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Stevels

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[54] **TEXTILE PICKER HAVING MEANS FOR VARYING FEED OF A WEB PASSING THERETHROUGH**

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[51] **Int. Cl.** **D01h 5/32**

[58] **Field of Search** 19/97.5, 67.5, 239, 240, 241

[56] **References Cited**

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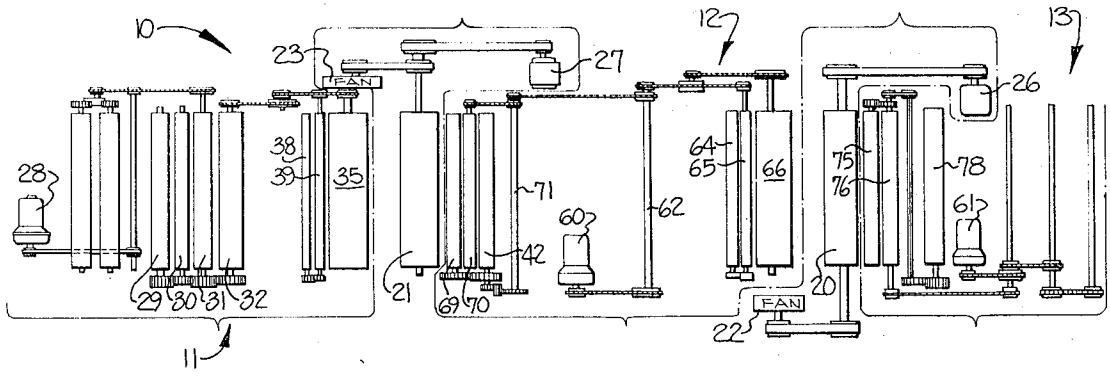
[57] **ABSTRACT**

A textile picker and drive arrangement therefor wherein rolls which advance a web of textile fibers passing through the picker are driven in rotation at variable speeds correlated to the thickness of the web passing through an evener motion of the picker. Electrical motor drives for the rolls of the picker are provided, and the rotational speed of the motors are controlled in response to sensing of web thickness by the evener motion.

5 Claims, 3 Drawing Figures



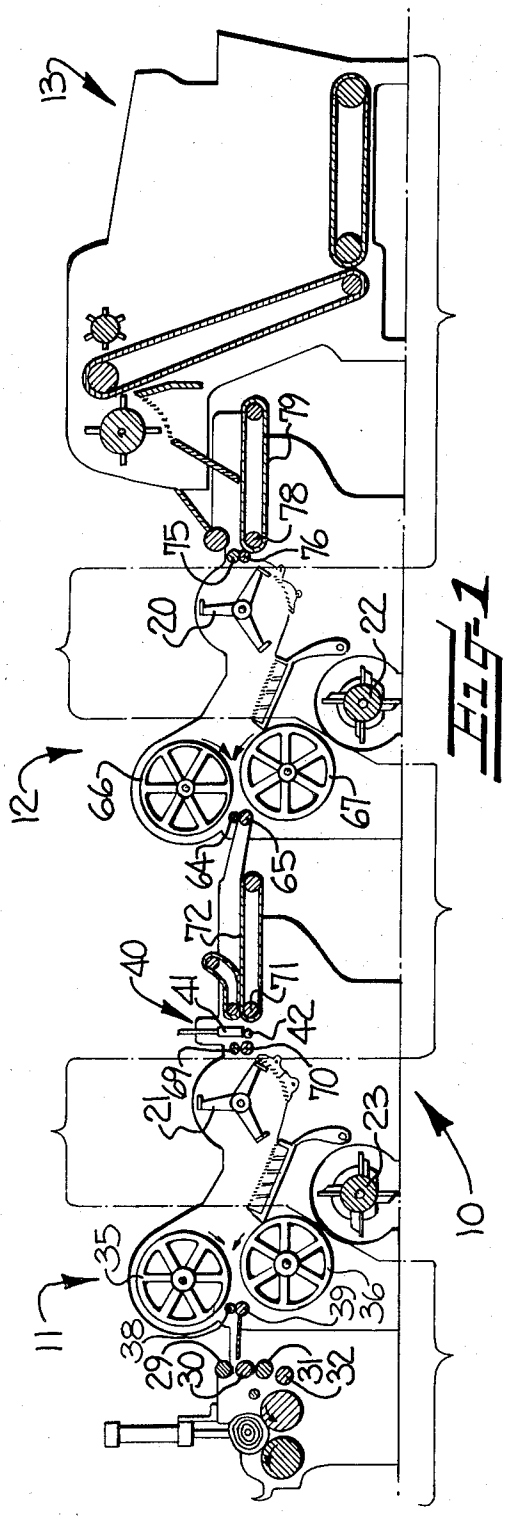


FIG-1

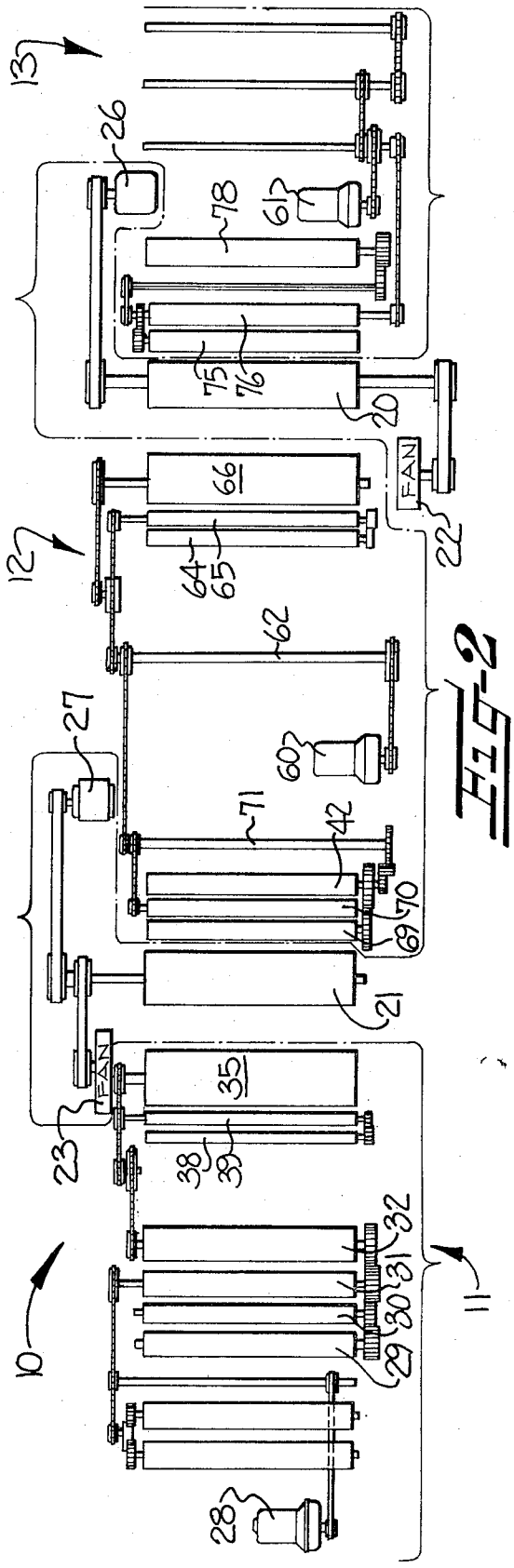


FIG-2

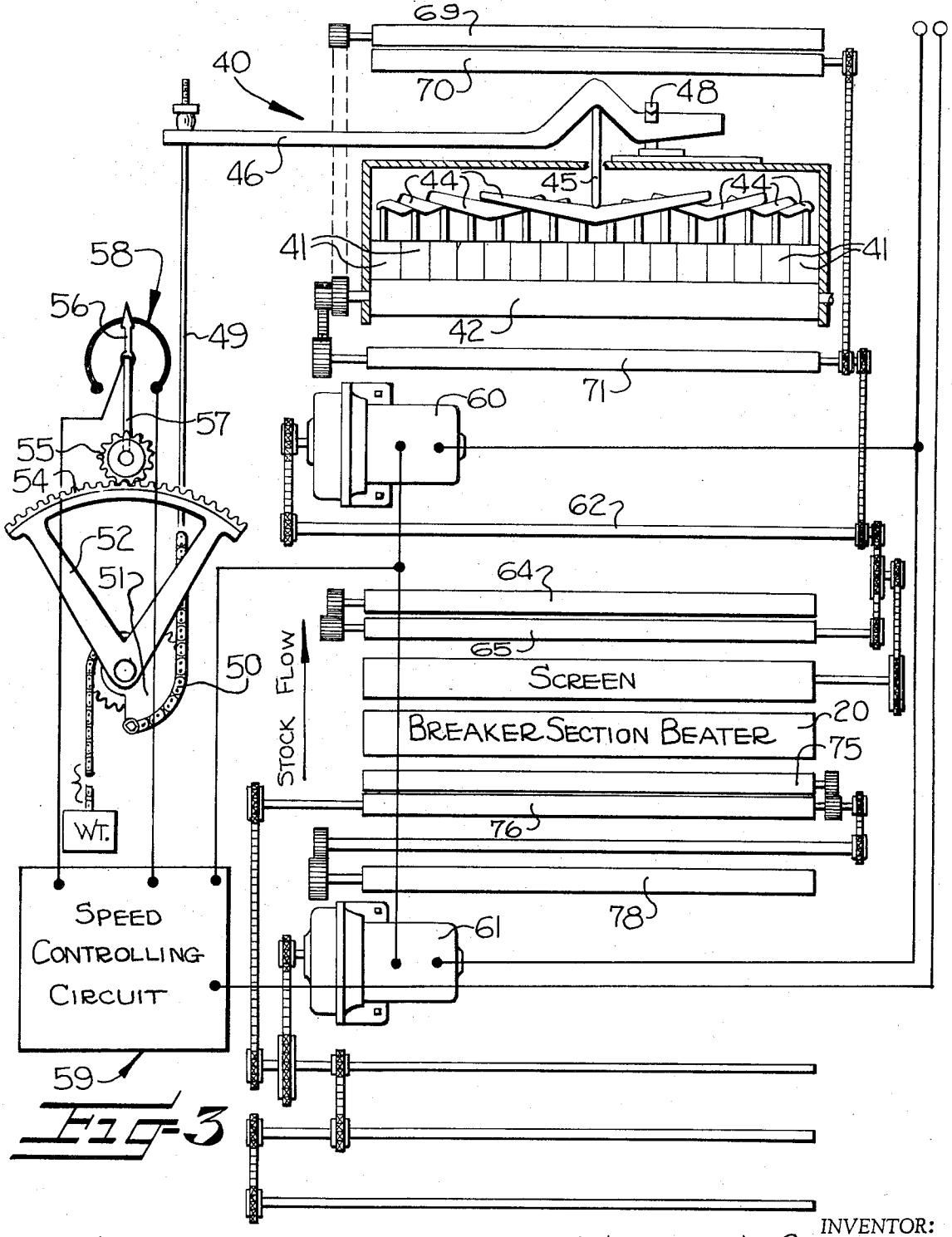


Fig-3

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TEXTILE PICKER HAVING MEANS FOR VARYING FEED OF A WEB PASSING THERETHROUGH

This invention relates to a textile picker and the combination therewith of means for facilitating production of a more uniform web of fibers by driving the rolls of the picker in rotation at variable speeds correlated to the thickness of the web passing therethrough.

In an effort to achieve production of a web of textile fibers of generally uniform weight per unit length, textile pickers have long been equipped with evener motions which sense the thickness of a web of fibers passing between an evener roll and movable sensing fingers or plates. Generally, such an evener motion operates through a mechanical variable speed drive, one widely used form of which included cone pulleys and a shiftable belt to effect variation in the rotational speed of evener feed rolls which advance the web of textile fiber from the evener motion.

As single process textile pickers came into more general use, it was proposed that speed variation in response to variations in the thickness of the web of fibers produced also be applied to draw rolls in a breaker section of the single process picker, in order to provide somewhat greater control over the uniformity of the web of fibers being passed to the finisher section which included the evener roll of the usual evener motion and the evener feed rolls which fed the fibers from the evener motion to the beater of the finisher section. Synchronizer apparatus for accomplishing this function was constructed with mechanical variable speed drives generally similar to those applied in controlling the speed of the evener feed rolls. In response to variation in the speed of the evener feed rolls, such a synchronizer arrangement was intended to accomplish variation in the speed of the draw rolls of the finisher section.

While the use of a synchronizer with a single process textile picker provided certain advantages in facilitating production of a more uniform web of fibers, the mechanical variable speed drives relied upon introduced certain deficiencies in operation. In particular, such drives are relatively slow to respond to sensing of variations in the thickness of the web passing through the single process picker. Secondly, such mechanical variable speed drives are incapable of fully synchronous operation, due to lag in variation of rotational speed of the rolls involved and inherent sloppiness and inaccuracy of the mechanical arrangements relied upon.

With the above discussion in mind, it is an object of the present invention to facilitate the production of a more uniform web of textile fibers by a textile picker, through driving the evener feed rolls of the picker in rotation at variable speeds closely correlated to variations in thickness of the web passing therethrough and while smoothly and quickly responding to variations in web thickness. In accomplishing this object, a textile picker has provided, in combination therewith, a drive comprising an electrical motor operatively connected to the evener feed rolls for supplying rotational motive force thereto and a speed control circuit electrically connected to the motor for controlling the average power of alternating current delivered to the motor and thereby varying the rotational speed thereof. In accordance with the present invention, an electrical circuit element incorporated in the speed control circuit means is mechanically coupled to the evener motion of the picker, for variation of an electrical characteristic of the element in response to sensing of web thickness. Upon variation in the electrical characteristic of the element, the speed of the motor and the speed of the evener feed rolls as well as the evener roll is varied in coordination with the sensed variations in the thickness of the fibers passing through the picker.

A further object of the present invention is to more closely control uniformity of a web of fibers passing through a single process textile picker by driving a plurality of sets of rolls thereof in rotation at variable speeds correlated to the thickness of the web as determined by an evener motion of the picker. In accordance with this object of the present invention, drive means for both breaker and finisher sections of a single process textile picker are controlled by a single speed control circuit means responsive to variations in web thickness sensed by the evener motion. Accordingly, advancement of the web of fibers through both sections of the single process picker is correlated to the thickness of the web and production of a more uniform web is further facilitated.

Some of the objects and advantages of the invention having been stated, others will appear as the description proceeds, when taken in connection with the accompanying drawings, in which:

FIG. 1 is a side elevation, in schematic section, of a single process picker incorporating the present invention;

FIG. 2 is a schematic plan view of the picker of FIG. 1, illustrating certain rotating elements thereof and drive arrangements for driving such elements in rotation; and

FIG. 3 is an enlarged schematic view of portions of the textile picker of FIGS. 1 and 2, illustrating in greater detail the combination with the picker of means for facilitating production of a more uniform web of fibers.

Referring now more particularly to the drawings, the present invention will be disclosed with reference to an illustrated single process textile picker generally indicated at 10 and including a finisher section generally indicated at 11, a breaker section generally indicated at 12, and a feed hopper section generally indicated at 13. As single process pickers such as the picker 10 are generally well known to persons skilled in the textile arts, a detailed discussion will not be given here of all of the elements and operation of the picker 10. The present discussion will be directed more particularly to the features of the novel combination which, in accordance with this invention, facilitate production of a more uniform web of textile fibers. It is appropriate, however, to recognize at the outset of this disclosure that the present invention may be applied where separate picker apparatus are used to perform successive picking operations, as well as where a single process picker such as the picker 10 is employed.

Among the rotating elements of the picker 10, the beaters 20, 21 and fans 22, 23 of the breaker and finisher sections 12, 11 are driven at substantially constant, predetermined rotational speeds by corresponding drive motors 26, 27 (FIG. 2). As is generally known, these rotating elements of the picker 10 do not

greatly affect the thickness of the web of fibers passing through the picker **10**, and the rotational speeds of these elements are preselected to accomplish the particular desired result for the particular textile fiber or fibers being processed.

In similarity, it is desirable to provide a substantially constant speed motor **28** for driving a stand of calender rolls **29, 30, 31, 32** at a lap forming station immediately adjacent the finisher section of the picker **10**. As is conventional practice, suitable drive train means interconnect the calender rolls and drive motor **28** therefor with finisher sections screens **35, 36** and draw rolls **38, 39** which pass a web of textile fiber to the calender rolls and lap forming station. The rotational speed of the drive motor **28** and the rotating elements driven thereby is preselected to deliver a final web of textile fiber having a predetermined weight per unit length, as is known in the operation of textile picker apparatus.

The textile picker **10** incorporates, in the finisher section **11**, an evener motion generally indicated at **40** for sensing the thickness and density of a web of fibers passing therethrough. The evener motion **40** comprises a plurality of evener plates **41** (FIG. 3) mounted for movement along parallel lines toward and away from an adjacent evener roll **42**, in response to variations in thickness of a web of fibers passing therebetween. By means of a plurality of saddle blocks **44**, the sum of the movements of the evener plates **41** relative to the evener roll **42** is transmitted to an evener motion pin **45**, displaced along a straight line in response to movement of evener plates. Such displacement of the evener pin **45** is transmitted to a beam member **46** arranged as a lever movable about a fulcrum hook **48**. Displacement of a free end of the beam member **46**, in response to movement of the evener pin **45**, is transmitted by a rod member **49** to a chain **50** and, by engagement of the chain **50** with a relatively small sprocket quadrant **51**, rotates a relatively large pivoted quadrant member **52**. The quadrant member **52** includes an arcuate surface **54** with timing belt serrations or gear teeth, engaged by a relatively small timing pulley or gear **55** which is coupled by a shaft **57** to a movable contact element **56** which contacts a fixed element of an electrical control device; namely, a variable resistor, rheostat or potentiometer, generally indicated at **58**. It is apparent that gear **55** and shaft **57** serve as means to transmit angular motion from quadrant member **52** to contact element **56** in direct proportion to the angular movement imparted to beam member **46** and that the angular motion of the contact element **56** is greater than the extent of angular motion of quadrant member **52**.

By suitable electrical connection, the potentiometer **58** is electrically interconnected in a speed controlling circuit generally indicated at **59** (as schematically shown in FIG. 3). The speed controlling circuit varies at least one of the voltage, amperage or frequency of alternating current passing therethrough so as to function as a variable speed AC motor drive, and may be in the form of a convertor transforming alternating current to alternating current or may be in form of a rectifier-inverter combination. Variable speed AC motor drives of this general class are commercially available or may, if required, be produced by persons skilled in the arts of electronic design and familiar with available manuals regarding the use of controlled phase conducting elements such as silicon controlled rectifiers and the like. One such reference manual which includes disclosures of variable speed AC motor drives such as the drive **59** schematically illustrated in FIG. 3 is the Fourth Edition of the "SCR Manual" published by the Semiconductor Products Department of General Electric (Copyright 1967). As therein disclosed, triggering circuits relying upon potentiometers and other variable resistance devices are used in conjunction with controlled phase conductive devices such as silicon controlled rectifiers in accomplishing control over the rotational speed of an electrical motor.

In accordance with the present invention, the speed controlling circuit **59** is operatively connected with drive means, in the form of first and second electrical motors **60** and **61**, for certain rotating elements of the picker **10** which are effective to control the thickness of the web of textile fibers passing therethrough. By way of example, the first electrical motor **60** functions as a driving motive power means which, through a common drive shaft **62**, supplies rotational motive power both to elements of the finisher section **11** and to elements of the breaker section **12**. More particularly, the common drive shaft **62** operatively connects the first electrical motor **60** with draw rolls **64, 65** and screens **66, 67** of the breaker section **12** and with evener roll **42** and evener feed rolls **69, 70** which advance a web of textile fiber through the evener motion **40** and to the beater **21** of the finisher section (FIG. 1). Additionally, a drive roll **71** for aprons **72** transporting a web of fiber from the breaker section **12** to the finisher section **11** is driven from the first electrical motor.

By the provision of appropriate chain and sprocket drives interconnecting the common drive shaft **62** to the various elements driven therefrom, the breaker section draw rolls **64, 65**, the evener roll **42**, and the evener feed rolls **69, 70** are driven in rotation in a fixed, predetermined speed relation one to another. Thus, variation in the rotational speed of the first electrical motor **60** results in simultaneous variation in the rotational speed of all elements driven therefrom.

The speed controlling circuit **59** is also electrically connected with the second electrical motor **61**, for controlling the rotational speed thereof. By suitable power transmission means including drive chains and sprocket elements, the second electrical motor **61** is operatively connected to beater feed rolls **75, 76** of the breaker section **12** for driving the same in rotation and for controlling the rate at which a web of textile fibers is advanced to the beater **20** of the breaker section **12**. Operative connection is also established from the second electrical motor **61** to a drive roller **78** for an apron **79** advancing textile fiber from a hopper section **13** to the breaker section **12** and for certain conveyors operating within the hopper section **13**.

In operation, the thickness of the web of textile fiber passing through the evener motion **40** is sensed and, in response to movement transmitted through the linkage means including the beam **46**, determines a resistance value presented by the electrical control device **58** to the speed controlling circuit **59**. In response to the resistance value presented, the speed controlling circuit **59** varies at least one of the characteristics of alternating electrical current delivered therethrough to the first and second electrical motors **60, 61**. As is known to

persons familiar with the design of such speed controlling circuitry, the characteristic varied frequently will be the phase angle of conduction, but frequency or voltage may also be varied in order to effect a variation in the average power delivered and thereby control the rotational speeds of the first and second motors **60, 61**. Inasmuch as both motors are electrically connected to a single speed controlling circuit **59**, the variations in speed of the motors are simultaneous. Further, due to the operative interconnection of the motors with the rotating elements of the picker **10**, such variations in rotational speed are immediately made effective to vary the flow rate of textile fiber through the picker **10** and thereby vary the thickness of the web of textile fiber passing therethrough.

It is believed that the disclosure will make clear for persons skilled in the construction and operation of textile machinery including pickers the manner in which production of more uniform webs of textile fiber is facilitated. In particular, the responsiveness of control over fiber flow rates resulting from application of the present invention is both higher and smoother than was accomplished by prior art mechanically variable drive arrangements.

In the drawings and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation.

What is claimed is:

1. In a textile picker having an evener motion for sensing the thickness and density of a web of textile fibers passing therethrough, said evener motion including an evener roll over which the web passes, a row of evener plates overlying and extending substantially parallel with said evener roll for engaging the upper surface of the web and being independently vertically movable in response to variations in thickness and density of the web engaged thereby, an evener pin, saddle blocks interposed between said evener plates and said pin for effecting vertical movements of said pin corresponding to the sum of the vertical movements of said evener plates, a lever fulcrumed adjacent and engaging said evener pin for movement therewith, and an electric motor drivingly connected to said evener roll; the combination therewith of means controlling said motor in response to variation in the position of said lever to rotate said evener roll at variable speeds correlated to the thickness and density of the web passing through the evener motion while smoothly and quickly responding to variations in web thickness and density and comprising:

an electrical control device interposed in an electrical circuit to said motor and including a fixed element and a movable contact element contacting said fixed element for varying at least one characteristic of electrical current delivered to said motor and thereby varying the output speed of said motor,

a relatively large quadrant member pivotally mounted adjacent said lever and having an arcuate surface with gear teeth thereon, means connecting said quadrant member to said lever for pivotal movement of said quadrant member in unison with said lever, a relatively small gear engaging said teeth on said quadrant, and a shaft on which said gear and said movable contact element are mounted whereby any angular motion of said quadrant member is transmitted to said movable contact member and the extent of angular motion of said movable contact member will be greater than the angular motion of said quadrant member.

2. The combination according to claim **1**, wherein said means connecting said quadrant member to said lever includes a relatively small sprocket quadrant pivotally mounted for pivotal movement with said relatively large quadrant member, a chain engaging said relatively small quadrant member, and a rod extending from and connecting said chain to said lever.

3. The combination according to claim **1**, wherein said fixed element is a resistor.

4. The combination according to claim **1**, wherein said electrical control device is a potentiometer.

5. The combination according to claim **1**, wherein said electrical control device is a rheostat.

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