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Melz

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[54] **THREAD WINDUP APPARATUS AND PROCESS**

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Related U.S. Application Data

[63] Continuation of Ser. No. 221,972, Jan. 31, 1972, abandoned.

[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **242/43**

[51] **Int. Cl.** **B65h 54/30**

[58] **Field of Search** ..... 242/43, 158 R, 158.3, 158.5

[56] **References Cited**

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[57] **ABSTRACT**

Process and apparatus for reversing stroke of guide-bar of thread or yarn windup device wherein the direction of stroke movement of the guide-bar mass and associated parts is changed by at least partial rebounding or reflexion from a relatively stationary body.

2 Claims, 3 Drawing Figures

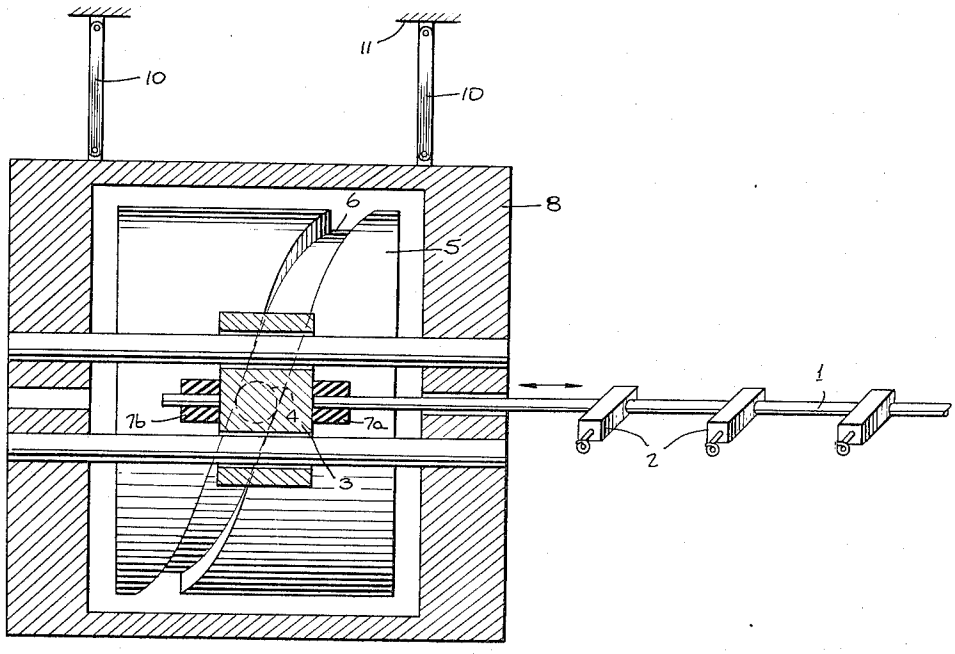


Fig. 1.

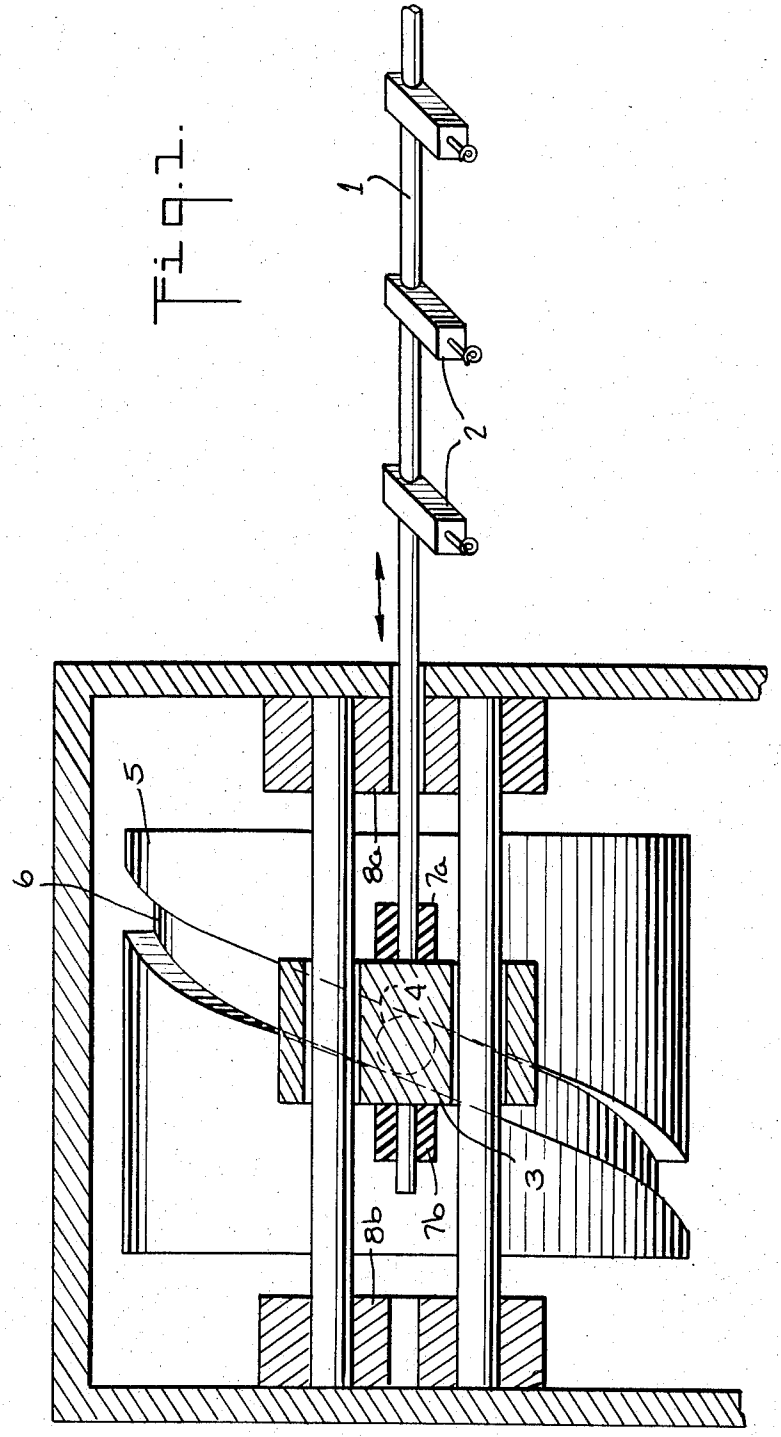


Fig. 2.

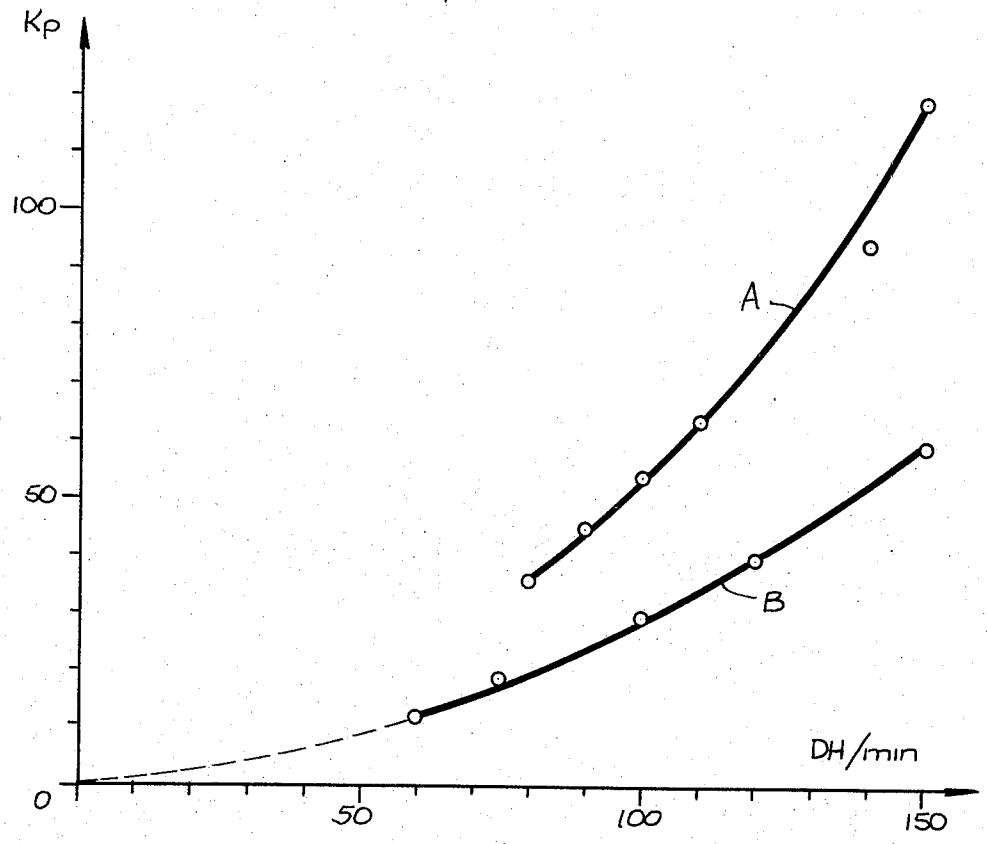
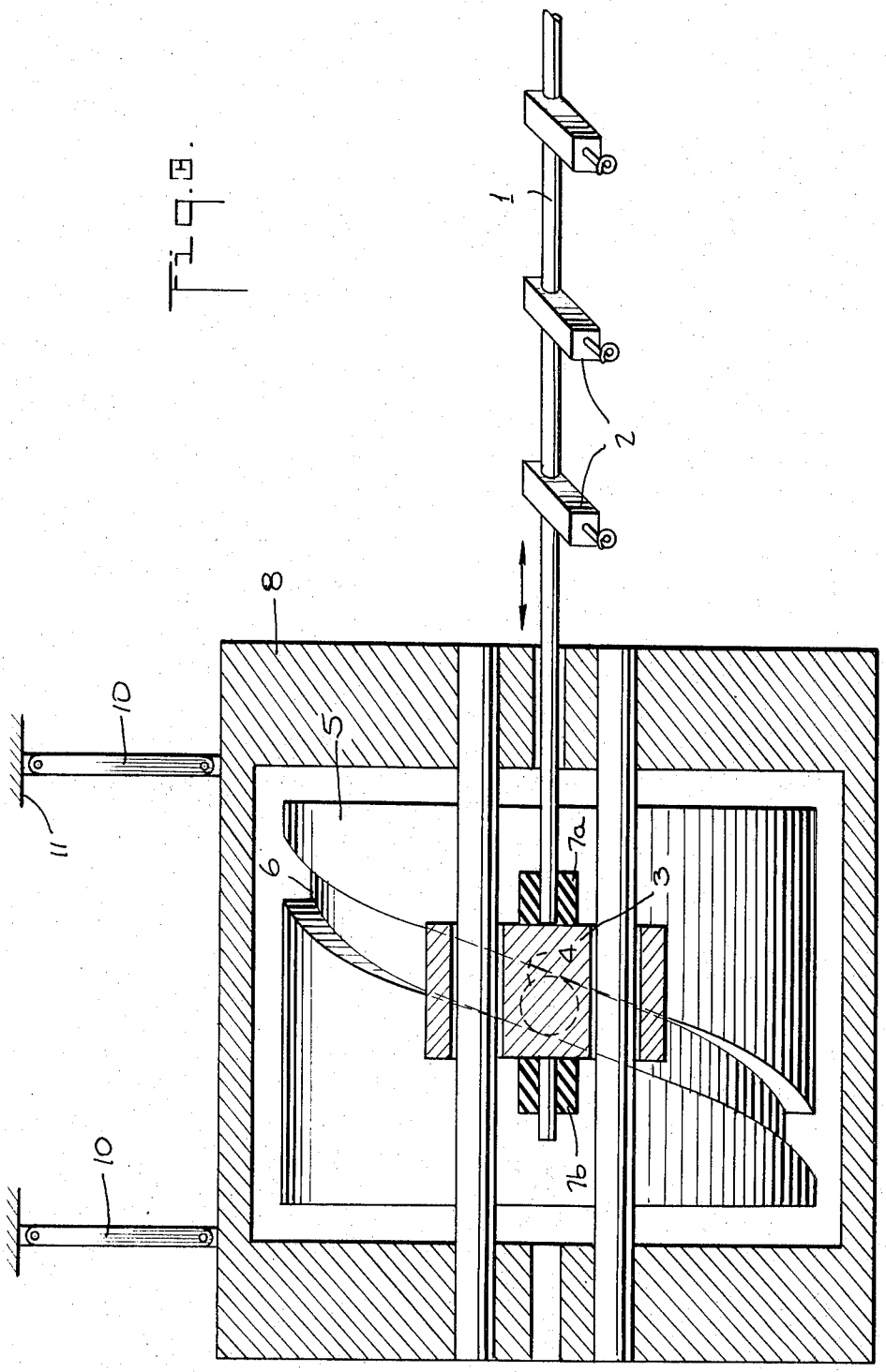


Fig. 5.



THREAD WINDUP APPARATUS AND PROCESS

This is a continuation, of application Ser. No. 221,972, filed 1/31/72 entitled "Thread Windup Apparatus and Process," now abandoned.

The present invention relates to the winding of threads and the like, and more particularly, to improvements in thread windup apparatus and method, especially in respect of the reversal of movement of the thread guide bars.

In known thread windup devices with several winding stations, the thread-guides are generally mounted in a row on a thread-guide bar common to all the thread-guides, and is displaced by oscillating movement, the stroke length of which is necessary for the winding process. In such devices, it is necessary, in order to obtain a regular build-up of the wound-up thread body, to effect the movement of the thread-guides at a constant speed, and to effect the reversal of movement in the shortest possible time and without noticeable braking and acceleration phases. The shorter the time available for negative or positive speed variation, the higher is the amount of acceleration itself, so that when the mass is constant, the force necessary for direction reversal increases.

It has now been found in known devices that, on one hand, because of the extremely high forces occurring upon direction reversal, the driving elements must be overdimensioned to a great extent, and that extremely high wear is unavoidable.

Furthermore, the obtainable stroke frequencies are limited by the solidity of the material constituting the force-transmitting parts since, at rising frequency, the speed of the moved masses rises and the time available for direction reversal diminishes so that acceleration and occurring forces reach a maximum which cannot be exceeded.

It is the purpose of the present invention to eliminate the disadvantages of the known devices, and particularly to contribute a process and apparatus for the reversal of the stroke movement of such oscillating thread-guide bars which permit an essential increase of the stroke frequencies while the drive forces and the wear remain relatively low.

According to the process of the invention, this problem is resolved by changing the direction of the stroke movement of the oscillations of the total mass of thread-guide bars and the parts fixed thereon by at least partial rebounding or reflexion from a stationary body into the opposite direction.

The use of the term "stationary" is relative and should be understood to express the fact that the stops are only sufficiently rigidly fixed that reflexion is possible. Each stop may, in principle, also be a freely suspended buffer or a counter-moving buffer device.

Thus, according to the present invention, the kinetic energy of the moving masses does not act upon the drive elements so that acceleration to the desired speed may be effected; but rather, during reflexion, a major part of the energy is conserved and the direction of movement of the mass is changed so that drive and force transmitting elements are relieved to a great extent from the effects of such kinetic energy.

The process of the invention can advantageously be realized with a device in which at least one elastically deformable reflector element for receiving and reversing the kinetic energy of the total moving mass is provided at each of the vertex points of deviation of the thread-guide bar between a stop fixed on the frame of the thread windup device and an element fixed on the thread-guide bar. The reflector element may, for example, be realized as a compact elastic body, a spring, or even as a volume of compressible gas, the inital pressure of which may be adjusted and where, in any case, the speed and deformation behaviour of the reflector elements must be adapted to the parameters of direction reversal given by the drive elements. Insofar as the stroke frequency does not remain constant, however, or if manual adaptation to various speeds should be avoided, automatic adjusting of the reflexion parameters (such as stop distances, gas pressure, etc.) can be effected as a function of the chosen stroke frequency.

It is particularly simple to realize the present invention in a windup device with a grooved drum for production of the stroke movement, the groove serving to guide a sliding weight fixed in a stroke bearing and wherein the stoke bearing is connected with the thread-guide bar and supported for free movement between two stop elements by providing, on both sides of the stroke bearing, elements for contacting the stop elements to effect a reflexion of the moving mass.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that the claims be regarded as including such equivalent construction as do not depart from the spirit and scope of the invention.

A specific embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings, forming a part of the specification wherein:

FIG. 1 is a schematic view, partly in section, of a thread-guide device with the features of the present invention;

FIG. 2 is a graphic representation of the forces appearing in the drive as a function of stroke frequency; and

FIG. 3 is a view similar to FIG. 1, but illustrating a further embodiment of the invention.

According to FIG. 1, a number of thread-guides 2 are fixed on a thread-guide bar 1. The thread-guide bar 1 is supported by a stroke bearing 3 which is engaged with a groove 6 provided in the rotatable drum 5 via a sliding weight 4.

As will be understood by those skilled in the art, as the drum 5 rotates, the sliding weight 4, the stroke bearing 3, the thread-guide 1 and the thread-guides 2 effect a stroke movement corresponding to the inclination of the groove 6. On respective sides of the stroke bearing 3, rubber buffers 7*a*, 7*b* are provided, and these are pushed against stops 8*a* and 8*b*, respectively, shortly before the vertex of the stroke movement is reached, such a reflexion of the stroke bearing 3 and the masses joined therewith being thus effected that the sliding weight 4 is discharged from the forces occurring

during direction reversal so that wearing of the flanks of the grooves in the vertex points is avoided.

FIG. 2 shows a comparative measurement of the forces, appearing upon load change as a function of the stroke frequency, dh/min, curve A having been recorded on a known apparatus and curve B showing the measured figures of a drive provided with the device of the present invention.

It can be seen from this curve that, according to the present invention, a 50 percent reduction of the forces occurring in the drive can be obtained at a maximum frequency of 150 double strokes per minute. When evaluating the curve, it must be considered that the reflexion element was especially constructed for the frequency of 150 double strokes per minute so that the values lying beneath do not represent the optimum conditions which can be obtained.

As has already been mentioned, each stop may be a freely suspended buffer or a counter-moving buffer device. Thus, as shown in FIG. 3, the buffer comprises a stop **8** which is freely suspended by links **10** from a fixed structure **11**, so that the stop is, in fact, movable relatively to the structure **11**. This arrangement permits the stop to be readily mounted at any desired location. The stop **8** has a substantially greater mass than the moving guide bar, controlling means and reflector element, i.e., the ratio of the masses is at least 10 to 1. If the reflector elements *7a*, *7b* are pushed against the stop **8**, the amplutude of the latter is therefore very small which results in the kinetic energy of the moving mass of the guide bar, controlling means and the refector elements being absorbed and reversed by the deformable elements. Sufficient clearance of the thread guide bar **1** is provided in the bore of the stop **8** in order to make possible a small pendulus motion of the stop.

Although the reflector elements, according to the example, are fixed on the stroke bearing, naturally, as an equivalent solution, an arrangement of the reflectors on the frame can also be provided, or only one reflector may be provided which, upon corresponding alteration of the stops and/or of the engagement points on the thread-guide bars, is reflected on both sides during the stroke movements.

I believe that the method and apparatus constituting my novel contribution to the art will now be understood, and that the advantages thereof will be fully appreciated by those persons skilled in the art.

I claim:

1. Apparatus of the class described comprising thread guide bar means arranged for oscillating movement, means controlling the stroke movements of said guide bar means, at least one elastically deformable reflector element (*7a*, *7b*) movable with the guide bar means, and stop means (**8**) freely pivotally suspended on a fixed structure in position to be engaged by said reflector element at the vertex of a stroke of said thread guide bar means and movable relatively to said fixed structure whereby kinetic energy of the moving mass of said guide bar means and controlling means and said reflector elements is absorbed and reversed by said deformable reflector element.

2. Apparatus of the class described comprising thread guide bar means arranged for oscillating movement, a rotatable drum, a sliding weight in the groove of said drum, bearing means attached to said weight and to the guide bar means, at least one elastically deformable reflector element attached to said bearing means, and stop means freely pivotally suspended on a fixed structure in position to be engaged by said reflector element at the vertex of a stroke of said thread guide bar means and movable relatively to said fixed structure whereby kinetic energy of the moving mass of said guide bar means and bearing means and said reflector elements is absorbed and reversed by said deformable reflector element.

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