

12 EUROPEAN PATENT APPLICATION

21 Application number: 82830220.8

51 Int. Cl.³: D 01 H 1/22
 D 01 H 5/82

22 Date of filing: 02.08.82

30 Priority: 02.09.81 IT 8345481

43 Date of publication of application:
 23.03.83 Bulletin 83/12

84 Designated Contracting States:
 BE DE FR GB

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54 Procedure for locking the torsion in long shafts and device which employs said procedure.

57 A procedure for locking the torsion of shafts in long spinning frames, said procedure comprising:

- start-up of the spinning frame with the device (20) for locking torsion connected up;
- the disconnecting of said devices (20) after a pre-set time long enough to cover the initial transient period;
- re-connection of the device (20) for a long enough time before the spinning frame is stopped;
- the device (20) is kept connected up while the spinning frame remains halted so as to ensure the proper working of said spinning frame when it is next started up again and so as to avoid phase displacement of the cylinders.

The invention also concerns the device (20) for carrying out said procedure and for locking the torsion of the shafts in long spinning frames, said device (20) being characterized by including in cooperation and coordination:

- transmission means (16) connected rigidly to a powered shaft (10) of the spinning frame,
- drivable coupling means (21) connected to said transmission means (16) and cooperating temporarily with at least one other shaft (11) of the spinning frame, and
- control means (22) able to operate said drivable coupling means (21) so as to suit the speed of said powered shaft (10).

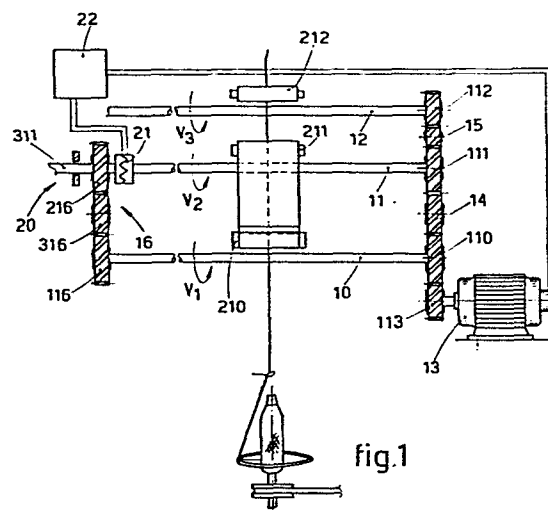


fig.1

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1 *Description of the invention entitled:*

"PROCEDURE FOR LOCKING THE TORSION IN LONG SHAFTS AND DEVICE WHICH EMPLOYS SAID PROCEDURE"

in the name of OFFICINE SAVIO SpA at Pordenone

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10 This invention concerns a procedure for locking the torsion in long shafts connected together mechanically; the device of the invention is applied advantageously, but not essentially, to the shafts of long ring spinning frames.

To be more exact, the invention has the purpose of preventing the relative movements of two or more shafts in only one direction of rotation when said shafts are not being rotated.

15. The invention can be applied to one or more shafts which are or are not parallel to each other.

According to the invention the device can be fitted to at least one end of a shaft located opposite to the end where the input of motion takes place.

20. Moreover, the device of the invention can be fitted to shafts which are driven at their end or which are driven at an intermediate position.

The invention can be applied in particular, but not only, to ring spinning frames and can be applied wherever conditions exist which can be related to or be likened to those

1 of ring spinning frames.

It is known that in a ring spinning frame the device
for drafting the roving consists not only of the organs able
to exert pressure on the roving but also of two or more sha-
fts which have a small diameter in relation to their length
and which in this case have to rotate at speeds different
from each other but having a constant reciprocal ratio.

Owing to the resisting moments acting on the shafts it
happens that during the transient period of start-up of the
machine the shafts undergo a torsion which grows progressi-
vely the further it is from the zone of input of motion and
the nearer it is to the opposite end zone.

This torsion occurring in the shafts becomes consider-
able, above all in especially long machines.

15 Since the resisting moments vary from one shaft to an-
other, it happens that the relative rotation (that is, the
rotation lag due to the torsion occurring) between the zone
of input of motion and the end zone or zones of one shaft
is different from that of another shaft. Owing to this fact,
20 when the resisting moments are lacking (as happens when the
machine stops), the shafts, or cylinders as they are also
called, stay still in the zone where the motive moment is
applied but tend, at their other end zone, to recover the
angle of torsion which has progressively built up as lag
25 since the machine was started and which exists at the time
when the machine is halted.

Such angles of torsion are not induced according to a
ratio the same as that existing between the speeds of rota-
tion of the shafts.

30 Thus, faulty drafting takes place in the phase of re-
covery of the torsion; that is to say, during the phase of
recovery of the induced torsion the end parts of the shafts
or cylinders can cause faulty drafting and can also lead to

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1. the possibility of causing the breakage of yarns at once or
when the machine is started up once more. This shortcoming
leads to a considerable burden of work for the machine oper-
atives and an evident lessening of output, yield and quality
5. of the yarn. So as to keep the ratio of the angles of rotat-
ion constant even at the end section of the cylinders, some
solutions have been put forward, such as those shown in pat-
ents DE-AS 26 41 434, DE-AS 27 22 532, DE-AS 28 17 162, DE-
OS 29 30 327 and DE-PS 94895.

10. In those patents a system is developed which connects
the end sections of the cylinders themselves with a system
of ratios the same as that which transmits the torques in
the zones of input of motion of the shafts or cylinders.

Furthermore, it is envisaged in those inventions that
15. the connection between the cylinders is continuous, that is
to say, it is always working both when the machine is oper-
ating and also when the machine is stopped; however, this
does not take into account the fact that such a connection
is not needed when the machine is running normally.

20. According to experiments made we have established that
in the long shafts used in modern ring spinning frames the
relative distortion in the drafting zone takes place during
the start-up and stopping phases of the machine.

Experiments made have shown that it is important to
25. eliminate the torsion related to the start-up of the machine
and also to prevent said shafts from recovering the induced
torsion whenever the spinning frame is stopped for any rea-
son at all.

According to the invention this purpose is fulfilled
30. by employing a rigid connection which only works during the
start-up and stopping phases.

The invention can also be applied where there are one
or more shafts.

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1. Advantages of this invention are the elimination of unnecessary extra consumption of energy and of wear on the gear wheels and on the device itself and also the suppression of a possible source of unpleasant noise during the working cycle of the machine.

This invention is displayed in a procedure for locking the torsion of shafts in long spinning frames, said procedure being characterized by comprising the following phases:

- start-up of the machine with the device connected up;
- 10. - the disconnecting of the device after a pre-set time long enough to cover the initial transient period;
- reconnection of the device for a long enough time before the machine is stopped;
- the device is kept connected up during the period while
- 15. the spinning frame is stopped so as to ensure the proper working of said frame when it is next started up again and so as to avoid phase displacement of the cylinders.

Moreover, the invention is embodied in a device for carrying out said procedure and for locking the torsion of shafts of long spinning frames, said device being characterized by including in cooperation and coordination:

- transmission means connected rigidly to a shaft of the spinning frame,
- drivable coupling means connected to said transmission
- 25. means and cooperating temporarily with at least one shaft of the spinning frame, and
- control means able to actuate said drivable coupling means so as to suit the speed of said shaft.

An embodiment of the device of the invention will be described hereinafter, as a non-restrictive example, with the help of the tables, wherein: -

.Fig.I gives a diagram of a spinning frame fitted with the device of the invention;

1. Fig. 2 shows diagrammatically the working cycle of the spinning frame and the transient periods of start-up and stopping;

Fig. 3 shows the specific make-up of the control means of the invention.

With reference to Fig. I the spinning frame comprises in its drafting unit three shafts numbered IO (drafting), II (accompanying) and I2 (feeding) which rotate at the respective angular speeds V_I , V_2 and V_3 transmitted to said shafts with a constant ratio by the motor I3, which is connected here to the drive shaft IO with belts, gear wheels or like connecting means.

In particular, so as to obtain drafting of the yarn said ratio has to correspond to the difference $V_I > V_2$ and is established by the ratios between the pairs of gear wheels II3-II0, II0-I4, I4-III, III-I5 and I5-II2, said gear wheels I4 and I5 being idler gear wheels, whereas the gear wheels III-II2 are solidly fixed to the shafts II and I2 respectively.

As is known, each of said shafts IO, II and I2 cooperates with its relative pressure roller 2IO, 2II and 2I2 respectively.

The device 20 of the invention is fitted to the spinning frame at the end of the latter opposite to the powered end thereof.

Said device will be described with reference to the shafts IO and II since the shaft I2 can possibly be connected to the other shafts by means of another device according to the invention.

The device 20 of the invention comprises transmission means I6 rigidly fixed to a shaft of the spinning frame, in this case to the drive shaft IO; said transmission means I6 consist here of a gear wheel II6 keyed onto said shaft IO

1. and cooperating through a gear wheel 3I6 with another gear .
wheel 2I6 keyed onto an idler shaft 3II, whereby said shaft .
3II is equipped at its end with drivable coupling means 2I .
which connect said shaft 3II to the shaft II at least tempo-
5. rarily. Said coupling means 2I consist here of a solenoid .
clutch I2I that is actuated electrically, but could also con-
sist of suitable mechanical coupling means such as clutches,
claw clutches, ratchet gears or like means which can be act-
uated with electromechanical or electromagnetic means or the
10. like.

Furthermore, the device of the invention comprises con-
trol means 22 able to actuate said coupling means 2I to suit
the speed of the shafts of the spinning frame, said control
means 22 being connected to the motor I3 of the spinning
15. frame in this instance.

The specific make-up of the said control means 22 is
shown diagrammatically in Fig. 3.

The control means 22 for starting and stopping the mot-
or I3, and also the coupling means 2I receive the mains sup-
20. ply or line supply current 8I, which feeds the motor I3 as
well, through a voltage transformer 82 having several out-
puts.

Moreover, the electrical protection of said means 22
and 2I and of the motor I3 is ensured by magnetic-thermal
25. protective means 83-I83-283-383 of a known type located in
series in the respective supply circuits.

Further thermal protective means 84 are also pre-arran-
ged in the supply connections of said motor I3.

To actuate said motor I3 it is enough to press the key-
30. 25, which is of a normally open type, so that the coil 85 of
the remote control switch I85 can be supplied.

Said coil 85 makes the contacts 89 close so that the
motor I3 is started. At the same time said coil 85 makes the

1 contact 87 close, said contact 87 permitting said coil 85 to
charge itself, and also makes the contact 88 close so as to
connect the circuit 90 to the derived supply 86.

In this way the timer 92 can be supplied through the
5 contact 91, which is of a normally closed type. Being fed,
said timer 92 closes the contact 24 and thus enables the coil
93 to be fed.

In its turn said coil 93 closes the self-charge contact
94 and opens the contact 91 so as to start the timing cycle.
10 for the opening of said contact 24 after a pre-set time.

Furthermore, the coil 93 closes the contact 97 of the
circuit 95 so that the coupling means 21 are fed with current
converted into direct current by the bridge rectifier 96.

The stopping of the motor 13 and the disengagement of
15 the coupling means 21 can take place at the time T_2 owing to
lack of mains current or owing to the action of the relative
protective devices, or can be obtained by pressing the push
button 23, which is of a normally closed type.

In fact, said push button 23, like the thermal protect-
20 ive contact 98, is located in series with the coil 85 and is
therefore able to cut off the supply thereto when it is open-
ed.

In this way the contacts 89 can be opened so as to stop
the motor 13 and the contact 88 can be opened so as to cut
25 off the supply to the coil 93.

Being no longer fed, said coil 93 permits the contact
91 to close and also enables the self-charge contact 94 and
the contact 95 which feeds the coupling means 21, to open
again.

30 The final stopping of the spinning frame takes place at
the time T_F .

Let us now see how the invention works. When the start-
er button 23 of the machine is pushed, the motor 13 of the

1. spinning frame, together with the coupling means 2I cooperating with the shaft II, is started. After a given time T_1 (Fig. 2), which can be regulated with the timer 24, the coupling means 2I are disengaged. When the machine stops owing to the button 25 being pushed or owing to lack of mains current or because of the action of the protective means included in the circuit, the coupling means 2I are engaged at the time T_2 and remain so engaged until the machine has been started up once again.

10. It is clear that the procedure of the invention eliminates the development of the relative torsion in the start-up phase and also the recovery of any relative torsion created between the shafts IO and II, as said shafts IO and II are connected rigidly together during the initial transient period, in the phase of stopping the machine and during the period when the machine is halted.

We have described here a procedure for locking the torsion of the shafts in spinning frames, and also a preferential embodiment of a device to carry out said procedure, but other alternative embodiments are possible for a technician in this field without departing from the scope of the inventive idea of this invention.

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C L A I M S

1. I. Procedure for locking the torsion of shafts in long spinning frames, said procedure being characterized by including the following phases:
 5. - start-up of the frame with the device (20) for locking torsion connected up;
 - the disconnecting of said device (20) for locking torsion after a pre-set long enough time (T_I);
 - re-connection of the device (20) for locking torsion for a long enough time (T_2) before the spinning frame is stopped;
 - the device (20) for locking torsion is kept connected up while the spinning frame is halted so as to ensure the proper working of said frame when it is next started up once again and so as to avoid phase displacement of the cylinders.
2. Procedure as in Claim I, characterized by the fact that the disconnecting of the device (20) for locking torsion takes place after a time (T_I) long enough to cover the initial transient period.
3. Procedure as in Claims I & 2, characterized by the fact that the re-connection of the device (20) for locking torsion lasts for a period (T_2) before the stopping of the machine (T_F) long enough to cover the transient stopping period.
4. Device (20) to carry out said procedure and the locking of torsion of the shafts in long spinning frames, characterized by comprising in cooperation and coordination:
 - transmission means (I6) connected rigidly to a shaft (I0) of the spinning frame,
 - drivable coupling means (2I) connected to said transmission means (I6) and cooperating temporarily with at least one other shaft (II) of the spinning frame, and

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1. - control means (22) able to actuate said drivable coupling.
means (21) so as to suit the speed of said shaft (10).

5. Device (20) for locking torsion as in Claim 4, characterized by the fact that said shaft (10) is the powered shaft of the spinning frame.

6. Device (20) for locking torsion as in Claims 4 & 5, characterized by the fact that said drivable coupling means (21) consist of an electrically operated solenoid clutch (121).

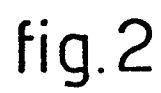
10. 7. Device (20) for locking torsion as in Claims 4 & 5, characterized by the fact that said drivable coupling means (21) consist of claw clutches operated by electromechanical or electromagnetic means.

8. Device (20) for locking torsion as in Claims 4 & 5, characterized by the fact that said drivable coupling means (21) consist of ratchet gears operated by electromechanical or electromagnetic means.

9. Device (20) for locking torsion as in Claim 4 and in one or another of the Claims thereafter, characterized by the fact that said control means (20) are connected to the motor means (13) which drive the powered shaft (10) of the spinning frame.

10. Procedure for locking the torsion of shafts in spinning frames, being substantially as described, shown and claimed and for the purposes allowed.

II. Device (20) for locking the torsion of shafts in long spinning frames, being substantially as described, shown and claimed and for the purposes allowed.







European Patent
Office

EUROPEAN SEARCH REPORT

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Application number

EP 82 83 0220

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
D, A	--- DE-A-2 722 532 (ZINGER)		D 01 H 1/22 D 01 H 5/82
D, A	--- DE-A-2 930 327 (W. SCHAFHORST)		
D, A	--- DE-C- 94 895 (J. EFFENBERGER) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
			D 01 H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 12-11-1982	Examiner DEPRUN M.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			