

[54] **SPEED DEVICE CONTROL OF DOFFER FOR CARDING**

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[57] **ABSTRACT**

The present invention concerns some improvements in the gearings able to decrease temporarily only the speed of the doffer cylinder particularly for carding machines.

[30] **Foreign Application Priority Data**

June 17, 1971 Italy..... 25968/71

[52] U.S. Cl. **19/106 R, 19/98**

[51] Int. Cl. **D01g 15/46**

[58] Field of Search **19/106 R, 98**

The invention resides in the disclosure of a gearing presenting two reduction stages and in the actuation of two reduction stages by means of toothed belts. The provision of an adjustment plate permits the further adaptation of the gearing to the different outputs of the carding machines.

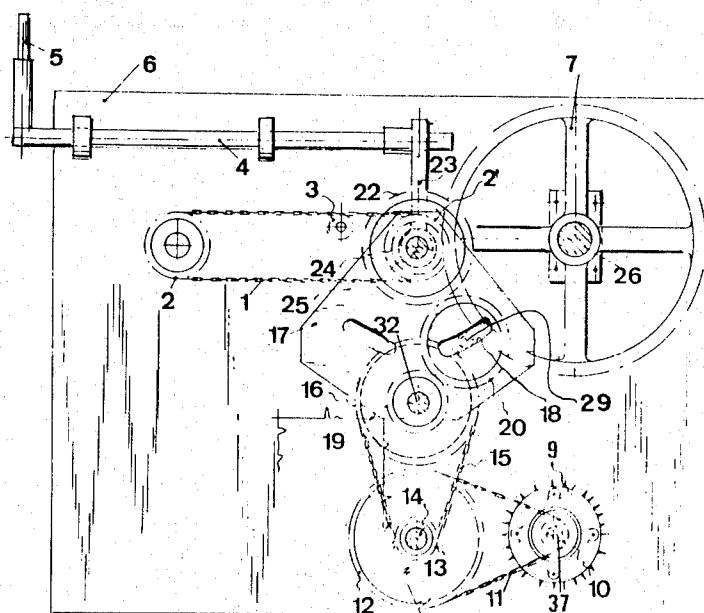
The invention is particularly applied to the carding machines according to the prior art in order to increase their out-put.

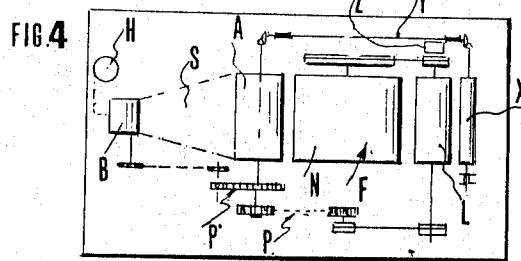
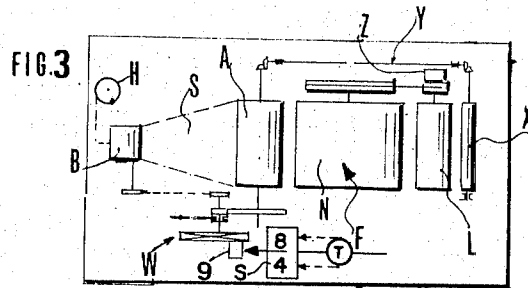
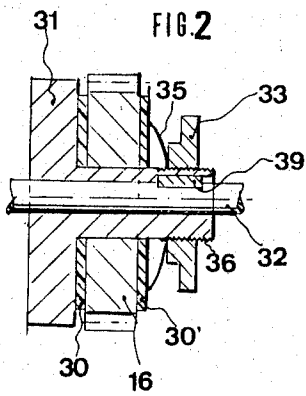
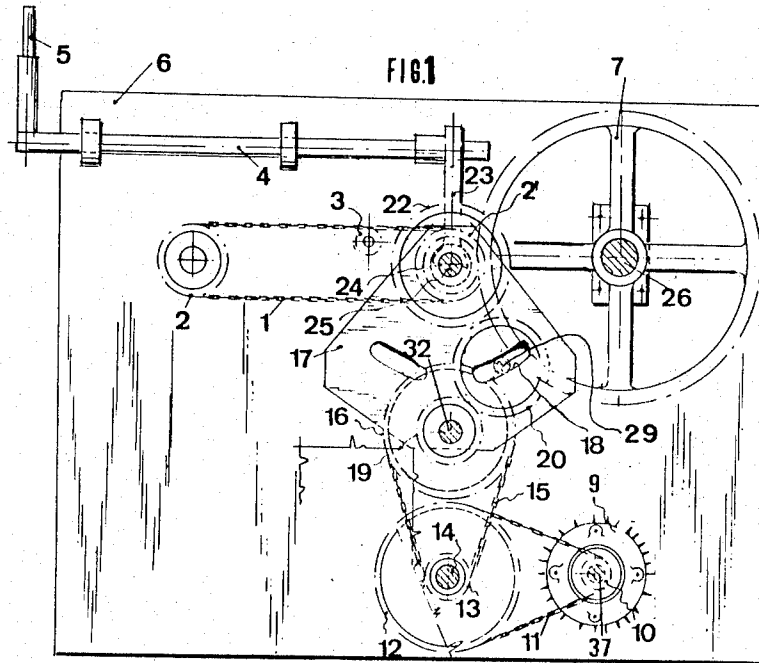
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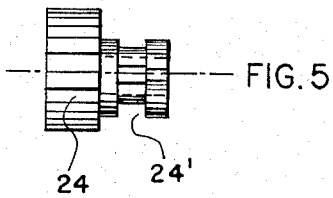
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2 Claims, 5 Drawing Figures





PRIOR ART



SPEED DEVICE CONTROL OF DOFFER FOR CARDING

FIELD OF THE INVENTION

The present invention is concerned with a device controlling the speed of the doffer cylinder to temporarily decrease its speed, for carding machines of high output or for carding machines according to the prior art but modified for obtaining a greater out-put.

For these high out-put carding machines it is necessary to decrease for 20-30 seconds the speed of the doffer cylinder in order to enable the machine operator to introduce the web, which is detached by means of a comb or rolls from the doffer, into the calender roller of a coiler or into a drawing apparatus such as disclosed in the U.S. Pat. No. 2,948,023 or No. 3,368,246 of the same inventor.

DESCRIPTION OF THE PRIOR ART

According to a known technique, a device of this kind has been proposed wherein an auxiliary electric motor is provided, distinct from the motor driving the carding machine and of two polarities kind. This auxiliary electric motor permits by means of a reduction gearing the speed of the doffer to be reduced for a predetermined interval, adjusted by the timer. It also permits a running speed twice that of the temporary speed of the doffer through the change of polarity, the doffer shaft controlling in synchronism the speed of the feed roller of the carding machine. The known devices are relatively complex, expensive, cumbersome, noisy and easily breakable.

SUMMARY OF THE INVENTION

According to the present invention there is provided a device for the control of the speed of the doffer cylinder of a carding machine the latter being actuated by a main motor, comprising in combination a two polarity electric auxiliary motor, which is distinct from the main motor, a timer, an eight-four pole change-polarity device for the auxiliary electric motor, said timer controlling the said change-polarity device so as to establish for a predetermined interval a lower velocity drive for the two - polarity electric motor, the outlet shaft of which has a first sprocket gear; a freely rotatable first stub shaft; a first reduction gearing comprising a first gearing fixed on the first stub shaft and a first toothed belt engaging the first sprocket gear and the first gearing; a second reduction gearing comprising a second sprocket gear fixed on the first stub shaft, a second freely rotatable stub shaft, a second gearing fixed on the second stub shaft and a second toothed belt engaging the second sprocket gear and the second gearing; a change gear fixed on the second stub shaft, a support plate formed with an arcuate slot; a third freely rotatable stub shaft; a third gearing fixed to the third stub shaft, an idle gearing meshing with the change gear and with the third gearing and with its stub movable along the arcuated slot; a third reduction gearing comprising a third sprocket gear formed with a circular groove portion and movable along the third stub shaft and a fourth gearing fixed on the shaft of the doffer, a fork to be manually actuated by the operator and engaging the circular groove portion of the third sprocket gear for disconnecting the drive to the doffer gearing.

According to a preferred feature of the invention, the second reduction gearing is connected to the second stub shaft through a friction gearing.

The above features and other ones as well as the objects and the advantages of the invention will be more readily apparent from the following specification of a preferred but not exclusive embodiment of the invention illustrated in the annexed drawing, wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view with some portions removed of the reduction gearing for an auxiliary electric motor according to this invention;

FIG. 2 is a sectional view through the shaft of a toothed wheel for controlling a friction coupling;

FIG. 3 is a diagrammatic sketch of driving a reduction gearing according to the present invention;

FIG. 4 is a sketch like the FIG. 3 concerned with a carding machine according to the prior art.

FIG. 5 is a side view of a sprocket gear formed with a groove portion.

DETAILED DESCRIPTION OF EMBODIMENTS

With particular reference to the diagrammatic sketch of the FIG. 3, A is the so-called doffer cylinder, B the drawing apparatus of the web S discharged by the doffer. F shows schematically a carding machine driven by an electric motor Z, that by means of drive belts controls the so-called taker-in L. In the carding machines according to the prior art (FIG. 4) the motor Z also controls the doffer cylinder A which in turn is coupled to the feed roller X of the carding machine.

For carding machines of high out-put (20 Kg/hour) the speed of doffer is relatively high, from 40 to 80 meters/minute and higher. Thus, it is necessary temporarily (20 to 30 sec.) to decrease the speed of doffer in order to permit the operator to introduce a new web to be fed by the doffer A and to introduce the same into the drawing apparatus B.

As with all known carding machines, the doffer cylinder A drives the feed roller X through conical gears and a transmission spindle to ensure the required synchronism between the feed roller X of the material to be worked and the doffer cylinder A. Likewise, the taker-in roller L is directly driven by the main cylinder N through belts. In the carding machines according to the prior art there are provided drive means identified as P-P' and consisting of a number of gears, pulleys and belts which transmit drive motion from taker-in roller L to doffer cylinder A. Since these transmission gears are known the same will not be described because as will be observed these transmission gearings are completely eliminated in the machine according to the present invention. This is seen clearly by making a simple comparison between FIG. 3 and 4.

The present invention provides an electro-mechanical reduction gearing W, which is controlled by an auxiliary motor 9 having a timer T associated therewith, whereby only temporarily the speed of the said doffer may be reduced to a web feeding speed of not more than 35 - 38 meters per minute (FIG. 1). Since the timer (T) switches for a preestablished time the (4-8) pole device (S) in the 8 pole winding arrangement then the motor speed is lowered. Of course the timer (T) automatically switches the change-over device to (4) pole winding arrangement after the preestablished time, by example 30 seconds. Of course, as

will be apparent hereinafter, at the same time that the reduction in speed stage of doffer cylinder is effected, the reduction of speed of inlet shaft of drawing apparatus as well of the calender rollers of the coiler H, must also be effected.

According to the invention the reduction gearing comprises a first reduction stage consisting of a toothed sprocket wheel 10 fixed to the drive shaft 37 of an auxiliary motor 9 and arranged to drive a toothed wheel 12 mounted on the opposite side of a support separation wall 6, the drive coupling therebetween being by means of a toothed belt 11. The reduction gearing further comprises a second reduction stage that takes place between a freely rotatable stub shaft 14 of the toothed wheel 12 and a freely rotatable stub shaft 32 by means of a toothed pinion 13; the latter is fixedly connected to the stub shaft 14 and drives the toothed wheel 16, the latter fixedly connected to the stub shaft 32. By means of these two reduction gearings an overall reduction of 1:13 is attained. On the second reduction gearing, coupling is effected by means of a second toothed belt 15 between pinion 13 and toothed wheel 16.

The transmission between the stub shaft 32 and the shaft 25 incorporates an adjustment plate 17. The shaft 25 is rigidly connected with the toothed wheel 22 which continuously meshes with the toothed wheel 20. The freely rotatable stub shaft 29 of the toothed wheel 20 slides along an arcuated slit 18 of the adjustment plate 17 to be in position to mesh with a change gear 19, the latter being selected according to the required out-put speed of the doffer. The doffer output speed may be changed by replacing the change gear 19 by another change gear 19'. A third reduction stage is provided by a toothed pinion 24 mounted on the stub shaft 25 for rotation therewith, and arranged to mesh with the toothed wheel 7. The toothed pinion 24 is axially movable along the stub shaft 25 by means of a fork 23 and is formed with a circular groove 24' as shown in the FIG. 5. The fork 23 is located by the shaft 4 which is positioned by its handle 5 either to connect or disconnect the drive for the toothed wheel 7. The shaft 25 is rigidly coupled to a sprocked toothed wheel 2' that drives a drawing apparatus by means of the sprocket wheel 2 and of the chain 1. The pinion 3 operates to tension the chain 1. Thus, the speed of the toothed wheel 7 fixed on the stub shaft 26 of the doffer cylinder and the speed of the drawing apparatus are synchronized.

The motor 9 has two polarity settings (4-8 poles), these settings corresponding to two motor speeds having a ratio 1:2. The lower speed is the transition speed and the higher speed is the running stage speed. It is clear that the running speed may be altered, as stated, by replacing the gear 19 with another gear of larger or smaller diameter.

When it is necessary to stop the doffer cylinder, the pinion 24 is disconnected by means of the fork 23, such operation being necessary by example when the doffer cylinder has to be adjusted.

With reference to the FIG. 2 it is observed that the toothed wheel 16 is connected to the stub shaft 32 by means of a friction device. This device comprises two discs 30-30' of, for example, brake lining material arranged to contact oppositely facing sides of wheel 16. A cup spring 35 urges the device towards a flange 31 for compression. The threaded flange 33 engaging the

threaded sleeve 36 secures the cup spring 35. The flange 31 is integral with the threaded sleeve 36. To couple the flanged sleeve 31 to the stub shaft 32, for rotation therewith, a key 39 is provided. In the event that jamming occurs, the toothed wheel 16 slides upon the two friction discs 30-30'.

The following examples may occur to clarify the application of the device according to the invention. If a carding machine according to the prior art which is to be modernized, works at the out-put of 4 Kgs/hour and it is required that the machine be adapted to give an out-put of 20 Kgs/hour, the doffer speed has to be increased five times. In consequence, it is necessary to reduce the doffer speed temporarily for the introduction of the web. The device according to the present invention permits a decrease of the doffer speed from 120 meters/minute to 35 meters/minute. The lower speed is the maximum at which the operator may introduce the web into the drawing apparatus or inlet calendering roller of a coiler. Alternatively, with an output-hour of 10 Kgs/hour, the production doffer speed has to be correspondingly reduced to 17,5 meters/minute. The change gear device with its adjustment plate serves only for adapting the running doffer speed to the required out-put. As is apparent, the speed reduction and drive device may offer a number of different applications. It is moreover observed that the introduction of the above quoted drawing apparatus which permits an increase of the drawing speed by a factor of 2, permits the discharge of the thicker web so that the speed of the doffer may be twice decreased, whereby the present device finds a correspondingly wider range of applications. At the end of the temporary operation, the auxiliary electric motor is changed from 8 to 4 poles and therefore its speed is doubled. It should be observed that the wheel 7 of the doffer drives the feed cylinder X of the carding machine, whereby the doffer cylinder and the feed cylinder X are synchronized. Since the taker-in cylinder L and the drum N are connected with one another by a distinct electric motor, if the speed of the taker-in reduced below a pre-determined level then a centrifugal adjustment device, (that is not represented and forms part of another patent of the same applicant), intervenes to disconnect the feed roller.

In the known transmission the coupling between doffer A and feed roller X is represented schematically and designated Y (FIG. 4).

I claim:

1. Device for the control of the speed of the doffer cylinder of a carding machine the latter being actuated by a main motor, comprising in combination a two polarity electric auxiliary motor, which is distinct from the said main motor, a timer, an eight pole change-polarity device for the auxiliary electric motor, the said timer controlling the said change-polarity device so as to establish for a predetermined interval a lower velocity drive for the two-polarity electric motor, the outlet shaft of which has a first sprocket gear; a freely rotatable first stub shaft; a first reduction gearing fixed on said first stub shaft and a first toothed belt engaging the said first sprocket gear and the first reduction gearing; a second reduction gearing comprising a second sprocket gear fixed on said first stub shaft, a second freely rotatable stub shaft, a second gearing fixed on said second stub shaft and a second toothed belt engaging the said second sprocket gear the said second gearing; a change gear fixed on the said second stub shaft,

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a support plate formed with an arcuate slot; a third freely rotatable stub shaft; a third gearing fixed to said third stub shaft, an idle gear meshing with the change gear and with the third gearing and with its shaft movable along said arcuated slot, a third reduction gearing 5 comprising a third sprocket gear formed with a circular groove portion and movable along the said third stub shaft and a fourth gearing fixed on the shaft of the doffer cylinder and engageable with said third sprocket gear and driven thereby a fork to be manually actuated 10

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by an operator and engaging the said circular groove portion of the said third sprocket gear for movement along the third stub shaft to disengage or engage the third sprocket gear and the doffer cylinder gearing.

2. A device for the control of the speed of the doffer cylinder of a carding machine defined in claim 1, wherein the said second gearing is connected to the said second stub shaft through a friction gearing.

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