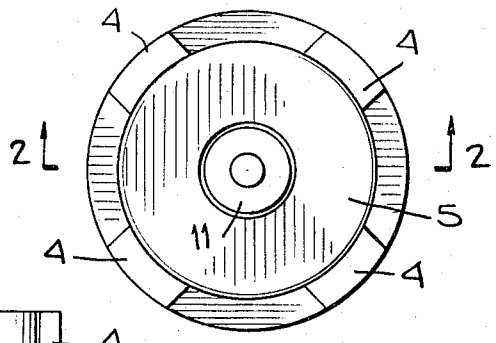
May 14, 1968 L. HORVATH 3,383,072

TENSION CONTROL SYSTEM

Filed Oct. 20, 1966 2 Sheets-Sheet 1

Fig. 1.



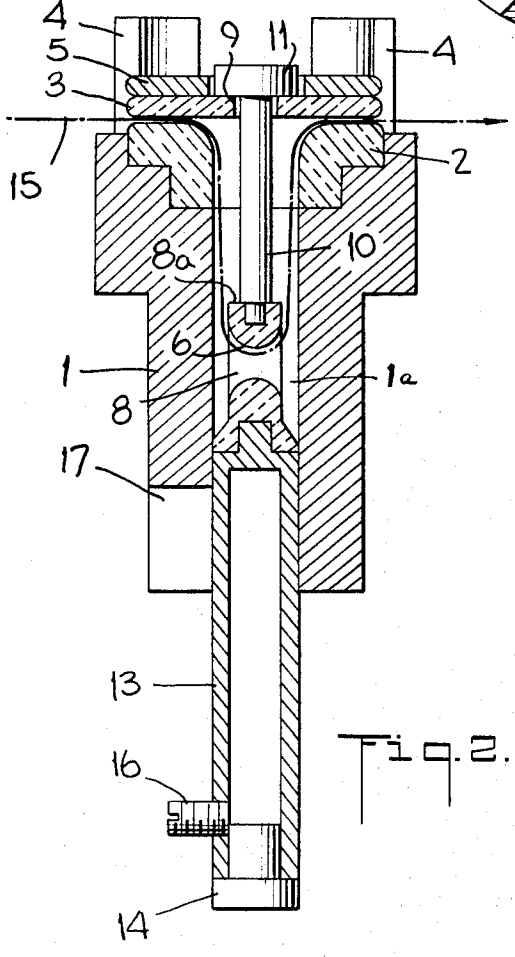


Fig. 2.

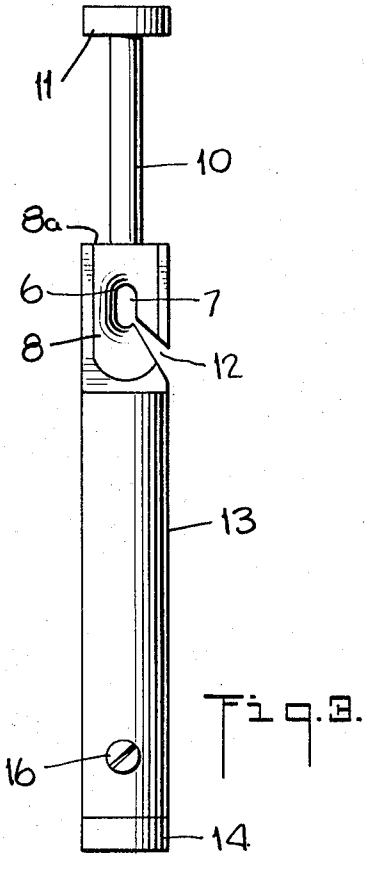


Fig. 3.

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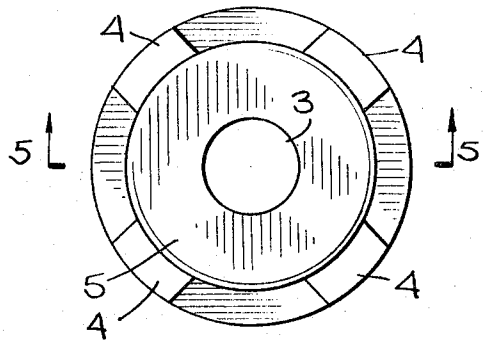
Fig. 4.



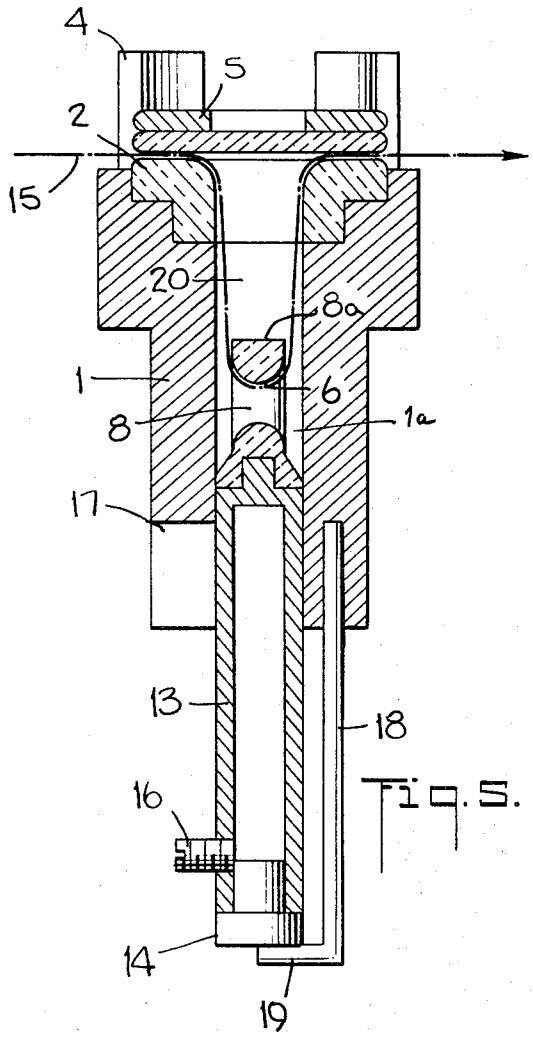


Fig. 5.

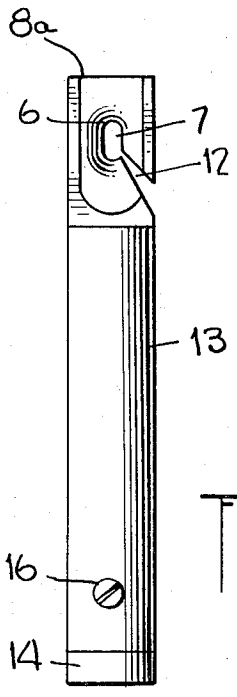


Fig. 6.

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3,383,072

TENSION CONTROL SYSTEM

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Claims priority, application Switzerland, Nov. 26, 1965, 16,343/65
6 Claims. (Cl. 242—149)

This invention relates to apparatus for compensating for tension variations in linearly advancing thread-like elements consisting, for example, of paper or textile fibres, or threads of glass, synthetic material and the like, hereinafter referred to as thread, and which are advanced linearly into processing machines, such as machines for texturing yarns, or for twisting, coning, knitting and weaving. In machines of this kind, the threads arriving from delivery means do so frequently under conditions of rather widely varying tensions; but it will be understood by those persons skilled in the art that for optimum processing, the threads ought to be introduced into the machine under as regular a tension as possible.

Efforts have already been made in the art to provide apparatus of the class described for maintaining a uniform tension in linearly advancing threads. Thus, a known device of this kind consists of two discs between which the yarn is passed, and a spring is employed to adjust the pressure on the discs. After leaving the discs, the thread is passed through an opening in a lever which is connected with the spring, the lever being drawn from a position of equilibrium when the state of original tension is varied, whereby the pressure of the spring and therefore also the pressure exerted on the discs is varied. It is also known to pass the thread through an opening in the lever prior to passing it through the brake discs. These tension braking apparatus, however, have certain disadvantages in that they are relatively complicated and occupy considerable space, and they have not complied satisfactorily with the requirements imposed upon them due in large part to the inertia of the moving parts.

Accordingly, I have conceived by my invention apparatus of the class described for compensating for tension variations in linearly advancing threads which obviate the aforementioned difficulties and disadvantages of known apparatus of this class

Essentially, my device comprises a support having surface means upon which the thread is received and delivered along a desired linear path, a guide member engageable by the thread and moveable relatively to the support in response to variations in the thread, and means cooperating with the support surface means to apply a braking force to the advancing thread.

As a feature of my invention, the support is cylindrical in configuration and has an annular surface at its upper end over which the yarn passes, and the guide member engageable by the thread is slideable within the cavity of the cylindrical support. For the purposes of this application the terms "cylindrical support" and "annular surface means" shall be understood to include surface means and support the configuration and cavity of which are round, square, polygonal or of any convenient configuration. Thus, it will be seen that the guide member moves downwardly when the tension in the advancing thread is reduced, and will be lifted upwardly by an increase in tension in the therad. In one embodiment of my invention, downward movement of the guide member in the cavity of the support will momentarily induce a small vacuum in the support cavity directly beneath the braking means, which may consist of a circular disc, for example, so as to add to the braking force applied on the thread

passing between the braking means and the support surface. In another embodiment of the invention, the guide member may be equipped with an arm extending through the annular surface means and through the braking means, and a stop may be located at the remote end of the arm adapted to engage the braking means to increase the braking force on the thread upon a predetermined drop in the tension therein.

Apparatus according to my invention provides exceedingly rapid reactions resulting from sudden variations of tension in the thread and compensatively adjusts the tension in the thread in advance of the processing machine.

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 a 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 to 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, whrein:

FIG. 1 is a top plan view of one embodiment of my invention;

FIG. 2 is a cross-sectional view taken along the lines 2—2 of FIG. 1;

FIG. 3 is an elevational view of the guide member; and

FIGS. 4, 5 and 6 are similar to FIGS. 1, 2 and 3, respectively, but illustrate a different embodiment of the invention.

Referring now to the drawings, and more particularly to FIGS. 1 to 3 thereof, there is shown a cylindrical support **1** which may be fabricated of die cast aluminum and which is enlarged at its upper region and recessed to receive a generally annular bearing member **2** of porcelain or the like having a polished outer surface which follows a curved conic path between horizontal and vertical surfaces. An annular polished porcelain disc **3** is positioned on the upper surface of the bearing member **2**, and is freely maintained in that position by means of four guides **4** extending upwardly of the support **1** and spaced ninety degrees apart.

An annular disc **5** is positioned atop the disc **3** and serves as a weight, this disc **5** also being maintained in position by the guides **4**.

A guide member **8** is slideably disposed within the bore or cavity **1***a* extending longitudinally of the cylindrical support **1** and has a polished curved surface **6** and a slot **12** communicating with an opening **7** therein. An arm **10** extends upwardly from the member **8** through the opening **9** in the annular disc **3** and a wider opening in the disc **5** and is equipped with an enlarged stop **11** at its upper end.

The member **8** has a hollow cylindrical piston **13** extending downwardly from its lower end and a weight **14** is secured in the bottom of the piston by means of a set screw **16** which protrudes outwardly of the piston and fits within a slot **17** in the lower end of the support **1** to act as a stop for upward movement of the assembly.

The thread **15** moves from a delivery member such as a bobbin (not shown) and passes between the bearing

member 2 and the disc 3, into the opening 7 by means of the slot 12 to bear against the surface 6 and out between the bearing member 2 and disc 3 to a processing machine. The weight of the member 8 and the piston 13 draws the thread 15 downwardly until its frictional resistance on the surface 6 and on the surface of the bearing member 2 corresponds to the tension set by the disc 3 which may be of suitable weight. It will be noted that the curved surface of the bearing member 2 provides an increasing line of contact between that surface and the thread as the member 8 moves downwardly; and conversely, the line of contact, and therefore the friction between the two is reduced as the member 8 moves upwardly.

In any case, downward movement of the member 8 is limited by the stop 11 coming into contact with the disc 3 whereby the disc 3 is further loaded thus creating a greater braking effort.

If the tension in the thread becomes too high, the members 8 and 13 are raised until the upper surface 8*a* of member 8 abuts against the lower surface of the disc 3, and upon a further increase in tension, lifts the disc 3 away from the thread 15. If the processing machine stops, the thread will be maintained under tension because of the loading of the disc 3 and the member 8 and piston 13.

Turning now to the embodiment illustrated in FIGS. 4 to 6, there is shown similar apparatus to that already described except that the apparatus of FIGS. 4 to 6 has no arm 10 or stop 11, and the disc 3 has no central opening. On the other hand, a lower piston stop 19 is mounted from the support 1 by means of a stationary bar 18. Thus, when the tension in the thread 15 decreases, the piston 13 sinks until the frictional resistance on the surface 6 and the surface of the member 2 correspond to the thread tension adjusted by the load provided by the disc 3 and any additional load members 5. Actually, the piston is made to fit closely within the support cavity; and for this reason and because the disc 3 (FIGS. 4 and 5) has no central opening, a slight vacuum is created in the support cavity in zone 20, as the piston drops, thus urging the disc downwardly and further loading the thread 15.

If the thread tension is too high, a slight pressure increase occurs in the zone 20 by the rising piston, thus reducing the loading effect of the disc 3 which may be ultimately lifted from the thread by the surface 7 on guide member 8.

From the foregoing description, it will be seen that I contribute a device of the class described which is capable of reacting exceedingly quickly to compensate for tension variations in linearly advancing thread. It will be appreciated that interchangeable parts such as pistons and braking discs of different weights may be employed. Additionally, spring or magnetic means may be used to load the guide member.

I believe that the construction and operation of my novel tension compensation will now be understood, and that the advantages of my invention will be fully appreciated by those persons skilled in the art.

I claim:

1. Apparatus for compensating for tension variations in linearly advancing threadlike elements comprising a cylindrical support having annular surface means upon which the threadlike element is received and delivered along a desired linear path, a guide member engageable by the threadlike element within a cavity extending longitudinally of said cylindrical support and moveable vertically relatively to said support in response to variations in tension in the threadlike element, and means cooperating with said support surface means to apply a braking force to the advancing threadlike element.

2. Apparatus according to claim 1, wherein said means cooperating with said support surface means to apply a braking force to the advancing threadlike element is a circular plate.

3. Apparatus according to claim 1, wherein said guide member is a piston-like member moveable reciprocally within the cavity of said support.

4. Apparatus according to claim 3, wherein stop means are provided limiting movement of said piston-like member in response to a reduction in the tension in the threadlike element.

5. Apparatus for compensating for tension variations in linearly advancing threadlike elements comprising a cylindrical support having annular surface means upon which the threadlike element is received and delivered along a desired linear path, a guide member engageable by the threadlike element within a cavity extending longitudinally of said cylindrical support and moveable vertically relatively to said support in response to variations in tension in the threadlike element, means cooperating with said support surface means to apply a braking force to the advancing threadlike element, said guide member including an arm extending through said annular surface means and said braking means, and a stop at the remote end of said arm adapted to engage said braking means to increase the braking force on the threadlike element upon a predetermined drop in the tension therein.

6. Apparatus according to claim 5, wherein means are provided at the upper end of said support means to locate said braking means relatively to said support means.

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