Sept. 1, 1953 W. H. KREAMER 2,650,414

CONTROL DEVICE

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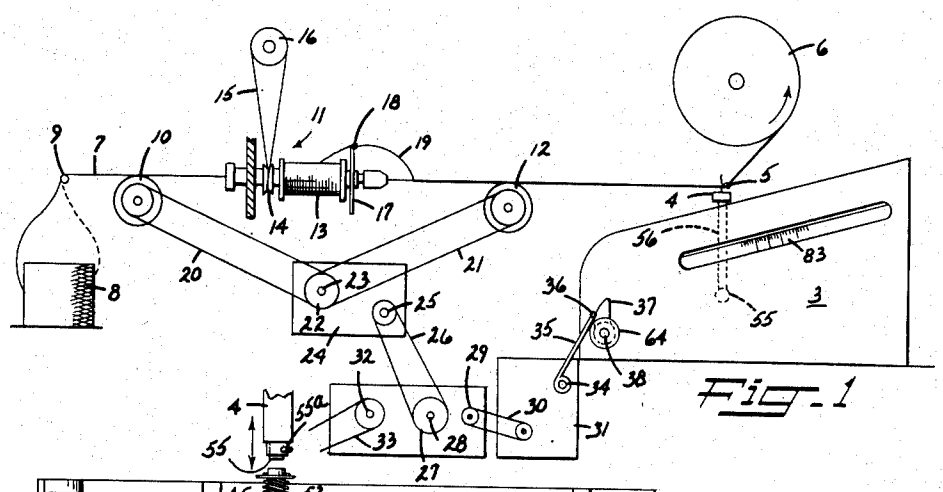

Fig. 1

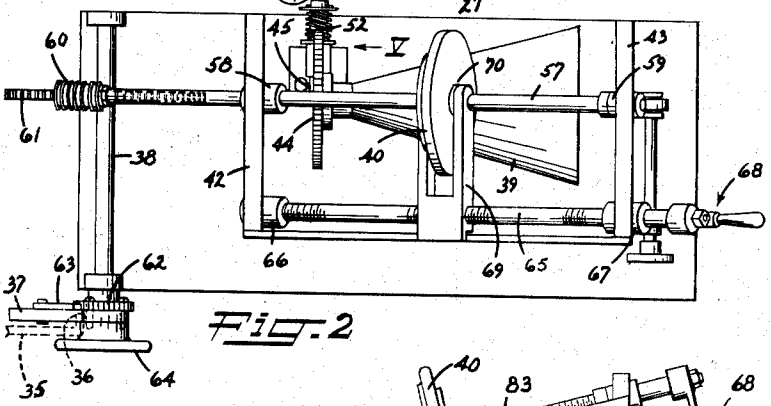

Fig. 2

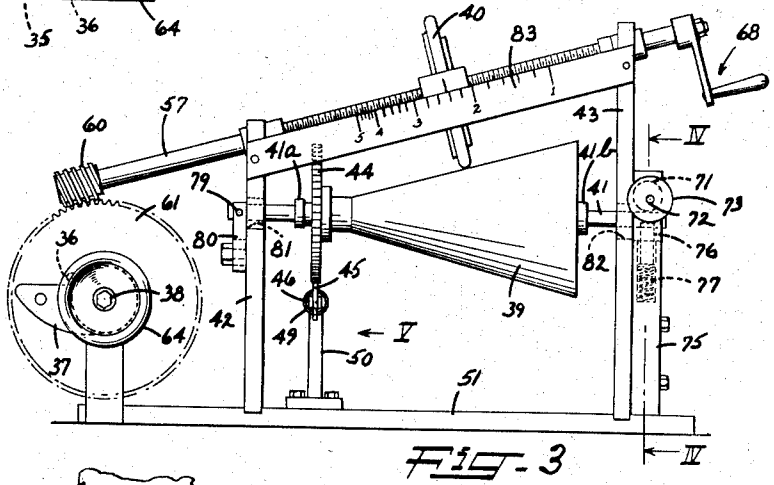

Fig. 3

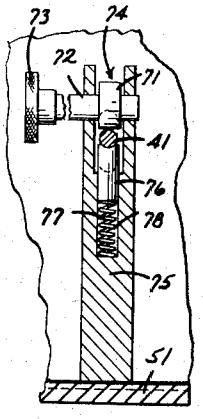

Fig. 4

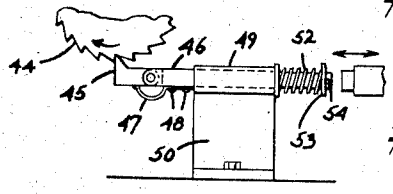

Fig. 5

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CONTROL DEVICE

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9 Claims. (Cl. 28—71.5)

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This invention relates to a control device which is applicable for many purposes and to the control of many types of machines. As described hereinafter, its relationship is shown for the control of the speed of a filament or yarn in an elastic filament-covering machine such as is shown in U. S. Patent 2,302,543. In this machine, the control device is actuated intermittently by the traverse bar and such actuation progressively adjusts the speed of rotation of the delivery rolls which pass the elastic core filament through the covering machine. By controlling the speed in this way, uniform tension is obtained so that the relationship between the covering material and the elastic filament core is uniform throughout the length of the product. The necessity for this compensation or adjustment in speed is clearly discussed in the patent referred to and accordingly no further discussion is considered necessary herein.

It is to be understood that the device may be employed in many other winding, twisting, covering, or doubling machines of the winding and spinning art as well as in machines of other kinds which comprise a reciprocating member which can serve to actuate the device progressively during operation of such machine. Appropriate gear speed-reducing or equivalent reducing mechanism may be connected to the output of the control device to adapt it to the particular machine since the amount of compensation or, more specifically, speed variation depends upon the particular operation carried out by the machine.

Although, as stated hereinabove, the control device of the present invention may be employed with speed reducing devices which may in themselves be adjustable, the device of the present invention comprises within its own construction means for adjusting the ratio between input and output motion so that it can be employed with a motion-reducing device which is not particularly adaptable to adjustment.

The invention will hereinafter be described in its relationship to a strand-wrapping machine and, in the drawings, which are illustrative of the invention:

Figure 1 is a somewhat diagrammatic view in side elevation of the control device in combination with a filament-covering machine,

Figure 2 is a plan view of the control device itself, with the hood or housing removed,

Figure 3 is a side elevation of the device, again with the hood removed,

Figure 4 is a section taken on line IV—IV of Fig. 3, and

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Figure 5 is a view of a detail taken in the direction of arrows V in Figs. 2 and 3.

In Fig. 1, the control device of the present invention is shown at 3 in cooperative relation with a strand covering machine. It is positioned near the end of the stroke of the traverse bar 4 which carries guides 5 for one or more strands proceeding to one or more take-up bobbins or spools 6 or to a beam instead. Each strand to be covered, which may consist of an elastic filament 7, proceeds from a supply package 8 about a guide 9 around a positively driven wheel, rotor, or godet 10 through the core of a wrapping-supply system 11, then around the periphery of another delivery wheel, rotor, or godet 12 to a guide 5. The wrapping supply system 11 may comprise a bobbin 13 mounted on a hollow spindle rotatably driven by a whorl 14, belt 15 and a driving pulley 16. This wrapping supply carries a flyer 17 and a flyer guide 18 and the wrapping material 19 is shown proceeding from the bobbin 13 through the flyer guide 18 to the core 7 as such core proceeds between the delivery rolls 10 and 12.

It will be seen that when bobbin 13 is rotated at a constant angular speed, the wrapping material supplied thereby is fed off under progressively increasing tension which decreases the angle of coverage and axial length of the core that is covered by a single revolution of the covering supply. Accordingly, it is necessary to compensate for this decrease in coverage by increasing the speed of delivery or passage of the core 7 by rolls 10 and 12. As shown, the rolls 10 and 12 are driven by belts 20 and 21 respectively which are driven by a common pulley 22 on the output shaft 23 of a gear reduction box 24. The input shaft 25 of the box 24 is driven by belt 26 which is driven by a pulley 27 on the output shaft 28 of a speed varying unit, such as is commonly known as a P. I. V. This unit may have any of the conventional forms of such P. I. V. devices, such as that utilizing a belt connecting the input and output shafts through axially displaceable pairs of cones on the peripheries of which the belt rides. Such cones are adapted to be displaced axially on the input and output shafts simultaneously by means of levers mounted on pivots disposed at right angles to the plane of these shafts at points therebetween. The levers are adapted to be simultaneously moved about their pivots by a cam therebetween against which the levers are urged resiliently or by equivalent means. The shaft for rotating the cam or equivalent means just mentioned is shown at 29 and is driven by a belt 30 from any suitable motion transmitting gear or linkage device 31.

The input shaft of the P. I. V. unit is shown at 32 and is driven by a belt or a chain 33 connected to a motor not shown. The belts and pulleys may be replaced by chains and sprockets or equivalent driving connections. Gear-reducing device 24 may be omitted if desired in which event the wheels 10 and 12 may be driven directly from one or two pulleys on shaft 28 of the P. I. V. The input shaft 34 of the device 31 is hereinafter referred to as the control shaft and it has secured thereon for rotation therewith a lever 35 which will hereinafter be called the control lever. This control lever is swung and the shaft 34 is correspondingly rotated when the follower element 36, which may be a roller or merely a fixed, laterally offset or projecting extension of lever 35, is swung under the influence of the cam 37 on the output shaft 38 of the control device 3. As so far described, the mechanism of Fig. 1 is entirely conventional and may be replaced by equivalent driving mechanisms for other machines to be controlled, with the sole exception of the control device 3 and its relationship to the machine drive.

As shown in Figs. 2 to 5, the control device 3 comprises a pair of rotatable friction drive members, one of which has a friction surface comprising circles of different radii, such as the annular friction surface of a disc or the conical surface of a conical roller 39. Besides this member, there is a friction wheel 40 in engagement therewith. The roller 39 is rotatably mounted between collars 41*a* and 41*b* fixedly mounted on a shaft 41 which projects endwise from the roller 39 and is mounted in suitable bearings in the supports 42 and 43 of the frame. The shaft 41 may extend horizontally or it may be inclined to the horizontal and, if desired, this inclination may be such that a horizontal plane at the top of the roller is tangential to its conical surface. A ratchet 44 is secured to the conical roller and is adapted to be engaged by a pawl 45 mounted thereunder pivotally on the end of a plunger 46 (see Fig. 5). An arcuate leaf spring 47 secured at 48 to the plunger urges the pawl upwardly into engagement with the ratchet teeth. The plunger is slidably mounted in a bearing sleeve 49 of an upright support 50 secured to the base 51 of the frame. A spring 52 surrounding the plunger 46 bears against a washer 53 held in place on the plunger by a cotter pin 54 and normally urges the plunger to the right as viewed in Fig. 5. As shown in Fig. 2, the plunger 46 is in alignment with a projection 55 adjustably secured as by a set screw 55*a* to the end of an extension 56 (see Fig. 1) from the traverse bar 4. The friction wheel 40 may be a rubber-tired wheel or its periphery may be provided with any other friction material. It is feather-keyed to a shaft 57 so that it can be slid therealong while at all times rotating with the shaft. The shaft 57 is mounted, parallel to a plane tangent to the conical surface of the roller 39, in bearings 58 and 59 in the supports 42 and 43 and has one end projecting beyond such supports. At this end it carried a worm gear 60 which is in engagement with a worm wheel 61. The worm wheel is fixedly secured to the shaft 38 which carries the cam 37. The shaft 38 carries fixedly secured thereon a ratchet 62 which is engaged by a pawl 63 pivotally carried on the cam 37 and resiliently urged against the ratchet teeth. The cam 37 is rotatable relative to shaft 38 and is fixedly secured to a knob 64 to permit hand adjustment.

Means is provided for shifting the friction wheel 40 in a direction transversely of the varying-diameter circles of roller 39 or, in other words, axially along the shaft 57 to vary the speed ratio between the ratchet 44 and shaft 57. This shifting means comprises a screw-threaded shaft 65 rotatably mounted in bearings 66 and 67 in the upright supports 42 and 43 respectively and carrying at one end a manipulatable element 68 which as shown consists of a crank though a knurled knob may be used instead. A yoke 69 has a threaded bore which engages the threads of the shaft 65 and the two arms of the yoke embrace the friction wheel 40. As shown, they have bores which fit about the shaft 57 to permit relative rotation and sliding action thereof. Thrust bearings 70 may be provided to take up any play or slack between the arms of the yoke 69 and the wheel 40.

Means is provided to disengage the conical collar from the friction wheel 40 and this means comprises eccentric 71 carried upon a pin 72 provided with a knurled knob 73. This eccentric is provided in a slot 74 in the upper end of a bar 75 secured to the support 43 with its slot in alignment with the shaft 41 which projects into the slot beneath the eccentric 71. A pin 76 is resiliently urged upwardly by a spring 77 within a bore 78 within the bar 75 and beneath the shaft 41. The upper surface of the pin 76 may be of concave shape to serve as a saddle within which the shaft 41 may rest. The other end of shaft 41 is pivotally mounted on a transverse pin 79 extending through the opposite prongs of a bifurcated member 80 secured to the support 42. A slot 81 in the member 42 allows upward and downward swinging of the shaft 41 therein. A similar slot 82 is provided in the upright support 43.

To set the device for operation, the operator disengages the conical roller 39 from the friction wheel 40 by rotating the eccentric 71. He then turns the crank at 68 to move the wheel 40 to any predetermined position along the conical rollar 39 depending on the speed ratio he desires between the ratchet 44 and shaft 57. A scale 83 may serve to facilitate such adjustment and to enable reliable reproduction of conditions for later operations. Adjustment of rod 55 by set screw 55*a* can also be made so that the pawl 45 ratchets 2, 3 or more teeth on 44 instead of one. We may provide two or more sets of calibrations on scale 83 to cover these several ranges of adjustment. After the friction wheel has been set in the position desired, the roller 39 is again brought into engagement with the wheel by turning the eccentric 71 so that the spring 77 can be brought into action. Then the operator sets the cam 37 in the initial position shown in Fig. 3 in which the follower 36 is at the lowest part and at the beginning of that part of the cam surface. This is done by turning the knob 64 in a counterclockwise direction as viewed in Fig. 3. The control device is then ready to function to control the speed of the machine with which it is connected. As shown, this is caused by the intermittent reciprocation of the plunger 46 caused by the projection 55 on the traverse bar 4. This causes the pawl 45 upon each forward stroke of the plunger 46 to rotate the ratchet 44 one notch. This causes rotation of the conical roller 39, the friction wheel 40, worm 60, worm gear 61, shaft 38, ratchet 62, and cam 37 by pawl 63. The cam 37 swings the control lever 35 and thereby rotates control shaft 34, thereby compensating progressively for changes of speed.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In combination with a thread-handling machine, such as a covering, twisting, or winding machine, having a reciprocating element, means for passing a thread or the like longitudinally through a path with respect to the machine, and means for varying the speed of passage of the thread through said path, a device for controlling the speed-varying means comprising a pair of rotatable friction drive members, at least one of said members having a friction surface comprising circles of different radii, ratchet means for driving one of the members intermittently, means for selectively engaging and disengaging the members, means for moving said members relatively in a direction transverse of said circles, and a reciprocable pawl engaging with the ratchet means and arranged in the way of the reciprocating element.

2. A combination in accordance with claim 1 in which one of the members is a conical roller and the other is a wheel.

3. A combination in accordance with claim 2 in which the roller is rotatably mounted on a shaft which is pivotally mounted at one end on a transverse axis, and the selective means comprises an eccentric for displacing the other end of the shaft.

4. A combination in accordance with claim 3 in which spring means urges the shaft against the eccentric.

5. A combination in accordance with claim 4 in which the wheel is selectively movable along the conical roller and a shaft driven by the wheel transmits motion to a cam and the speed-varying means has a control lever actuated by the cam.

6. In combination, a strand-covering machine comprising a hollow spindle, a supply package of covering material mounted on the spindle, means for rotating the spindle, two rotors, one on each side of the spindle for passing a core strand to be covered or wrapped through the hollow spindle, winding means for taking up the wrapped strand comprising a reciprocatory traverse guide element, means for driving the rotors comprising speed varying means, and a control device actuated by the traverse guide for adjusting the speed varying means.

7. A combination as defined in claim 6 in which the control device comprises a pair of rotatable friction drive members, ratchet means for driving one of the members intermittently, and a reciprocable pawl engaging with the ratchet means and arranged in the way of the reciprocatory element.

8. A combination as defined in claim 6 in which the control device comprises a pair of rotatable friction drive members, at least one of said members being a roller having a conical friction surface and mounted on a shaft which is pivotally mounted at one end on a transverse axis, ratchet means for driving one of the members intermittently, means for selectively engaging and disengaging the members comprising an eccentric for displacing the other end of the shaft and spring means for urging the shaft against the eccentric, and means for moving said members relatively in a direction generally parallel to the conical surface, and a reciprocable pawl engaging with the ratchet means and arranged in the way of the reciprocatory element.

9. A combination as defined in claim 6 in which the control device comprises a pair of rotatable friction drive members, at least one of said members being a roller having a conical friction surface, a shaft for mounting the roller, said shaft being pivotally mounted at one end on a transverse axis, an eccentric adjacent the other end of the shaft, spring means for urging the shaft against the eccentric, means for rotating the eccentric to selectively engage and disengage the members, ratchet means for driving one of the members intermittently, and means for moving said members relatively in a direction parallel to the conical surface, and a reciprocable pawl engaging with the ratchet means and arranged in the way of the reciprocatory element.

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