April 29, 1969 R. GREENWOOD ET AL 3,440,690

MEANS FOR FEEDING FIBROUS MATERIALS

Filed Nov. 3, 1966 Sheet 1 of 2

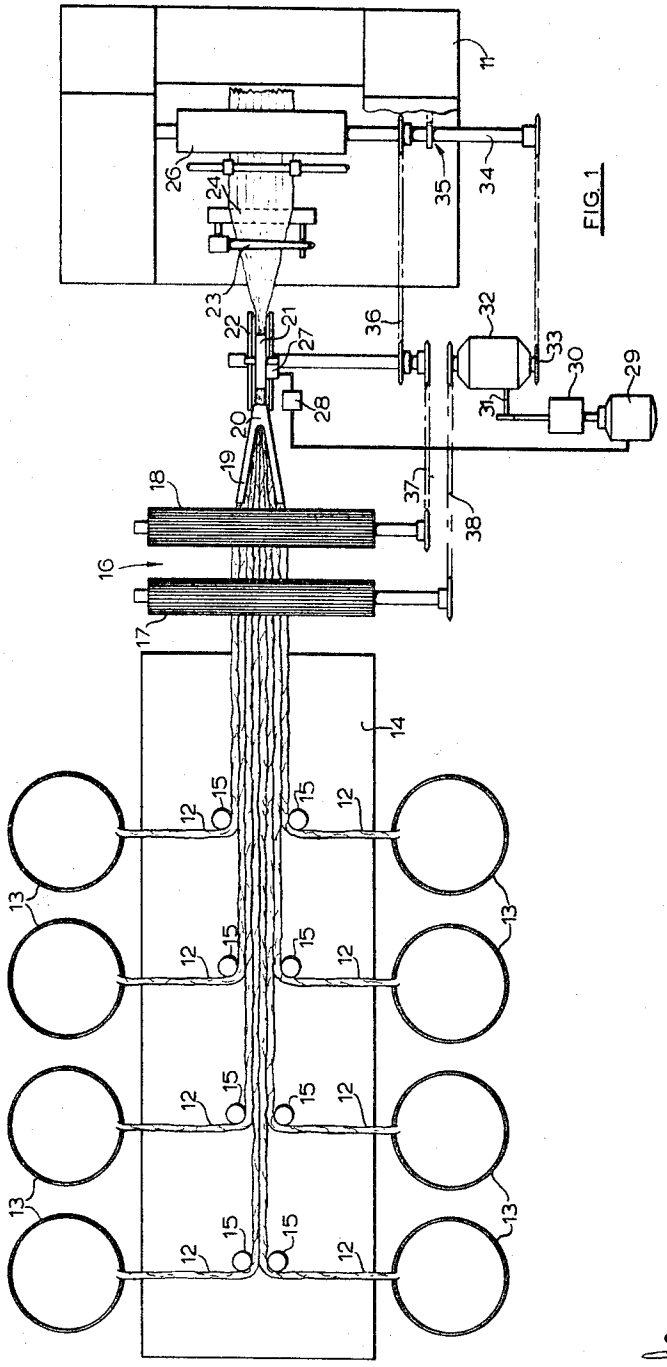

FIG. 1

Inventors
Robert Greenwood
and
Walter Howarth
By Poole + Noe
Attorneys

April 29, 1969 R. GREENWOOD ET AL 3,440,690

MEANS FOR FEEDING FIBROUS MATERIALS

Filed Nov. 3, 1966 Sheet 2 of 2

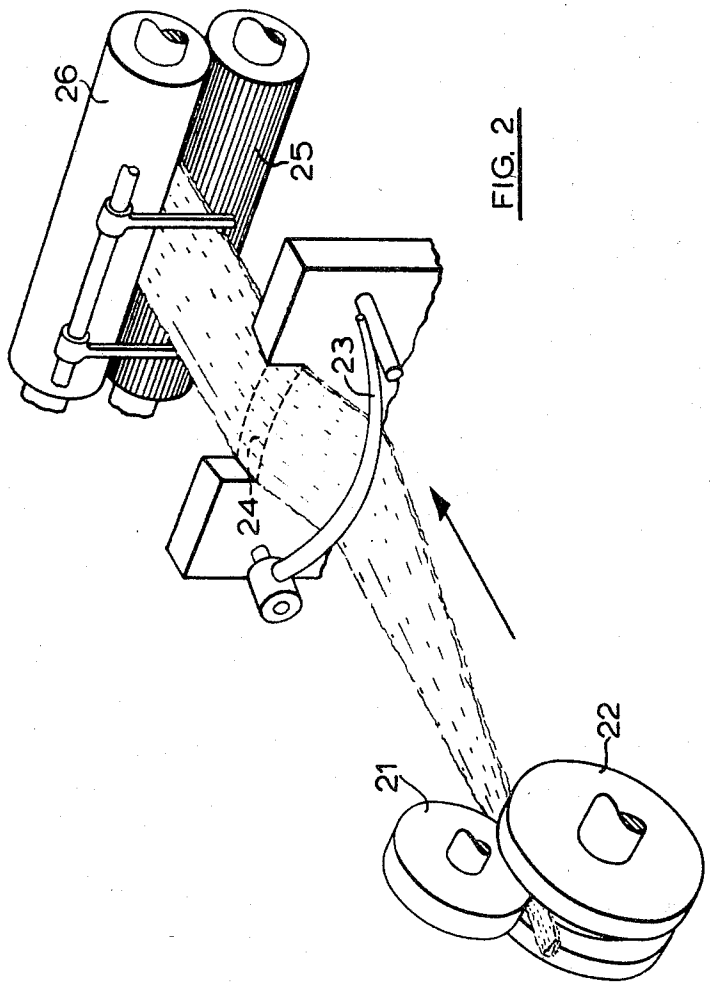

FIG. 2

Inventors
Robert Greenwood
and
Walter Howarth
By Hoste & Hoste
Attorneys

United States Patent Office 3,440,690
Patented Apr. 29, 1969

3,440,690

MEANS FOR FEEDING FIBROUS MATERIALS

Robert Greenwood, Whalley, near Blackburn, and Walter Howarth, Haslingden, Rossendale, England, assignors to T.M.M. (Research) Limited, Oldham, England, a British company

Filed Nov. 3, 1966, Ser. No. 591,900
Int. Cl. D01h 5/32
U.S. Cl. 19—240 5 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for controlling the mass per unit length of fibrous material fed to a textile drafting machine. The apparatus utilizes a draft control means which is responsive to a deviation of the measured mass per unit length from a predetermined mass per unit length to vary the draft of the control drafting system to thereby reduce said deviation.

This invention relates to improved means for controlling the mass per unit length of fibrous material fed to a textile drafting operation.

Attempts have been made previously to control the mass per unit length of fibrous material being subjected to a drafting operation. In one arrangement hitherto proposed the mass per unit length of a fibrous material being fed to a drafting system is measured and the draft in the drafting system adjusted in response to any deviations in the measured quantity to correct the deviations. This arrangement is an open loop control system and suffers from the defects common to all open loop systems, that is to say, there is a tendency to drift away from the predetermined desirable mass per unit length and there is usually inaccurate amplitude correction at some response frequencies. It has also been proposed to measure the output from a drafting system and to alter the draft in the drafting zone in response to deviations in the measured output so as to correct such deviations. This is a closed loop system but whilst it overcomes some of the disadvantages of the open loop system it has been found that attempts to alter the draft in the main drafting system when processing at high speeds have led to complications and unsatisfactory correction.

An object of the present invention is to provide improved means for correcting deviations in the mass per unit length of fibrous material before it is fed to a drafting operation and without making any alterations to the draft in the main drafting system.

According to the invention there is provided a textile drafting system comprising a main drafting system, measuring means for measuring at a measuring position the mass per unit length of fibrous material being fed to the main drafting system, a control drafting system acting on said fibrous material before it reaches the measuring position, and draft control means responsive to deviations of the measured mass per unit length from a predetermined mass per unit length to vary the draft in said control drafting system to reduce or tend to reduce said deviations.

In a preferred embodiment of the invention, a plurality of slivers are processed in side-by-side formation through the control drafting system and then through the main drafting system, the slivers being combined as they pass through the measuring position so that the combined mass per unit length is measured.

One embodiment of the invention will now be described by way of example with reference to the accompanying drawing in which:

FIG. 1 is a plan view, part of which is in diagrammatic

form, of a textile drafting system according to the invention and

FIG. 2 is a perspective view of part of the apparatus shown in FIG. 1.

Referring to the drawings, a drawframe **11** is fed with slivers **12** from eight sliver cans **13** arranged behind the drawframe, four of the cans being positioned along one side of a sliver supporting table **14** and the other four cans being positioned along the other side of the table. The table **14** is arranged with one end behind the drawframe **11** and the slivers **12** from the cans are fed on to the table by driven creel rollers (not shown) and guided by guide rollers **15**. On leaving the sliver supporting table **14**, the slivers are fed through a control drafting system **16** having a pair of back rollers **17** and a pair of front rollers **18**, the relative speeds of the front and back rollers **17** and **18** being such as to provide a draft of, say, between 1 and 2. The slivers **12** emerging from the control drafting system **16** are passed over a guide tray **19** having side walls converging to form a trumpet **20**, the slivers **12** converging into the trumpet and issuing from it at approximately single sliver width. From the trumpet **20** the combined slivers are fed to the nip of a pair of measuring rollers consisting of a top tongued roller **21** and a bottom grooved roller **22**, the former of which is so mounted as to be vertically displaceable in dependence upon the thickness or mass per unit length of the combined slivers **12** passing therethrough. The combined slivers **12** on leaving the tongued and grooved rollers **21** and **22** are separated by passing them under and over two bow shaped spreader guides **23** and **24** and then fed via assisting rollers **25** and **26** to the main drafting system to the drawframe.

The top tongued roller **21** is coupled to a transducer **27** which is arranged to generate an electrical signal which is a measure of the displacement of the top roller **21** from a desired thickness setting and is related in phase angle to the direction of displacement from the desired thickness setting. The electrical signal generated by the transducer **27** is fed to an amplifier **28** where the signal is amplified and the amplified signal is applied to drive servo motor **29** the output shaft of which is arranged to drive through reduction gearing **30** an input shaft **31** to a variable speed unit **32** which also has a constant speed input **33** driven via shaft **34** of the assisting roller **25** and gears **35** from the main drafting system of the drawframe, which also provides through chain and sprocket drives **36** and **37** a constant speed drive to the bottom grooved roller **22** and to the front rollers **18** of the control drafting system **16**. The variable speed output of the variable speed unit is arranged to drive through a chain and sprocket drive **38** the back rollers of the control drafting system as well as the creel rollers (not shown).

In operation, the eight slivers **12** from the sliver cans **13** are fed to the drawframe **11** via the control drafting system **16** and the tongued and grooved rollers **21** and **22**. Upon a reduction in the thickness or mass per unit length of the combined slivers **12** passing through the tongued and grooved rollers **21** and **22** the top tongued roller **21** is lowered resulting in a signal at the transducer **27** of zero phase angle. As a result, servo motor **29** will drive in say an anticlockwise direction, causing an increase in speed on the variable speed output of the variable speed unit **32**, and the arrangement is such as to cause an increase in the speed of the back rollers **17** of the control drafting system **16** and a reduction in the draft of the latter which will restore or tend to restore the thickness of the combined slivers to the desired thickness setting. In response to an increase in the thickness of the combined slivers **12** above the desired thickness setting the phase angle of the signal from the transducer changes through 180°, causing clockwise rotation of the servo motor **29** a reduction in

the speed of the back rollers **17** of the control drafting system and an increase in draft which will bring or tend to bring the combined slivers **12** back to the desired thickness.

The embodiment of the invention hereinbefore described may be used behind any standard textile drafting system and will control long-term and medium-term regularity of the fibrous material fed to (and therefore delivered from) the main drafting system.

In addition to correcting normal variations in sliver thickness the embodiment of the invention hereinbefore described will correct for a missing sliver or an extra sliver fed in during a piecing operation.

Although in the embodiment hereinbefore described a servo motor and reduction gearing have been employed it will be appreciated that the draft of the control drafting system can be varied by the use of clutches in a manner similar to that described in our British Patent No. 941,405.

What we claim as our invention and desire to secure by Letters Patent is:

1. A textile drafting system for drafting textile slivers, comprising sliver supply means for supplying a plurality of slivers, a control drafting system to which the slivers from the sliver supply means are fed initially in side-by-side relationship therethrough, measuring means for measuring the combined mass per unit length of the slivers delivered by the control drafting system, a main drafting system to which said slivers are passed after passage through said control system and measuring means, and draft control means responsive to a deviation of the measured mass per unit length from a predetermined mass per unit length to vary the draft of the control drafting system to reduce said deviation, said control drafting system including a pair of front rollers and a pair of back rollers, a constant speed drive, means drivably connecting said front rollers to said constant-speed drive of said main drafting system, a variable-speed unit, means drivably connecting said back rollers to said variable-speed output shaft of said variable-speed unit, and means drivably connecting a constant speed input shaft of said variable-speed unit to said constant-speed drive of said main drafting system, said draft control means further including a transducer arranged to generate an electrical signal which is a measure of the deviation of the said measured mass per unit length from said predetermined mass per unit length, and a servo motor responsive to said signal and drivingly connected to a variable-speed input shaft of said variable-speed unit to vary the speed of the variable-speed output shaft of the unit and thereby the speed of the back rollers of said control drafting system.

2. A textile drafting system according to claim **1**, wherein said measuring means comprises a pair of measuring rollers one of which is formed with a peripheral groove and the other of which is formed with a peripheral tongue, wherein the combined slivers are arranged to be fed to the nip between the two rollers, and wherein one of the rollers is mounted so as to be biased against the other roller and displaceable away from the other roller in dependence upon the thickness or mass per unit length of the combined slivers passing through said nip.

3. A system according to claim **2**, wherein said measuring rollers are arranged one above the other and wherein the bottom roller is rotatable about a fixed axis and wherein the top roller is rotatable about a vertically displaceable axis in dependence upon the thickness or mass per unit length of the combined slivers passing through said nip.

4. A system according to claim **2**, wherein said transducer is arranged to generate an electrical signal which is a measure of the displacement of the displaceable roller from a desired thickness setting and is related in phase angle to the direction of the displacement from the desired thickness setting.

5. A system according to claim **1**, wherein the constant speed input to the variable speed unit is driven from the main drafting system, the latter driving the front rollers of the control drafting system.

References Cited

UNITED STATES PATENTS

802,492	10/1905	Birch	19—240
2,244,203	6/1941	Kern	19—65
2,608,725	9/1952	Strew	19—157
2,964,803	12/1960	Robinson	19—240
2,981,986	5/1961	Neil	19—240
3,038,216	6/1962	Naegeli	19—157 XR

FOREIGN PATENTS

68,315	11/1957	France.
930,873	7/1963	Great Britain.

DORSEY NEWTON, *Primary Examiner.*