

Sept. 22, 1931.

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1,824,464

APPARATUS FOR TWISTING TEXTILE FIBERS OR YARNS

Filed June 12, 1930

2 Sheets-Sheet 1

Fig. 1

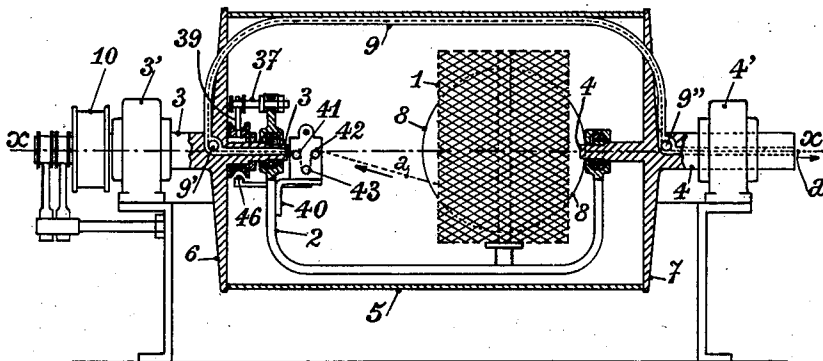
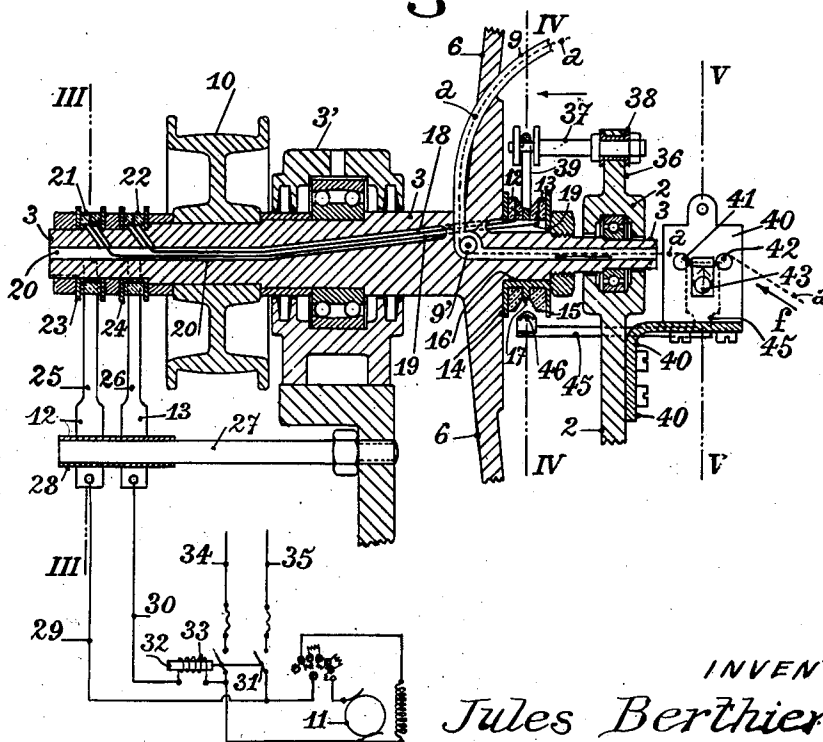


Fig. 2



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2 Sheets-Sheet 2

Fig. 4

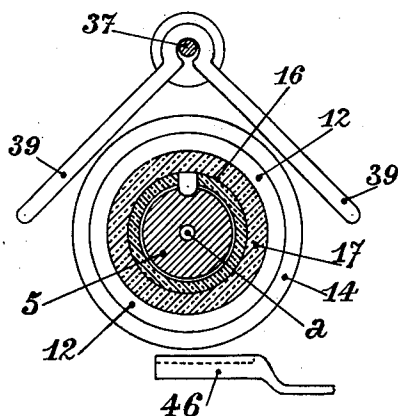


Fig. 3

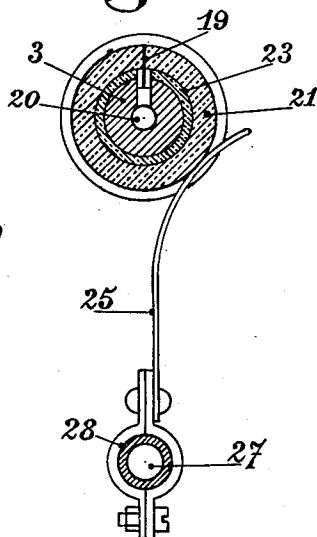
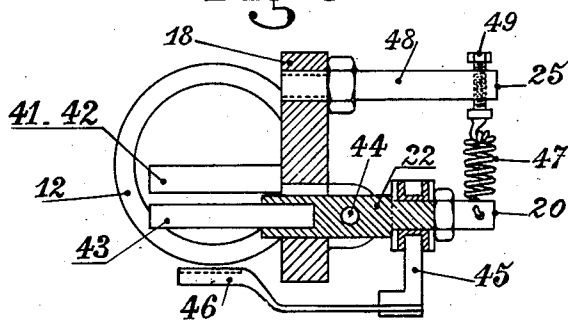


Fig. 5



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UNITED STATES PATENT OFFICE

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APPARATUS FOR TWISTING TEXTILE FIBERS OR YARNS

Application filed June 12, 1930, Serial No. 460,762, and in France June 26, 1929.

My invention relates to apparatus or spindles for doubling or twisting textile fibers by double torsion which is essentially composed of a bobbin for the doubled threads, or the threads to be doubled, supported by a strap or carrier about which a rotor imparting a double torsion to the fibers is rotated, which rotor may consist of a cylinder, a frame or other equivalent means.

Whether the axis of rotation of said rotor be horizontal or inclined, this apparatus can only function regularly if

1. the said carrier is maintained stationary.
2. The regular travel of the yarn through the apparatus is ensured.

My invention relates to a doubling or twisting apparatus operating by double torsion and characterized by the use of safety devices by which the mechanism is automatically stopped on the occasion of any disturbance to the regular operation of the apparatus, and such safety devices may comprise:

- (a) contact elements secured to the rotor of the apparatus.
- (b) contact elements situated opposite the preceding and mounted on the stator of the bobbin of textile fibers under treatment; said elements are subjected to the disturbances occasioned in the apparatus, and are adapted to make contact with the aforesaid contact elements of the rotor, in case of any disturbance to the functioning.

- (c) an external electric circuit which is permanently connected to the said contact elements of the rotor; said circuit can be closed by said contact elements of the stator if any trouble occurs, and it comprises a device for stopping the driving shaft of the doubling machine.

Numerous apparatus may be constructed in conformity to the above mentioned principle, and as an example, a doubling apparatus according to said principle may comprise the following arrangements:

- (a) Contact elements mounted on the rotor may comprise two electrically conducting rings which are insulated from one another

and also from the rotor, which rings are placed side by side and are permanently connected to the external electric circuit.

- (b) Contact elements mounted on the stator and comprising the whole or a part of the following devices.

A forked contact member drawn by the stator in its motion is disposed in such manner as to make contact with the said conducting rings when the stator departs from the normal position.

A contact member mounted opposite the two contact rings of the rotor, it being disposed upon a movable member which is subjected on the one hand to the tension of the fibers to be twisted which travel upon said member, and on the other hand to the action of antagonistic means such as a spring, said movable member being so disposed that the said movable contact member will make contact with the said contact element of the rotor when the tension of the fibers exceeds a given amount.

When the apparatus is stopped, for instance, by reason of a movement of the stator or of an excessive tension of the fibers, it is then possible to examine the apparatus, to find the cause of the irregular functioning, to remedy all such defects, and to again place the apparatus in operation.

My invention further relates to a modification of the preceding mechanism in which the antagonistic member combined with the movable guide subjected to the tension of the fibers is provided with regulating means, in order that yarns of various kinds may be twisted in the same doubling machine.

The accompanying diagrammatic drawings which are given by way of example and which in no wise limit the scope of the present invention, relate to a doubling apparatus of the type described in the U. S. application for Patent Serial No. 283,687 filed on the 7th June, 1928, in the name of Mr. Victor Baudonnel and my name, and provided with a safety device constructed in conformity to the aforesaid principle.

In the said drawings:

Fig. 1 is an axial longitudinal section of the entire apparatus.

Fig. 2 is a similar section showing in detail the safety arrangement and the electric circuit with which it is connected.

Fig. 3 is a section along the line III—III of Fig. 2 showing the rings and the friction contact elements for supplying the current to the rotating parts.

Fig. 4 is another section, on the line IV—IV of Fig. 2, of the friction contact elements secured to the rotor and the friction contact elements secured to the support of the bobbin disposed opposite the former and adapted to stop the apparatus, should the bobbin carrier be moved.

Fig. 5 is a section on the line V—V of Fig. 2, showing the second contact device adapted to stop the machine in the case of an excessive tension on the yarn.

The same reference numerals indicate the same elements in these various figures.

The doubling apparatus, shown in Fig. 1 by way of example, is similar to apparatus described in the hereinabove mentioned application; as in this apparatus, yarn *a* to be doubled is wound on a bobbin 1 supported by a carrier 2 rotatable on journals 3 and 4 of a rotating cylinder 5 which is provided with two end plates 6 and 7, a peripheral opening 8 for introduction and removal of the coil, and a second similar orifice which cannot be seen in the drawings, diametrically opposite the former relative to the axis *x—x*.

The yarn leaving the bobbin 1 passes through the journal 3, round a pulley 9' in a tubular duct 9 secured to the rotating cylinder 5 and returns over a pulley 9'' through the opposite journal 4 whence it emerges and is entrained by a suitable drawing apparatus. Bearings 3' and 4' support the journals 3 and 4. A pulley 10 actuated by a motor 11 (Fig. 2) imparts the desired rotational movement to the cylinder 5 by means of a belt not shown.

According to my invention and the apparatus shown in the drawings a contact arrangement which is mounted on one of the journals 3 consists of two contact rings 12, 13, electrically insulated from the journal by insulating elements 14, 15, 16 and from one another by an insulating ring 17.

Insulated electric conductors 18, 19 positioned in a channel 20 in the journal 3 are connected with contact rings 21, 22 arranged externally of the drum 5 of the apparatus on the journal 3, these rings being also insulated from the journal 3 by insulated mountings 23, 24.

Brushes 25 and 26 carried by a common axle 27 and insulated therefrom by an insulating sleeve 28 connect the rings 21, 22 permanently with an external electric circuit in parallel in this case with the same circuit as that supplying current to the motor 11, and herein this is a direct current circuit.

A switch 31 mounted in this circuit and connected with magnetic core 32 actuated by

a coil 33 is inserted in the circuit of the conductors 29, 30 which are mounted in shunt on the distribution circuit 34, 35 feeding the motor 11.

The whole being thus disposed, the carrier 2 is provided with

(1) a projection 36 carrying an arm 37, electrically insulated from the said carrier by an insulating bush 38, and a metallic bridge member 39 provided with two arms embracing the rings 12, 13 without normally contacting therewith, this member 39 being freely suspended from the arm 37, in such manner that its two branches can be moved only parallel with themselves in the case in which said arm 37 is moved by the carrier 2 about the journal 3.

(2) a bracket 40 carrying three rods 41, 42, 43 about which the yarn to be doubled travels in the direction of the arrow *f* during the operation of the apparatus, the rods 41, 42 being fixed to the member 40 whilst the rod 43 is movable about a pivot 44 (Fig. 5) provided with an insulated contact-carrier 45 terminating in a contact 46 which is herein located opposite and below the rings 12, 13 (Figs. 2 and 5).

A spring 47 arranged between the oscillating rod 43 and a fixed anchorage 48 determines the position of the rod 43; this spring may be regulated, for example, by means of a screw 49.

If, for any reason the carrier 2 is entrained in the rotational movement of the cylinder 5, the arm 37 participates in this movement and one of the branches of the bridge member 39 comes into contact simultaneously with the two rings 12, 13 and thus closes the electric circuit through the coil 33; then, the interrupter 31, 32 is operated, the current flowing through the motor 11 is cut off, and the spindle is thus stopped.

Similarly if for any reason the yarn to be doubled does not travel regularly and is subjected to a tension greater than a fixed limiting value regulated by the tension of the spring 47, the rod 43 oscillates about the pivot 44, thereby re-connecting electrically the rings 12, 13, and thus the electric circuit is closed through the coil 32 and the switch 31 acts as in the previous case.

Immediate stoppage of the spindle is thus effected.

The arrangements described above can be modified in numerous ways, and the various elements constituting the same may be differently constructed, thus for example, instead of the bipolar contact arrangement described, a unipolar contact device may be used, the return being effected through the metal of the apparatus. The apparatus may also be constructed so as to comprise only one of the contact arrangements described above, namely, that responding to the movements of said carrier or that responding to an excess

of tension in the yarn to be doubled. Similarly the electric circuit utilized may be a direct current or alternating current circuit, etc.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In an apparatus for twisting textile fibers comprising a bobbin carrier suspended on bearings integral with a flyer, the said bobbin carrier being normally fixed in position, and the said flyer provided with channels to conduct the thread from the centre of the same radially outwards at one end of the same and inwards at the other end of the same, a channel for conducting the thread from one of the said ends to the other and a driving shaft for the said flyer, the combination of contact elements carried by the flyer, contact elements arranged opposite the foregoing and carried by the bobbin carrier, these elements being subjected to the disturbances to which the apparatus is exposed and constructed so as to be able to contact with the contact elements carried by the flyer, an external electric circuit permanently connected with the contact members of the flyer, this circuit being closed in case of disturbance by contact members of the bobbin carrier and comprising means for stopping the driving shaft of the apparatus as soon as the said circuit is closed.

2. In an apparatus for twisting textile fibers comprising a bobbin carrier suspended on bearings integral with a flyer, the said bobbin carrier being normally fixed in position, and the said flyer provided with channels to conduct the thread from the centre of the same radially outwards at one end of the same and inwards at the other end of the same, a channel for conducting the thread from one of the said ends to the other and a driving shaft for the said flyer, the combination of contact elements carried by the flyer, contact elements arranged opposite the foregoing and carried by the bobbin carrier, one of these elements being subjected to the displacements to which the bobbin carrier is exposed and then coming in contact with the contact elements carried by the flyer, an external electric circuit permanently connected with the contact members of the flyer, this circuit being closed by contact members of the bobbin carrier in case of displacement of this latter and comprising means for stopping the driving shaft of the apparatus as soon as the said circuit is closed.

3. In an apparatus for twisting textile fibers comprising a bobbin carrier suspended on bearings integral with a flyer, the said bobbin carrier being normally fixed in position, and the said flyer provided with channels to conduct the thread from the centre of the same radially outwards at one end of

the said flyer and inwards at the other end of the same, a channel for conducting the thread from one of the said ends to the other and a driving shaft for the said flyer, the combination of contact elements carried by the flyer, contact elements arranged opposite the foregoing and carried by the bobbin carrier, one of these elements being controlled by means subjected to the tension of the material to be twisted and coming in contact with the contact elements carried by the flyer as soon as the tension of the said material exceeds a predetermined value, an external electric circuit permanently connected with the contact members of the flyer, this circuit being closed by contact members of the bobbin carrier in the said case of excessive tension and comprising means for stopping the driving shaft of the apparatus as soon as the said circuit is closed.

4. In an apparatus for twisting textile fibers comprising a bobbin carrier suspended on bearings integral with a flyer, the said bobbin carrier being normally fixed in position, and the said flyer provided with channels to conduct the thread from the centre of the same radially outwards at one end of the said flyer and inwards at the other end of the same, a channel for conducting the thread from one of the said ends to the other and a driving shaft for the said flyer, the combination of contact elements carried by the flyer, contact elements arranged opposite the foregoing and carried by the bobbin carrier, one of these elements being subjected to the movements to which the bobbin carrier is exposed and then coming in contact with the contact elements carried by the flyer, another of these elements being controlled by means subjected to the tension of the material to be twisted and coming in contact with the contact elements carried by the flyer as soon as the tension of the material exceeds a predetermined value, an external electric circuit permanently connected with the contact of the flyer, this circuit being closed by contact members of the bobbin carrier in each above case of disturbance and comprising means for stopping the driving shaft of the apparatus as soon as the said circuit is closed.

5. In an apparatus for twisting textile fibers comprising a bobbin carrier suspended on bearings integral with a flyer, the said bobbin carrier being normally fixed in position, and the said flyer provided with channels to conduct the thread from the centre of the same radially outwards at one end of the said flyer and inwards at the other end of the same, a channel for conducting the thread from one of the said ends to the other and a driving shaft for the said flyer, the combination of contact elements carried by the flyer, contact elements arranged opposite the foregoing and carried by the bobbin carrier,

one of these elements being controlled by means subjected to the tension of the material to be twisted and coming in contact with the contact elements carried by the flyer as soon as the tension of the material exceeds a predetermined value, regulating means for varying the said predetermined value, an external electric circuit permanently connected with the contact members of the flyer, this circuit being closed by contact members of the bobbin carrier in the said case of excessive tension of the material and comprising means for stopping the driving shaft of the apparatus as soon as the said circuit is closed.

6. In an apparatus for twisting textile fibers comprising a bobbin carrier suspended on bearings integral with a flyer, the said bobbin carrier being normally fixed in position, and the said flyer provided with channels to conduct the thread from the centre of the same radially outwards at one end of the said flyer and inwards at the other end of the same, a channel for conducting the thread from one of the said ends to the other and a driving shaft for the said flyer, the combination of contact elements carried by the flyer, contact elements arranged opposite the foregoing and carried by the bobbin carrier, one of these elements being subjected to the movements to which the bobbin carrier is exposed and then coming in contact with the contact elements carried by the flyer, another of these elements being controlled by means subjected to the tension of the material to be twisted and coming in contact with the contact elements carried by the flyer as soon as the tension of the material exceeds a predetermined value, regulating means for varying the said predetermined value, an external electric circuit permanently connected with the contact members of the flyer, this circuit being so closed by contact members of the bobbin carrier in each of the above cases of disturbance and comprising means for stopping the driving shaft of the apparatus as soon as the said circuit is closed.

7. In an apparatus for twisting textile fibers comprising a bobbin carrier suspended in the hollow cylinder of a flyer on bearings integral with end plates of the said cylinder, the said bobbin carrier being normally fixed in position, the flyer consisting of the said hollow cylinder with end plates, said plates being provided with channels to conduct the thread from the centre of the same radially outwards in the case of one plate and inwards in the case of the other, a channel for conducting the thread from one plate to the other and a driving shaft for the said flyer, the combination of means producing automatic stoppage of the flyer as soon as the regular operation of the twisting of the fibers is disturbed.

8. In an apparatus for twisting textile

fibers comprising a bobbin carrier suspended in the hollow cylinder of a flyer on bearings integral with end plates of the said cylinder, the said bobbin carrier being normally fixed in position, the said flyer consisting of the said hollow cylinder with end plates, said plates being provided with channels to conduct the thread from the centre of the same radially outwards in the case of one plate and inwards in the case of the other, a channel for conducting the thread from one plate to the other and a driving shaft for the said flyer, the combination of contact elements carried by the flyer, contact elements arranged opposite the foregoing and carried by the bobbin carrier, these elements being subjected to the disturbances to which the apparatus is exposed and constructed so as to be able to contact with the contact elements carried by the flyer, an external electric circuit permanently connected with the contact members of the flyer, this circuit being closed by contact members of the bobbin carrier and comprising means for stopping the driving shaft of the apparatus.

9. In an apparatus for twisting textile fibers comprising a bobbin carrier suspended in the hollow cylinder of a flyer on bearings integral with end plates of the said cylinder, the said bobbin carrier being normally fixed in position, a flyer consisting of the said hollow cylinder with end plates, said plates being provided with channels to conduct the thread from the centre of the same radially outwards in the case of one plate and inwards in the case of the other, a channel for conducting the thread from one plate to the other and a driving shaft for the said cylinder, the combination of two conducting rings electrically insulated from one another and from the flyer, these rings being arranged side by side on an inner shaft of one of the end plates of the flyer and permanently connected with an external electric circuit, an insulated conducting member in the form of an inverted V which is suspended from an arm on the bobbin carrier, the branches of which extend on either side of the two conducting rings arranged on the flyer, so that one arm of the said V member comes in contact with the said conducting rings as soon as the bobbin carrier leaves its normal position, and the external electric circuit permanently connected with the contact members of the flyer, this circuit being so closed by the contact member of the bobbin carrier and comprising means for stopping the driving shaft of the apparatus as soon as one arm of the V member comes in contact with the conducting rings of the flyer.

10. In an apparatus for twisting textile fibers comprising a bobbin carrier suspended in the hollow cylinder of a flyer on bearings integral with end plates of the said cylinder, the said bobbin carrier being normally fixed

in position, the said flyer consisting of the said hollow cylinder with end plates, said plates being provided with channels to conduct the thread from the centre of the same radially outwards in the case of one plate and inwards in the case of the other, a channel for conducting the thread from one plate to the other and a driving shaft for the said flyer, the combination of two conducting rings electrically insulated from one another and from the flyer, these rings being arranged side by side on the inner shaft of one of the end plates of the flyer and permanently connected with an external electric circuit, and an insulated contact arranged on the bobbin carrier opposite the two conducting rings of the flyer, means arranged on the bobbin carrier, the said means being movable with relation to the said bobbin carrier, carrying the said contact and submitted on the one hand to the tension of the yarn to be twisted and passing over them, and on the other hand to an opposite determined action, these movable means being arranged so that the movable contact just contacts simultaneously with the two contact rings of the flyer as soon as the tension of the yarn exceeds a predetermined value, and the external electric circuit permanently connected with the contact members of the flyer, this circuit being so closed by the said tension contact of the bobbin carrier and comprising means for stopping the driving shaft of the apparatus as soon as the said tension contact comes in contact with the conducting rings of the flyer.

11. In an apparatus for twisting textile fibers comprising a bobbin carrier suspended in the hollow cylinder of a flyer on bearings integral with end plates of the said cylinder, the said bobbin carrier being normally fixed in position, the said flyer consisting of the said hollow cylinder with end plates, said plates being provided with channels to conduct the thread from the centre of the same radially outwards in the case of one plate and inwards in the case of the other, a channel for conducting the thread from one plate to the other and a driving shaft for the said flyer, the combination of two conducting rings electrically insulated from one another and from the flyer, these rings being arranged side by side on the inner shaft of one of the end plates of the flyer and permanently connected with an external electric circuit, three rods arranged on the bobbin carrier, and about which the yarn to be doubled travels during the operation of the apparatus, the first and the latter of these rods being fixed to the bobbin carrier whilst the second arranged outside the line of the two preceding ones is movable on the said bobbin carrier, an insulated contact controlled by the said movable rod and arranged opposite the two conducting rings of the flyer submitted on the one hand to the tension of the yarn to be twisted

and passing over the said rods and on the other hand to an opposite determined action, an insulated contact controlled by the said movable rod and arranged opposite the two conducting rings of the flyer so that it just contacts simultaneously with these two contact rings of the flyer as soon as the tension of the yarn exceeds a predetermined value, and the external electric circuit permanently connected with the contact members of the flyer, this circuit being so closed by the said tension rod of the bobbin carrier and comprising means for stopping the driving shaft of the apparatus as soon as the tension of the yarn exceeds the said predetermined value.

12. In an apparatus for twisting textile fibers comprising a bobbin carrier suspended in the hollow cylinder of a flyer on bearings integral with end plates of the said cylinder, the said bobbin carrier being normally fixed in position, a flyer consisting of the said hollow cylinder with end plates, said plates being provided with channels to conduct the thread from the centre of the same radially outwards in the case of one plate and inwards in the case of the other, a channel for conducting the thread from one plate to the other and a driving shaft for the said flyer the combination of two conducting rings electrically insulated from one another and from the flyer, these rings being arranged side by side on an inner shaft of one of the end plates of the flyer and permanently connected with the said external electric circuit, an insulated conducting member in the form of an inverted V which is suspended from an arm on the bobbin carrier, the branches of which extend on either side of the two conducting rings arranged on the flyer, so that one arm of the said V member comes in contact with the said conducting rings as soon as the bobbin carrier leaves its normal position, and an external electric circuit permanently connected with the contact members of the flyer, this circuit being so closed by the contact member of the bobbin carrier, an insulated contact arranged on the bobbin carrier opposite the two conducting rings of the flyer, means arranged on the bobbin carrier, the said means being movable with relation to the bobbin carrier, carrying the said contact and submitted on the one hand to the tension of the yarn to be twisted and passing over them and on the other hand to an opposite determined action, these movable means being arranged so that the movable contact just contacts simultaneously with the contact rings of the flyer as soon as the tension of the yarn exceeds a predetermined value, the external circuit being then closed by the said tension contact of the bobbin carrier and comprising means for stopping the driving shaft of the apparatus as soon as one arm of the aforesaid V member comes in con-

tact with the conducting rings of the flyer and, also, as soon as the said tension contact comes in contact with the said conducting rings.

5 13. In an apparatus for twisting textile fibers comprising a bobbin carrier suspended in the hollow cylinder of a flyer on bearings integral with end plates of the said cylinder, the said bobbin carrier being normally fixed
10 in position, the said flyer consisting of the said hollow cylinder with end plates, said plates being provided with channels to conduct the thread from the centre of the same radially outwards in the case of one plate
15 and inwards in the case of the other, a channel for conducting the thread from one plate to the other and a driving shaft for the said flyer, the combination of two conducting rings electrically insulated from one another
20 and from the flyer, these rings being arranged side by side on the inner shaft of one of the end plates of the flyer and permanently connected with an external electric circuit, and an insulated contact arranged on the bobbin carrier opposite the two conduct-
25 ing rings of the flyer, means arranged on the bobbin carrier, the said means being movable with relation to the bobbin carrier, carrying the said contact and submitted on the one hand to the tension of the yarn to be
30 twisted and passing over them and on the other hand to an opposite determined action, means for regulating the said opposite action, means carrying the movable contact being arranged so that the said contact just
35 contacts simultaneously with the two contact rings of the flyer as soon as the tension of the yarn exceeds a predetermined value, and the external electric circuit permanently
40 connected with the contact members of the flyer, this circuit being so closed by the said tension contact of the bobbin carrier and comprising means for stopping the driving shaft of the apparatus as soon as the said
45 tension contact comes in contact with the conducting rings of the flyer.

14. In an apparatus for twisting textile fibers comprising a bobbin carrier suspended in the hollow cylinder of a flyer on bearings
50 integral with end plates of the said cylinder, the said bobbin carrier being normally fixed in position, a flyer consisting of the said hollow cylinder with end plates, said plates being provided with channels to conduct the
55 thread from the centre of the same radially outwards in the case of one plate and inwards in the case of the other, a channel for conducting the thread from one plate of the other and a driving shaft for the said cylinder,
60 the combination of two conducting rings electrically insulated from one another and from the flyer, these rings being arranged side by side on the inner shaft of one of the end plates of the flyer and permanently con-
65 nected with an external electric circuit, an

insulated conducting member in the form of an inverted V which is suspended from an arm on the bobbin carrier, the branches of which extend on either side of the two conducting rings arranged on the flyer, so that
70 one arm of the said V member comes in contact with the said conducting rings as soon as the bobbin carrier leaves its normal position, and an external electric circuit permanently connected with the contact mem-
75 bers of the flyer, this circuit being so closed by the contact member of the bobbin carrier, an insulated contact arranged on the bobbin carrier opposite the two conducting rings of the flyer, means arranged on the bobbin car-
80 rier, the said means being movable with relation to the bobbin carrier, carrying the said contact and submitted on the one hand to the tension of the yarn to be twisted and passing over them and on the other hand to an
85 opposite determined action, means for regulating the said opposite action, the means carrying the movable contact being arranged so that the said contact just contacts simul-
90 taneously with the two contact rings of the flyer as soon as the tension of the yarn exceeds a determined value, the external circuit being then closed by the said tension contact of the bobbin carrier and comprising means
95 for stopping the driving shaft of the apparatus as soon as one arm of the aforesaid member comes in contact with the conducting rings of the flyer and, also, as soon as the said tension contact comes in contact with the said conducting rings.

In witness whereof I have hereunto set my hand.

JULES BERTHIER.

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