

[54] **FEEDING OF FIBROUS MATERIALS TO TEXTILE CARDS**

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[22] Filed: **Oct. 28, 1969**

[21] Appl. No.: **871,859**

[52] U.S. Cl. **19/105**

[51] Int. Cl. **D01g 15/40**

[58] Field of Search 19/145.5, 155, 156.3, 156.4, 19/148, 64.5, 105, 65, 106; 222/63; 302/28, 36, 39, 40, 42

[56] **References Cited**

UNITED STATES PATENTS

605,057 5/1898 Hopkinson et al. 19/106

3,029,477 4/1962 Wildbolz et al. 19/105 X
3,414,330 12/1968 Trutzschler 302/28
3,112,139 11/1963 Wildbolz et al. 302/22

FOREIGN PATENTS OR APPLICATIONS

735,172 8/1955 Great Britain 19/145.5

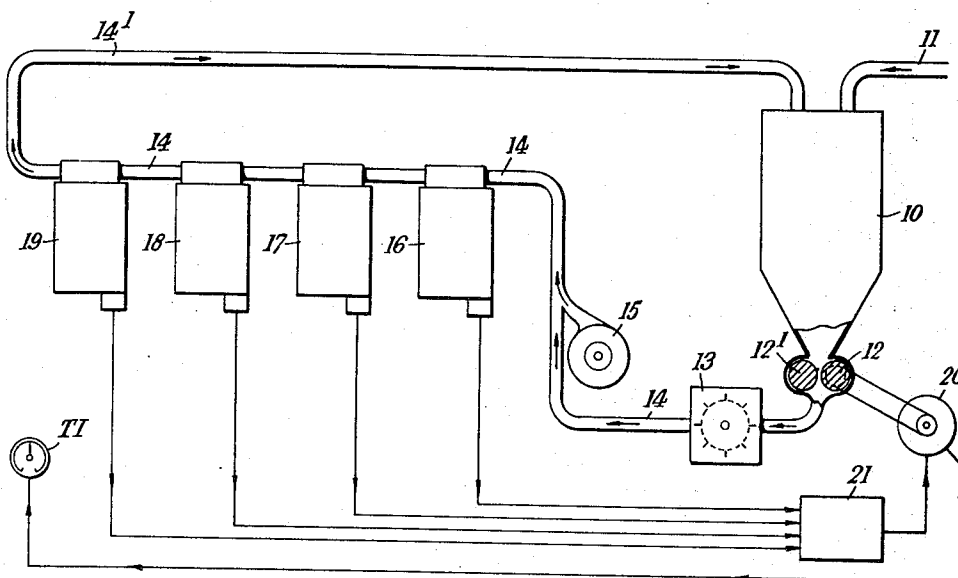
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[57] **ABSTRACT**

In a method of feeding fibrous material to a plurality of textile cards, the rate of feed of the fibrous material from a common feed means is automatically changed in response to a change in the production rate of one or more of the cards by an amount equal to or substantially equal to the change in production rate of the one or more cards. The automatic changing of the rate of feed of the fibrous material is controlled by control means responsive to the stopping or reduction in speed of a card and to the bringing of the card from the stopped or slow speed condition to normal operating speed.

8 Claims, 2 Drawing Figures



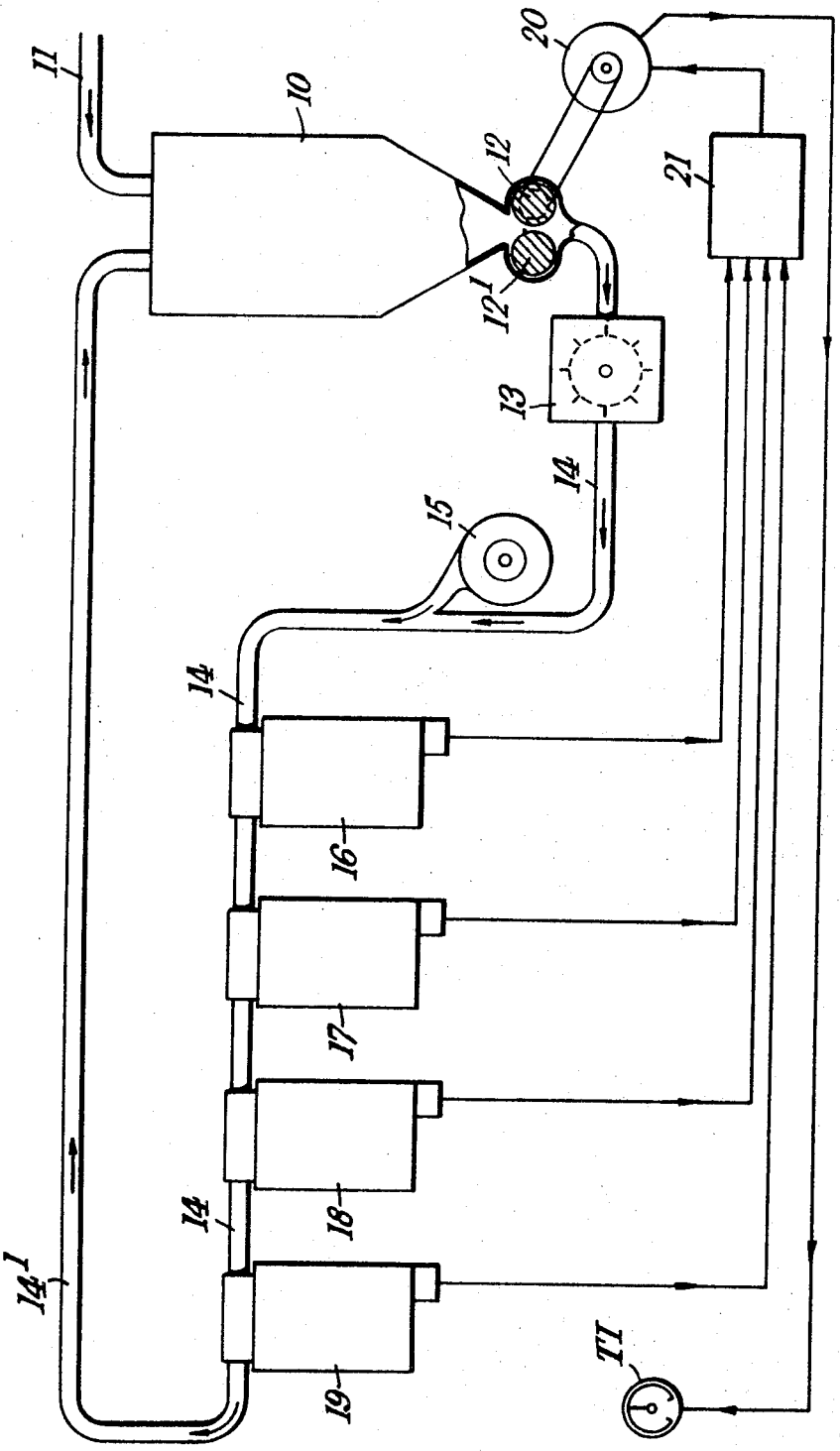


Fig. 1.

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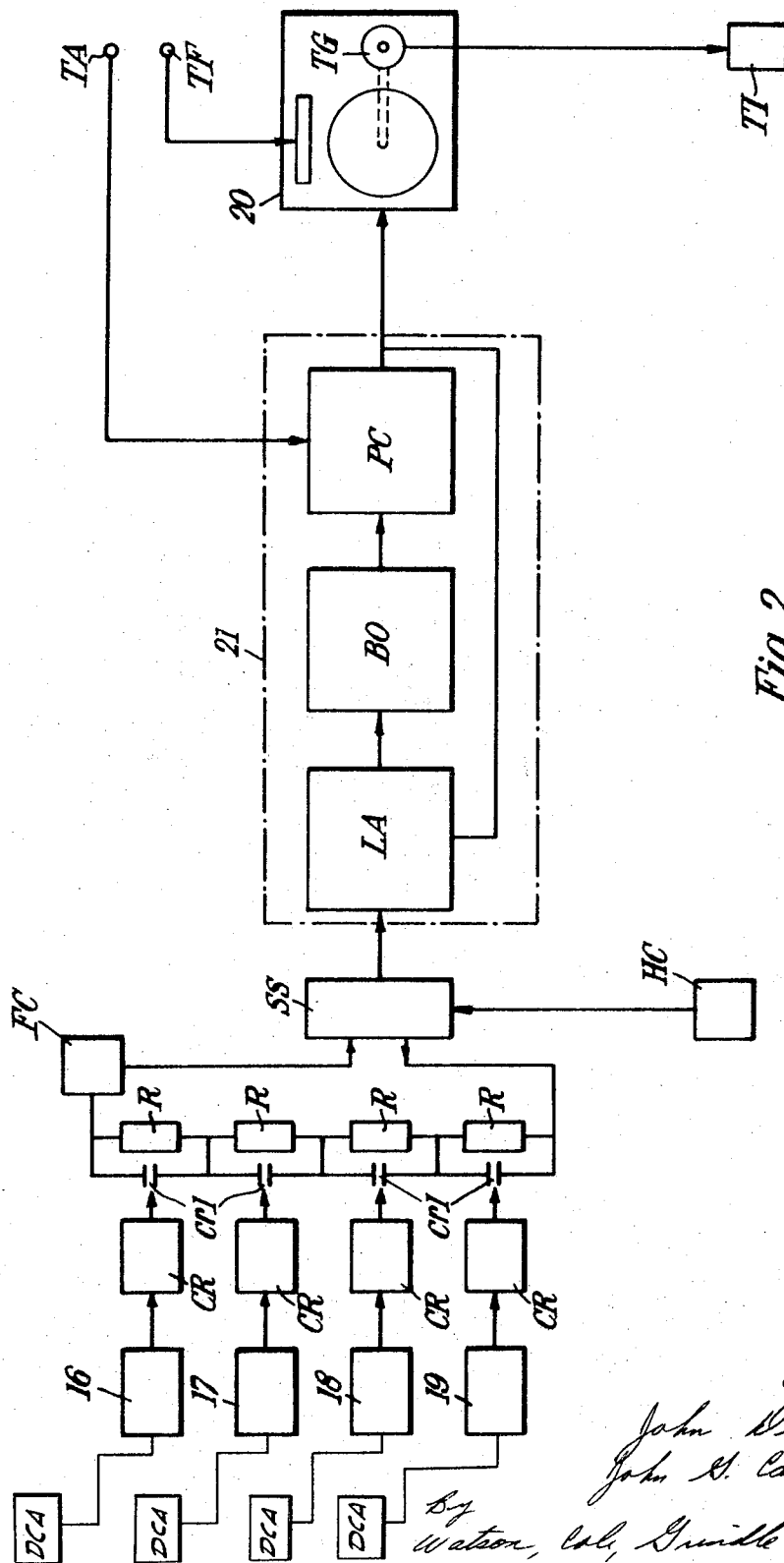


Fig. 2.

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FEEDING OF FIBROUS MATERIALS TO TEXTILE CARDS

The present invention relates to the feeding of fibrous materials to a plurality of cards and is particularly though not exclusively concerned with the feeding of fibrous material from a source of supply to each of the cards in turn, with surplus material being returned in an airstream to the source of supply.

In such fiber-feeding arrangements it is found that when one or more of the cards is stopped the relatively large increase in the amount of surplus material being returned to the source of supply in the airstream chokes the conveying duct and the system becomes completely inoperative. The cards must be stopped and the choked duct cleared before normal operations can be resumed.

A fiber feeding arrangement has already been proposed in which the amount of fibrous material fed to a circulating pneumatic fiber-conveying duct serving a number of cards in turn is controlled by sensing and measuring the amount of surplus material in the return duct and adjusting the rate of feed accordingly, but a disadvantage of this arrangement is that by locating the sensing means downstream of the cards any blockage occurring in the region upstream would not be detected by the sensing means and the feed of material would continue until a complete blockage of the system occurred. Furthermore, difficulty is found with this arrangement in providing suitable sensing means that will measure the amount of material carried in the airstream satisfactorily.

It is an object of the present invention to provide an improved method of and apparatus for feeding fibrous material to a plurality of cards, which will overcome the aforesaid disadvantage and difficulty economically.

According to a first aspect of the present invention, there is provided a method of feeding from common feeding means fibrous material to a plurality of textile cards, including the step of automatically changing the rate of feed of the fibrous material from the common feed means in response to a change in the production rate of one or more of the cards by an amount equal to or substantially equal to said change in production rate of the said one or more of the cards.

In a preferred embodiment of the invention, the rate of feed of the fibrous material from the common feed means is automatically decreased in response to the stopping or reduction in speed of one or more of the cards and automatically increased in response to one or more of the cards being brought from a stopped or slow speed condition to normal operating speed.

Preferably, the feed rate is arranged to vary between a predetermined minimum feed rate at least equal to the production rate of all the cards running at slow speed and a predetermined maximum feed rate at least equal to the production rate of all the cards running at normal processing speed.

According to a second aspect of the present invention, there is provided a fiber feeding arrangement for a plurality of textile cards, comprising fiber conveying means for conveying from a common feed means fibrous material to said plurality of cards, and control means responsive to a change in the production rate of one or more of the cards to change the rate of feed of the fibrous material from the common feed means by an amount equal to or substantially equal to the said change in the production rate of the said one or more of the cards.

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

FIG. 1 is a block schematic diagram of a fiber-feeding arrangement according to the invention; and

FIG. 2 is a block schematic diagram of a control system for use in the fiber feeding arrangement shown in FIG. 1.

Referring to FIG. 1 of the drawing, a reserve hopper 10 is arranged to receive opened fibrous material supplied from an opening and cleaning line through duct 11 and to deliver from

its lower end under the control of a pair of driven feed rollers 12, 12' a regulated supply of material to a rotary beater 13, which further opens the material and passes it to the inlet of a conveying duct 14 in which the fibers are circulated in a conveying airstream generated by a fan 15. The feed duct 14, as shown, delivers the fibrous material in turn to a plurality of cards 16 to 19, where the material passes down a card chute to the taker-in of the card, surplus material remaining in the conveying duct 14 being returned in the airstream along a return duct 14' to the reserve hopper 10.

The feed rollers 12, 12' are arranged to be driven by a variable speed DC shunt-motor 20, the speed of which is controlled by a variable-speed control unit 21, the operation of which will now be described with reference to FIG. 2. Each of the cards 16 to 19 is provided with a drive control arrangement DCA, shown in FIG. 2, whereby it can be switched by the operative between a slow-speed piecing-up condition and a high-speed normal operating condition and such switching is employed to control the operation of a control relay CR associated with the card. As will be seen from FIG. 2, each of the relays CR is provided with contacts *crl* which are normally open and which close upon energization of the relay. Each of the contacts *crl* is connected in parallel with a resistor R, and the arrangement is such that when a card is switched, by means of its drive control arrangement DCA, by the operative from the slow-speed piecing-up condition to the high-speed normal operating condition the appropriate resistor R becomes short-circuited by the operation of the relay CR. The resistors R are connected together in series and also in series with a fine-control manually operable variable resistor FC and the series combination is connected through a selector switch SS to form a variable component in a linear control amplifier LA. The amplifier LA produces a variable DC output which is applied to a blocking oscillator BO producing firing pulses for a thyristor power controller PC fed with a DC armature supply voltage applied to terminal TA. The power controller PC produces a variable armature voltage for application to the DC shunt motor 20, the field windings of which are fed with a DC field voltage supply applied to terminal TF.

The selector switch SS is arranged for switching over manually to cut out the series-connected resistors R and fine control resistor FC and bring into circuit with the linear amplifier LA a manual feed-rate control resistor HC when required. In addition the output shaft of the motor 20 is provided with a tacho-generator TG producing an output signal which is fed to a tachometer TI to provide an indication of the speed of the motor 20.

With all the cards 16 to 19 running at the slow piecing-up speed, the DC motor 20 drives the feed rollers 12, 12' at a speed which will ensure that enough fibrous material is supplied to the conveying duct 14 to keep all the cards running at slow speed, whilst providing a slight overfeed which is returned to the reserve hopper 10 through the return duct 14'. When the cards have been pieced up at slow speed, the operative presses the high-speed button on a first card which causes the card to speed up gradually to its normal operating speed and which at the same time causes the activation of an appropriate one of the relays CR. As a result, the appropriate one of the resistors R is short-circuited, causing the motor 20 to speed up and increase the rate of delivery of fibrous material from the reserve hopper 10 to the conveying duct 14. The increase in delivery rate is made such as to provide the extra supply of fibrous material needed for the card switched over to normal operating speed. This automatic operation is then repeated as each of the other cards is switched over from slow speed to normal operating speed. When switching a card from normal operating speed to slow speed operation or if a card is stopped, for example, when it is taken out of production for stripping and grinding or to effect any necessary repair, the appropriate short-circuited resistor R is brought back into the energizing circuit, causing the speed of the motor 20 automatically to reduce and cut down the rate of delivery of fibrous material from the hopper 10 to the conveying duct 14.

It will be apparent that by adjusting the fiber feed rate in proportion to the number of cards running at normal operating speed overcomes the problem of choking of the return duct 14'. If, for example, the normal production rate of one card is 100 lbs/hr and the production rate at the slow running speed of the card is 5 lbs/hr the rate of supply of material from the common feed means may according to the invention be lowered by approximately 95 lbs/hr. It will be apparent that the advantages of the invention will also be achieved by lowering the feed rate by a smaller amount provided it is sufficient to ensure that the overfeed does not rise to such an amount which would cause a blockage.

The basic speed of the motor 20 can be adjusted by the fine control FC to provide for the delivery of different types of material from the hopper 1.

Whilst in the preferred embodiment of the invention a variable speed electrical DC shunt motor is employed to drive the feed rollers 12, 12' use may be made of other types of variable speed devices, such for example as hydraulic or pneumatically operated motors and variable speed gear drives having a constant speed input and variable speed output.

It will be appreciated that pneumatic or mechanical fiber conveying means may be employed in the fiber-feeding arrangements according to the invention.

A variable speed driving arrangement for switching over each card from its slow speed condition to its normal operating condition and vice versa may include a main motor for driving the card cylinder and the taker-in and a variable-speed drive unit having a constant speed input driven from the taker-in, a variable-speed output coupled to drive the card doffer and feed elements and a variable-speed input arranged to be driven by a constant speed reversible motor. A manually operable switch connected in the reversible motor control circuit is employed to initiate the operation of the reversible motor in one sense to accelerate the doffer and feed elements to the normal operating speed and further switch means are provided to initiate rotation of the reversible motor in the opposite sense to decelerate the doffer and feed elements to the slow speed condition, the latter switch means being manually operable or automatically operable in response to a length measuring motion or a stop motion. The stopping of the reversible motor is controlled from a rotary switch which is driven by the reversible motor and which serves automatically to arrest the reversible motor on the latter reaching a first position in which the doffer and feed elements are being driven at the normal operating speed and to arrest the reversible motor on the latter reaching a second position in which the doffer and feed elements reach their slow speed condition. This card driving arrangement is fully described in the specification of our British Patent application No. 1092364.

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

1. A fiber feeding arrangement for a plurality of textile cards each operating at a predetermined production rate, comprising a hopper and an opening and cleaning line for supplying open fibrous material to said hopper, an exit end on said hopper through which a regulated supply of said open fibrous material is delivered under the control of a control means to a common conveying means for conveying the fibrous material to said plurality of cards, said control means

comprising a pair of feed rollers arranged at said exit end of the hopper to deliver said regulated supply of material, a variable-speed electric motor and a motor control unit for controlling the speed of said motor, each of the cards being provided with a drive control arrangement whereby it can be switched by an operative between a slow-speed piecing-up condition and a high-speed normal operating condition, and wherein said motor control unit includes a control relay associated with each card and operative in response to the switching of the respective one of said drive control arrangements, and a power controller the output of which energizes said motor and is caused to vary in response to a change in the condition of each of the relays to change the rate of feed of the fibrous material from the hopper by an amount equal to or substantially equal to the change in the production rate of at least one of the cards.

2. An arrangement according to claim 1, wherein said control means also includes means responsive to a stopping or reduction in speed of at least one of the cards to reduce the rate of feed of the fibrous material from said hopper by an amount equal to or substantially equal to the reduction in the card production rate resulting from said stopping or speed reduction of said at least one of the cards.

3. An arrangement according to claim 2, wherein said responsive means is also responsive to the bringing of said at least one of the cards from a stopped or slow-speed condition to normal operating speed to increase the rate of feed of the fibrous material from said hopper by an amount equal to or substantially equal to the increase in the card production rate resulting from the change in condition of said at least one of the cards.

4. An arrangement according to claim 3, wherein said control means is such as to vary the feed rate of said hopper between a predetermined minimum feed rate at least equal to the production rate of all the cards running at a slow speed and a predetermined maximum feed rate at least equal to the production rate of all the cards running at a normal operating speed.

5. An arrangement according to claim 1, wherein said conveying means is common to each of said plurality of cards for conveying the fibrous material from said hopper thereto in turn, with surplus material remaining in or on said common conveying means after the last card being returned to said hopper.

6. An arrangement according to claim 10, wherein said common conveying means comprises a conveying duct and means for generating in said duct an airstream for conveying the fibrous material therein.

7. An arrangement according to claim 1, wherein a signal generating circuit is provided for controlling said power controller by signals fed to it, said circuit including a plurality of series-connected resistors each of which is arranged to be short-circuited by contacts of a predetermined one of the relays in response to the switching of the drive control arrangement of the appropriate card.

8. An arrangement according to claim 1, wherein said motor is a variable-speed DC shunt motor, and wherein said power controller varies the armature voltage applied to the motor.

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