May 15, 1962 W. M. HALL, JR 3,034,179

CARDING MACHINE LICKER-IN ROLL COWLING

Filed Oct. 16, 1958

FIG. 2.

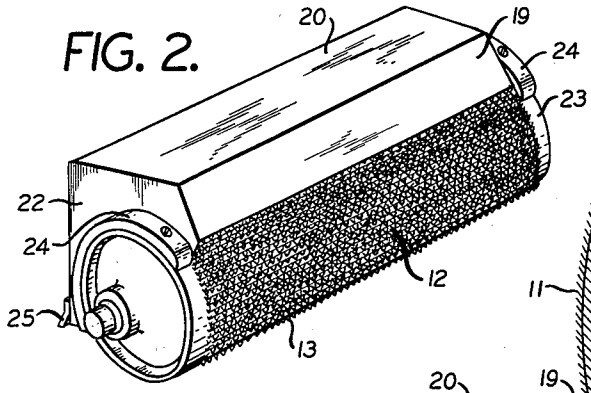


FIG. 1.

FIG. 4.

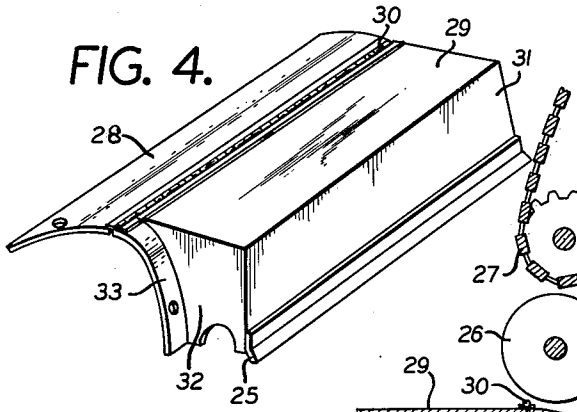


FIG. 3.

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CARDING MACHINE LICKER-IN ROLL COWLING

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This invention relates to a means for increasing the efficiency of carding machines and reducing the waste resulting from the carding operation while maintaining the quality of the end product. More particularly, this invention relates to a new type of cowling for the licker-in roll of a carding machine which can be utilized to produce the above-mentioned results.

This new type of cowling consists of baffle plates, preferably three in number, located generally above the licker-in roll. These baffle plates are so arranged, in relation to the licker-in roll and to one another, as to provide an enclosed space above the licker-in roll wherein air currents from the surface of the carding cylinder are deflected in such a manner as to provide turbulent areas in said space, and also low pressure areas wherein the fiber content fly waste is accumulated and held. When a sufficient quantity of fibers accumulates in these areas, it rolls onto the lap and is fed back to the licker-in roll. In this manner a large proportion of usable fiber is reclaimed from the fly waste.

The licker-in roll of a carding machine is conventionally provided with arcuate cowling which is parallel to the surface of the licker-in roll and spaced at slight distance therefrom, just sufficient to allow clearance between the teeth of the licker-in and the inner surface of the cowling. Thus the cowling usually serves merely as a cover for the licker-in and to prevent the fly waste and trash from being carried into the room by the air currents from the licker-in.

Heretofore, various attempts have been made to provide boxes or receptacles adjacent the licker-in or the carding cylinder, designed to catch and hold waste. Such attempts have not met with commercial success, and in addition their operation has generally depended on a knife or blade located adjacent the opening of the receptacle. Moreover, the high-speed air currents generated by the revolution of the licker-in have been regarded heretofore as detrimental to the carding process, particularly in that they carry with them considerable amounts of usable fibers, causing the latter to be thrown through the mote knives or grid bars and into the waste bin.

The present invention partially dissipates these air currents and at the same time utilizes them, not only to enable the reclamation of a large proportion of the usable fiber from the fly waste, and actually reverse the relative proportions of lint and trash in the waste bin, but also to clean the feed roll and to bloom or fluff the cotton on the feed table. At the same time, the hand, or preparation, of the sliver or end product is greatly enhanced. Moreover, this invention eliminates the necessity for a clearer roll and eliminates clearer waste, resulting in further increased efficiency, since there is no necessity for the usual frequent manual cleaning of a clearer roll. In addition, it eliminates the need for fly separators in the waste bin, greatly reduces the cleaning frequency of the waste bin, and reduces the amount of lint present in the air, thus improving working conditions in the vicinity of the carding machine.

Moreover, the use of the present invention improves the uniformity and appearance of the carded sliver; makes the carded sliver more susceptible to the action of the combers, normally reducing the amount of waste extracted by the combers; and makes the sliver more susceptible to modern high draft equipment. Also the ultimate yarns produced from the sliver are of better grade, strength and uniformity than those produced heretofore.

A preferred embodiment of this invention is shown in the accompanying drawing, in which:

FIG. 1 is a fragmentary, diagrammatic sectional view of a carding machine showing the cowling of my invention installed therein;

FIG. 2 is a perspective view of the cowling of this invention;

FIG. 3 is a fragmentary, diagrammatic sectional view of a carding machine showing a modified form of the cowling of my invention; and

FIG. 4 is a perspective view of the modified cowling of FIG. 3.

Referring to the drawing, reference numeral 10 indicates generally the carding cylinder provided with the usual needles 11. Adjacent thereto is the licker-in roll 12 provided with the usual teeth 13. Behind the licker-in roll 12 is the conventional feed roll 14, situated immediately above the forward end of the feed plate 15 carrying the lap L. Underneath the licker-in roll 12 is the usual screen 16, provided with mote knives 17 and grid bars 18, which are designed to remove waste and trash particles from the lap L, said particles falling into the spaces provided between adjacent mote knives and adjacent grid bars, and into a waste bin (not shown) provided below screen 16 and extending generally throughout the length of the machine.

Located just above the licker-in roll 12 is a new cowling of the present invention, consisting of front baffle plate 19, which extends upwardly and rearwardly from a point just above the setting point of the licker-in roll 12 and the carding cylinder 10, to a point just beneath the flaps (not shown), where it joins top baffle plate 20, which extends rearwardly to the rear baffle plate 21 which extends downwardly to a point just above the lap L. These baffle plates are joined together to enclose the space above the upper surfaces of the licker-in roll 12 and the feed roll 14. The structure thus formed is closed at each end by means of suitable plates 22 and attached to the shroud 23 of the licker-in roll 12 by means of suitable collars 24.

Normally, the lower edges of end plates 22 are formed in a yoke which rests on the ends of feed roll 14. It is therefore desirable to remove the flutes from the end portions of feed roll 14 adjacent the point of contact with end plates 22 and projecting outwardly therefrom. Similarly, it is desirable to line the interior arc of the yoke with a suitable anti-friction material, such as neoprene or nylon.

In operation, the high-speed air currents generated by the rapid revolution of the licker-in roll 12 travel upwardly through the space between the licker-in roll 12 and front baffle plate 19, striking top baffle plate 20, which breaks the flow thereof and causes the flow to be deflected and strike rear baffle plate 21, just above the lower end thereof. The air currents thus generated and directed in the space beneath the cowling, and the turbulence thus created, causes a low pressure area (in the angle B) near the juncture of top baffle plate 20 and rear baffle plate 21. The numerous light fiber particles which are normally carried in the centrifugal air current generated by the licker-in roll 12 are caught and held in the above-mentioned low pressure area until a sufficient mass of such fibers is accumulated in the vicinity of angle B to overcome the forces supporting them there, at which time they roll in a uniform bat into the space provided between the feed roll 14 and the lower edge of the rear baffle plate 21. They are thus discharged onto the feed plate 15, joining the lap as it passes toward and under the feed roll 14, and are thereby returned to the carding process.

The air currents, after traveling through the path described generally above, strike the feed roll 14 and exert a cleaning action thereon, removing loose fibers or particles of trash therefrom. Finally, these air currents escape

through the space between rear baffle plate 21 and feed roll 14 and are directed against the lap as it moves toward the feed roll 14 on the feed plate 15, causing a blooming or fluffing action on the lap L, which greatly facilitates the carding operation, by rendering the cotton more susceptible to the cleaning action of the licker-in roll.

From the foregoing description it will be seen that the presesnt invention provides a complete and unique system for utilizing the air currents generated by the revolution of the licker-in roll, heretofore regarded as detrimental to the carding process, to facilitate and increase the efficiency of the carding process.

There are several variable factors to be considered in connection with the installation of the new type of cowling of this invention. The first of these is a proper placement of front baffle plate 19. The lower edge of the front baffle plate 19 must of course clear both the teeth of the licker-in roll 12 and the needles of the carding cylinder 10. The distance between this lower edge of front baffle plate 19 and the needles of the carding cylinder may vary from approximately 0.005 in. to 0.030 in. or more. Generally speaking, as this distance is increased, the amount of waste carried into the space beneath the cowling is reduced. However, the particular setting used may vary from one machine to another.

Having determined the desired clearance between the lower edge of the front baffle plate 19 and the needles of the carding cylinder 10, this lower edge may conveniently be placed at a point equidistant between the carding cylinder 10 and the licker-in roll 12, simply by constructing the front baffle plate 19 wider or narrower.

It has been determined that the efficiency of the new type of cowling of this invention is influenced by the size of the angle A, formed by front baffle plate 19 and top baffle plate 20; and the angle B, formed by top baffle plate 20 and rear baffle plate 21. Generally speaking, angle A should never be considerably smaller than 100° nor larger than 150°. Angle B may vary from about 90° to about 115°, and preferably within the range of approximately 90° to 110°, for most efficient operation. These angles may be varied, within the ranges stated just above, to obtain the most efficient operation for a given machine, depending to a large extent on the speed of the licker-in.

For example, it has been determined that for a licker-in roll speed of 580 r.p.m., best results are obtained when angle B is approximately 100° and angle A is approximately 130°.

Since the location of feed roll 14 is adjustable forwardly in the direction of licker-in roll 12, the space provided between feed roll 14 and the lower portion of rear baffle plate is variable. Generally, it is desirable to allow approximately one inch clearance between the feed roll 14 and the lower portion of rear baffle plate 21, although this distance may be less or greater.

If desired, the lower edge of rear baffle plate 21 may be provided with a hinged flap 25 to facilitate the carder's placing of the lap in the machine.

The modified form of my invention illustrated in FIGS. 3 and 4 is particularly adapted for use in connection with carding machines equipped with a continuous stripper 26 located between the flats 27 and the licker-in roll 12. In this modification, the front baffle plate 28 is arcuate, and parallel to the surface of the licker-in roll 12; it extends from the setting point rearwardly over the surface of the licker-in roll 12, to a point above the axis of the licker-in roll 12, where it joins the top baffle plate 29. The front and top baffle plates may conveniently be joined by means of a hinge as at 30. Top baffle plate 29 extends rearwardly in a substantially horizontal plane, to the rear baffle plate 31, which extends downwardly to a point above the lap L. The size of the angle formed by the top baffle plate 29 and rear baffle plate 31 may be varied generally within the ranges described above for angle B. The ends are closed as described hereinabove, except that the end

plates 32 are preferably secured only to the top baffle plate 29 and the rear baffle plate 31, the front baffle plate 28 being coextensive with the collars 33. In operation, this modification of the cowling of my invention is substantially the same as described above in connection with the form illustrated in FIGS. 1 and 2.

As stated previously, the present invention eliminates the necessity of a clearer roll.

The new cowling of this invention is preferably rigidly constructed from heavy gauge, very smooth surfaced sheet metal, such as 14 or 16 gauge plate.

The inside surfaces should be free from scratches, nicks, burrs or other imperfections in the metal which might catch and hold an accumulation of fibers, and thereby affect the path of the air currents.

Once installed, the new cowling of this invention requires no maintenance.

Numerous tests which have been conducted show that the use of this invention results in substantially increased efficiency of the carding operation. For example, in one control test, using the old type of cowling, the waste bin was found to contain approximately 800 units of lint to 400 units of trash; the same test, on the same machine and for the same running time, but using the cowling of the present invention, resulted not only in less waste, but also a reversal of the proportions of lint and trash in the waste. These results show that the cleaning efficiency of the licker-in roll is substantially increased by the present invention. Moreover, the reduced proportion of lint in the waste bin enables the waste to settle more compactly in the waste bin, since the trash particles are heavier, thus reducing the frequency of cleaning the waste bin. In most cases, the cleaning cycle may be doubled and in some cases tripled by the use of the present invention and with a substantial saving of spinnable fly.

This application is a continuation-in-part of my copending application Serial No. 667,334, filed June 24, 1957, now abandoned.

This invention has been described in detail above for the purpose of illustration only, and is not intended to be limited by this description or otherwise, except as defined in the following claims.

What I claim is:

1. In a carding machine comprising a feed roll, a feed plate, a licker-in roll and a carding cylinder, a cowling comprising a plurality of baffle plates secured together in a manner to provide a space above the licker-in roll and the feed roll, at least one of said baffle plates extending substantially horizontally over said feed roll and another of said baffle plates extending downwardly to a point above the feed plate rearwardly of said feed roll, and means for enclosing the space so formed, in which space fly waste carried by the air currents generated by the revolution of the licker-in roll and cylinder accumulates, and from which space said fly waste rolls continuously onto the lap.

2. A cowling for a carding machine comprising a carding cylinder, a licker-in roll, a feed roll and a feed plate, said cowling comprising a first baffle plate extending rearwardly over the licker-in roll from a point adjacent the setting point of the licker-in roll and the carding cylinder, a second baffle plate secured to said first baffle plate and extending rearwardly over said feed roll, and a third baffle plate secured to said second baffle plate and extending downwardly to a point above the feed plate rearwardly of the feed roll, and means for enclosing the ends of the structure formed by said baffle plates.

3. A cowling for a carding machine comprising a carding cylinder, flats, a licker-in roll, a feed roll, and a feed plate, said cowling comprising a first baffle plate, a second baffle plate and third baffle plate, said first baffle plate extending upwardly and rearwardly from a point located just above the setting point of the licker-in roll and the carding cylinder, to a point just below the flats, where said first baffle plate is secured to said second baffle plate, which extends substantially horizontally rearwardly over

the said licker-in roll and said feed roll and is secured to said third baffle plate at a point above and to the rear of said feed roll, at which point said second baffle plate is joined to said third baffle plate, said third baffle plate extending downwardly to a point above the feed plate and to the rear of the feed roll, means for closing the ends of the structure formed by said baffle plates, and means for securing said structure to the licker-in roll.

4. A cowling for a carding machine, as defined in claim 3, and in which said first baffle plate and said second baffle plate form an angle of approximately 100° to approximately 150°.

5. A cowling for a carding machine as defined in claim 4, and in which said second baffle plate and said third baffle plate form an angle of approximately 90° to approximately 110°.

6. A cowling for a carding machine comprising a carding cylinder, a licker-in roll, a feed roll, and a feed plate, said cowling comprising a first baffle plate, a second baffle plate, and a third baffle plate, said first baffle plate extending from a point adjacent the setting point of the licker-in roll and the carding cylinder arcuately over the

licker-in roll and parallel to the surface thereof to a point above the axis of said licker-in roll, where it is secured to said second baffle plate, which extends substantially horizontally rearwardly over the said feed roll and is secured to said third baffle plate at a point above and to the rear of the feed roll, at which point said second baffle plate is joined to said third baffle plate, said third baffle plate extending downwardly to a point above the feed plate and to the rear of the feed roll, means for closing the ends of the structure formed by said baffle plates, and means for securing said structure to the licker-in roll.

7. A cowling for a carding machine as defined in claim 6, and in which said second baffle plate and said third baffle plate form an angle of approximately 90° to approximately 110°.

References Cited in the file of this patent

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