Sept. 27, 1938. W. SIEGENTHALER 2,131,147

COP WINDING MACHINE

Filed Dec. 11, 1936 2 Sheets-Sheet 1

Fig. 1

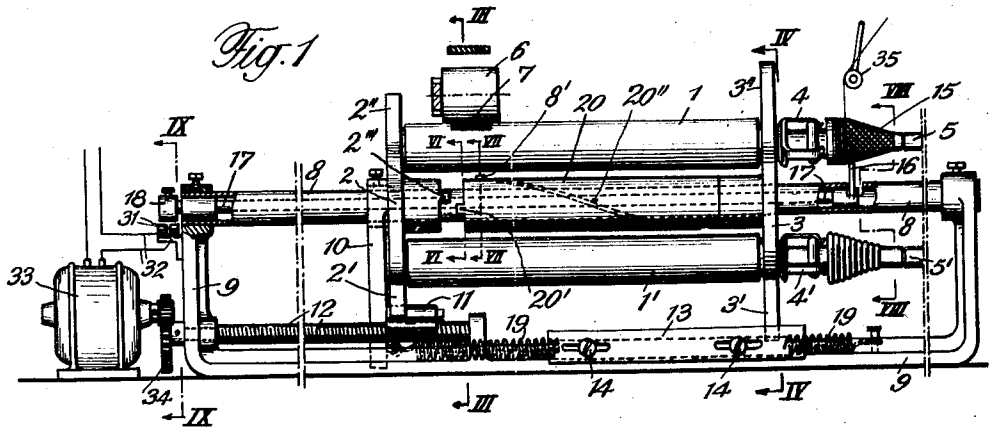


Fig. 2

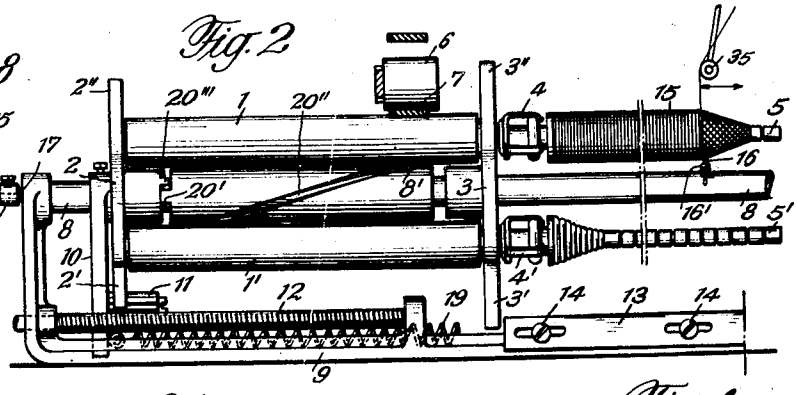


Fig. 8

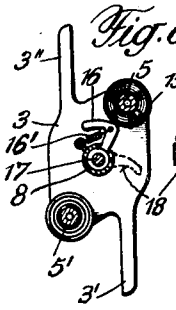


Fig. 3

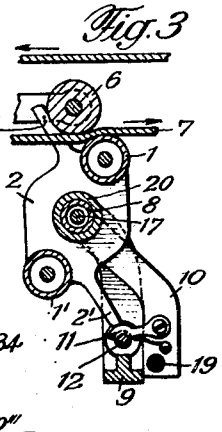


Fig. 9

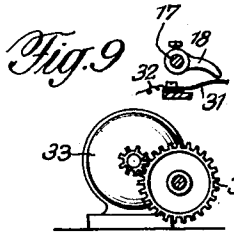


Fig. 5

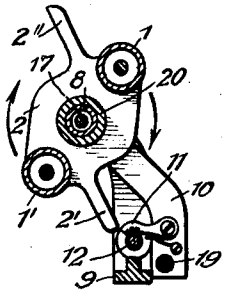


Fig. 4

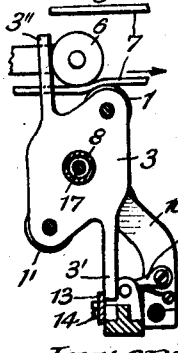


Fig. 6

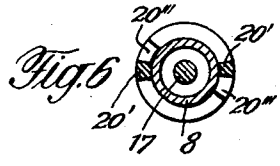
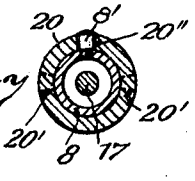


Fig. 7



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Fig. 10

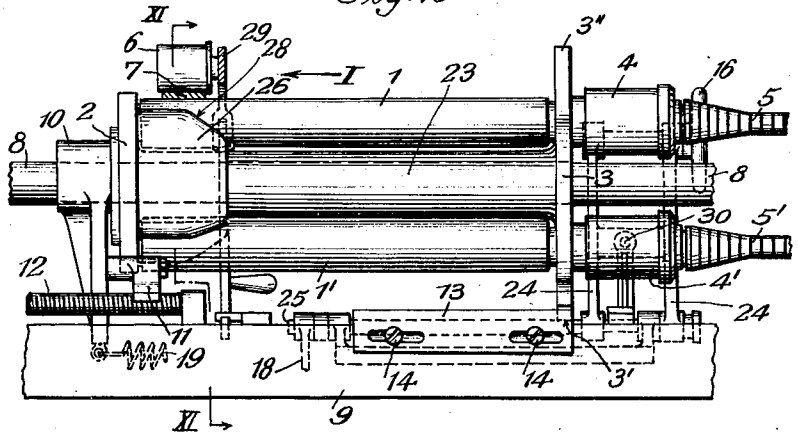


Fig. 11

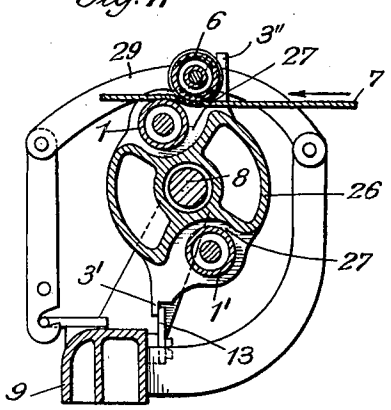


Fig. 12

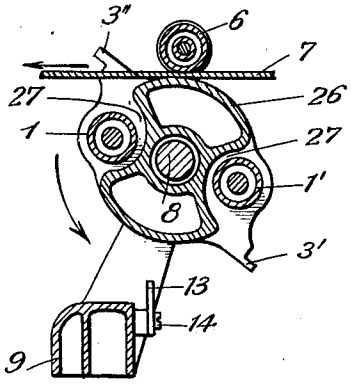
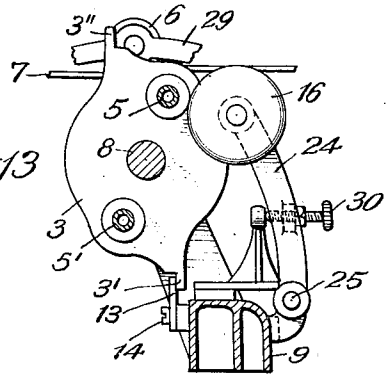


Fig. 13



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UNITED STATES PATENT OFFICE

2,131,147

COP WINDING MACHINE

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Application December 11, 1936, Serial No. 115,419
In Switzerland December 17, 1935

7 Claims. (Cl. 242—27)

This invention relates to cop winding machines.

It is usual practice in yarn or thread winding machines to arrange a number of individual machines in a row on a common bed in one and the same machine, and to drive the whole series of machines by means of a common driving shaft extending parallel to the row of machine frames. In this case it is, however, necessary to stop the individual winding machine in order to insert an empty bobbin or to remove a full bobbin, or in order to tie a broken thread. Consequently the particular section of the machine has to be put out of action temporarily during which period it remains unproductive.

In order to eliminate this stoppage, insofar as the insertion and the removal of the bobbins is concerned, the automatic exchange of the empty bobbins for full bobbins has been carried out by simultaneously exchanging a plurality of empty bobbins lying in the same horizontal plane. Such arrangements, however, have the disadvantage that in order to operate them successfully, it is necessary for the thread guides to be mechanically controlled and for them to work in the same tempo or cycle, a fact which makes the individual winding of bobbins a rather difficult matter. Winding machines of this character are difficult to work in conjunction with individual thread feelers for the bobbins, and as a result there is difficulty in suiting the winding operation to the particular requirements of the thread being wound in order to produce pirns of the same diameter of winding and also of good appearance. Without individual control of the winding, if the winding operation is interrupted for any cause whatever before a bobbin is fully wound, then this bobbin is subsequently delivered by the frame or machine in an unfinished condition.

The winding machine or frame with a plurality of winding spindles according to the present invention is, however, designed in such a manner that the individual winding spindle, after having been wound, leaves the operative position by traveling through a circular path, and a fresh winding spindle simultaneously moves into position.

This arrangement allows of continuous operation because following the completion of the winding of one bobbin, it is automatically replaced at the working position by a winding spindle carrying an empty bobbin; and consequently it is then possible to exchange the fully wound bobbin or pirn for an empty bobbin without interrupting the winding operation. In this case a break of the thread cannot cause any very great damage, because the bobbin can, after the thread has been knotted together, be straight away wound to its finished diameter. Furthermore it is also possible to make use of a feeler when winding the bobbins, so that all the advantages inherent in the process of individual winding are retained.

The appended drawings illustrate two embodiments of a winding machine according to the present invention. Two winding spindles are shown which are mounted on a sliding and rotatable carriage, and are adapted alternately to take the operative position.

In these drawings:

Fig. 1 shows the first embodiment in elevation, the bobbin shown in the operative position having as yet been wound only to a small extent.

Fig. 2 is a similar view showing the bobbin in the operative position, fully wound.

Fig. 3 is a vertical section on the line III—III of Fig. 1.

Fig. 4 is a vertical section on the line IV—IV of Fig. 1, and

Fig. 5 is a section similar to Fig. 3 but with the carriage slightly rotated as compared with Fig. 3 and Fig. 4.

Figs. 6 and 7 show sections on the lines VI—VI and VII—VII of Fig. 1.

Fig. 8 shows a section on the line VIII—VIII of Fig. 1.

Fig. 9 shows a section on the line IX—IX of Fig. 1.

Fig. 10 illustrates the second embodiment in elevation.

Fig. 11 is a cross-section on the line XI—XI of Fig. 10 and

Fig. 12 shows a corresponding part section, but with the carriage rotated as compared with Fig. 11.

Fig. 13 is an end view as seen from the right in Fig. 10.

In the case of the first embodiment (Figs. 1–7) the reference numeral 1 denotes a spindle which is rotatably mounted in and between two plates 2 and 3 and is provided at one of its extremities with a clamping head 4 for the reception of the bobbin 5. The winding spindle 1 is driven by means of an endless belt 7 which is pressed against the circumference of the spindle by means of a tension roller or pulley 6, the belt preferably being common to a plurality of winding frames which are of the same individual design and are mounted in a row on the same bed. The two plates 2 and 3 are mounted on a hollow shaft 8 which is supported at its extremities in the machine frame 9, (only partly shown in the

drawings). The two plates 2 and 3 are further interconnected by a second winding spindle 1' extending between them and also having a head 4' for the reception of a bobbin 5', the spindle 1' being positioned on the opposite side of the hollow shaft 8 from spindle 1. The two plates 2 and 3 together with the two winding spindles 1 and 1' form a carriage, which is adapted to be displaced longitudinally and rotated on the hollow shaft 8. This carriage is also provided with an arm 10 on which is pivotally mounted a screw threaded coupling member 11 which engages a screw threaded spindle 12 mounted on the machine frame to move the carriage step by step in the manner described below. The two plates 2 and 3 of the carriage are each provided with two co-planar projecting arms 2', 2'' and 3', 3'' respectively. As shown in Figs. 1 and 3 the plate 2 presses with its arm 2' on the threaded coupling member 11, which is thus held in mesh with the screw spindle 12. Also as shown in Figs. 1 and 4 the arm 3' of the plate 3 engages a rigid abutment bar 13, thereby preventing any rotary movement of the carriage due to the action of the driving belt 7 moving in the direction of the arrow in Figs. 3 and 4. Slots are provided in the bar 13, it being fixed to the machine frame 9 by means of the screws 14 passing through the slots in such a manner that its position can be longitudinally adjusted.

The thread feeler 16 works in conjunction with the winding 15 which is being produced on the bobbin 5 and projects through a slot provided in the hollow shaft 8, being fixed to a spindle 17 mounted on roller bearings provided within the hollow shaft 8. The thread is fed to the winding in progress by a thread guide 35 which is moved to and fro according to the extent of the lift of the cone of the winding. The spindle 17 projects from one extremity of the hollow shaft 8, and is provided at that end with a contact arm 18. This contact arm 18 is intended to act in conjunction with two contact blades 31 each of which is connected to one of the leads 32 of an electric circuit operating a small electric motor 33, which rotates the screw spindle 12 through a gearing 34. This electric motor operates intermittently and is started whenever the feeler 16 is rocked, against the action of a spring 16' with which it is associated, by the pressure exerted on it by the winding 15 sufficiently to cause the contact arm 18 to close the circuit. The motor then rotates the screw spindle 12, which causes the threaded coupling member 11 mounted on the arm 10 to be moved along, and with it the carriage against the action of of a tension spring 19 acting upon the arm 10. As the carriage is displaced, the pressure exerted by the winding 15 on the thread feeler 16 ceases, so that the latter rocks back into its rest position, whereby the circuit of the electric motor is broken.

During the step movement of the carriage effected in the manner above described from right to left (according to Fig. 1), a sleeve 20 which is sleeved on the hollow shaft 8 is also displaced by means of the hub provided on the plate 3; this sleeve 20 is provided at its opposite end with two dog teeth 20' which are adapted to interengage with two dog teeth 2''' provided on the hub of the plate 2. The sleeve 20 is also provided with a helical slot 20'' extending around half its circumference, a striking roller 8' which is mounted by means of a pin or bolt on the hollow shaft riding within this slot.

As soon as the winding 15 on the bobbin 5 is finished, i. e. after the pirn is completed, the arm 3' of plate 3 of the carriage leaves the end of the bar 13. Consequently a rotational movement is imparted to the carriage by the pull of the driving belt 7 acting on the winding spindle 1, and this causes the carriage to rotate in the direction of the arrow shown in Fig. 5. The arm 10 to which the tension spring 19 is coupled does not, however, share in this rotational movement, but the arm 2' of plate 2 leaves the threaded coupling member 11 which is then lifted clear of the screw spindle 12 by its spring. The carriage is thus released and is pulled back to its starting position by the tension spring 19. During the initial stage of this return movement the dogs on the hub of plate 2 engage those of sleeve 20 which has sufficient freedom of longitudinal travel between the hubs to ensure that the dogs are not in engagement during the outward travel of the carriage. As the carriage returns bringing with it sleeve 20, the latter is simultaneously turned through 180° by reason of the engagement between its curved slot 20'' and the striking roller 8' which is mounted on the stationary hollow shaft 8. Consequently the carriage is similarly rotated thus causing the winding spindles 1 and 1' mutually to exchange their positions. Thereby the winding spindle 1' is moved into its working position where it is driven by the belt 7, and the winding of the hitherto empty bobbin 5' is then proceeded with. The finished pirn 5 can be replaced on the head 4 by an empty bobbin at any time during the operation of winding the bobbin 5', but must be effected before the last named pirn is finished and prior to the next rotation of the carriage. During the rearward displacement and rotary motion of the carriage, the arm 3'' of the plate 3 comes into engagement with bar 13 thereby again securing the carriage against rotation; also the arm 2'' on plate 2 engages on the threaded coupling member 11 which thereby is again compelled to mesh with the screw spindle 12 when the carriage reaches its starting position. The winding frame is then immediately ready for further production, the cycle of operations being repeated indefinitely.

The helical slot 20'' provided in the sleeve 20 may extend to less than half the circumference, as shown in the embodiment illustrated, in order to effect the rotation of the carriage more rapidly during its return movement, this rapidity of the return motion giving correspondingly greater limits for altering the lengths of bobbins or pirns to be wound.

The number of winding spindles used with the winder may be any number upwards of two, it being, however, a condition that the extent of the rotational movement of the winding spindles should correspond to the number of the latter.

In the case of the second embodiment shown (Figs. 10–12) the two discs or plates 2 and 3 are connected together by means of a hollow shaft 23, the resulting carriage being mounted on the solid spindle 8 which passes through the said hollow shaft. The winding spindles 1 and 1' are mounted on this carriage diametrically opposite one another, each of the winding spindles being provided with a head piece 4 and 4' adapted to receive a winding body 5 and 5' respectively, which may be pushed on a spindle fixed to and projecting from the said head. The carriage 2, 3, 23 in this embodiment is also provided with an arm 10 with a rockable screw-threaded coupling member 11, adapted to mesh with the screw spindle 12 for the purpose of effecting the step by

step movement of the carriage. As shown in Figs. 10 and 11, the disc 3 engages by means of its projection 3' with the stationary bar 13 whereby rotation of the carriage, because of the movement of the belt 7 in the direction of the arrow as in Figs. 11 and 12, is prevented.

The thread feeler 16, which in this case is disc shaped, is rotatably mounted on a lever 24 which rocks together with a shaft 25 and is spring-urged in the direction of the windings on the bobbin to which the thread is fed over a thread guide in a similar manner as shown in Fig. 1, the thread guide being uniformly moved to and fro according to the conical lift of the winding.

The step by step movement of the carriage in the direction of the arrow I in Fig. 10 is effected from the thread feeler 16 (Fig. 13) by means similar to those shown in Figs. 1 and 9, except that in this case, for example, a contact arm 18 is fastened to the inner end of the shaft 25 for cooperation with the contact blades of the supply leads of the correlated motor (not shown), whereby the screw spindle 12 is rotated. The carriage is provided, at the extremity formed by the disc 2, with an extension member 26 designed in the fashion of a belt pulley and provided with two recesses 27 on its circumference, in order to accommodate the winding spindles 1 and 1'. This member 26 is tapered on the side away from the disc 2 to form a sloping run-in 28.

As the pirn on the winding body 5 is finished, the projection 3' provided on the disc 3 of the carriage leaves the bar 13, whereupon the carriage has imparted to it, by reason of the pulling force of the driving belt 7 acting on the winding spindle 1, a rotational impulse in the direction of the arrow in Fig. 12. By reason of the rotation of the carriage which is thus initiated, the screw-threaded coupling member 11 on the lower end of plate 2 is swung clear of the screw spindle 12 by spring action, and the carriage is pulled back into its starting position by means of a tension spring of a shape and arrangement similar to that shown for the first embodiment. During this operation the extension member 26 moves in the first instance under the driving belt 7, by means of its run-in edge 28, and the said belt subsequently engages with the cylindrical surface of the said member 26, as shown in Fig. 12, the half rotation of the carriage being thereby completed. The winding spindle 1' is thus brought into the operative position and is driven by the belt 7, so that the winding of the hitherto empty bobbin commences. After the finished pirn 5 has been removed, a new empty bobbin is pushed on to the head 4 of the winding spindle 1, this empty bobbin then being swung into the operative position as a result of the next rotation of the carriage. During the above mentioned return and rotary movement of the carriage the projection 3'' of the disc 3 abuts against bar 13, thus securing the carriage against further rotation; also the screw-threaded coupling member 11 is again caused to mesh with the screw spindle 12 by the disc 2 when the carrying member attains its starting position. The winding machine is then ready for further production and the same cycle of operations is repeated.

The full bobbin or pirn leaves the operative positions when at its full speed of rotation, and the empty bobbin is brought to the full number of revolutions by the driving belt, before it reaches the operative position, so that the winding commences at once at full working speed.

According to Figs. 10 and 11 the tension roller or pulley 6 for the driving belt is mounted on an arm 29 which is mounted pivotally at one of its extremities and can be fixed in position at its other extremity. The lever 24 carrying the thread feeler 16 is provided with a regulating device 30 which makes it possible to predetermine the inner final position of the feeler, according to the diameter of the bobbin.

In the case of this second embodiment, the slotted sleeve 20 with its accessories, which is provided in the first embodiment for the rotation of the carriage, is superfluous, which simplifies the design. The step-by-step movement of the carriage can be effected either by purely mechanical means or by means of an electric motor as aforesaid.

The term "winding spindle" is intended to be given the widest interpretation, and may, for instance, in certain circumstances refer to a winding spindle connected to a driving spindle in which the bobbin and winding spindle alone move over a circular path without the driving spindle.

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 frame, at least two winding spindles alternately movable into winding position, a common rotatably arranged feed carriage for said spindles, means for producing a winding on the spindle moved into said winding position by rotation of said carriage, a feeler cooperating with said winding in progress at said winding position, a threaded carriage feed spindle, a threaded coupling member on said carriage cooperating with said spindle for feeding said carriage step by step in dependence on the adjustments of said feeler during said winding operation, carriage rotation means cooperating with said coupling member for disengaging the same from said spindle on the termination of said winding by automatic control of said feeler, and means for returning said carriage into initial position in the opposite direction to its feed while said rotation means rotate said carriage for removing said wound spindle from and moving an empty spindle into said winding position through circular paths.

2. In a winding frame, at least two winding spindles alternately movable into winding position, a common rotatably arranged two-part extensible feed carriage for said spindles, a clutch intercalated between said two parts of said carriage, means for producing a winding on the spindle moved into said winding position by rotation of said carriage, a feeler cooperating with said winding in progress at said winding position, means for feeding said carriage step by step in dependence on the adjustments of said feeler during said winding operation, means for rotating said carriage on the termination of said winding by automatic control of said feeler, an element of said clutch comprised by a curved groove- and stud-connection between said element and a stationary part of the winding frame, and means for returning said carriage in clutched contracted condition into initial position in the opposite direction to its feed, while said connection rotates said carriage for removing said wound spindle from and moving an empty spindle into said winding position through circular paths.

3. In a winding frame, at least two winding spindles alternately movable into winding position, a common rotatably arranged feed carriage

for said spindles, means for producing a winding on the spindle moved into said winding position by rotation of said carriage, a feeler cooperating with said winding in progress at said winding position, means for feeding said carriages step by step in dependence on the adjustments of said feeler during said winding operation, means for rotating said carriage on the termination of said winding by automatic control of said feeler, and spring means for returning said carriage into initial position in the opposite direction to its feed while said rotation means rotate said carriage for removing said wound spindle from and moving an empty spindle into said winding position through circular paths.

4. In a winding frame at least two winding spindles alternately movable into winding position, a common rotatably arranged feed carriage for said spindles, portions on said carriage shaped in the manner of circumferential belt pulley portions, a driving belt for cooperation with said pulley portions, and means for causing said belt to cooperate with said pulley portions for rotating said carriage for removing said wound spindle from and moving an empty spindle into said winding position through circular paths.

5. A cop winding machine comprising a carriage having a plurality of bobbins removably mounted thereon, means for automatically intermittently progressively moving said carriage longitudinally in dependence on the condition of a cop being wound, means for automatically rotating said carriage upon completion of each cop winding and for returning said carriage to its original longitudinal position, whereby the carriage and the bobbins carried thereby are in operative position with respect to an empty bobbin member for performing a furrther winding operation.

6. In a cop winding machine, a carriage having means for removably mounting a plurality of bobbins thereon, means for automatically, progressively moving said carriage longitudinally intermittently in dependence on the condition of a cop being wound, a feeler engaging the cop being being wound and controlling the carriage moving means, and means for rotating said carriage and returning it to its original longitudinal position upon completion of each cop winding operation so that it is in operative position for the beginning of winding of an empty bobbin.

7. In a cop winding machine, a frame, a carriage rotatably mounted in said frame for longitudinal movement, said carriage having a pair of cop spindles, a belt and pulley drive for selectively rotating one of said spindles, and for rotating the carriage in the frame, a bar for guiding said carriage and preventing rotation of the carriage during a cop winding operation, said bar terminating at a point corresponding to the longitudinal limit of winding of a cop whereby when said limit is reached the carriage is free to be rotated by the belt and pulley drive, means for progressively moving the carriage longitudinally during a cop winding operation in dependence on the condition of winding of the cop, coupling means between said carriage and said moving means, means for uncoupling said coupling means when the carriage is rotated, and means for returning said carriage to its original longitudinal position when the longitudinal limit of winding of a cop has been reached.

WALTER SIEGENTHALER.