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Applicant: **TECNOPROGET DI ZANETTIN B. & C. S.a.s.**
Via dell'Industria 5
I-35023 Bagnoli di Sopra (Padova)(IT)

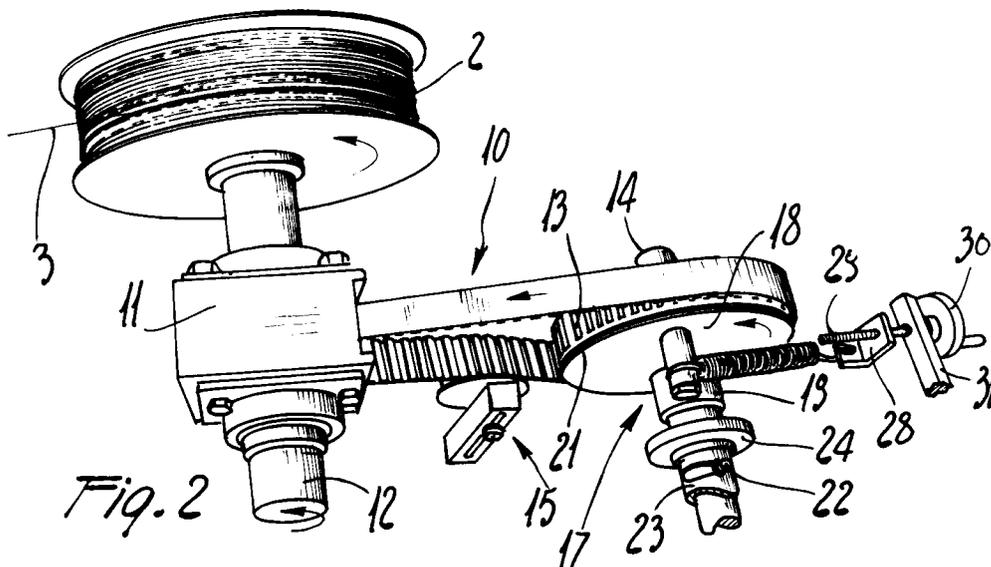
Inventor: **Palmarin, Mario**
Via Nespollari 9
I-35020 Carrara San Stefano (Padova)(IT)

Representative: **Modiano, Guido et al**
c/o Modiano & Associati S.r.l. Via Meravigli,
16
I-20123 Milano(IT)

Tensioning device for a thread, tape or the like unreeled from a reel.

Tensioning device for keeping constant the tension of a thread, tape or the like unreeled from a reel, including a friction disk (18) acting directly on a rotating element (13) which is kinematically connected to the reel (2), an internally threaded bush (19) rigidly connected to the friction disk (18) and

freely screwed upon the rotating element supporting shaft, and an adjustable biasing spring (27) connected to the friction disk for opposing a rotation thereof which spaces the friction disk from the rotating element.



EP 0 513 765 A1

The present invention relates to a tensioning device for a thread, tape or the like unreeled from a reel.

Treatments which entail the unreeling of a thread, tape or the like from a reel are currently performed in many fields of industry.

By way of example, mention can be made of machines suitable for covering metallic cables for electrical use with insulating tapes or cords made of plastic material.

In these machines, a cord or tape constantly subjected to tension is wound in a helical pattern around the sliding cable which is kept under tension.

In most machines which provide for the unreeling of a thread, tape or the like from a reel, there arises the problem of keeping the unreeling tension constant.

This, for example in the above mentioned machines, serves both to avoid breakages of the cable or of the covering tape or cord and to achieve uniform covering.

The need to keep constant the tension of the thread, tape or the like which unreels from the reel is rendered more difficult in practice by the fact that during unreeling the reel decreases in volume, thereby offering decreasing resistance to the action performed by the unreeling means.

Attempts have currently been made to solve the problem by arranging counterweights suitable for producing a resisting torque whose orientation is opposite to the unreeling torque, but the results have not been positive indeed due to the fact that the unreeling torque is not constant but decreases in the course of time.

The aim of the present invention is to provide a device which is suitable for keeping truly constant the tension of a thread, tape or the like unreeled from a reel.

A consequent primary object is to provide a device which allows to adjust the unreeling tension of the thread, tape or the like from the reel.

Another important object is to provide a device which is simple to adjust and in operation.

Another important object is to provide a device which is simple and reliable.

A final object is to provide a device which is composed of a reduced number of elements and has a low cost.

This aim, these objects and others which will become apparent hereinafter are achieved by a tensioning device for a thread, tape or the like unreeled from a reel, which comprises a friction element which acts directly on the reel or on a rotating element kinematically connected thereto and which is coupled to guiding means, which are suitable for spacing it from the surface on which it acts when it rotates concordantly with said surface,

and to means suitable for keeping it pushed against said surface.

Further characteristics and advantages of the invention will become apparent from the detailed description of two embodiments thereof, given by way of non-limitative example in a machine for covering cables, and illustrated in the accompanying drawings, wherein:

figure 1 is a perspective view of a cable covering machine equipped with the devices according to the present invention;

figure 2 is a perspective view of a first embodiment of the device according to the invention, suitable for keeping constant the tension of the cable to be covered;

figure 3 is a perspective detail view of the device of figure 2;

figure 4 is a sectional side view of the detail of figure 3.

figure 5 is a perspective view of a second embodiment of the device suitable for keeping constant the tension of the covering thread made of plastic material;

figure 6 is a partially sectional side view of the device of figure 5;

figure 7 is an exploded perspective view of the device of figures 5 and 6.

With reference to the above figure 1, a machine for covering metallic cables by winding plastic threads thereon in a spiral pattern comprises, on a supporting structure generally designated by the reference numeral 1, a first reel 2 from which a metallic cable 3 is unreeled in order to be covered.

The metallic cable 3 then passes on a guide 4 and, under tension, passes through a device 5 which winds a plastic thread 6, unreeled from a second reel 7, around said cable in a spiral pattern.

The covered cable is then redirected by a guide 8 and is wound on a third reel 9 which is conveniently motorized.

The first reel 2 and the second reel 7 are both coupled to devices according to the invention for keeping constant the tension respectively of the cable and of the thread which are unreeled therefrom.

In particular, as regards the first reel 2, with reference now to the above figures 2 to 4, a first embodiment of the device according to the invention comprises a toothed-belt transmission 10 which kinematically connects a pinion, of which only the box-like containing structure 11 is visible in the figures, said pinion being keyed on the shaft 12 on which the first reel 2 is also fixed, to a toothed drum 13 which is able to rotate freely on a shaft 14 which is parallel to the reel shaft 12.

Said belt transmission 10 is also equipped with an adjustable roller tension application device, generally designated by the reference numeral 15.

The axial movements of the drum 13 are blocked on one side by means of an abutment ring 16 and on the other side by a friction element 17 which is composed of a disk 18 which acts on the corresponding lateral surface of the drum 13 and which extends from a sleeve-shaped bush 19 which is internally threaded and is screwed on a corresponding bush 20 which is externally threaded and fixed on the shaft 14.

The thread, which conveniently has a square cross-section (or another kind of cross section, with one or more starts), has such a shape that rotations of the friction element 17 which are concordant with the rotations of the drum 13 cause the spacing of the disk 18 from said drum 13.

A disk-like element 21, made of felt or equivalent or other braking material, is conveniently interposed between the disk 18 and the drum 13.

The shaft 14 is fixed and is locked with one end by means of bolts 22 in a bush 23 which extends from the supporting structure.

A spacer 24 is arranged between the bush 23 and the sleeve 19.

Said disk 18 is eccentrically provided with a hole in which the threaded end 25 of a pin 26 is screwed; an end of a cylindrical helical spring 27 is fixed to said pin 26. The other end of the spring 27 is fixed to a plate 28 which has a hole in which a threaded rod 29 is screwed; said rod 29 is rigidly associated with an adjustment handwheel 30.

The rod 29 is inserted, between the plate 28 and the handwheel 30, in a through hole of a supporting element 31 which is rigidly associated with the structure.

The function of said spring 27 is to keep the disk 18 pushed against the drum 13, producing the friction action.

For this purpose, the spring 27 is pre-loaded with a certain tension, producing a resisting torque whose orientation is opposite to the rotation direction of the drum 13.

The handwheel 30 is suitable, by rotation thereof, for varying the position of the plate 28 on the threaded rod 29, in order to thereby adjust the tension of the spring 27.

In practice, when the cable 3 unreels from the first reel 2, the toothed drum 13 is rotated and tends to rotate the friction element 17.

However, said friction element, due to the coupling between the threaded bushes 19 and 20, tends to separate, loading the spring 27, whose contrasting action causes the effect of friction and resistance to unreeling of the reel 2.

The cable 3 is thus kept under constant tension.

As regards the second reel 7, with particular reference now to the above figures 5 to 7, a second embodiment of the device according to the

invention comprises a motorized hollow shaft 32; only the casing 33 of its kinematic actuation system, which contains the motion take-off gear on which an externally threaded bush 34 is fixed, is visible.

A friction element 36 is screwed on said bush 34 with a complementarily threaded bush 35; said element 36 again comprises a disk 37 which extends therefrom and on which a flange 38 of the second reel 7 rests; said second reel is conveniently free on said shaft 32.

A disk-like element 39, made of felt or equivalent or other braking material, is interposed between the disk 37 and the flange 38.

The thread of the bushes 34 and 35, whose cross-section is conveniently square (or shaped in another manner, with one or more starts) extends so that concordant rotations of the friction element 36 and of the flange 38 in the direction of rotation of the shaft 32 tend to space the disk 37 from said flange 38.

A cylindrical spiral spring 40 is arranged axially and externally on said bush 35; a first radial end 41 of said spring is fixed to the disk 37 with a ring-like portion thereof by means of a screw 42.

A second radial end 43 of the spring 40 is inserted in a notch 44 of a toothed sector 45 which extends axially outside a disk-like element 46 which is in turn axially fixed to the bush 34 and thus to the shaft 32 by means of a retention screw 47.

A rod-like supporting element 48 for a guide 49 of the thread 6 is fixed to the disk-like element 46. Other guides 50 and 51 are instead fixed to a bush 52 which is axially fixed to the shaft 32 and is suitable for preventing the extraction of the reel 7.

As can be seen in figure 5, the cable 3 passes axially within the shaft 32 and the thread 6 is wound around it by virtue of the rotation of the shaft 32. The friction element 36 rotates the second reel 7 since it is pushed against it by the pre-loading of the spring 40, which can be conveniently adjusted on the toothed sector 45.

The tension of the thread 6 is due to the resistance which the second reel 7 opposes to being rotated.

Increases or decreases in resistance, and thus in tension, immediately affect the friction action which entails the further approach or spacing of the disk 37 to or from the flange 38 by virtue of the presence of the threaded bushes 34 and 35.

In practice it has thus been observed that both devices for keeping constant the tension of both the cable 3 and the thread 6 have achieved the intended aim and objects of the present invention.

In both cases it is in fact possible to adjust the unreeling tension and to keep it constant in the course of time during processing.

The device thus conceived is susceptible to numerous modifications and variations, all of which are within the scope of the inventive concept.

All the details may furthermore be replaced with other technically equivalent elements.

In practice, the materials employed, so long as compatible with the contingent use, as well as the dimensions, may be any according to the requirements.

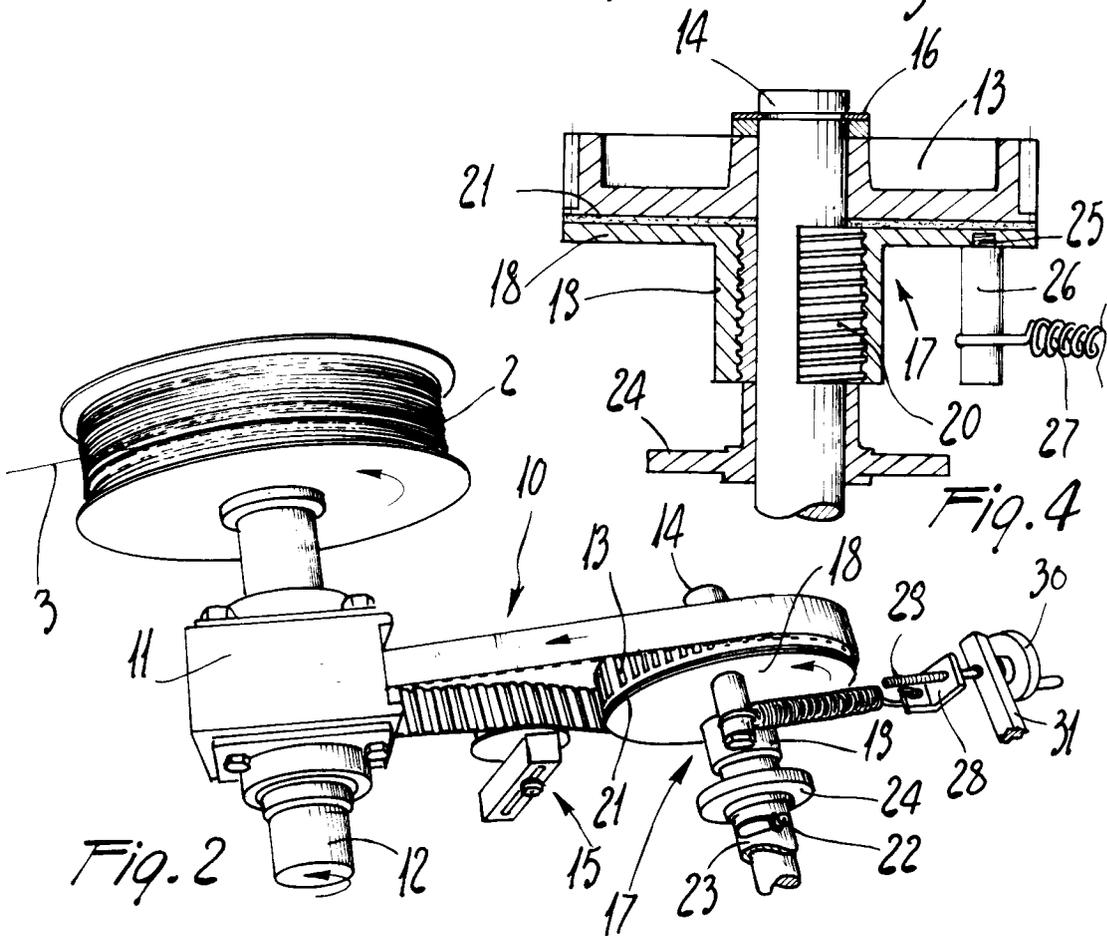
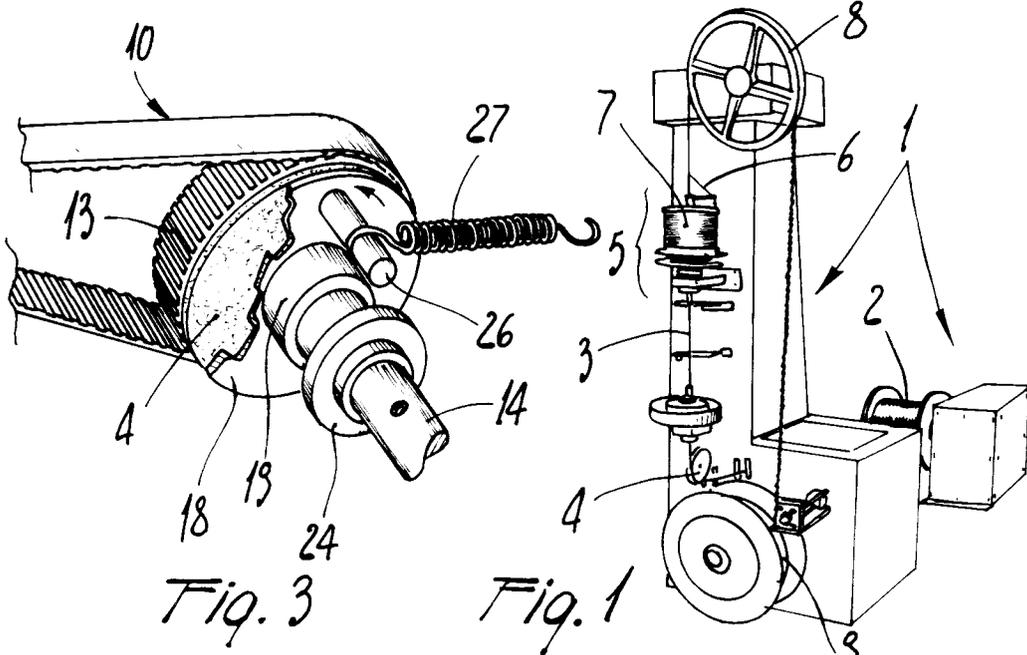
Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

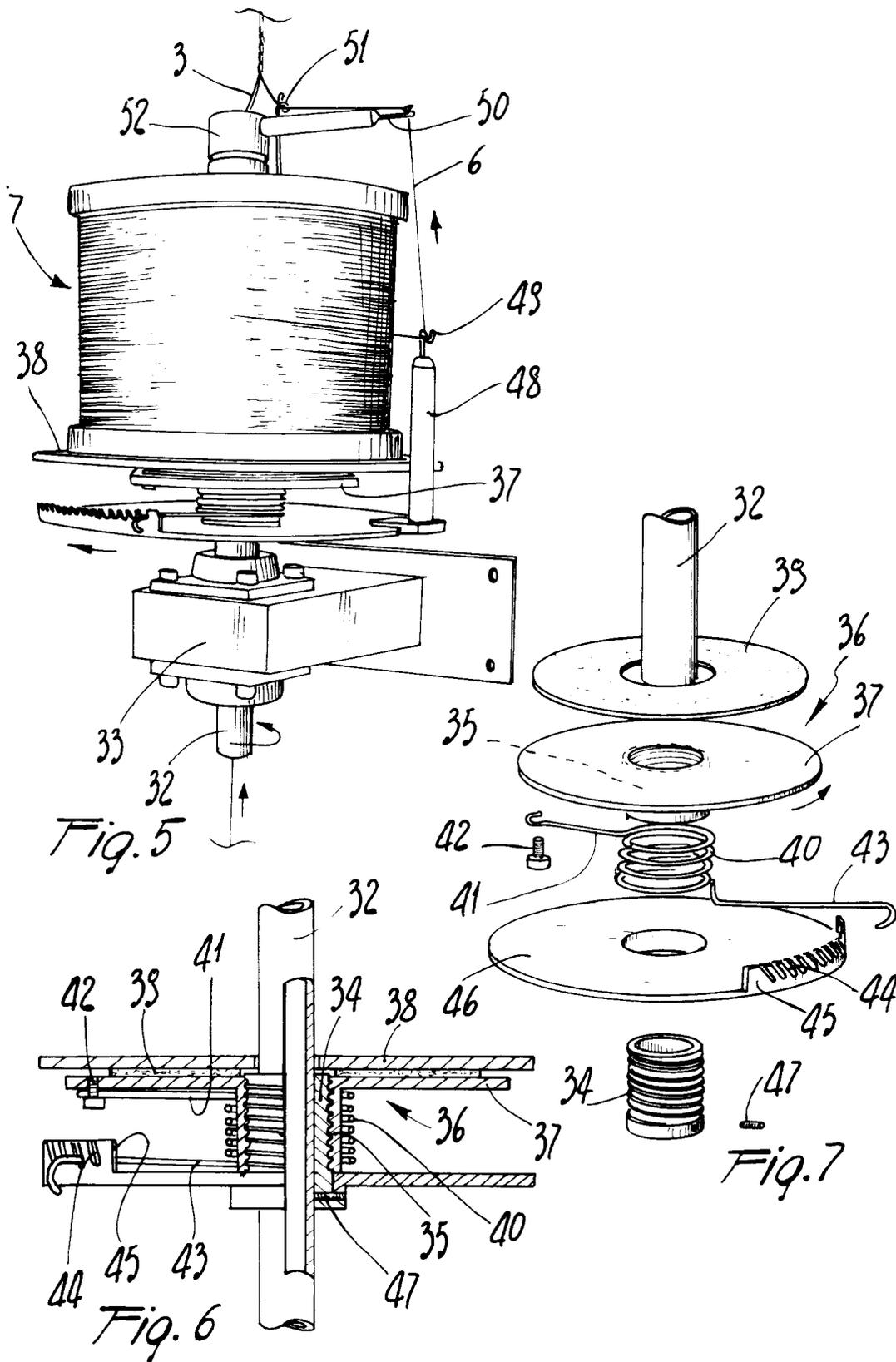
Claims

1. Tensioning device for a thread, tape or the like unreeled from a reel, characterized in that it comprises a friction element (17;36) which acts directly on a rotating element (13;38) kinematically connected to said reel (2;7), said friction element being coupled to guiding means (20;34) for spacing thereof from a surface of said rotating element on which said friction element acts when said friction element rotates concordantly with said surface, and to means (27;40) for keeping said friction element pushed against said surface.
2. Device according to claim 1, characterized in that said friction element comprises a friction disk (18;37) which acts directly on said rotating element, said friction disk extending from a bush (19;35) which is associated with said guiding means.
3. Device according to claim 2, characterized in that said guiding means are constituted by an externally threaded bush (20;34) which is fixed to a supporting shaft (14;32) of said friction element, said bush of said friction disk being provided with an internal thread and being screwed on said externally threaded bush, the threads of said bushes allowing to space said disk from the surface on which it acts when it rotates concordantly with said reel or with said rotating element.
4. Device according to one or more of the preceding claims, characterized in that said means for keeping said friction element pushed against said surface on which it acts comprise a spring (27) which is axially offset with respect to said disk of said friction element, so

as to induce a resisting torque whose direction is opposite to the rotation direction of said rotating element.

5. Device according to one or more of the preceding claims, characterized in that said spring (27) is fixed with one end to a pin (26) which is fixed non-axially on said disk (18), the other end being fixed to a plate (28) provided with a threaded hole on which a threaded rod (29) is screwed, said threaded rod being connected to an adjustment handwheel (30), the movements of said plate causing variations in the tension of said spring.
6. Device according to claims 1 to 3, characterized in that said means for keeping said friction element pushed against the surface on which it acts comprise a cylindrical spiral spring (40) which is arranged externally and coaxially to said bush, said spring having a first radial end (41) which is fixed to said disk (37) and a second radial end (43) which is inserted in a notch (44) of a series provided on a toothed sector (45) which extends at right angles with respect to the periphery of a disk-like element (46) which is fixed to the shaft (32) on which said externally threaded bush is fixed, said spring being arranged so that it is loaded by concordant relative rotations of said friction element and of said reel.
7. Device according to claims 1 to 3, characterized in that said means for keeping said friction element pushed against the surface on which it acts are constituted by pneumatic or hydraulic pistons or by electric or magnetic or electromagnetic or equivalent devices.
8. Device according to one or more of the preceding claims, characterized in that a disk-like element (21;39) made of felt or equivalent or other braking material is interposed between said friction element and said rotating element.







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.5)	
X	US-A-2 388 982 (G. L. LEITHISER) * the whole document * ---	1-3, 6	B65H59/04	
X	FR-A-1 181 070 (R. A. M. IMBERT) * the whole document * ---	1-5		
X	US-A-2 361 192 (A. E. GOODWIN) * the whole document * ---	1-5, 8		
A	EP-A-0 340 101 (AEROSPATIALE SOCIETE NATIONALE INDUSTRIELLE) * column 3, line 5 - line 62 * * column 5, line 1 - line 11 * ---	1, 2, 6-8		
Y	US-A-2 761 630 (H. A. GEORGE) * the whole document * ---	1-4		
Y	DE-A-1 499 146 (WINGET LTD.) * page 7, line 14 - line 17 * ---	1-4		
A	DE-A-1 931 659 (DR. -ING. W. REINERS) * the whole document * ---	1, 7		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	US-A-2 034 267 (R. R. NYDEGGER) * page 2, left column, line 29 - line 52 * ---	1, 6		B65H
A	US-A-2 098 422 (A. W. KEEN; F. D. CHITTENDEN) * figures * ---	1, 7		
A	FR-A-1 313 210 (J. GODDERIDGE) ---			
A	US-A-4 681 277 (D. D. KOSCH) ---			
A	US-A-1 642 972 (P. SHARP) -----			
The present search report has been drawn up for all claims				
Place of search THE HAGUE		Date of completion of the search 17 AUGUST 1992	Examiner D HULSTER E. W. F.	
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