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SUPPLYING THREAD UNDER EXTENSION, FOR EXAMPLE IN COVERING MACHINES

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Fig. 1.

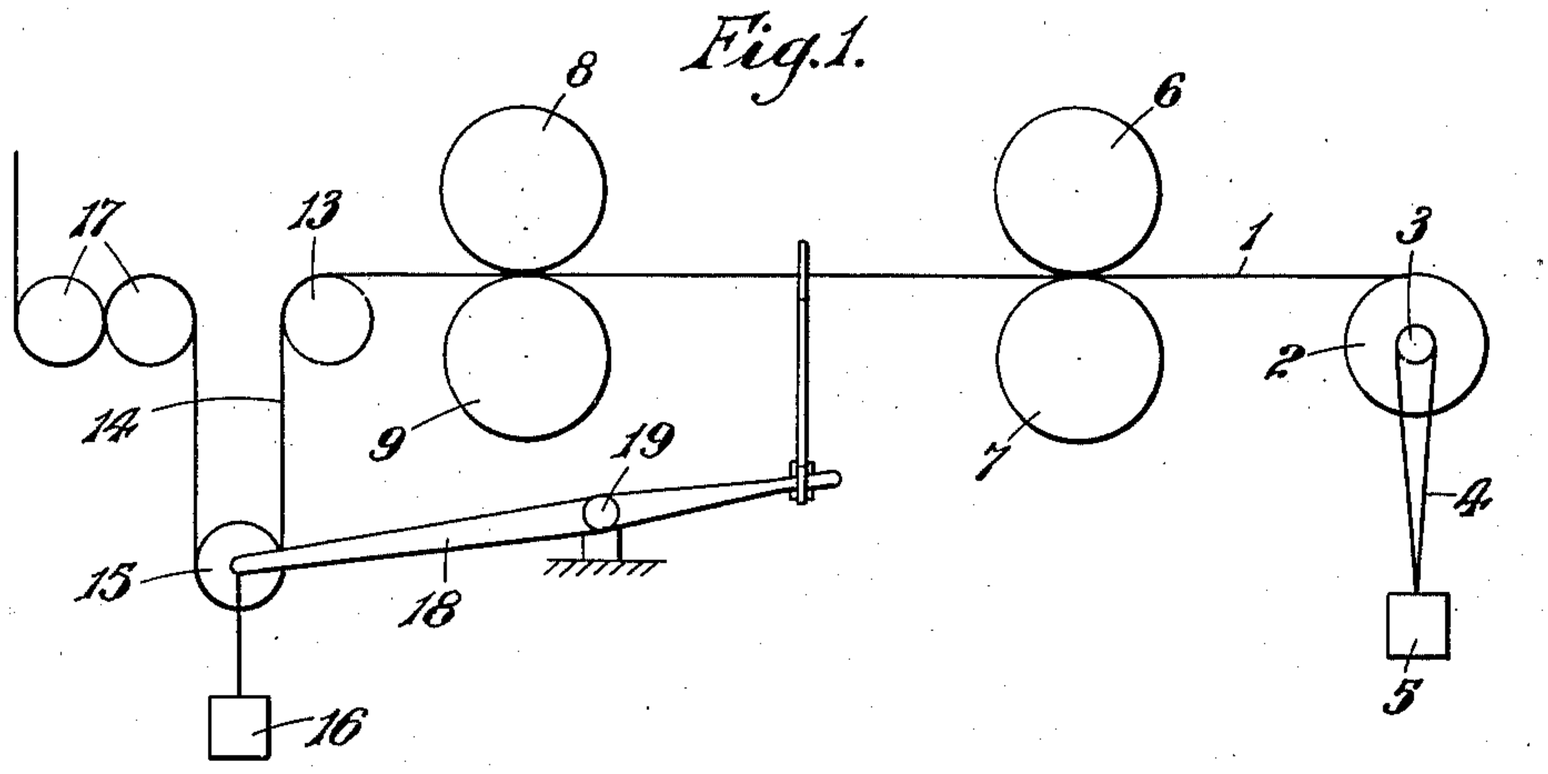
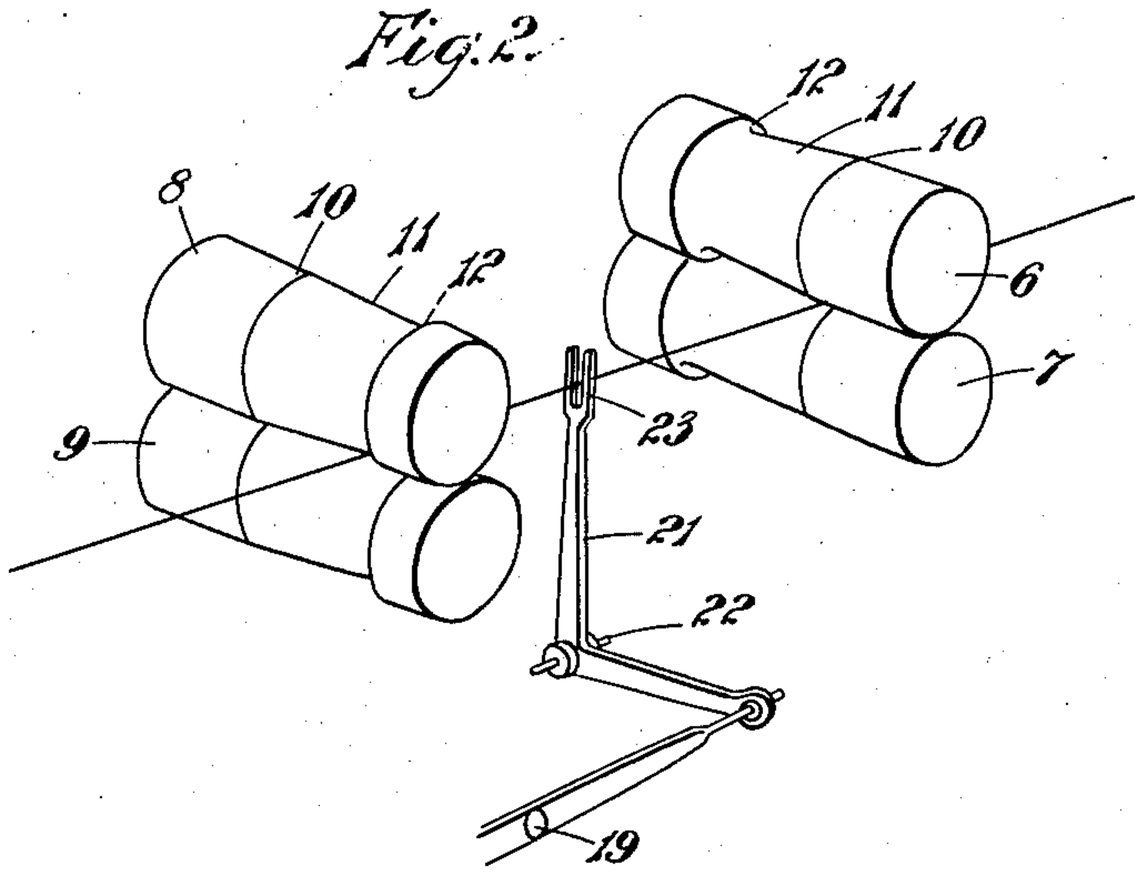


Fig. 2.



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SUPPLYING THREAD UNDER EXTENSION, FOR EXAMPLE IN COVERING MACHINES

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6 Claims. (Cl. 117—34)

This invention concerns improvements in supplying thread under extension, and more particularly concerns improvements in method and apparatus for supplying threads in movement under constant extension, the kind of thread with which the invention is particularly concerned pertaining to that class of threads which may be highly extended, such as threads of natural or artificial rubber.

Threads of this kind are frequently supplied under extension to undergo further processes or treatment as, for instance, to be wound with a wrapping in a covering machine the supply to which it is of importance to maintain above a certain tensile strength and at a predetermined extension.

The maintenance of a supply of thread or threads of rubber at constant tension or extension introduces difficulties of a kind peculiar to the material, inasmuch as the degree of adhesion and elasticity of the thread to a supporting surface precludes a sufficiently rapid and positive variation in feed control merely by variation of the speed or diameter of the rolls or other feeding surfaces.

According to this invention we provide a method and apparatus for maintaining a supply of thread composed wholly or partly of vulcanized rubber at constant extension comprising drawing the thread at initial tension between successive traction rolls for extension by a displaceable load, the movement of which regulates the extension by varying the tractive grip exerted by the rolls.

In order that the invention may be more easily understood and readily carried into effect, the same will now be described with reference to the accompanying drawing, in which—

Fig. 1 is a diagrammatic side elevation of the apparatus.

Fig. 2 is a part perspective view of the rolls and traversing arm shown in Fig. 1.

In one embodiment of the invention, which will be described in its application to a single thread but which will be understood can equally well be extended to a plurality of threads merely by duplication and extension of the shafts, surfaces and supports, the thread 1 to be supplied under constant extension is carried on a spool 2 supported on an axle 3 to which a braking action is applied as, for instance, by a brake which may consist of a loop 4 passed over the axle of the spool, the lower end carrying a weight 5, so that a constant frictional restraint is laid upon the rotation of the shaft. Any other suitable frictional restraint may be employed, however, such for instance as a leaf spring having a friction pad, the pressure of the spring being adjustable by a thumb screw.

The thread then passes in succession between two parallel pairs of rollers 6 and 7, and 8 and 9, called hereinafter the first and second pairs of rollers. These rollers may have rubber or other yielding surfaces and may be pressed together by suitable springs.

The surface speed of the first pair of rollers 6 and 7 is greater than that of the second pair, but both pairs have one or both rolls formed with portions of reduced diameter preferably in which the diameter of each roller in each pair is at first gradually reduced at 10 and then reduced more rapidly at 11 to terminate in a comparatively deep groove 12, with the tapering portions of one pair of rolls lying in the reverse direction to those of the other pair of rolls. In one embodiment shown, one roll of each pair is provided with a tapered surface.

The differential surface speeds of the pairs of rollers 6 and 7, and 8 and 9 may be obtained either by separate motors driving each pair of rolls at different speeds or by driving both pair of rolls simultaneously by an interconnecting spur wheel or wheels or by a chain or belt drive driven by a single electric or other motor, the differential surface speeds being obtained in the latter case by providing pairs of rolls, the diameter of the driven roll in one of the pairs being greater than that of the driven roll of the other pair.

The thread passes from the nip of the second or lower speed pair of rollers 8 and 9 over an idler pulley 13 whence it is allowed to form a bight 14 in which is pendant a floating pulley 15 carrying a weight 16, the diameter of the pulley preferably being of such diameter that the legs of the bight are parallel, each leg in consequence carrying half the load of the weight, the thread being then led over or between a second idler pulley or pulleys 17 to undergo subsequent operations which may, for instance, consist of being passed through the mechanism of a machine for covering them.

The weighted pulley in the loop or bight is directly or indirectly connected to one end of a lever 18 pivoted intermediate its end at 19 to a convenient portion of the supporting framework, the other end 20 of the lever being thus depressed when the weight rises and raised when the weight falls.

The movement of the free end of the lever 20

is transmitted to a horizontal arm 21 of a bell crank lever, rocking in a plane transverse to that of the lever 20, about a pivot 22, the vertical arm 23 of the bell crank lever being forked to guide the thread to right or left across the nip of the rolls.

In operation, the weight or loading force is so adjusted that when it is applied to the thread, the thread is drawn away by the covering or other machine at the required extension which will initially depend on the rate at which the thread is drawn away and the frictional or other resistance applied to the thread supply spool or reel.

If now the rotational resistance of the thread supply spool increases which may be due, for example, to variations in winding or inter-thread adhesion which consequently tend to increase the degree of extension of the thread, the floating weight will rise and cause the deflecting arm to traverse parallel to the rolls so as to move the thread into the nip of the first pair of rollers.

Since, however, the surface speed of these rollers is greater than that of the supply spool, an increased tractive grip is exerted upon the thread, the grip being sufficiently great to overcome the increase in resistance, but when the resistance falls to normal, the weight falls, thereby causing the thread to be disengaged from the drive of the first pair of rollers and to slip through them.

In the event of the unwinding resistance of the supply spool decreasing below normal, the floating weight and pulley falls, causing the deflecting traverse to move in the opposite direction to that in which it moves when the unwinding resistance increases.

The traverse arm thus causes the thread to be gripped between the lower speed rolls of the second of the two pairs of rolls which are revolving at a lower surface speed than that corresponding to the rate at which the thread is leaving the unwinding spool.

The thread, it is assumed, still passes over the final guide pulley or pulleys at the same speed, but the retardation experience by the thread at the second or slower pair of rolls causes an increase in the extension of the thread to take place as it leaves these rolls, thus counteracting the decrease in extension caused by the decrease in the apparent unwinding resistance of the supply spool.

The floating weight and pulley will then tend to rise and so to slip or disengage the slow speed rollers of the second pair when the increase in extension becomes too great.

When the unwinding resistance increases again to normal, the extension of the thread between the supply spool and the final guide pulley or pulleys will be sufficient to keep the floating weight in the natural position once more, so that both pairs of rollers will be inoperative until a repetition of one of the cycles above described is re-initiated by variation in the supply.

It will be appreciated that while the differential tractive effort applies the necessary correction to the supply of thread, the extension of which is controlled despite variations in supply, similar variations may in part be imposed by variations in the rate of working of the covering machine or other apparatus, and that such variations independently of the supply of their resultant when combined therewith, are equally well controlled by the present method and apparatus.

What we claim is—

1. Apparatus for continuously maintaining a supply of elastic thread at constant extension comprising successive means for passing the thread, one of said means operating at one speed and the other at a different speed displacing means for displacing said thread and means actuated by the displacement of said displacing means to engage said thread alternatively by one or the other of said thread passing means.

2. Apparatus for continuously maintaining a supply of elastic thread at constant extension which comprises successive pairs of traction rolls, means for supplying thread under initial tension to the first of said rolls, means for displacing said thread under uniform load after passing from between the second of said pair of rolls, and means governed by the displacement of said thread under said load to shift said thread longitudinally relative to said pairs of rolls, one pair of said rolls having surfaces formed with decreasing tractive grip in one longitudinal direction and the other pair of rolls having surfaces formed with decreasing tractive grip in the opposite longitudinal direction.

3. Apparatus for continuously maintaining a supply of elastic thread at constant extension which comprises successive pairs of tractive rollers, the surfaces in the nip of one pair of rolls diverging in one longitudinal direction, and the surfaces in the nip of the other pair of rolls diverging in the opposite longitudinal direction, means for displacing said thread, said means comprising a pulley and a means for applying a constant force to said pulley to force it transverse to the path of travel of said thread, and means controlled by the movement of said pulley to shift said thread longitudinally of said rolls in one direction or the other.

4. The apparatus of claim 3 in which said force is a suspended weight connected to said pulley.

5. The apparatus of claim 3 in which said thread shifting means comprises a lever mechanism connected at one end to said pulley and having a thread guide displaceable longitudinally of said rolls proportionately to the transverse movement of said pulley.

6. The apparatus of claim 3 in which said thread is supplied from a spool having a brake tensioning means.

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