March 29, 1966 C. W. SCHWALM 3,242,749

VARIABLE SPEED ATTACHMENT FOR CARDING MACHINES

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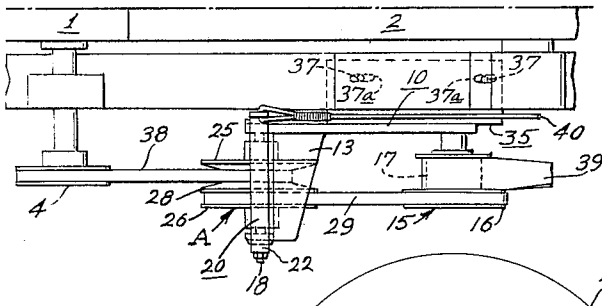
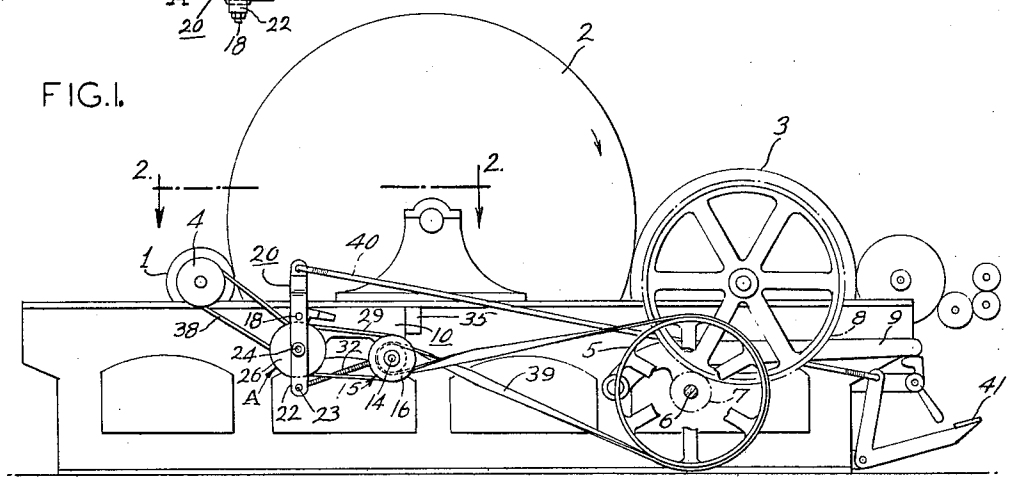


FIG. 2.

FIG. 1.



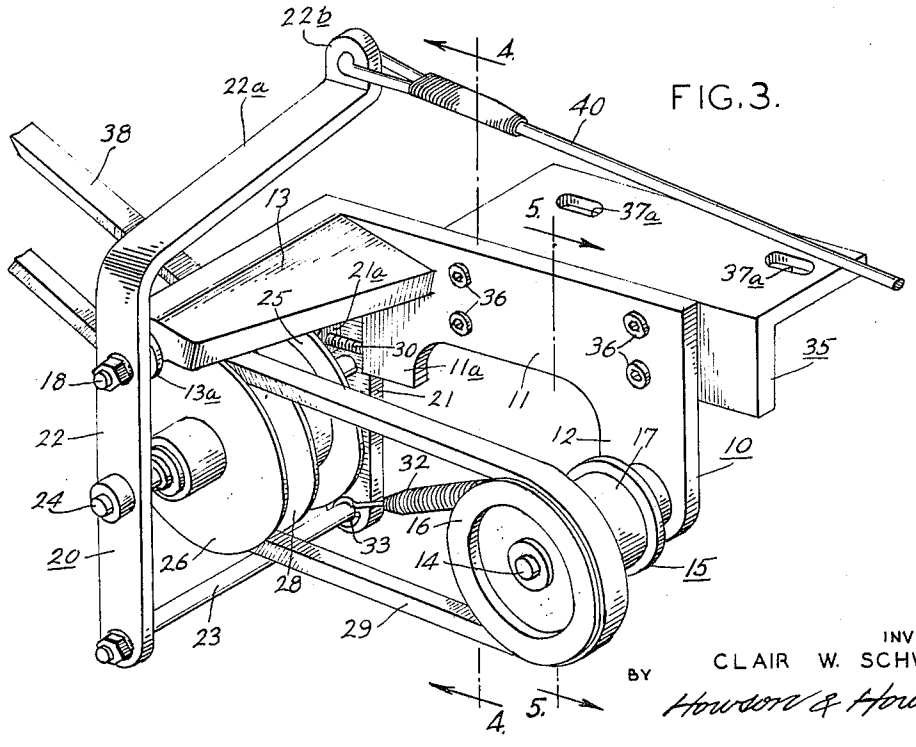


FIG. 3.

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FIG. 4.

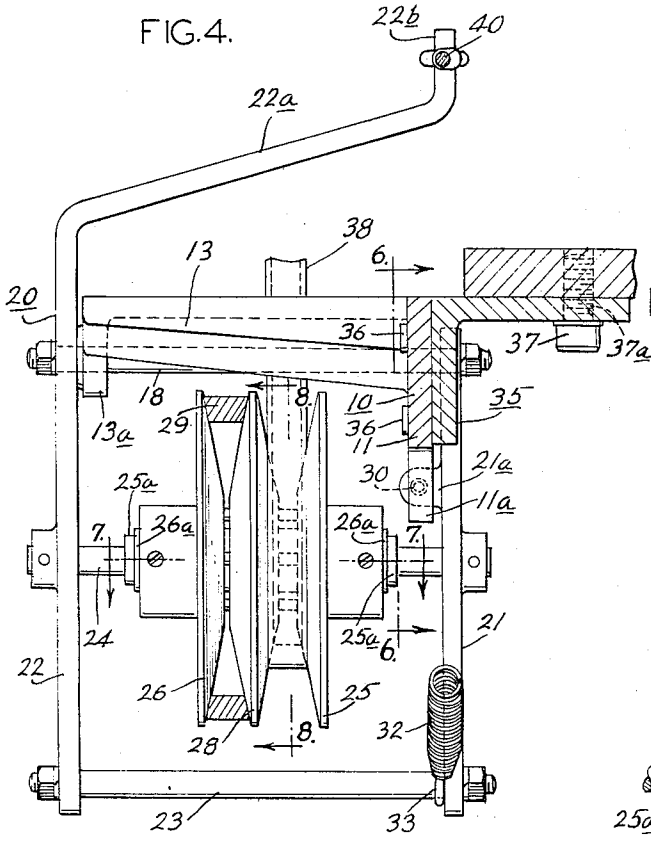


FIG. 6.

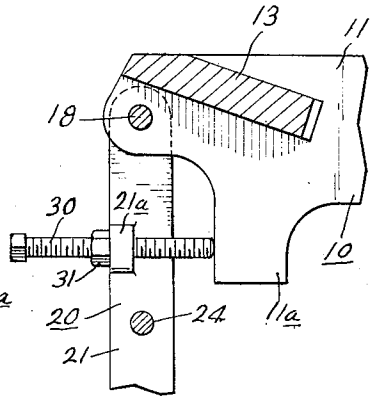


FIG. 7.

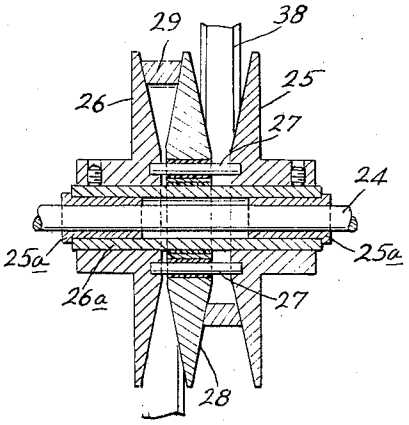


FIG. 5.

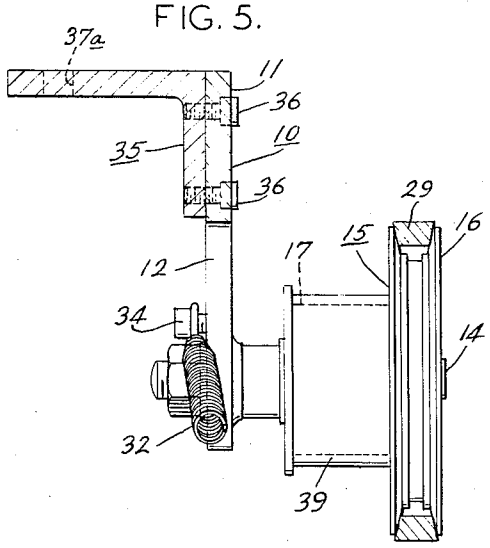
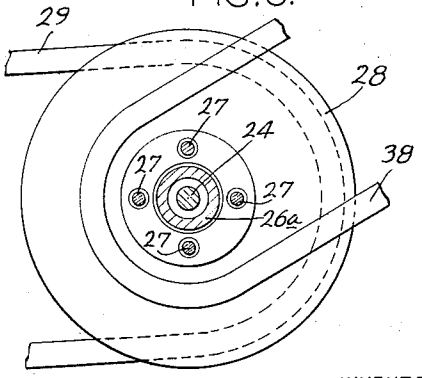


FIG. 8.



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VARIABLE SPEED ATTACHMENT FOR CARDING MACHINES

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6 Claims. (Cl. 74—230.17)

This application is a continuation-in-part of application Serial No. 277,381, filed May 1, 1963, now abandoned.

This invention relates to an improved means for driving the doffer of a cotton card adapted to be installed as an attachment to a conventional card.

More specifically, the attachment of the present invention provides a means for remotely controlling the production rate of the machine through a continuous range of speeds, but with fixed maximum and minimum speeds as limits to the aforementioned range.

On a cotton card, the production rate is in direct proportion to the rotational speed of the doffer. If the rotational speed of the doffer is doubled, the production rate of the machine is as a consequence also doubled.

Developments in the art and increased production demands now require doffer speeds in excess of 30 r.p.m. which corresponds to a production rate of approximately 42 pounds of fibers per hour. At these speeds, the shock of engagement between the change gear and doffer causes gear tooth breakage. Furthermore, "putting up the end," the manual task of threading the output fiber web or sliver into the calender roll section of the card and the card coiler, is made virtually impossible, at these higher speeds.

According to the present invention, a variable speed attachment is provided which enables the machine tender to slow the doffer speed and production to a fraction of the normal rate. The device may be controlled by a treadle conveniently located at the front of the card where the machine tender must stand while performing the manual task of putting up the end, or starting and stopping rotation of the doffer. Thus, it becomes possible for the operator to slow the speed of the drive sufficiently that the production change gear may be safely engaged with the doffer gear. The production rate is slowed sufficiently that a normally proficient machine tender can put up the end. The use of a foot actuated control, frees both of the machine tender's hands to perform this task which is normally a two-handed task. The end is normally put up with the doffer turning, and the card in production in order that the flow of fibers from the doffer be continuous and unbroken. If the doffer is allowed to stop, the web of fibers normally is broken.

As another feature, the invention allows the upper speed limit of the card to be altered and preset by an adjusting screw, whereas formerly it was necessary to change gears to effect speed changes.

Also, the invention provides for automatic return to the preset upper speed limit as soon as the machine tender's foot is removed from the treadle, thereby obviating the possibility that the machine be allowed to remain in the slow mode of operation for an extended period of time, due either to machine tender neglect or forgetfulness.

The attachment may be readily and easily attached to the frame of conventional cards and no modification of the barrow pulley production change gear assembly or its bearing stud is required.

These and other objects and features of the invention

are hereinafter fully set forth and described with reference to the accompanying drawings, in which:

FIG. 1 is a schematic side elevational view of a conventional card incorporating the variable speed drive attachment of the present invention.

FIG. 2 is a fragmentary top plan view on line 2—2, FIG. 1;

FIG. 3 is an enlarged perspective view of the variable speed attachment embodying the present invention;

FIG. 4 is an enlarged sectional view on line 4—4, FIG. 3;

FIG. 5 is an enlarged fragmentary sectional view on line 5—5, FIG. 3;

FIG. 6 is a fragmentary sectional view on line 6—6, FIG. 4;

FIG. 7 is a fragmentary sectional view on line 7—7, FIG. 4; and

FIG. 8 is a fragmentary sectional view on line 8—8, FIG. 4.

Referring to FIG. 1 of the drawings, the variable speed drive attachment of the present invention is shown and described with reference to a conventional carding machine comprising the usual lickerin **1**, card cylinder **2** and doffer **3** in the order in which the fibers pass through the card from left to right. Prior to the present invention, the doffer **3** in a conventional card is driven from the lickerin pulley **4** directly to the barrow pulley **5** by a belt (not shown). The barrow pulley **5** is mounted on a shaft **6** together with a gear **7** which meshes with the doffer gear **8** to drive the doffer **3**. In the conventional card the speed of the doffer **3** is changed and consequently the production rate of the card is changed by selectively interchanging the gear **7**, and starting and stopping of the doffer **3** is accomplished by engagement and disengagement, respectively, of the selected gear **7** with the doffer gear **8**, for example, by means of a pivoted lever **9**. This system performs entirely satisfactorily at doffer speeds below 10 revolutions per minute which corresponds to a production rate of the card of approximately 14 pounds of fibers per hour.

According to the present invention a variable speed drive attachment is provided which may be readily and easily incorporated or attached to conventional carding machines and interposed in the drive from the lickerin pulley **4** to the barrow pulley **5** of the card, for example, as generally designated A in FIG. 1 of the drawings.

Referring to FIGS. 3 to 8, inclusive, of the drawings, the attachment of the present invention comprises a frame member **10** including a vertical flat plate portion **11** of generally inverted L-shape providing a depending leg portion **12**, and having an integral laterally projecting arm portion **13** at the opposite end of the plate portion **11** from the depending leg portion **12**. The arm portion **13** has a depending lug **13***a* (see FIG. 4) at its outer free end. Mounted at the lower end of the depending leg portion **12** of the frame **10** is a shaft **14** which projects laterally from the frame **10** generally parallel to the arm portion **13** thereof and has notably journaled thereon a combination pulley **15**. The pulley **15** includes an outer V-belt pulley **16** of predetermined diameter and inwardly thereof a flat-belt pulley **17** of a predetermined diameter smaller than the pulley **16**.

Underlying the laterally projecting arm portion **13** of the frame **10** is a rod or shaft **18** which has its opposite ends mounted respectively in the upright plate portion **11** of the frame and the depending lug **13***a* of said arm portion **13** so that said shaft **18** is disposed in spaced parallel relation to the shaft **14**. A stirrup or subframe, generally designated **20**, is pivotally mounted on the shaft **18** for

limited swinging movement toward and away from the combination pulley **15** on the shaft **14**. Referring to FIG. 4 the subframe **20** comprises a pair of spaced parallel arms **21** and **22**, respectively. The arm **21** has its upper end mounted on the inner end of the shaft **18** at the opposite side of the upright plate portion **11** of the frame **10** from the laterally projecting arm portion **13**. Similarly the arm **22** is mounted on the other end of the shaft **18** outwardly adjacent the depending lug portion **13***a* of the lateral arm **13**. The lower ends of the two arms **21** and **22** are rigidly connected together by means of a rod **23** and the upper end portion of the arm **22** is inclined inwardly as indicated at **22***a*, terminating at its upper or free end in a vertically extending terminal portion **22***b* disposed substantially in vertical alignment above the arm portion **21** of the subframe **20**.

A shaft **24** has its opposite ends mounted in the arms **21** and **22** of the subframe **20** and is disposed in spaced parallel relation to the shaft **14** mounting the combination pulley **15**. Journalled on the shaft **24** by means of bearings **25**[a] is a sleeve **26**[a] on which is mounted a variable speed pulley V comprising a pair of cone-faced end pulley members **25** and **26** disposed in predetermined fixed spaced relation with respect to each other and an intermediate double-faced cone pulley member **28**. Bridging the gap or space between the confronting cone-faces of the end disk members **25** and **26** is a plurality of pins **27** arranged at 90° spaced intervals circumferentially of the shaft **24**. These pins **27** have their opposite ends fixedly mounted in the end disk members **25** and **26** and are disposed in accurate parallelism with respect to the shaft **24**, for example, as best shown in FIGS. 7 and 8 of the drawings. The double cone-faced pulley member **28** is slidably mounted on the sleeve **26**[a] and pins **27** and to minimize wear the shaft and pin openings through the pulley member **28** are lined with suitable bushings of Teflon, nylon, or like wear-resistant material.

An endless V-belt **29** is mounted on the pulley **16** on shaft **14** and between the fixed end disk **26** and adjacent face of the double-faced intermediate cone member **28** of the variable pulley on the shaft **24**.

In accordance with the present invention, pivotal movement of the subframe **20** towards the combination pulley **15** may be predeterminedly set and limited by means of a stop screw **30** which is threaded in a laterally projecting lug **21***a* on the arm **21** of the subframe **20** and engages against the confronting surface of a depending lug **11***a* on the plate portion **11** of the frame **10**, for example, as shown in FIG. 6 of the drawing. A lock nut **31** is provided to secure the screw **30** in the position to which it is adjusted. The subframe **20** normally is retained in the limit position determined by the stop screw **30** by means of a tension spring **32** one end of which may be hooked over the rod **23** of the subframe **20** as shown at **33** in FIG. 4, and the other end connected to the depending leg portion **12** of the frame **10** by a screw **34**, as shown in FIG. 5 of the drawings.

The variable speed attachment of the present invention may be operatively mounted on a conventional carding machine by means of a mounting bracket **35** secured by bolts **36** to the upright plate portion **11** of the frame **10** and to the longitudinal frame structure of the card by means of bolts **37** through the elongated openings **37***a* provided in the top face of the bracket **35**.

As previously stated, the variable speed drive attachment is interposed in the drive from the lickerin pulley **4** to the barrow pulley **5**. This is readily accomplished by mounting an endless V-belt **38** on the lickerin pulley **4** and the fixed disk **25** and adjacent face of the intermediate double-faced cone member **28** of the variable speed pulley V on the shaft **24** of the attachment, and by mounting a crossed flat belt pulley **39** on the smaller diameter pulley **17** on shaft **14** and the barrow pulley **5** on the drive shaft **7**, for example, as shown in FIGS. 1 and 2 of the drawings.

Pivotal movement of the subframe **20** and the variable speed pulley V on the shaft **24** in the clockwise direction with respect to FIG. 1 away from the combination pulley **15** against the action of the spring **32** may be accomplished, for example, by means of a rod or cable **40** connected between the upper end **22***b* of the subframe arm **22** and a foot operated treadle or lever **41** adjacent the operator's station.

As previously described, the pivotally mounted subframe **20** carrying the variable speed pulley V is urged by the spring **32** against the fixed stop provided by lug **11***a* engaged by the adjustable stop screw **30** thereby predeterminedly limiting rotation of the subframe **20** and variable speed pulley V towards the fixedly mounted combination pulley **15** so that by proper adjustment of the stop screw **30** the maximum speed at which the doffer is driven may be predeterminedly set or limited. Since the V-belt lengths are finite, changes in the position of the variable pulley V relative to the lickerin pulley **4** and the pulley **15** causes the pitch diameter of the variable pulley V to adjust or alter. Consequently, when the foot treadle or lever **41** is actuated by the operator of the card to cause the subframe **20** and its variable pulley V to be pivotally actuated in the clock wise direction with respect to FIG. 1 away from the pulley **15**, the ratios of the variable pulley V will be progressively changed so as to drive the pulley **15** at a progressively slower speed as desired by the operator to enable him to perform the manual task of putting up the end or to start and stop rotation of the doffer. Thus, the operator may slow the speed of the drive sufficiently to enable the gear **7** to be engaged and disengaged with the doffer gear **8** without damage to the gears as would occur at normal high speed operation of the card. Also the production rate of the card may be slowed sufficiently to enable the operator to put up the end with the doffer still turning and the use of a foot actuated treadle or lever **41** in conjunction with the attachment of the present invention frees the operator's two hands to do this which normally is a two-handed task.

While a particular embodiment has been shown and described, the invention is not to be limited thereto and it is intended that changes and modifications may be made and incorporated within the scope of the claims.

I claim:

1. For carding machines, a variable speed attachment comprising a main frame, a first shaft mounted on said main frame, a combination pulley on said first shaft having a V-belt portion and a flat belt portion, a subframe pivotally mounted on said main frame for pivotal movement toward and away from the first shaft, another shaft carried by said subframe parallel to said first shaft and movable with the subframe toward and from the first shaft, a variable speed pulley mounted on the other shaft having fixedly spaced inner and outer cone disks and an intermediate double-cone disk slidable therebetween defining a pair of pulley grooves, a first V-belt mounted on the V-belt portion of the combination pulley on the first shaft and the variable pulley on the other shaft, a second V-belt mounted in the other groove of the variable pulley and on a drive pulley driven by the carding machine, adjustable stop means carried by the subframe and engageable with the main frame to predeterminedly limit movement of the subframe and other shaft toward the first shaft and thereby selectively set the maximum speed at which the pulley on the first shaft is driven by said V-belt, spring means normally urging the subframe and said other shaft to the limit position determined by said stop means, and means for actuating the subframe and other shaft relative to said limit position with respect to the first shaft and thereby vary the pitch diameter of the variable pulley on the other shaft and correspondingly change the speed at which the combination pulley on the first shaft is driven by said belt.

2. An attachment as claimed in claim 1 wherein the means for actuating the subframe comprises a foot-treadle for pivotal mounting adjacent the operator's station at one end of the machine and a member connected between said treadle and the subframe.

3. An attachment as claimed in claim 1 wherein a second shaft is mounted on the main frame in spaced parallel relation to the first shaft, the subframe is pivotally mounted on said second shaft for movement toward and away from the first shaft, and the variable speed pulley is mounted on a third shaft carried by the subframe parallel to the first shaft and movable with the subframe toward and from the first shaft.

4. An attachment as claimed in claim 1 wherein the main frame of the attachment includes an upright flat plate portion for mounting at one side of a carding machine and a laterally projecting arm portion extending substantially normal to said plate portion, and the subframe is suspended from the projecting arm portion of the main frame for movement toward and away from the first shaft.

5. An attachment as claimed in claim 1 wherein the main frame of the attachment includes an upright flat plate portion for mounting at one side of a carding machine and a laterally projecting arm portion extending substantially normal to said plate portion, the first shaft

is mounted on and projects from the plate portion of the main frame, a second shaft underlies the projecting arm portion of the frame in spaced parallel relation to the first shaft, the subframe is pivotally mounted on said second shaft for movement toward and away from the first shaft, and the variable speed pulley is mounted on a third shaft carried by the subframe parallel to the first shaft and movable with the subframe toward and from the first shaft.

6. An attachment as claimed in claim 5 wherein the means for actuating the subframe comprises a foot-treadle for pivotal mounting adjacent the operator's station at one end of the machine and a member connected between said treadle and the subframe.

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