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Zang et al.

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[54] **THREAD-APPLYING DEVICE**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** ..... **34/236**, 34/152, 34/162, 57/34 R, 57/106

[51] **Int. Cl.** **F26b 19/00**

[58] **Field of Search** ..... 34/39–42, 117, 236, 120, 34/148, 152, 162; 28/62; 226/95, 97; 57/34 X, 34 B, 106; 263/3

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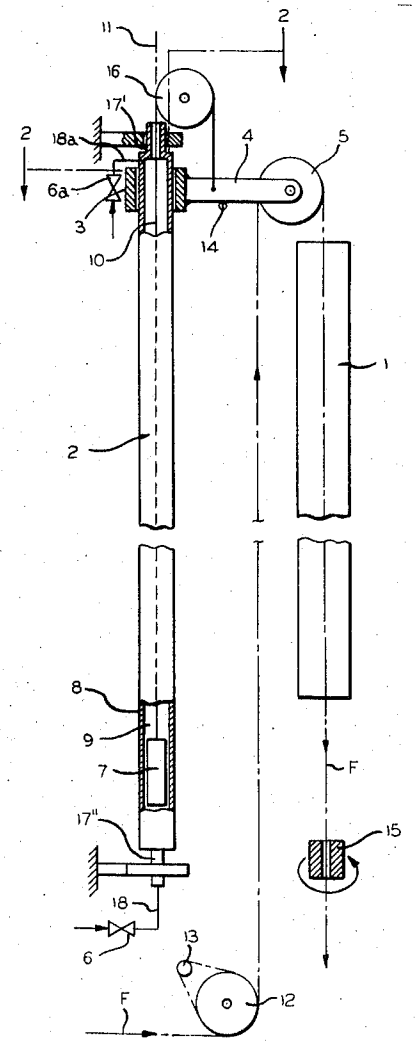
[57] **ABSTRACT**

Device for applying rapidly running threads to heating surfaces and embodying a swingable, vertically movable thread run-over member adjacent the heating device, and a pneumatically operated counterweight-cable-pulley unit for effecting the vertical movement.

5 Claims, 2 Drawing Figures



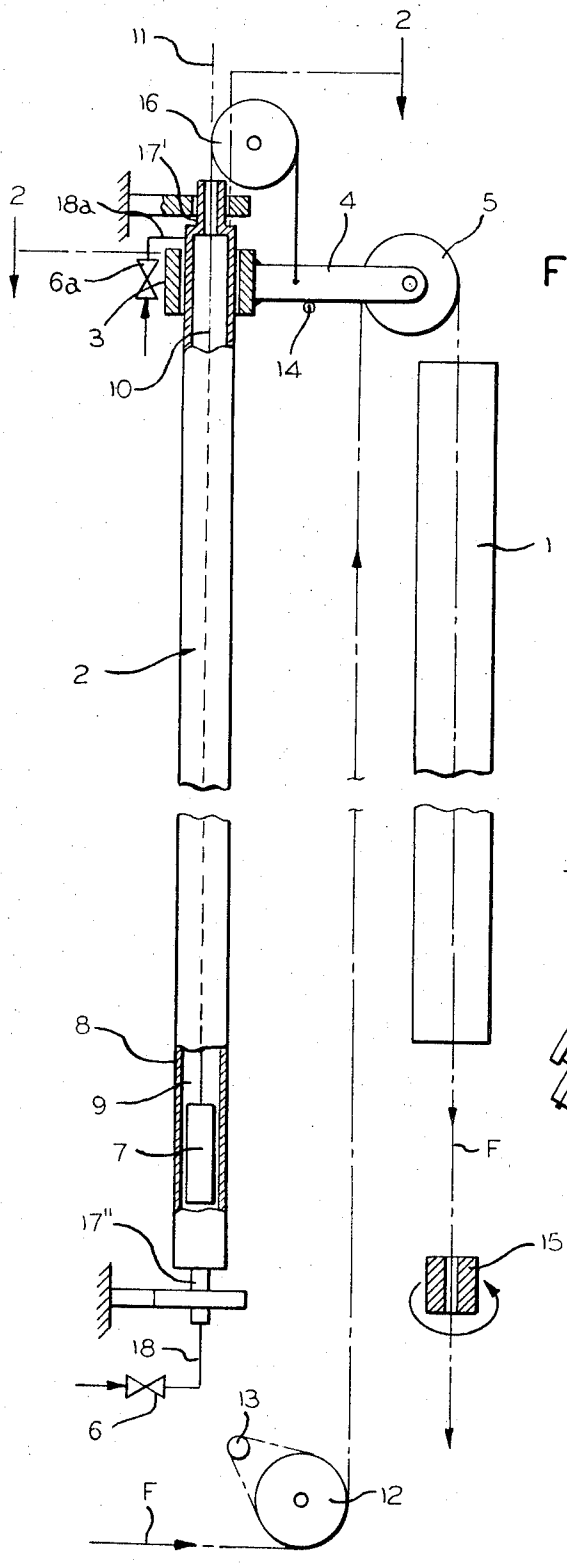


FIG.1

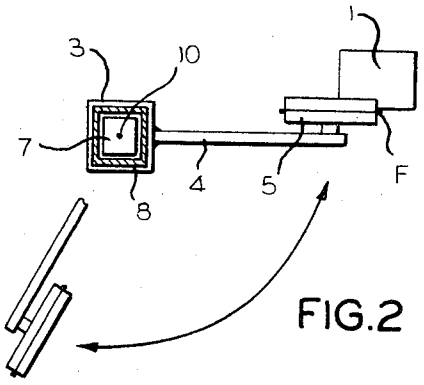


FIG.2

THREAD-APPLYING DEVICE

INTRODUCTION

Heating devices with heating surfaces over which the threads to be treated are guided are common in many, diverse types of processing stages of yarn production and yarn treatment, e.g., in stretching, stretch-winding, stretch-twisting, texturizing or stretch-texturizing operations. Usual forms of such heating devices are so-called heating plates, over whose arched heating surface the threads run, and slotted heating tubes, in which there is present a generally likewise arched heating surface for the threads running over it or through it. Such heating devices with run-over surfaces are represented, for example, in German Gbm. No. 1,958,183. This patent considers the problems which arise because of the steadily increasing production speeds and the constantly increasing lengths of such heating devices, without, however, solving these problems in the long run.

On increase of the delivery speeds from, for example, 200 m/min to 400 m/min, it suffices to increase the heating member length from, say, 0.75 m to 1.5 m, without its being necessary to increase the temperatures of the heating member to values in the vicinity of the melting point of the polymer to be processed. The delivery speeds attainable technically in the last few years of 100 m/min to about 4,000 m/min or more require, for equal contact time of the thread on the heating member at constant heating temperature, however, lengths of several meters. Aside from the fact that the production spaces are not high enough to accommodate such long heating devices including the thread feed members arranged above and below, the tending of such long heating members, particularly the applying of the thread thereto, no longer can be done by hand.

As long as the heating temperature lies clearly below the melting point and the heating device length does not exceed 1.80 m, the thread applying device described in German Gbm. No. 1,958,183 may still function. The height adjustment of the thread run-over roller is accomplished in this patent by hand, i.e., by means of a push rod, on the upper end of which there is fastened the deflection roller. The maximal stroke and thereby the maximal heating plate length, therefore, are limited by the dimensions of the human body (body size and extendable arm length). Further, the known device does not permit in the thread applying the optical checking of the applying process itself, since the applying device as mounted at the heating place on the heating face side blocks the view. This disadvantage is particularly serious in the case of very high thread running speeds, where the temperatures of the heating device are in the immediate vicinity of the melting point of the thread's polymer. Slight disturbances in the thread course near the heating device lead, therefore, within a few seconds to relatively great accumulations of thread on the heating surface, to which the threads rapidly become stuck and force a temporary shut down of the heating device.

THE INVENTION

It is the objective of the invention to avoid the disadvantages occurring in the known device. In particular, in the case of very high thread running speeds and maximal heating temperatures employed on such heating devices, the thread applying operation is surely and rapidly achieved on heating devices, namely, those having a length of several meters, e.g., 2 to 5 meters. The thread is applied to the heating surface only when all the thread guiding elements are completely in operation. The thread applying operation is brief in order to avoid relatively great waste windings. Further, in case of irregularities or malfunctions, the thread applying operation can be stopped immediately.

These features of the invention are attained by a thread applying device of the type mentioned above, which is characterized by a guide member positioned beside the heating device and running substantially vertically, a slide piece vertically adjustable on it, on whose horizontally swingable arm is supported the thread run-over member, and a drive for the moving of the slide piece up and down.

Through the feature that the thread applying device is arranged beside and not — as in the known state of technology — on face side in front of the heating surface, the heating surface can always be well observed during the applying process. Through the arrangement that the arm carrying the thread run-over member is swung, not vertically, but horizontally away from the heating surface and toward it, there is simultaneously achieved a large gain in space.

Through the drive for the up-and-down movement of the slide piece, which, as is shown further below, can be simple, the operating personnel, standing and without having to stretch, can move the slide piece to the upper stop, even if the heating member is 5 meters long or even longer. With the device of the invention, therefore, the thread applying step is possible without difficulties even in the face of virtually unlimitedly long heating surfaces.

It is possible to construct the guide member as a profiled rod or rail, on which a slide piece with mating counter-profile is guided. Drive and swingable movement of the arm with the thread run-over member are possible in many ways.

An especially simply constructed and cheaply manufactured form of the device of the invention is characterized in that the guide member is a pipe, which is surrounded by a slide piece and has in its interior a piston connected via a cable with the arm of the slide piece, which piston is preferably elevationally adjustable pneumatically by operation of a valve. In this embodiment, after the thread is laid over all the thread guide elements including the thread run-over member, and the operating speed in the thread running is adjusted, through moving down of the piston the slide piece with the arm and the thread run-over member is driven up until the thread run-over is at level above the upper edge of the heating surface.

In order to carry out the swinging of the arm, it is possible, for example, for the slide piece to be rotatable about the pipe. Preferable, however, is a form in which the guide member, e.g., the tube, is rotatable about its vertical axis. If a new thread has to be applied, then the arm is swung away from the heating surface, for example through 45° to 120°, and driven down by the drive to a height at which the operating personnel can conveniently reach the thread run-over member.

The device becomes especially simple if — as preferred — the piston is movable upward pneumatically and movable downward by reason of its own weight. In this manner the supplying of a pneumatic pressure to the undersurface of the piston suffices during the travel

upward. For the driving down of the piston it suffices to release the pressure — i.e., the piston need be acted upon on only one side of its sides. This leads to a simplification of the pneumatic conduit system. Through the size of the piston weight it is possible, furthermore, to achieve a clearly defined path-time function.

This arrangement is preferred to a further conception of this invention in which the piston is acted upon only from above when the slide piece is to be raised. Here, the system of slide-piece-arm-thread run-over member has to have a sufficiently great mass to be able to raise the piston again. In a third arrangement of the invention, the piston is movable pneumatically both upward and downward.

THE DRAWING

The invention is explained in detail with the aid of a preferred embodiment illustrated in the drawing, wherein:

FIG. 1 is a front elevation of the preferred embodiment of the thread-applying device of the invention in operating position; and

FIG. 2 is a top plan and section view of the embodiment of FIG. 1, as seen from section 2—2, and illustrates simultaneously the swinging range of the thread-applying device.

THE ILLUSTRATED EMBODIMENT

A thread run-over roller or pulley 5 is mounted on the free end of the arm 4, which, in turn, is connected to the slide piece 3. The slide piece 3 embraces the pipe 8 with the latter serving as guide member 2. The connection between the arm 4 and the counterweight-piston 7, which is movable vertically in the interior 9 of the pipe 8, is by the cable 10. The cable 10 reverses its direction as it passes across the roller or pulley 16. In upward movement of the piston 7, the slide piece 3 moves downward in the same degree, and in downward movement of the piston 7 the slide piece 3 is raised correspondingly.

In the present example the pipe 8 serving as guide member 2 is constructed a rectangular, four-corner pipe. It is borne by means of two pivots 17′ and 17″ at its ends, so that the pipe can rotate about its vertical axis 11. Rotation of the pipe 8 brings about the horizontal swinging, according to the invention, of the arm 4 and its thread run-over member 5. The pivots 17 are drilled axially, the cable being conducted through the upper pivot 17′, while through the lower pivot 17′ passes the feed line 18 for the pneumatic pressure medium, which acts on the underside of the piston 7.

In the form represented the piston is acted upon only on one side with air or the like when it is brought to the top. In this case, through opening of the valve 6 the downward movement of the members 3, 4 and 5 is initiated. The piston 7 is constructed as an adequately great counterweight, which is in a position to move the slide piece 3 with arm 4 and thread run-over pulley or roller 5 upward against all the frictional forces. This means that the pneumatic system needs to be operated only for a brief time, namely, when new thread is to be run over pulley 5 after slide piece 3 is lowered. The piston 7 otherwise keeps, by gravity, the slide piece 3 in its upper operating position. For driving the piston downwardly by pneumatic pressure, a second air pressure line 18*a* with valve 6*a* may be connected similarly to the upper portion of the pipe 8.

For the distributing of the new thread, therefore, after turning of the pipe 8 through about 45° to 120°, the slide piece 3 has moved off of the arrest or stop device 14 and is driven downward. The thread F, coming from a supply (not represented), is wound a number of times around the stretching godet 12 and its deflection roller 13, guided over the lowered thread run-over roller or pulley 5, guided through the false-twist assembly 15 (schematically represented) and wound on a ring-twist device (not represented). Now the thread running speed is allowed to increase to the value desired in operation, thus, for example, 800 m/min, and the pneumatic system is then taken out of operation. The piston 7 then descends, following its path-time function, to a lower stop, the slide piece 3 going into the highest position, i.e., the operating position. By swinging back the arm 3, i.e., by turning the pipe back through about 45° to 120°, the thread F running with full speed is applied to the heating surface of the heating plate or tube 1, which in the present example has a length of 2.5 meters. The arresting device 14 then holds the arm 4 in operating position.

The pipe 8 used preferably can be standard size. The piston 7 can be a correspondingly prefiled iron or steel bar or rod. In order to maintain the pneumatic drive principle, coarse tolerances are sufficient. Thereby, the entire thread-applying device is most simple and cheap to produce. For the pipe 8 and the slide piece 3 there can be used, for example, circular pipes, although polygonal cross sections are preferred. With the latter, the turning of the pipe 8 about its axis 11 brings about a defined swinging of the arm 4. In particular in the present example a square cross-section pipe and a square cross-section slide piece have been used.

Obviously it is possible to replace individual functional elements by parts with equivalent action. It is possible, for example, to replace the cable 10 by a chain, in which case the deflection roller 16 can be replaced by a sprocket wheel, which possibly could take over the drive function. Likewise, for the up-and-down movement of the piston 7 and thereby of the slide piece 3 there can be used instead of the preferred pneumatic system a hydraulic system. In this manner a number of alternatives are possible without departing from the scope and spirit of the invention.

The invention is hereby claimed as follows:

1. A device for applying rapidly running threads to heating surfaces, which comprises a heating surface, a substantially vertical guide member positioned beside said heating surface, a slide piece slidable on said guide member, a horizontal arm on said slide piece, a thread run-over member on said arm, turning means for swinging said arm and its run-over member in a horizontal arc, and drive means for moving said slide piece up and down along said guide member.

2. A device according to claim 1, said guide member being a pipe, said slide piece being fitted about said pipe, a piston inside said pipe and connected via a cable with said arm of said slide piece, and means for moving said piston longitudinally in said pipe.

3. A device according to claim 1, said turning means including said guide member, and means mounting the latter for rotation about its vertical axis.

4. A device according to claim 2, said drive means being pneumatic means for pushing said piston upwardly by pneumatic pressure in said pipe, and said piston returning downward by reason of its own weight upon release of said pressure.

5. A device according to claim 2, said drive means being pneumatic means for forcing said piston pneumatically both upward and downward.

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