Feb. 20, 1945. E. C. GWALTNEY 2,369,893

COTTON CARDING MECHANISM

Filed Aug. 21, 1942

Fig. 1.

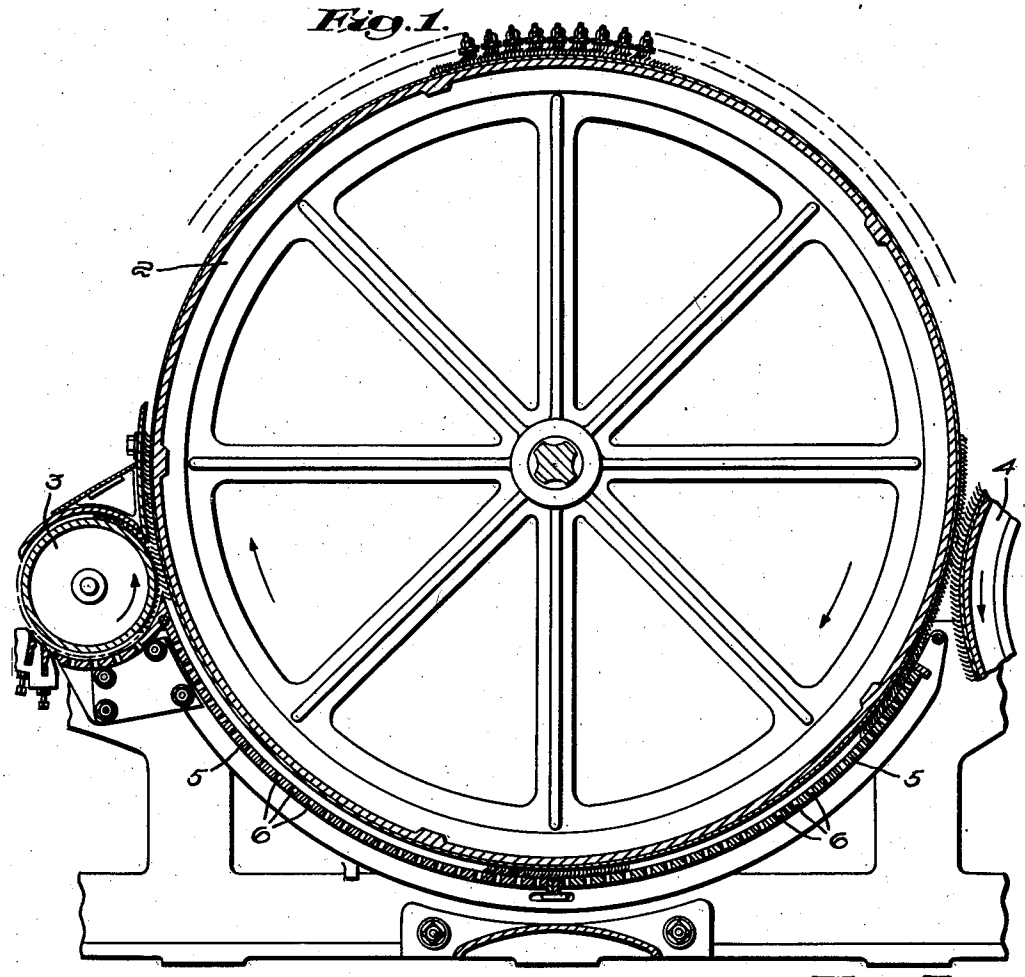


Fig. 2.

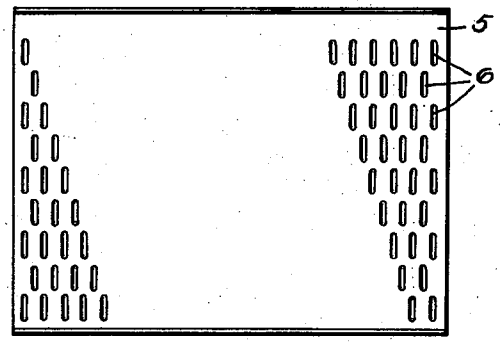
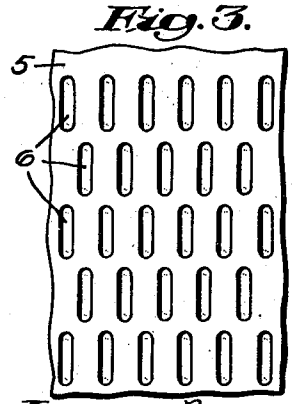


Fig. 3.



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Patented Feb. 20, 1945 2,369,893

UNITED STATES PATENT OFFICE

2,369,893

COTTON CARDING MECHANISM

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Application August 21, 1942, Serial No. 455,555

2 Claims. (Cl. 19—98)

One of the objects of a cotton carding operation is to separate the longer cotton staple from the very short fibers and foreign materials still retained by it. A very considerable part of this function is performed at the lower side of the card cylinder where it passes over the card screen or grid. Usually this screen consists of a combination of bars and solid metal fastened to suitable supports in such a manner that the spacing of successive portions of the screen from the peripheral surface of the cylinder or, more accurately, from the face of the card clothing, can be adjusted with a high degree of accuracy and precision. Just what occurs at this screen is not altogether clear, notwithstanding the fact that these machines have been in common use for many years. This is evidenced by the observation that the amount of waste separated from the good fiber and collected daily under a line of cards operating on the same stock and presumably set to give as uniform results as possible, will vary to such a degree that it is not reasonable to believe that the difference in adjacent machines is due solely to variations in the stock. It has been believed that variations in air pressures at different points between the cylinder and the screen, or peculiarities of air currents in this region, are responsible for much of the variation in results. But whatever may be the cause, the fact of very substantial non-uniformity in results produced by different cards is well known.

The materials causing the most trouble are the short fuzzy fibers adhering to the cotton seed, part of which is removed during the ginning operation and therefore goes along with the longer fiber. This material, when separated, is known as "linters," and it is extremely troublesome in various preparatory operations prior to spinning because the fibers are so short that they cannot be controlled as can the longer fibers, they tend to bunch, to adhere to the good fiber, and they are important factors in contributing to the irregularity or non-uniformity of spun yarn.

A further difficulty experienced in using some of the commercial types of screens, and one which lends weight to the variation in air pressure theory above referred to, is that much good fiber has been found in these machines to blow out under the licker-in, thus making it necessary to set the mote knife, not at its point of greatest efficiency as a cleaning element but, instead, in such a position as to prevent the good stock from blowing out.

The present invention is especially concerned with the foregoing factors, and it aims to improve cards with a view to maintaining more uniform and better control of the conditions at the lower side of the card cylinder, and to producing a more effective separation of linters and other short fibers from the longer fibers.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawing, and the novel features will be particularly pointed out in the appended claims.

In the drawing,

Figure 1 is a vertical, sectional view of a card cylinder and adjacent parts at right angles to the axis of the cylinder and shows it equipped with a screen plate made in accordance with this invention;

Fig. 2 is a plan view of a portion of the screen plate shown in Fig. 1; and

Fig. 3 is a plan view on a larger scale of a small section of the screen plate.

In the construction shown in the drawing a card cylinder of a common commercial form is indicated at 2, associated in the usual way with a licker-in 3 and a doffer 4. Mounted below the cylinder, and in the usual cooperative relationship thereto, is a screen 5 consisting of a perforated, smooth surfaced, metal plate. Preferably the perforations are in the form of slots 6 extending at right angles to the direction of the movement of fiber across them, and spaced apart by relatively small and substantially uniform dimensions, the entire screening surface of the plate being made in this way. As shown in Figs. 2 and 3, these slots are arranged in circumferential rows and adjacent rows are spaced slightly apart, thus leaving circumferential strips of unbroken metal extending the entire length of the screen. If desired, however, the slots may be staggered or echeloned so that one slot overlaps one or more adjacent slots circumferentially. As shown, the individual slots in each row are offset or staggered with reference to those in a next adjacent row.

A plate made in this way from cold rolled steel, or any other suitable metal of adequate gage to be stable, may be supported in any common or suitable manner, so that its clearance with the peripheral surface of the cylinder can be accurately adjusted. Usually this clearance is made relatively large, say three-sixteenths of an inch, at the front end of the screen near the doffer, and it decreases gradually to a relatively small value, say in the neighborhood of twenty-five or thirty thousandths of an inch near the licker-in. In other words, no change in the usual mounting or adjustment of the screen is required by this invention.

It has been found in using a screen of this character that it produces exceptionally favorable results, particularly in that there is a better separation of the linters and other short fibers from the good fiber, the waste taken out by adjacent machines in the same line working on the same stock is far more uniform, and the factors affecting the operation of the machine appear to be under better control. This is particularly true

as to the excessive discharge of air under the licker-in above mentioned. The reason for this improved result apparently is that because the screen is perforated substantially throughout its area, there is no opportunity for any substantial pressure to build up at localized areas between the screen and the cylinder. In other words, the pressure conditions maintained between these parts appear to be substantially uniform. In any event, whatever the reason may be, the difficulty formerly experienced with excessive draft near the forward end of the screen and the resultant loss of good fiber at this point is no longer troublesome.

I have also discovered that if one or both surfaces of this plate are coated with a paint or varnish having good electrical insulating properties, a further and very noticeable improvement in results is realized.

The exact reasons for this improvement are very difficult to ascertain with certainty. The best explanation that I am able to give at this time for this result is that a card naturally tends to create static electricity. Its very organization contributes to this end and it is well known that unless measures are taken to control such generation of static it can be an exceedingly troublesome factor. It will be observed that the plate **5** when coated, as above described, acts as an electrical condenser. A static charge is created in this plate during the normal operation of the machine, and such charge naturally causes, I believe, the short fibers to stand out tangentially at the surface of the cylinder. There is, also, a very considerable centrifugal force tending to throw them off the cylinder altogether. As the short fibers stand on end and are swept over the slots they are, I believe, thrown through these slots. The action apparently is that as the ends of these fibers, which are lightly anchored in the card clothing, are bent backwardly by their contact with the solid surface of the plate, they tend to be snapped out when they reach one of the slots, so that these ends strike the forward edge of the slot as they are leaving it, and this abrupt contact, which is in the nature of a blow commensurate with the mass of the fiber and its speed of travel, tends to discharge the short fibers through the slots, particularly as this action is repeated many times on an individual fiber during its movement across a long series of these slots. The longer fibers, however, being more firmly embedded in or attached to the card clothing, are not thrown out. In any event, the fact that the separation of these short fibers is improved very materially by the coating of the screen plate with an insulating varnish, has been definitely established.

The dimensions of the slots, particularly their width, appears to be important. I have had the best results with slots between an eighth and a quarter of an inch in width. The spacing of the slots is not so important but they should not be so close together as to unduly weaken the plate mechanically. I have had the best results by spacing them apart by a distance only slightly greater than the width of the slots themselves. And this width should be selected primarily with reference to the length of the fiber which is to be separated. That is, the width exercises a control over the length of fiber that will be thrown off. Fiber shorter and even slightly longer than the width of the slots will usually be thrown through them but if a fiber bridges the slot by too great a distance, it will not be thrown off. Most of the fibers which it is desired to eliminate are less than three-eighths of an inch in length and these are effectually discharged if the slots are made about three-sixteenths of an inch in width.

A typical length of slot is three-quarters of an inch, but the latter dimension is far less important from the standpoint of the carding action than is the width of the slot. Length is determined primarily by considerations of mechanical strength and stability. The surfaces of the plate and the edges of the slots should, however, be smooth and free from surface defects likely to catch and hold the fibers.

Preferably the perforated screen **5** is extended under the licker-in up to a point closely adjacent to the mote knives, as indicated in Fig. 1, so that the entire screen structure really is a combination cylinder screen and licker-in screen.

This invention has proved in practical operation to produce a substantially better separation of the very short fiber from the longer staple suitable for spinning than has been obtainable heretofore, so far as I have been able to learn, with cards equipped with the customary forms of screens. The perforated construction of the screen plate **5** is alone an important factor in so controlling the air currents as to reduce very greatly the tendency to discharge good stock in the region under the licker-in. However, without the condenser effect produced by coating this plate with an insulating material, the discharged fibers cling to the plate to such a degree as to plug the holes after a relatively short period of operation. This invention utilizes the condenser effect above described in eliminating practically all of this difficulty, as has been amply demonstrated in the practical use of these coated screens in the cards in regular use in a relatively large number of textile mills.

While I have herein shown and described the embodiment of my invention at present preferred, it will be evident that the invention may be embodied in somewhat different forms without departing from the spirit or scope thereof.

Having thus described my invention, what I desire to claim as new is:

1. In a cotton carding machine, the combination with a card cylinder, of a metallic screen plate positioned close to the peripheral surface of the cylinder at the lower side thereof, the surface of said plate adjacent to said cylinder being flat and smooth but curved to conform substantially to the curvature of the cylinder, said plate being perforated substantially throughout its screening area with apertures of such dimensions in the direction of movement of the fibers across the plate as to permit the linters to pass sidewise through said apertures but to prevent the escape of fibers of materially greater length, said plate having a smooth coating of electrical insulating material on both sides thereof, whereby a static charge is induced in said metal plate by the movement of the fibers across it in the normal operation of the machine and an electrical condenser effect is thus generated which promotes elimination of the linters.

2. In a cotton carding machine according to preceding claim 1, a construction in which the apertures in said plate are of a width in the direction of movement of the fibers across the plate of between approximately one-eighth and one-quarter of an inch.

EUGENE C. GWALTNEY.