

EUROPEAN PATENT APPLICATION

Application number: **88200603.4**

Int. Cl.⁴: **D01H 5/14 , D01G 19/10**

Date of filing: **30.03.88**

Priority: **08.05.87 IT 2042887**

Date of publication of application:
09.11.88 Bulletin 88/45

Designated Contracting States:
BE CH DE ES FR GB GR LI

Applicant: **SAVIO S.p.A.**
Via Udine 105
I-33170 Pordenone(IT)

Inventor: **Sartoni, Sandro**
Via Pendini 1/A
I-40026 Imola Bologna(IT)
Inventor: **Minguzzi, Eraldo**
Via Golfari 3
I-48012 Bagnacavallo Ravenna(IT)

Representative: **De Carli, Erberto et al**
ING. BARZANO' & ZANARDO MILANO S.p.A.
Via Borgonuovo, 10
I-20121 Milano(IT)

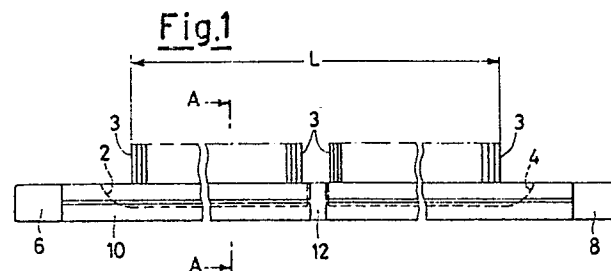
Improvement in the comb bar for rotary-head drawing devices on drawing frames for fibre bands.

The present invention relates to an improvement which gives a greater strength to the bars equipped with a plurality of needles, and to be used in combination with a plurality of other similar bars in the rotary-head drawing devices.

In the rod-shaped body of the comb bar two narrow longitudinal slots are provided, each of them being spaced apart from the other one by a distance substantially positioned astride the middle of said bar.

Each one of the above-said longitudinal slots houses the butt portion of a plurality of needles operating on one or more fibre bands.

The length interposed between two consecutive longitudinal slots is strengthened, in that it shows a larger cross-section than the bar cross-sections in correspondence of the needles.



"IMPROVEMENT IN THE COMB BAR FOR ROTARY-HEAD DRAWING DEVICES ON DRAWING FRAMES FOR FIBRE BANDS"

The present invention relates to the needle bars of a drawing machine for the combing, or preparation for spinning, of fibre bands.

More particularly, the present invention is concerned with the comb whose active surface bears a plurality of needles whose operating field serves to control and parallel the fibres of a fibre band, in order to prepare them for the spinning.

By "operating field of the needle comb", the straight length has to be understood, which is formed by the whole set of the needles which regularize and accompany the fibres of the fibre bands from the feed point to the pinching point of the drawing rolls.

Rotary-head drawing devices are known, which rotatably move, along preset paths, a set of needle combs, which act on a plurality of continuously fed fibre bands. Said rotary-head drawing devices are substantially composed by: feed rolls, drawing rolls, and by an accompanying device.

This latter performs the task of controlling and accompanying the fibres of the fibre bands by means of needles mounted on purposely arranged bars. The whole structure constituted by the needles and the bar is denominated "the comb".

In said machines, in order to increase the efficacy of control, and, hence, the quality of the product, the needle-holder bars have to be positioned as close as possible to each other, in order to increase the number of installed needles per surface area unit. However, it is known that this close positioning is limited by the need of giving the bars such a thickness that, on one hand, secures them a high enough stiffness in order to prevent them from bending due to the influence of the traction exerted by the fibres pulled by the drawing unit, and, on the other hand, gives them a high strength inside the drawing device, which enables them to withstand the impacts applied by the drive system.

The rotary-head drawing devices of the above-said type are equipped with two couples of grooved flanges which drive the combs to revolve, whilst two couples of stationary cams make them run along a path which, in the central working area, is approximately straight. Thus, the combs and linked with one another, and with the other operating members of the drawing machine in such a way that, when a damage occurs to a single comb, the whole machine must be completely stopped for a time which sometimes may be very long, with a consequent loss in production. The individual comb, constituted by a bar equipped with needles, moves along guides or sliding tracks, and its move-

ment is secured by the slots of the flanges inside which the two ends of the same bar are engaged.

This bar, undergoing repeated impacts, and considerable rubbing, is made from special steel and is furthermore submitted to a full series of treatments in order to prevent a rapid damaging from occurring to it. It is expensive to produce, and its repair or replacement is always a delicate operation. The working requirements of the drawing frames oblige each comb to undergo rapid changes in its running trajectory, in order to enter, and exit from, the fibre bands to be treated, which cause prevailing pulsating bending stresses to be applied to them, which are particularly intense in correspondence of the middle of the rod-shaped body of the comb.

In the applications known from the prior art, following a long-term operation of the drawing frames, the presence was therefore observed of bent bars, which frequently causes the needles to get released from the bars, and, in extreme cases, the same bar to get broken, notwithstanding the thermal treatment and the proper selection of the material.

If we examine the crack, we observe that it occurs at the basis of the slot which houses the needle butts, and substantially starts in correspondence of the middle of the rod-shaped body of the comb, subsequently progressively propagating towards the ends of the bar. Said cracks are typically due by the presence of pulsating fatigue stresses deriving from a strain applied perpendicularly to the rod-shaped body of the bar. This latter results hence to undergo a pulsating bending tensile stress, which reaches its maximum value in correspondence of the middle of said bar.

This middle point becomes often, after a high-intensity thermal treatment, a brittle point from which a micro-crack starts, which progressively originates a visible crack area.

The purpose of the improvement according to the present invention is precisely to obviate the brittleness of these elements, and to considerably decrease the opportunities they have to get damaged, or, in extreme cases, to get broken.

Said improvement substantially consists in that a length astride the middle of the bar has a strengthened cross-section, by virtue of the absence, along said portion, of the needle housing slot.

According to a particular form of practical embodiment of the invention, the chamfers along the sides of the rod-shaped bars may be even completely got rid of in correspondence of said central strengthened lengths. Thanks to this larger-strength

central cross-section, the speed can be considerably increased, with which the bars advance along their running and working trajectory.

As a consequence, the production capacity of the drawing frame increases by virtue of the higher fibre band feed speed. Clearly, the higher the revolution speed of the comb-holder grooved disks, and consequently, the larger the production capacity of the drawing frame, the higher the stresses applied to the bars. The above-said stresses add up to the stresses deriving from the presence of treated fibre bands which must be accompanied and controlled in an efficacious way.

The present invention proposes improvements to be supplied to the prior art from which it derives, and which considerably innovates, solving technical limitations which were heretofore unsolved in the sector of the combs for drawing frames.

Thus, the invention aims at actually providing some advantages, among which the following can be reminded:

- the increase in operating speed, as already above mentioned, and, therefore, in the productivity of the drawing frame, with the quality of the exiting bands being the same, because the comb bars are strengthened in their central area to which the highest pulsating bending stresses are applied, which cause the combs to be deformed and damaged, and, in extreme cases, to undergo a fatigue break, due to a progressive crack started in the brittlest points astride their middle portion.
- Obviously, the strengthening of the central length of the bar takes place without endangering the regular operation of the comb mechanism;
- the reduction in vibrations, in that the new shape of the rod-shaped body of the bar secures a discrete attenuation of the pulsating deformation camber arising from the bending stress, securing a better control of the fibre bands to be regularized, which substantially results in a considerable technological improvement of the produced band;
- the increase in combs useful life, in that their mechanical strength is increased in an area wherein, due to the prevailing bending stress, the largest strain is concentrated;
- the widening of the comb, which causes an overall increase of the needle field, which makes it possible a wide rotary head to be installed, with the precise requirement being met, that bands can be treated, which have a larger weight than of the bands treated on the heads of the presently existing drawing machines, contributing to a higher productivity to be accomplished in the machines, with the other operating parameters being unchanged.
- to prevent unbindings from occurring between the bars and the needles, or cracks from occurring in the highest-brittleness cross-sections, without increasing the weight of the individual comb, in that

in the strengthened portion no needles are present and the mass of the absent needles compensates for the slight increase in material deriving from the interruption of the slot which houses the butts of said needles.

Incidentally, the strengthened lengths of the combs without the corresponding needles are positioned in the dead operative areas between the fibre bands being fed. Said fibre bands which undergo a simultaneous drawing process should not interfere with one another, not even to a minimum extent.

These and still further purposes are all achieved by the improvement in the comb bar according to the present invention, in particular on rotary-head drawing devices for drawing frames for fibre bands, characterized in that it comprises:

- a rod-shaped body inside which two narrow longitudinal slots are provided, each of which spaced from the other in a central length of the bar, and each of which houses the butt portion of a plurality of needles operating on one or more fibre bands.

According to a form of practical embodiment, the number of needle-holder slots provided in the rod-shaped body of the comb coincides with the number of the bands fed in order to undergo the drawing operation.

According to a further form of practical embodiment, the length(s) existing between two consecutive longitudinal slots is(are) further strengthened by increasing the thickness of the rod-shaped body, totally depriving it of the chamfers provided on its side in correspondence of said lengths.

The following disclosure, supplied for purely exemplifying, non-limitative purposes, will be useful in order to illustrate the finding of the present invention, by referring to the hereto attached drawing, wherein:

Figure 1 shows a schematic, front view of a rod-shaped bar equipped with a plurality of needles, subdivided into two groups symmetrically positioned around a central length;

Figure 2 shows a schematic top plan view of the comb of Figure 1;

Figure 3 shows a sectional view according to A-A path of Figure 1, wherein the needle plunged inside the slot is positioned with a desired alpha angle relatively to the longitudinal plane of the comb.

The operation of the elements operating in mutual cooperation with the combs of the revolving head of the drawing frames is not disclosed, in that said elements are already known, and also because they do not relate to the improvement of the present invention.

In the only one attached drawing table, we have that: 2 is one of the slots provided in the rod-

shaped body of the bar 10, inside which the needles 3 are plunged; 3 is the needle, which may have an either circular or a flat cross-section; 4 is the other one of the longitudinal slots provided in the rod-shaped body of the bar 10, inside which the needles 3 are plunged; 5 is the butt of the needle 1 housed inside the slot of the bar 10; 6 is an end of the bar 10, which engages inside a slot provided in a grooved disk which, in combination with a fixed cam, obliges the comb to run along a determined path, which meets precise technological requirements; 8 is the other end of the bar 10; 10 is the rod-shaped body of the bar which, in combination with a plurality of needles, forms the individual comb of the rotary head of a drawing device; 12 is the central length, which is strengthened both because it does not contain any grooves, and because it does not have the chamfers as provided on the side of the bar 10; L is the width of the needle field, comprising the needle groups subdivided by the strengthened length 12.

For exemplifying purposes only, one strengthened central length was provided for, in that a plurality of strengthened lengths between needle groups can be provided; different types of reinforcements can be provided as well, like increases in cross-sectional surface area, angle roundings, and so forth.

Several modifications may be supplied in the details of the form of practical embodiment of the invention, as to the nature, the shape, the size and the number of the reinforcements, without going out of the purview of the present invention.

Claims

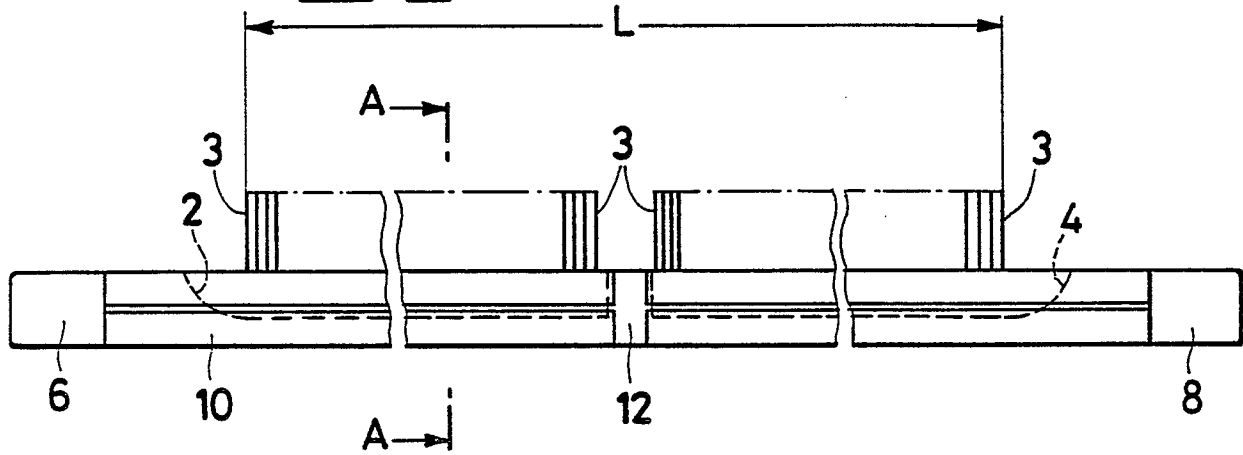
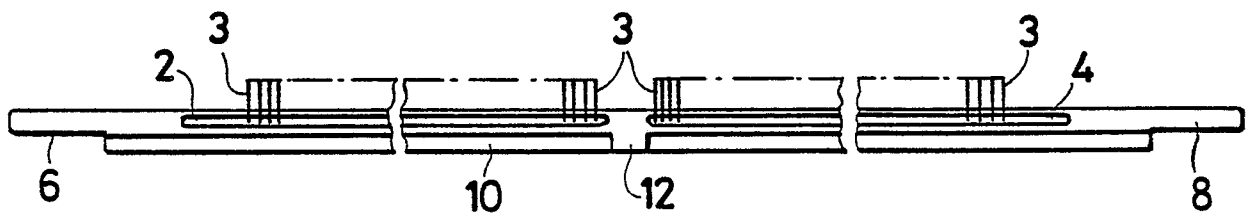
1. Comb bar for drawing machines for fibre bands, constituted by a rod-shaped body inside which a plurality of mutually parallel needles are inserted, characterized in that inside its rod-shaped body two narrow longitudinal slots are provided, each of which is spaced from the other one by a substantially central length of the bar, and wherein each of said slots houses the butt portion of a plurality of needles operating on one or more fibre band(s).

2. Comb bar according to the preceding claim, characterized in that the number of the needle-holder slots corresponds to the number of the fibre bands fed in order to undergo the drawing operation.

3. Comb bar according to the preceding claims, characterized in that the length(s) existing between two consecutive longitudinal slots is(are) furthermore reinforced by increasing the thickness

of the rod-shaped body, by totally depriving it of the chamfers provided on its side in correspondence of said lengths.

4. Comb bar characterized in that it is accomplished according to as said in any of claims from 1 to 3.

Fig.1**Fig.2****Fig.3**