Dec. 21, 1926. 1,611,696

M. F. THOMA

MACHINERY FOR PREPARING TEXTILE FIBERS

Filed April 17, 1926 2 Sheets-Sheet 1

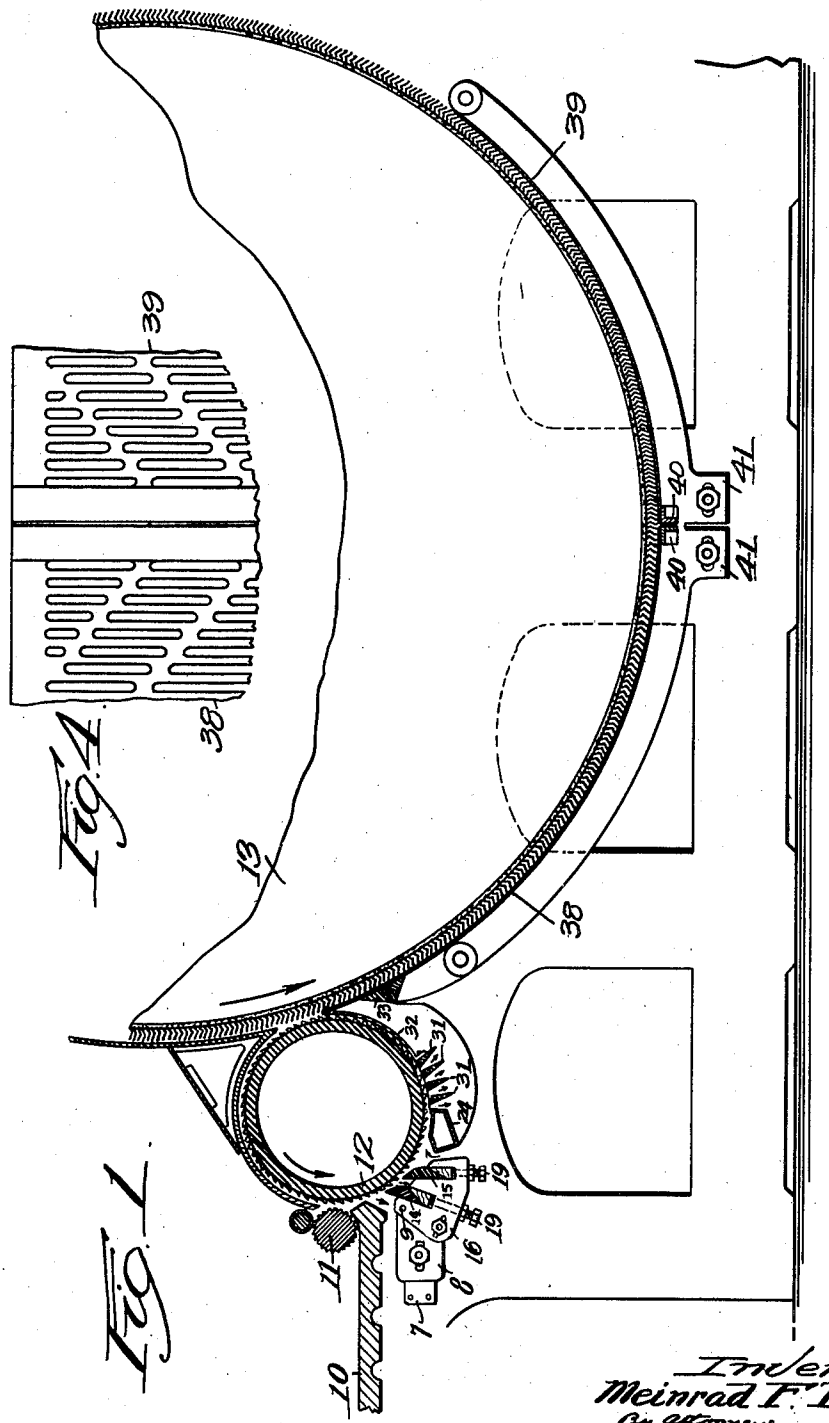


Fig. 4

Fig. 1

Witness
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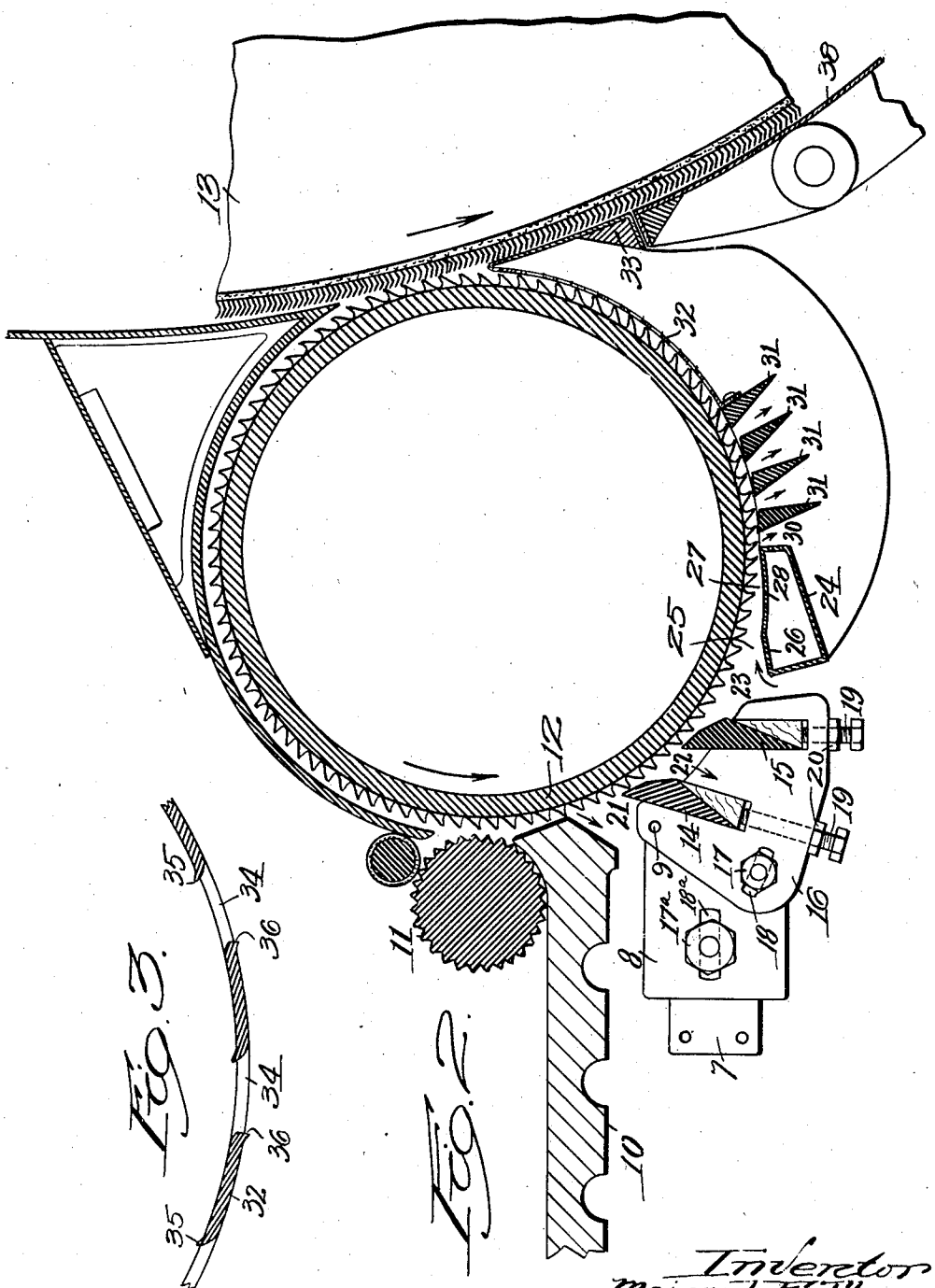


Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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MACHINERY FOR PREPARING TEXTILE FIBERS.

Application filed April 17, 1926. Serial No. 102,787.

This invention is particularly applicable to the means for feeding fibers into carding engines, openers, scutchers and the like.

The principal object of this invention is to provide effective means whereby the cotton or other fiber being directed to the carding or other cylinders will be divested of a maximum amount of its impurities such as motes, shale, husks, and broken seeds, and at the same time retaining nearly all the fibers which are long enough for spinning. The practice heretofore has been to attempt to do this, but the best machines resulted in a material waste of the fibers by expelling them with the impurities. Furthermore the results have not been of sufficiently high degree of perfection in the product because some of the foreign particles, particularly the smaller ones, were not removed. This invention therefore may be considered as having two objects, the removal of the impurities both large and fine in character, and the retaining of an extraordinarily high percentage of the good fibers, thus increasing the quantity of the product and also its quality.

The invention involves the provision of means of an efficient character for controlling the air currents produced by the ordinary licker-in or equivalent cylinder, and while providing outlets for them which permit of the discharge of the impurities with them, also taking back into the machine a current of air close to the surface of the licker-in compressing it to produce a swifter current, and then expelling it gently so as to take out the finer impurities after the coarser ones are removed.

The invention also involves improvements in details of construction of the mechanism for accomplishing these last mentioned results, including special perforated plates under the discharge side of the licker-in and the further provision of means for retaining the fibers along the surfaces of the card itself so that they will not be wasted, but permitting impurities to be discharged all along the lower side thereof.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings in which—

Fig. 1 is a sectional view of the cylinder of a card and its feeding-in mechanism shown with a preferred form of this invention to illustrate their relationship to each other;

Fig. 2 is an enlarged view of a similar nature showing principally the licker-in and the features of this invention which are associated therewith;

Fig. 3 is an enlarged sectional view of the concave guard plate which is located along the lower delivery side of the licker-in; and

Fig. 4 is a fragmentary plan of the same on reduced scale.

In the feeding of cotton or other fibers to a card or similar machine, the layer of fibers which have been matted together previously, is fed along a table 10 to a feeding roll 11 and the fibers are taken up by the licker-in 12 having numerous teeth on its surface and which rotates in the direction of the arrows in the drawings. This takes the material to the cylinder 13 which removes the fibers and performs its usual functions.

The licker-in rotates at a high enough speed so that its teeth create currents of air, which to the best of my information have never been taken proper care of for the purposes I have mentioned above. It has been common to place a bar of triangular cross section in a position to co-operate with the licker-in and grid for the general purpose of removing impurities, but it has had the effect that a large quantity of fibers, good for spinning, are removed by it and become waste so that they are lost for further treatment. As stated above, this invention is designed to reduce the loss by a very material percentage and at the same time produce a cleaner cotton or other material at the cylinder 13 itself. I do not necessarily make any change in the parts that have been referred to by numerals above. They work in the usual way.

For the purpose of gently directing the air away from the licker-in 12, I have provided two deflectors 14 and 15. These are shown mounted on plates 16 on the two sides of the machine, these plates being adjustable about pivots 9 on plates 8 which can be adjusted horizontally. They are secured in adjusted positions by bolts 17 and 17ª and slots 18 and 18ª in fixed plates 7 on the two sides of the machine. Each of the deflectors 14 and 15 is mounted to be adjusted sidewise by screws 19. These screws are capable of being turned back and forth to regulate the distance of the edges of the de-

flectors from the teeth of the licker-in. These adjusting screws are secured by nuts 20 in a well known way. These deflectors are located with their active surfaces directed toward the surface of the licker-in at different small angles to receive the air currents on their forward surfaces and change their direction gently so as to avoid the formation of whirls of air or vortexes.

They extend all the way across the machine and provide two passages 21 and 22 through which the currents of air can pass from the licker-in and escape toward the bottom of the machine. These currents of air carry with them most of the heavier particles that are mixed with the cotton or of other fiber, dropping into the waste box below, not shown. These deflectors are adjusted to the most efficient position by experiment.

The action is to allow many heavy particles to be separated from the fiber and yet not provide wide enough spaces between the deflectors to permit very long fibers to be discharged in any great numbers. On account of this, more than the usual number of the long fibers that can be used in spinning are retained on the licker-in up to the space 23.

From this point on the action is of a somewhat different character. Instead of providing for the expelling of the air I provide for inducing air currents from the space 25 into the passage between the surface of the licker-in and a plate 24 preferably of sheet metal. This plate is so located and shaped that it leaves a wide throat 25 between a flat surface 26 thereon and the surface of the licker-in capable of admitting currents of air in the direction of the arrows. These currents are caused by the rotation of the licker-in which takes them from any available source and carries them along with it. The currents of air are compressed in the throat 25 and in a narrowing space 27 which is located between the licker-in and a curved surface 28 extending from the wall 26 to the end of the sheet metal plate 24. This curvature gradually converges toward the points of the teeth of the licker-in. Therefore, the currents of air which enter the throat 25 have no point of egress along the top of this plate 24, but they are forced into a narrowing space all the way along. Therefore they are compressed and the rapidity of the current is increased.

These currents mentioned, naturally take along the fine impurities which may be dropped out of the licker-in along the surface of the plate 24 and what loose particles there may be. As their rapidity increases in the manner above mentioned, they form a comparatively swift current at the end of the plate 24 and here, a passage 30 is provided to allow much of the air to escape suddenly. This, however, is a narrow passage as it is bounded on the front by a deflector 31 which preferably is of metal and extends throughout the length of the cylinder. This has a front surface which slants off gradually and gently and a sharp point at the top to stop the impurities which have slowed down enough to drop off the licker-in instead of going along around with it. This, therefore, obviously tends to separate out some of the foreign particles from the fiber and yet there is little tendency to take any fibers from the licker-in because of the narrowness of the passage 30 and because there is a current of air passing circumferentially around it which helps to hold them in place. What fibers are dropped here are likely to be very short ones and perhaps some that are heavier than the bulk of them for one reason or another.

I have shown four of these deflectors all shaped in a similar way and all providing gently sloping and gradually widening passages for the dispersal of the air. These deflectors are slanted back on their upper ends and this allows the air to expand a little when it passes over the sharp points on the top, to slow down and drop out foreign particles in the currents. In this way the fiber is cleared most effectively of impurities not ordinarily taken out by any kind of knives or bars usually employed. The provision of means for separating out impurities in two ways, so that one means naturally disperses more of the heavy ones and the other more of the lighter ones is an important feature of this invention.

The last deflector 31 is shown as shaped a little different, being concentric on its top with the licker-in and having a radial rear surface to which is fastened a concave sheet metal plate 32. This plate extends up the rest of the way around the licker-in nearly to the point of contact with the cylinder 13 and then downwardly around the cylinder in a circular direction, where it is attached to a bar 33. This plate 32 is provided with a series of oblong staggered openings or slots 34. These openings, even if the walls were flat, would present a series of straight surfaces transverse to the direction of motion of the air, against which the air would necessarily press to a certain extent and thus perform a further cleaning operation without much loss of any material amount of fiber. But in addition to the fact that I have these straight surfaces or walls, I shape the metal plate 32 so that each of the surfaces 35, against which the air beats in passing along the concave side of this plate, is bent inwardly to form a further abutment and a more efficient means for stopping many impurities that are heavier than the fiber itself.

To allow the air currents to pass out gently, I bend the opposite end surface 36 outwardly to give a gentle curve at the corner surface over which the air is discharged without forming whirls or vortexes in the air currents. This, therefore, provides for a gentle exit of the air as has been described in connection with the deflectors 31 and at the same time on the other side of each opening, positive means 35 is shown for stopping the impurities and insuring their deposit below.

I continue this principle to an extent not heretofore adopted as far as I am aware, by providing two concave sheet metal plates 38 and 39, concentric with the cylinder 13 of the card and extending practically throughout the lower surface thereof. These two plates may be connected by cross bars 40 adjustably mounted on brackets 41 at the two ends of the machine and securing between the two cross bars the outwardly bent ends of these sheets. They are practically like the sheet metal plate 32, having staggered oblong slots or openings provided with the edge projections 35 and 36. In this way an additional cleaning is provided all the way along the lower surface of the main cylinder of the card without danger of loss of any material portion of the good or long fiber.

The result of this arrangement is that the fibers delivered by the main cylinder of the card are very much cleaner than anything that has been produced heretofore and the product is increased by a material percentage, owing to the fact that provisions are made, all the way from the table 10 to substantially the delivery point of the main cylinder, for preventing the discharge of fibers which are not weighted by impurities and that are long enough for effective use in spinning.

Although I have illustrated and described a preferred form of the invention in considerable detail, I am aware of the fact that modifications can be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims, so long as the principles herein set forth are retained. Therefore I do not wish to be limited to all the details of construction herein shown and described, but what I do claim is:—

1. In a machine of the character described, the combination with a licker-in, of a concave plate extending along the licker-in, said plate being shaped to permit a current of air to be drawn in between it and the licker-in and to pass in a current along the surface thereof and compress it during its progress along said surface, and a deflector beyond said plate having a long surface nearly transverse to said current to receive the air currents and deflect some of them out from the licker-in along a gentle curve, said deflector being of a triangular shape with its short side nearly tangent to the licker-in but sloping outwardly therefrom to present a sharp edge toward the licker-in, and so located that the air passage between it and the end of said plate widens slightly to reduce the velocity of the air current passing through it.

2. In a machine of the character described, the combination with a licker-in and a deflector extending along the surface thereof and arranged to deflect air therefrom in a long and gentle curve, of a plate beyond said deflector and having a space between it and the deflector for air currents, said plate being shaped to permit a current of air to be drawn in between it and the licker-in, a series of deflectors beyond said plate, each arranged to present a long surface to receive the air currents and sloping away to provide a widening air channel, and a thin plate extending from the last of said deflectors around the balance of the licker-in, said plate being provided with a series of staggered oblong openings, each presenting a straight surface transverse to the direction of the air currents to deflect the air currents outwardly through the openings.

3. In a machine of the character described, the combination with a licker-in and a concave plate extending along the licker-in having a narrowing space between it and the licker-in for receiving and compressing the air current, of a series of deflectors beyond said plate, each arranged to present a long sloping surface to receive the air currents and deflecting some of them out from the licker-in along a gentle curve, and a thin plate extending from the last of said deflectors around the balance of the licker-in to its side, said plate being provided with a series of staggered oblong transverse openings, each presenting a straight surface transverse to the direction of the air currents to deflect the air currents outwardly through the openings, said surfaces being raised at their farther edges toward the licker-in for the purpose described, and having their opposite edges, over which the currents of air travel to the openings, bent outwardly on a gentle curve to assist the air currents in passing out without creating vortexes or other disturbances.

4. In a machine of the character described, the combination with a licker-in and means for discharging the heavier and coarser impurities during the travel of the fibers through the first part of their course on and with the surface of the licker-in, of a sheet metal plate bent into a form concentric with the licker-in and extending from a point near the bottom thereof to a point to which the licker-in delivers, said plate being provided throughout its surface with

a series of staggered oblong openings each having two straight edges transverse to the direction of rotation of the surface of the licker-in, the forward edge of each opening extending outward to form a gentle curve, and the other edge extending inwardly toward the licker-in to form a deflecting surface for the air currents, whereby air currents are discharged through the openings with smaller impurities.

5. In a machine of the character described, the combination with a licker-in, of a sheet metal plate bent into a form concentric with the licker-in provided with a series of staggered oblong openings each having two straight edges transverse to the direction of rotation of the surface of the licker-in, the forward edge of each opening extending outward to form a gentle curve, and the other edge extending inwardly toward the licker-in to form a deflecting surface for the air currents.

6. In a machine of the character described, the combination with a licker-in, of a metal plate in a form concentric with the licker-in provided with a series of oblong openings each having two straight edges transverse to the direction of rotation of the surface of the licker-in, the forward edge of each opening extending outward to form a gentle curve.

7. In a machine of the character described, the combination with a licker-in, of a sheet metal plate bent into a form concentric with the licker-in provided with a series of staggered openings each having two straight edges transverse to the direction of rotation of the surface of the licker-in, the edge of each opening extending inwardly toward the licker-in to form a deflecting surface for the air currents.

8. In a machine of the character described, the combination with a licker-in and means for discharging the heavier and coarser impurities during the travel of the fibers through the first part of its course on and with the surface of the licker-in and a sheet metal plate concentric with the licker-in and extending from a point near the bottom thereof to a point to which it delivers, said plate being provided throughout its surface with a series of staggered oblong openings each having two straight edges transverse to the direction of rotation of the surface of the licker-in, the inner edge being bent outwardly to form a gentle curve, and the other edge being bent inwardly toward the licker-in to form a deflecting surface for the air currents, whereby air currents are discharged with smaller impurities, of a card cylinder having card clothing thereon in position to receive the fibers from the licker-in, and a concave sheet of metal extending from the first-named sheet of metal around substantially the entire bottom surface of said cylinder, said concave sheet being provided with openings throughout the principal part of its area of a form similar to the openings in the first-named sheet.

9. In a machine of the character described, the combination with a licker-in and a sheet metal plate concentric with the licker-in and extending from a point near the bottom thereof to a point to which it delivers, said plate being provided with a series of openings each having two straight edges transverse to the direction of rotation of the surface of the licker-in, the inner edge being bent outwardly, and the other edge being bent inwardly toward the licker-in, of a card cylinder having card clothing thereon in position to receive the fibers from the licker-in, and a concave sheet of metal extending from the first-named sheet of metal around the bottom surface of said cylinder, said concave sheet being provided with openings throughout the principal part of its area of a form similar to the openings in the first-named sheet.

10. In a carding machine, the combination with a card cylinder, of a concentric sheet of metal on its lower side having transverse oblong slots with their advance edges bent out and their rear edges bent in, for the purpose described.

11. The combination with a card cylinder of a carding engine, of two sheets of metal together covering most of the bottom thereof and partaking of the shape of the cylinder, said sheets having their adjacent edges extending outwardly where they meet and means for clamping them together at said edges, said sheets being provided with oblong slots to permit of the discharge of fine impurities.

12. The combination with a card cylinder of a carding engine, of two sheets of metal partaking of the shape of the cylinder, said sheets having their adjacent edges extending outwardly where they meet and means for clamping them together at said edges, said sheet being provided with oblong slots to permit of the discharge of fine impurities, the straight edges of said slots being bent in opposite directions.

In testimony whereof I have hereunto affixed my signature.

MEINRAD F. THOMA.