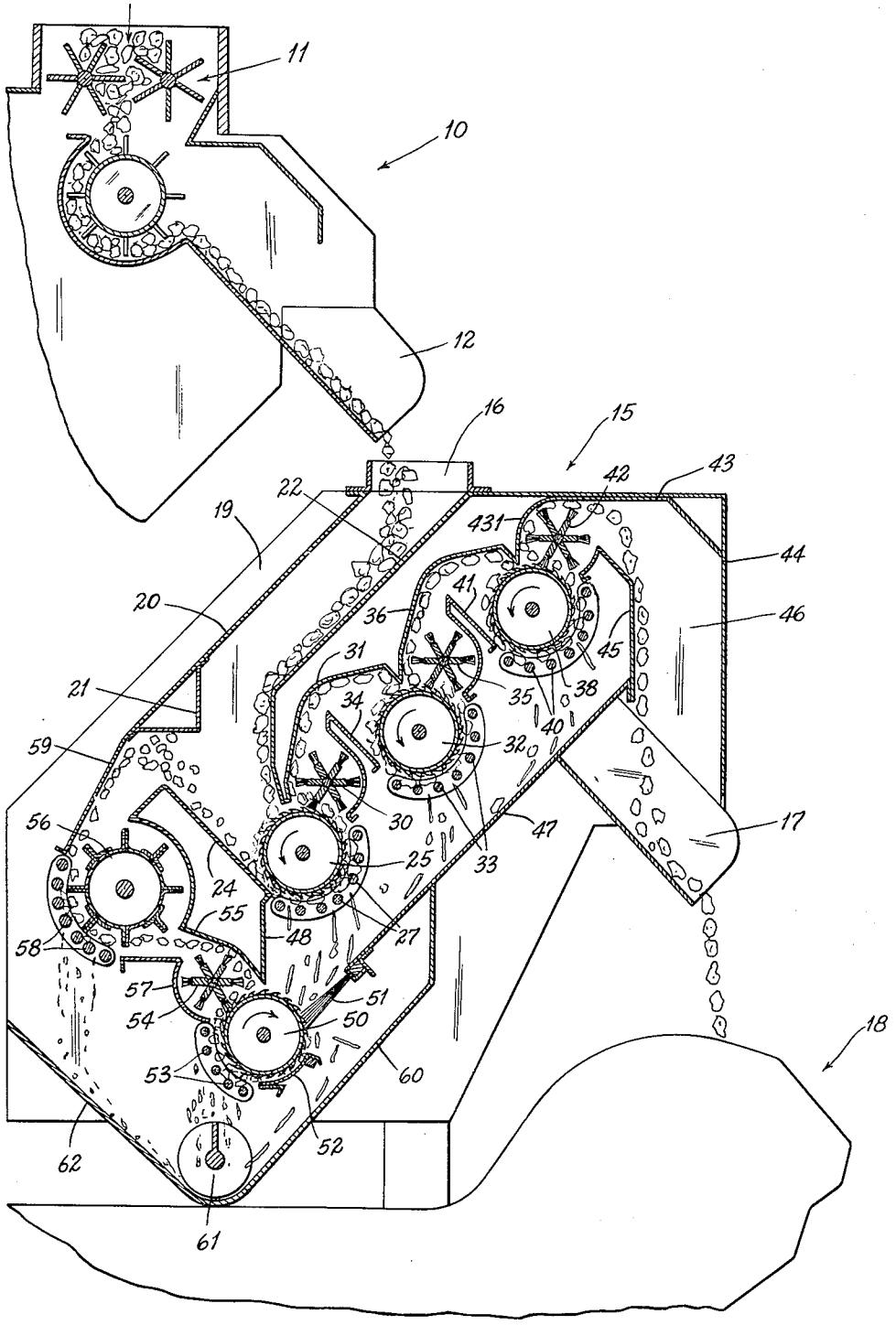
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STICK REMOVER FOR COTTON CLEANING MACHINERY

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STICK REMOVER FOR COTTON CLEANING MACHINERY

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The present invention relates to cotton cleaning machinery, and particularly to a machine that is designed to remove trash such as sticks from a stream of cotton. More especially, the stream of cotton is one flowing into a cotton gin. While usually this particular cleaner will be used as a stick remover and will be interposed at some point in the regular cleaning machinery, nevertheless it has a broad field of use as an extractor and cleaner of general use without other cleaning machinery. It has especial value as a remover for hard locks of cotton where circumstances require their removal.

Cotton, as it comes from the fields, contains hulls, rocks, sticks and trash of various kinds. At least substantially all of this must be removed before the cotton reaches the gin if the ginning operation is to be efficient. The use of mechanical cotton pickers has increased the problem of trash in the cotton. At the present time, in many areas cotton coming to the gin contains a great many sticks and trash of a similar nature. Previously employed cotton cleaners and extractors have proved inadequate to the removal of this type of stick trash.

When used as a stick remover, the present stick remover may be interposed into the cotton cleaning and ginning system subsequent to an extractor and just ahead of the gin. It thereby will receive cotton in a steady stream from the extractor, which cotton is free of the normal type of hulls and trash but which may yet contain the sticks, some hulls, and other trash. The stick remover treats this stream of cotton while it is still flowing, removing the sticks and trash from it for conveyance away, and delivering the finally cleaned cotton to the gin.

It has been discovered that this stick trash, that heretofore has almost defined removal by known machines, can be removed by a modification of an existing type of machine in a manner that would heretofore have been considered to render the machine inoperative. In short, the machine is modified to waste cotton, because it has been found that by so wasting cotton the stick trash will be removed from the main stream of cotton. Then the waste cotton, heavily laden with sticks, can be reclaimed and preferably returned to the stick remover for a recycle. By this means and process of deliberately wasting cotton, and then reclaiming it from the waste, especially in a beater bar type reclaiming device, the sticks that currently constitute a formidable problem for the ginner can be extracted satisfactorily.

It is an object of the invention to provide a machine and process having the foregoing characteristics to overcome the stated problems. It is a particular object of the invention to provide a machine having those characteristics and yet which involves rugged, durable parts that can be easily serviced and replaced, and which are not likely to give any trouble throughout long periods of use.

Other objects will appear in the description to follow.

The drawing is a front-to-rear, sectional view of this stick remover, positioned between a conventional extractor and a gin.

In more detail, a cotton cleaner, feeder and extractor is diagrammatically illustrated at **10**. It is partly broken away but has a feeding mechanism represented at **11**, being of the double-cylinder type that provides a relatively flat stream of cotton into the extractor. There is a spout **12** through which the relatively clean cotton leaves the extractor and descends into the machine of the present invention, generally indicated at **15**. While the illustrated cleaning machinery interposes certain other apparatus between the feeding means **11** and the casing of the present invention, the other apparatus may be omitted in many occasions, in which event the feeding means would be located on the machine **15**.

The machine **15** has an inlet port **16** to receive cotton from the spout **12** and an outlet spout **17** to deliver cotton to the gin. The gin stand is diagrammatically illustrated at **18**.

The cotton coming by way of the spout **12** into the stick remover from prior cleaners and extractors is rather clean. The hulls and most of the heavy trash, as well as the larger part of the light trash, have been removed. However, the ordinary extractor does not remove such sticks as are apt to be found in cotton that is picked by modern mechanical pickers. These sticks may vary, for example, from one-eighth inch to one-quarter inch in diameter, and up to a foot in length. In the process of treating the cotton to bring it to the gin, these sticks may become quite embedded in the cotton.

The cotton stream coming from the chute **12** flows into the inlet **16** of the machine **15**. The machine **15** comprises a housing, as will appear. This housing has a pair of end walls, one of which is illustrated at **19**. The other corresponds in size and shape. Various wall panels are supported from these end walls. Normally, the end walls may be about sixty-six inches apart. There is a downwardly and rearwardly sloping upper back wall panel **20** extending from the inlet **16**. Toward the lower end of the wall **20** is a baffle **21**. Spaced from the wall **20** is another downwardly and rearwardly extending panel **22**, leading from the inlet **16**. Its lower end bends to a vertical position opposite the baffle **21**, so that the two walls **20** and **22**, with the baffle **21**, form an inlet passage extending from side to side of the machine, and leading from the inlet **16** downwardly and rearwardly to a rotating cotton-entraining cylinder **25** to be described. A lower panel **24** comprises a lower baffle wall for this inlet passage.

In this machine, there are a plurality of rotary, cotton-entraining cylinders, here in the form of saws. The first of these is the cylinder **25** previously mentioned. A typical diameter for this cylinder would be about ten inches, although this size is not critical.

This saw cylinder **25** is shown as rotating counter-clockwise. Below and to the right it moves adjacent a plurality of beater bars **27**, seven of such bars being illustrated. These bars are broadly known in this art. However, in the present arrangement, they are markedly different from what have heretofore been used. For example, they typically may be three-quarter inch round bars spaced so as to provide approximately a two inch gap between bars. The gap must be at least about one inch to do the job assigned to the bars. This is a much larger gap than has heretofore been used, and, as will appear, is so large that there is a deliberate wastage of cotton between them.

The main stream of cotton flows upwardly and forwardly in this machine. There is a brush-type doffer cylinder **30** adjacent the cylinder **25** so operated in a clockwise direction as to doff the cotton off the teeth of

the saw cylinder 25 and hurl it against the underside of a baffle wall 31 located adjacent the doffer 30. The baffle 31 extends upwardly and to the right, and then downwardly until it comes adjacent a second saw cylinder 32. This saw cylinder is similar to the cylinder 25, and similarly operates against rods 33 that are about of the size and spacing of the bars 27. There is a baffle 34 between the two saw cylinders and extending below the doffer 30. The baffle wall 34 cooperates with the upper wall 31 in forming a passage for the main stream of cotton from the first cylinder 25 to the second cylinder 32. It also causes any cotton that travels around with the doffer and fails to travel to the second cylinder to be returned to the saw cylinder 25.

Adjacent the saw cylinder 32 there is another doffer cylinder 35. There is a baffle 36 that leads from the saw 32 and the doffer 35 upwardly to the right, and then inwardly toward a third saw cylinder 38. This saw cylinder 38 has a plurality of beater bars 40 of the character of those previously described. A panel 41, similar to the panel 34 of the previous stage, defines the lower side of a passage between the cylinders 32 and 38, the wall 36 being the upper side.

There is a doffer cylinder 42 that withdraws the cotton from the saw 38. A baffle wall 43 adjacent to the doffer 42, a top wall 43, an upper forward wall 44, and an inner vertical wall 45 form a discharge passage 46 that receives cotton from the doffer 42. The chute 45 discharges into the discharging chute 17 that feeds the gin 18.

The foregoing forms the passage for the main stream of cotton from the inlet 16 to the outlet chute 17.

Between the end walls and below the beater bars 27, 33 and 40 there is a lower wall 47 extending downwardly and to the rear from the wall 45, until it is below the lower cylinder 25. The wall 24 of the inlet chute has a continuation 48 that extends vertically from its lower end to adjacent the first cylinder 25. Thus, the walls 47 and 48 converge below the several saw cylinders 25, 32 and 38, and their respective sets of bars 27, 33 and 40. They extend to a reclaiming cylinder 50 and constitute a collecting means for material ejected through the beater bars that conducts such material to the reclaiming device.

The reclaiming saw cylinder 50 sweeps across a brush 51 projecting out from the lower edge of the wall 47, the brush being of the type that causes cotton fibres to adhere to the teeth of the saw 50 but which does not prevent passage of the sticks, trash, and the like. There may be an adjustable gate 52 of a type that is known which can adjust the size of the trash opening between the brush 51 and the gate.

The cylinder 50 operates against beater bars 53. However, these bars are conventionally close together, being spaced apart no more than about five-eighths inch. A doffing cylinder 54 is located adjacent the saw cylinder to sweep the cotton fibres from the saw cylinder 50. An upper wall panel 55 above the cylinder 50 and the doffer 54 directs the cotton removed by the doffer upwardly and to the left against a beater type of cylinder 56. A lower wall 57 confines any loose cotton and encloses the passage from the cylinder 50 to the cylinder 56. The wall 55 continues over the beater cylinder 56, and then bends upwardly and forwardly to join the panel 24.

The beater cylinder 56 acts against closely spaced beater rods 58 that should be only about three-eights inch apart. The beater cylinder carries the cotton from the rods 58 upwardly within the passage formed by the lower end 59 of the wall 20, the baffle 21, and the wall 57, and thus connects back with the inlet passage to the main saw cylinder 25.

The foregoing constitute the passage means for the collecting of the cotton heavily loaded with sticks, the reclaiming means for recovering the cotton therefrom, and the elevator-type returning means to return the reclaimed cotton to the main stream of cotton and simultaneously to extract trash therefrom.

The trash thrown outwardly past the brush 51 by the reclaiming cylinder 50 descends against and down a downwardly and rearwardly sloping forward wall 60, where there is some suitable means, such as the screw device 61, to convey the trash out of the machine. There is a similar wall 62 on the other side of the screw conveyor 61 that receives and confines trash from the left side of the machine and causes it to descend to the conveyer.

All of the various passages for free flow of cotton slope downwardly at 45° or better to insure flow of cotton. The angular disposition of the several cleaning cylinders permits saving of space despite the requirement for steep slope of these passages.

Operation

Cotton from some suitable source is delivered into the feeding device 11. Usually this cotton comes from previous treating machinery which may include driers or preliminary cleaners or the like. However, the machine may be used as a cleaner-extractor without other apparatus. The feeders 11 are designed to provide an even, flat stream of cotton extending from side to side of the machine.

The cotton emits from this machinery in the spout 12 and is delivered into the inlet 16 of the machine 15 of the present invention. The inlet 16 feeds to the inlet passage, the cotton descending downwardly and rearwardly to the first cylinder 25.

The cotton stream reaching the lowest saw cylinder 25 is entrained on the teeth of this cylinder and is rotated rapidly counterclockwise. The cylinder 25 carries the cotton around against the widely spaced beater rods 27. It has been discovered that when the beater bars are spaced so far apart, they cause the sticks to align with the rods and to tend to roll through the gaps between the rods, being ejected therethrough by the effect of the rotary force of the cylinder 25. The sticks thus ejected fall down against the wall 47, and descend therealong to the reclaiming cylinder 50.

The main stream of cotton retained on the cylinder 25 is conveyed to the doffing cylinder 30. It moves more rapidly than the cylinder 25 so that it sweeps the cotton off of the teeth of the cylinder. This cotton is driven with considerable velocity against the wall 31, traveling upwardly and forwardly until it reaches the second cylinder 32. Any cotton that does not so travel is confined by the baffle wall 34 and is returned to the cylinder 25.

The second cylinder 32 rotates counterclockwise so that its teeth pick up the cotton and throw the same against the second set of rods 33, which are also widely spaced. When the cotton strikes these rods, additional sticks are thrown outwardly and fall downwardly to the reclaiming cylinder 50. Again there is a deliberate wasting of cotton to cause ejection of the sticks past the bars 33. The cotton that remains entrained on the cylinder and passes the bars 33 is carried to the doffer cylinder 35, which removes it and directs it upwardly along the baffle wall 36 to the top cylinder 38. Loose cotton is confined by the baffle 41 to return to the cylinder 32 or move to the cylinder 38.

The cylinder 38 moves counterclockwise and throws the cotton against the rods 40, which are similar to the rods 33. So further sticks are removed thereat. Finally, the cotton is doffed by the doffer cylinder 42 from the saw cylinder 38 and is thrown against the walls 43 and 45 until it reaches the chute 46, whence it falls into the outlet chute 17 for delivery to the gin 18.

The foregoing represents the flow of the main stream of cotton through the machine.

In the meanwhile, the trash and wasted cotton that pass between rods 27, 33 and 40 descend to the reclaiming saw 50. This saw rotates clockwise past the brush 51. That brush sweeps the lint onto the teeth of the saw 50, but permits the sticks to be ejected outwardly above the adjustable gate 52.

The cotton entrained thus by the reclaiming cylinder 50 is thrown across the beater bars 53. They are closely

spaced so that only small trash can escape between them. Meanwhile, the cotton is carried by the reclaiming cylinder **50** to the doffer **54**, which removes it from the cylinder and throws it up to the beater cylinder **56**. There it is caused to rotate around against the bars **58**. Most of the remaining trash is expelled between these bars **58** while the cotton is caused to continue upwardly and to the right, so that it again falls down the wall **24** into the cylinder **25**, and again goes through the system. The trash is ultimately conveyed out of the machine by the conveyor screw **61**.

The incoming new stream of cotton descending in the inlet passage is deflected downwardly by the upper side of the baffle **21**, while the upwardly thrown reclaimed stream leaving the cylinder **56** is similarly deflected downwardly by the lower side of the same baffle **21**. Thus, the two streams are brought together while traveling in the same direction toward the saw cylinder **25**. This avoids an inefficient confusion of these two streams.

In operating this process, the bars **27**, **33** and **40** (sometimes less than three cylinders are sufficient) are set deliberately far enough apart that there is a certain amount of waste of cotton through the gaps. This waste may be upwards to about ten per cent, which is many times more than is permissible in an ordinary machine. (The average farmer would object to losing one per cent in cleaning.) The spaced bars provide elongated slots about one and one-half to two inches wide and elongated so as to pass any sticks in the cotton. As noted, the gaps are approximately four times as great as the gaps on the bars below the reclaiming cylinder **50**, which latter represent the typical arrangement.

In other words, the bars **27**, **33** and **40** are set far enough apart to permit the expelling of sticks even though the process causes a substantial percentage of cotton to be carried through with them. The sticks, however, are rolled out of the cotton in this step. The reclaiming devices are sufficient to recover enough cotton from the trash to prevent excessive loss despite the deliberate initial wastage of five to ten per cent in the stick removing cylinder passages.

In some cases, the present machine is especially useful as a cleaner-extractor without other machinery. In such case, feeding means such as at **11** will be directly incorporated into this machine at the inlet **16**. The machine acts satisfactorily as an extractor and cleaner and does very well in the removal of hard locks, which frequently are discarded. This machine rejects the hard locks rather than to fluff them and feed them into the main stream.

It will be observed that the cotton that is wasted past the stick removing cylinders and their bars is returned to the system after passing two additional sets of closely spaced bars. In other words, the cotton from the wastage is given treatment by two cylinders before it is returned to the stream. Obviously, the material descending to the reclaiming cylinder **50** is very high in percentage of trash. If it were returned directly to the stream, it would inescapably introduce trash back into the stream. The present arrangement with two sets of bars to be passed by the cotton withdrawn by the reclaiming cylinder causes the reclaimed cotton to be substantially clean when delivered back to the stream. While screens may be used under the two cylinders **50** and **56**, it has been found that better results come from using bars, as illustrated, because of the presence of sticks.

What is claimed is:

1. In a cotton cleaning machine: a housing having a cotton inlet passage and a cotton outlet passage; a rotary cotton-entraining cylinder at the delivery end of the inlet passage; a plurality of beater bars adjacent the cylinder against which the cylinder can beat the entrained cotton, the bars providing elongated slots and being spaced apart sufficiently to enable sticks to be ejected between them and escape from the cylinder, along with a substantial amount of cotton; means to doff the entrained cotton from the cylinder and conduct it toward the outlet; means to collect the sticks and cotton ejected between the bars; a reclaiming device to which the collecting means delivers the sticks and cotton, the reclaiming device having means to separate the cotton and the sticks and means to deliver the cotton thus separated to the cotton-entraining cylinder for repassage thereover.

2. The machine of claim 1, wherein the beater bars are spaced apart about one and one-half to two inches.

3. The machine of claim 1, wherein the reclaiming device includes at least one rotary cotton-entraining means and a set of beater bars associated therewith, these beater bars being spaced apart not more than about one-half inch for minimizing loss of cotton therethrough.

4. A cotton cleaning machine comprising: a housing having an inlet passage and an outlet passage; at least two main rotary cotton-entraining cylinders disposed sequentially in the housing between the inlet passage and the outlet passage, the inlet passage conducting the cotton to the first such cylinder; doffing means adjacent each cylinder to remove the entrained cotton from that cylinder and direct it toward the next in series; doffing means to remove the entrained cotton from the last cylinder and direct it toward the outlet passage, each cylinder having a plurality of beater bars adjacent the cylinder against which the cylinder can beat the entrained cotton, the bars providing elongated slots and being spaced apart a sufficient distance to pass sticks with a substantial proportion of waste cotton, the gaps being at least about one to two inches; means to collect the waste cotton from the mass ejected by the cylinders and beaters; means to reclaim the cotton from the sticks and trash in the mass thus collected; and means to return the cotton thus collected to one of the rotary cotton-entraining cylinders for repassage thereover.

5. The machine of claim 4, wherein the last-named returning means delivers the cotton back to the first cylinder.

6. The machine of claim 4, wherein the reclaiming means includes two rotary cotton-entraining devices, one of which is a saw cylinder, and wherein there is a rotary doffing means to remove the cotton from the saw cylinder and deliver it to the other rotary device, and wherein at least one of the rotary devices has a trash-permeable means adjacent to it through which trash is discharged, and wherein the latter rotary device also has means that delivers cotton back to a rotary cotton-entraining cylinder.

7. The machine of claim 4, wherein the inlet passage conveys the cotton downwardly by gravity to the first cylinder, and wherein the collecting means for the sticks with waste cotton includes sloping wall means below the beater bars and extending to the reclaiming means.

8. The machine of claim 1, wherein there are two rotary cylinders, the reclaiming means is below the first cylinder, the cylinders are arranged one above and to one side of the other, and there is doffing means adjacent each cylinder to remove the entrained cotton from it and direct it from the first cylinder to the second, and from the second to the outlet passage, respectively, wherein the inlet passage slopes downwardly to the lower cylinder, and wherein the wall of the collecting means comprises sloping wall means that slopes downwardly below the two cylinders to the reclaiming means, and wherein the outlet passage receives cotton from the upper cylinder and conveys it by gravity from the housing.

9. The machine of claim 4, wherein the reclaiming means includes two rotary cotton-entraining cylinders, and trash passage means associated therewith, with a passage-forming means leading from the latter to the inlet connecting into the first main cotton-entraining cylinder.

10. The machine of claim 4, wherein the reclaiming means includes means to feed a stream of reclaimed cotton into the inlet passage, and deflecting means to direct the reclaimed cotton stream to enter the main stream in the same direction as the main stream travels.

11. In a cotton cleaning machine: a housing having a cotton inlet passage and a cotton outlet passage; a rotary cotton-entraining cylinder at the delivery end of the inlet passage; a screening device adjacent the cylinder having spaced cross members against which the cylinder may drive the entrained cotton mass, the spaced cross members providing slots and being spaced apart sufficiently to enable sticks to be ejected between them and to escape from the cylinder along with a substantial amount of cotton; means to doff the entrained cotton from the cylinder and conduct it toward the outlet; means to collect the sticks and cotton thus ejected between the cross members; a reclaiming device to which the collecting means delivers the sticks and cotton, the reclaiming device having means to separate the cotton and the sticks; and means to deliver the cotton thus separated to the cotton-entraining cylinder for repassage thereover.

12. The machine of claim 11, wherein the cotton-entraining cylinder is of the saw type having cotton-engaging teeth.

13. In a cotton cleaning machine: a housing having a cotton inlet passage and a cotton outlet passage; a rotary cotton-entraining cylinder at the delivery end of the inlet passage; a screening device adjacent the cylinder having spaced cross members against which the cylinder may drive the entrained cotton mass, the spaced cross members providing slots and being spaced apart sufficiently to enable sticks to be ejected between them and to escape from the cylinder along with a substantial amount of

cotton; means to receive the entrained cotton from the cylinder and conduct it toward the outlet; means to collect the sticks and cotton thus ejected between the cross members; a reclaiming device to which the collecting means delivers the sticks and cotton, the reclaiming device having means to separate the cotton and the sticks; and means to deliver the cotton thus separated to the cotton-entraining cylinder for repassage thereover.

14. The machine of claim 13, wherein there are a plurality of such cotton-entraining cylinders arranged successively, the last of them delivering the cotton to the means that receives it and conducts it toward the outlet.

15. The machine of claim 13, wherein the cotton-entraining cylinders are of the saw type having cotton-engaging teeth, and there are doffing means, one for each cylinder, to remove the cotton from the cylinder and direct it toward the next subsequent cylinder and, in the case of the last cylinder, to deliver it to the receiving means.

References Cited in the file of this patent

UNITED STATES PATENTS

1,709,663	Farley	Apr. 16, 1929
1,886,713	Mitchell	Nov. 8, 1932
1,914,893	Mitchell	June 20, 1933
1,990,816	Conrad	Feb. 12, 1935
2,307,287	Mitchell	Jan. 5, 1943