present on the cop tube 8 in widely spaced convolutions, is then moved by the thread deflector 14 into the path of a thread catch 19 arranged on the head 7' of the winding spindle 6', as evident from Fig. 5. The supporting head 7 of the winding spindle 6 is also provided with the same kind of thread catch 19 which is composed of a spring arm secured at one of its ends to the respective spindle head by means of a screw 20, the spring arm bearing with a point of its free length on the spindle head, thereby exerting a clamping effect at 21 (Fig. 11). At the point of clamping 21 the thread is held to the thread catch 19 of the spindle head 7' in loop-shape, as shown in Fig. 8.

Then, as evident from Fig. 9, the thread is torn apart due to tension action on its length between the spindle heads 7 and 7', that is, between the wound and the empty cop tubes 8 and 8' respectively in which way the connection between the winding on the cop tube 8 and the spindle head 7' is interrupted. After the winding thread has been caught by the thread catch 19 of the spindle head 7' in the manner shown in Fig. 6, it is retracted laterally from the respective side of the thread deflector 14 in the corresponding direction by the spindle head 7' turning about its own axis. Thereupon, the winding thread passes to the other side of the thread deflector 14 again, and the thread guide 10 assumes the position as shown in Figs. 7 to 9. The winding thread is then shifted inwardly on said guide the more the thread, due to the spindle head 7' turning, approaches the cop tube 8', and is then wound on the cop tube.

In this position of the parts, the device has reassumed its initial condition of operation in order to wind the thread in a cop onto the empty tube 8' in the manner previously explained. During this winding operation the completed wound cop is doffed from the winding head 7 and replaced by an empty cop tube. This empty tube is moved into the position of winding automatically, on the winding carried by the cop tube 8' being completed, by means of the movements taking place again in the manner previously explained, while the completely wound cop is moved away from the winding position in a gyrating movement. During the simultaneous turning movement of the supporting carriage frame through half a revolution the arm 1' of the face plate 1 of the supporting frame is rendered operative again.

A modification from the construction described is represented by the second embodiment which is shown in the Figs. 12 to 17 and in which on the individual winding spindle a ring providing the thread catch is clamped, the ring acting to catch the thread, carried by the winding spindle passing out of the winding position, by means of

a projecting arm, in order to let it wind on the other winding spindle having arrived at the winding position.

In the second embodiment, the direction of feeding the supporting carriage frame 51, 52 by steps in dependence on the cop building movement is indicated in Fig. 14 by the arrow I. As shown in Fig. 15, the arm 51'' of the face plate 51 engages the rail 55 in which way the supporting frame is secured against turning. The cop tubes 58, 58' may be pushed on spindles secured to the heads 57 and 57' respectively and projecting out of the corresponding head. With the winding of a cop under formation, a thread feeler member (not shown) cooperates which, with the aid of proper means, for example similar to those described in connection with the first embodiment, initiates the feeding of the supporting frame 51, 52 step by step. The feed operation may be effected entirely mechanically or by aid of an electric motor.

On the heads of the two winding spindles 56 and 56', in circumferential grooves, thread catches 69, 69 are arranged and which are formed by open ended springy annuli one end of each of which provides a projecting arm-shaped catch 69' for the thread. These springy annuli are insertable in circumferential grooves on the spindle heads by expanding them over conical end portions 73 (Fig. 16) on the front face of the respective winding spindle and are maintained in inserted position by clamping action. This arrangement permits of readily mounting the springy annuli on the winding spindle and of interchanging them, if desired. At the end shown, the supporting carriage frame 51, 52 is provided with a head 74 situated on the axis of the shaft 52 and provided with guide arms 75, 75' for the thread each of which is arranged in one of two diametrically opposed bores. The guide arms 75, 75' are rectilinear at their connecting ends and are curved from a knee 76 formed therein up to the outer end thereof.

When the winding is finished, the face plate 51 moves beyond the respective end of the rail 55, as shown in Fig. 12. In this position of the parts, the supporting carriage member is turned, advantageously automatically, clockwise through half a revolution by the aid of means (not shown) about its carrier spindle 67, as indicated in Fig. 13. Incidental thereto the supporting carriage frame is retracted into initial position by spring action, as indicated in Fig. 12 by the arrow II. In the positions of the parts as shown in the Figs. 14 and 15, this combined rocking and longitudinal displacing movement of the supporting frame has taken place already, while the winding spindle 56 together with the completely wound cop tube 58 has been turned away from the winding position and the winding spindle 6' carrying the empty tube 58' has been turned into the winding position instead. In this position, the winding spindle is automatically moved into operative engagement with a driving element and, consequently, is then actuated. As a driving element, a driving belt, such as the belt 31, may be used which cooperates each time with the winding spindle occupying the winding position.

The rocking movement of the supporting carriage frame is limited by the arm 51'' of the face plate 51 abutting the rail 55, as evident from Figs. 14 and 15, in which way the supporting frame is subsequently locked again against unintentional rocking. At the beginning of the said rocking movement of the supporting carriage frame 52, the winding thread 59 is retracted laterally from the thread deflector 64 by the cop tube 58 carrying out a gyrating movement and is temporarily moved out of the path of movement of this deflector. During the displacement of the supporting frame in the direction of the arrow II in Fig. 12 into its initial position, the winding thread 59 is wound about the winding on the tube 58 in widely spaced convolutions and enters into the path of movement of the guide arm 75' along which it slides up to the knee 76. During this sliding movement the winding thread 59 also enters into the path of movement of the projecting arm-shaped catch 69' of the thread catch 69, provided on the winding spindle 56', to be caught thereby, and subsequently to be firmly arrested between the thread catch 69 and the head 57' of the winding spindle 56, in order to then be wound on the cop tube 58' occupying the winding position.

The thread is, on the other hand, afforded a certain amount of support by the knee 76 of the thread guide 75', particularly, since this knee 76 is positioned axially behind the head of the winding spindle and consequently also relative to the place on the winding spindle 56' at which the winding thread is caught. In this way the thread is accordingly laterally deviated relative to the thread deflector 64 and to the cop tubes during its passage from the completely wound cop tube 58 to the empty cop tube 58'. Therefore, the winding thread is passed over in safe manner from the completely wound cop tube to the empty cop tube, severance of the thread dependably between the two tubes being thus accomplished.

Thereupon, the cop tube 58' is wound and the cycle of operations as explained is repeated. The finished cop moved out of the winding position is removed from the respective spindle which operation can be carried out at any desired time during winding of the cop tube 58' then occupying the working position but, obviously, prior to completely finishing this cop.

On the head 57 of the winding spindle 56 again an empty cop tube is mounted which is rocked into the winding position during the next following rocking movement of the supporting frame and the simultaneous gyrating movement of the winding spindles into winding position. During this rocking movement of the supporting frame the thread guide 75 obviously is rendered operative to direct the winding thread towards the thread catch 69 of the winding spindle 56. Waste thread material sticking to the thread catch 69 of the individual winding spindle can be readily removed by turning the thread catch by hand in a direction to cause the waste thread material to enter the gap between the open ends of the springy annulus.

The completely wound cop tube starts on the gyrating movement at full rotational speed and the empty cop tube is given the full rotational speed by the driving belt before arriving at the winding position, so that when occupying the winding position the winding operation can be immediately begun at constant working speed. The term winding spindle is to be understood in the widest sense of this word and may, depending upon conditions, also have reference to a winding carrier connected with a driving spindle but performing the gyrating movement without the driving spindle.

The device according to the invention can also be applied to winding machines without provid-

ing a gyrating movement of the winding spindles alternately passing into winding position.

I do not limit myself to the particular size shape, number or arrangement of parts as shown and described, all of which may be varied without going beyond the scope of my invention as shown, described and claimed.

What I claim is:

1. In a winding device for winding machines, winding spindles alternately movable into a winding position, a spool mounted on the winding spindle occupying said winding position for receiving a winding of thread-like material, a thread catch and a correlated thread deflector associated with the individual winding spindle, means for simultaneously feeding an empty spool, mounted on a second winding spindle to, and discharging said wound spool, mounted on said first spindle from, said winding position through circular paths incidental to which said thread deflector associated with said first spindle deviates the discharging circularly moving thread end portion onto the path of said thread catch associated with said empty spool to be directed by said catch onto the latter spool having arrived at said winding position.

2. In a cop winding machine, the combination of a carriage having means for removably mounting a plurality of spools thereon, means for automatically, progressively, intermittently moving said carriage longitudinally in dependence on the condition of a cop being wound on one of said spools, means for automatically rotating said carriage and returning it to its original longitudinal position upon completion of each cop winding operation, to bring the other spool into position for winding, a uniformly reciprocatory thread deflector, a thread catch mounted to rotate with said empty spool, a thread guide, means for periodically moving said thread guide to direct the thread being wound to said thread catch as the empty spool comes into winding position, whereby the thread is broken between the full and empty spools by the tractive forces of said spools.

3. In a cop winding machine, the combination of a carriage having means for removably mounting a plurality of spools thereon, means for automatically, progressively, intermittently moving said carriage longitudinally in dependence on the condition of a cop being wound on one of said spools, means for automatically rotating said carriage and returning it to its original longitudinal position upon completion of each cop winding operation, to bring the other spool into position for winding, a uniformly reciprocatory thread deflector, a thread catch mounted to rotate with said empty spool, said thread being moved transversely off of the thread deflector, a thread guide, means for moving said thread guide to direct the thread into the path of the thread catch of the empty spool, the thread being then broken by the tractive forces of the spools.

4. In a cop winding machine, the combination of a carriage having means for removably mounting a plurality of spools thereon, means for automatically, progressively, intermittently moving said carriage longitudinally in dependence on the condition of a cop being wound on one of said spools, means for automatically rotating said carriage and returning it to its original longitudinal position upon completion of each cop winding operation, to bring the other spool into position for winding, a uniformly reciprocatory thread deflector, each spool having a thread catch mounted to rotate therewith, each catch having an arm diverging from the spool mounting means for leading the thread to a clamping point formed by the thread catch and its mounting, a thread guide, means for periodically moving said thread guide to direct the thread being wound to said thread catch as the empty spool comes into winding position, whereby the thread is broken between the full and empty spools by the tractive forces of said spools.

5. In a cop winding machine the combination of a carriage having a plurality of spindles mounted therein, each spindle having a head for removably mounting a spool, means for automatically, progressively, intermittently moving said carriage longitudinally in dependence on the condition of a cop being wound on one of said spools, means for automatically rotating said carriage and returning it to its original longitudinal position upon completion of each cop winding operation, to bring the other spool into position for winding, a uniformly reciprocatory thread deflector, a thread catch mounted on each spool mounting head, each catch having an arm diverging from the spool mounting means for leading the thread to a clamping point formed by the thread catch and its spool mounting head, a thread guide, means for periodically moving said thread guide to direct the thread being wound to said thread catch as the empty spool comes into winding position, whereby the thread is broken between the full and empty spools by the tractive forces of said spools.

6. In a cop winding machine the combination of a carriage having a plurality of heads for the removable mounting of spools, means for automatically, progressively, intermittently moving said carriage longitudinally in dependence on the condition of a cop being wound on one of said spools, means for automatically rotating said carriage and returning it to its original longitudinal position upon completion of each cop winding operation, to bring the other spool into position for winding, a uniformly reciprocatory thread deflector, each spool mounting head having a conical end portion and having a peripheral groove adjacent said conical portion, a thread catch comprising an open resilient ring clamped in said groove, each thread catch having an arm diverging from its spool mounting head, for leading the thread to a clamping point formed by the thread catch and its mounting, a thread guide, means for periodically moving said thread guide to direct the thread being wound to said thread catch as the empty spool comes into winding position, whereby the thread is broken between the full and empty spools by the tractive forces of said spools.

7. In a cop winding machine the combination of a carriage having means for removably mounting a plurality of spools thereon, means for automatically, progressively, intermittently moving said carriage longitudinally in dependence on the condition of a cop being wound on one of said spools, means for automatically rotating said carriage and returning it to its original longitudinal position upon completion of each cop winding operation, to bring the other spool into position for winding, a uniformly reciprocatory thread deflector, each spool having a thread catch mounted to rotate therewith, each catch having an arm diverging from the spool mounting means for leading the thread to a clamping point formed by the thread catch and its mounting, a rotatable thread guide adapted to engage the thread in rotating, said thread guide guiding the thread

into the range of movement of the thread catch of the empty spool, the thread being then broken by the tractive forces of the spools.

8. In a cop winding machine the combination of a carriage having means for removably mounting a plurality of spools thereon, means for automatically, progressively, intermittently moving said carriage longitudinally in dependence on the condition of a cop being wound on one of said spools, means for automatically rotating said carriage and returning it to its original longitudinal position upon completion of each cop winding operation, to bring the other spool into position for winding, a uniformly reciprocatory thread deflector, each spool having a thread catch mounted to rotate therewith, each catch having an arm diverging from the spool mounting means for leading the thread to a clamping point formed by the thread catch and its mounting, a rotatable thread guide adapted to engage the thread in rotating, said thread guide having a knee which provides the thread in the range of movement of the thread catch with the necessary support for the clamping of the thread by the catch, said thread guide guiding the thread into the range of movement of the thread catch of the empty spool, the thread being then broken by the tractive forces of the spools.

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