

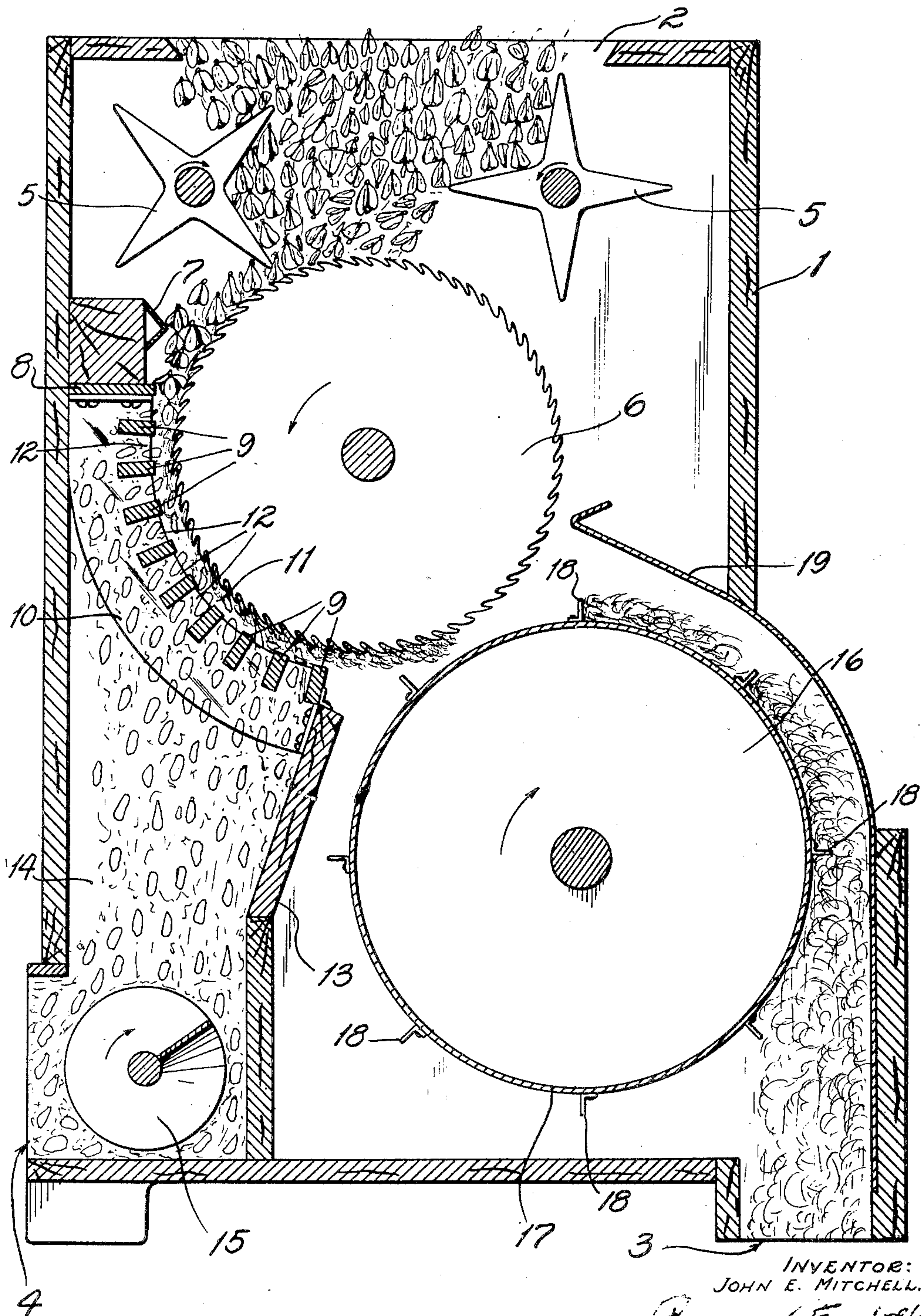
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BOLL SEPARATING AND COTTON CLEANING MACHINE

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BOLL-SEPARATING AND COTTON-CLEANING MACHINE.

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This invention relates to an improved machine for use as a boll separator and cotton cleaner. In prior machines for use in cleaning cotton invented by me, such, for example, as illustrated in Patent No. 1,426,588, dated August 22nd, 1922, I have employed, in connection with the feeding means, boll breaking mechanism involving a rotary beater which operated to separate the connected sections of the boll before the raw material was fed to the cotton cleaning mechanism, such breaking apart of the bolls rendering the subsequent separation of the cotton therefrom easier. Also, in such prior machines, I have depended upon the action of a kicker roll operating in conjunction with the saw cylinder to knock back the hulls and trash from the cotton carried around by the saw, and thus produce the necessary separation.

The present invention aims to provide a cotton cleaning machine of simpler construction than that of my prior machines, and is characterized by the fact that the breaking apart of the bolls and the separation of the hulls therefrom is produced by the saw cylinder itself, co-operating with certain stationary parts, thus dispensing entirely with the use of separate boll breaking mechanism and the kicker roll embodied in my prior machines.

The invention is characterized by a pair of feeders operating to deliver the mixed cotton, hulls and bolls directly to a revolving saw cylinder, which latter revolves in co-operative relation with stationary members operating, in conjunction with the saw, to separate the bolls, and with separated retarding members functioning in the nature of a screen, but causing the hulls and trash to be separated from the cotton and delivered to the trash discharge, while permitting the cotton, which has the trash and hulls removed from it as it is drawn over such retarding means, to be carried beyond such retarding means to a given point, where the cotton is continuously removed from the saws by a doffer as it reaches such point.

An important feature in the construction of the machine is the provision of a screening or retarding means of circular shape located in proximity to the surface of the saw cylinder, with spaced retarding members diverging in a direction away from the surface of the saw cylinder.

Another feature entering into the success-

ful operation of the machine is the provision of a space between the saw cylinder and the screening or retarding means, of such width as to cause the cotton carried around by the saws to be dragged over the edges of the retarding members so that the latter will engage and retard the movement of the hulls and trash, leaving the latter free to fall through the spaces between the retarding members.

Another feature of the invention resides in employing a pair of feeders of a construction adapted to compress the bolls, or mixed cotton and hulls, between them and force the same down into contact with the surface of the rotating saw cylinder.

In the accompanying drawing—

The view is a cross-section illustrating a machine constructed according to my invention, the hopper from which the feed rolls withdraw the bolls and mixed cotton and hulls for treatment by the machine, being omitted.

Referring now to the drawing, the numeral 1 indicates, generally, the casing of the machine, having an opening 2 at its top through which the bolls and mixed cotton and hulls are withdrawn from a suitable hopper (not shown) for treatment, an opening 3 at its bottom at one side of the machine through which the cleaned cotton passes to a gin, on which my machine is supposed to rest, and an opening 4 at the other side of the machine for the discharge of hulls and trash. Mounted in the upper part of the machine below the opening 2 are two feed rollers 5 of similar construction, preferably star-shaped in cross-section and revolving in opposite directions, the arms of these feeders withdrawing the bolls and mixed cotton and hulls through the opening 2 from a hopper, compressing them and delivering the raw product to the upper side of a saw cylinder 6. Mounted on the side of the casing 1 is an angle bar 7 which, as shown, is V-shaped in cross-section, the point of the bar being located at a certain distance from the surface of the saw cylinder and the bar as a whole acting as a breaker. Below the angle bar 7 is a second bar 8, the inner edge of which is located at a less distance from the surface of the saw cylinder 6 than the inner edge of the bar 7, and this bar also cooperating with the saw to form a breaker. It will be understood that the bars 7 and 8

extend transversely of the machine, or parallel with the surface of the saw cylinder. Below the bar 8, I provide a screening member for the purpose of separating the hulls from the cotton and for permitting the hulls to fall away from the cotton and out of the machine. This screening member may have various forms, but preferably, it is in the form of a grate; that is to say, a series of bars 9 are secured at their ends in slots in the frame members 10 provided at opposite ends of the machine, and only one of which is shown. The inner edges of these frame members, at all but their upper portions, are arranged in circular formation and are shown as being concentric with the surface of the saw cylinder, although this precise disposition is not essential. The bars 9 are secured therein to have their inner edges positioned at suitable distances from the surface of the saw cylinder, providing a space 11 between the bars and the surface of the saw cylinder in which the treatment of the cotton occurs. The bars 9 are arranged in spaced relation to each other, the spaces 12 between the bars being of such size as to permit hulls to readily pass through them to the discharge part of the machine. The bars 9 are, furthermore, caused to diverge in a direction away from the saw cylinder, as shown, or, in other words, they are arranged radially with reference to the center of the saw cylinder. By providing for gradual increase of the width of the spaces 12 in a direction away from the saw cylinder, as described, I provide against choking of the hulls as they pass, or are forced through, said spaces in the rotation of the saw cylinder.

At the lower end of the screening member just described, I provide a partition 13, the upper end of which supports the screening member, said partition providing, with the wall of the casing, a space 14 through which the hulls and trash passing between the bars 9 fall, and at the bottom of this space, I provide a screw-conveyor 15 of the well-known type having right and left spirals extending from either end to the center of the conveyor, which is directly opposite the outlet opening 4 and which acts to continuously discharge the hulls and trash through said opening. On the other side of the partition 13 and beneath and slightly to one side of the saw cylinder 6, I mount in the machine a doffer 16 which is preferably in the form of a cylinder 17 having angle bars 18 mounted on its periphery at suitable distances apart and extending from end to end thereof. A guard 19 projects over the doffer 16 to have its end positioned in relatively close proximity to the saw cylinder 6 so as, on the one hand, to prevent cotton removed from the saw cylinder by the doffer from being thrown upward in the rotation of the doffer, and on the

other, to prevent any hulls or bolls which may fall past the saw cylinder on the right-hand side thereof, as shown in the view, from becoming mixed with the cleaned cotton separated from the saw cylinder by the doffer. The bars 9, in addition to forming a grate or screening member, also act as retarding members to prevent the hulls from being carried through the space 11 by the saw cylinder with, or at the same rate of speed as, the cotton, and ultimately blocking the movement of the hulls entirely and causing them to discharge through the spaces 12. The space between the inner edge of the upper bar 9 and the surface of the saw cylinder, which is the width of the space 11, is less than the width of the space between the inner edge of the breaker bar 8 and the surface of the saw cylinder, and as this latter space is also of less width than the space between the inner edge of the breaker bar 7 and the surface of the saw cylinder, there is a gradual increase in the effective breaking and separating action between the said breakers and the bar 9 on the one hand, and the saw cylinder 6, on the other.

In the operation of the machine, the feeders 5 being rotated in the direction shown by the arrows, operate to compress the bolls and mixed cotton and hulls in the successive pockets formed between their arms, and to deliver the mixture in a fairly compressed condition to the upper surface of the saw cylinder. This compressing action not only facilitates the action of the saws in engaging the cotton and carrying the bolls and hulls along with them, but it also tends to prevent any bolls or hulls from falling past the saw cylinder on the opposite side from that at which the separating action occurs, or on the right as shown in the drawing. As the bolls and mixed cotton and hulls are carried around by the saw cylinder in the direction shown by the arrow, any unopened bolls, or partly unopened bolls, will be forced into contact with the breaker 7, and the sections or hulls are broken apart. The space between the breaker 7 and the saw cylinder being just large enough to prevent an entire boll from passing through with the saw, will necessarily permit smaller parts of the bolls, such as two connected hulls or sections, to pass through, and perhaps, also, bolls of a less size than the average. Such smaller bolls and connected hulls will next be forced into engagement with the edge of the breaker 8, and as the space between the inner edge of the breaker 8 and the saw cylinder is less than the space between the inner edge of the breaker 7 and the saw cylinder, such smaller bolls and boll sections will be broken apart by the combined action of the saw and said breaker 8. The raw material, consisting of mixed cotton and hulls and such trash as may be in the mixture, is then carried by the

saw through the space 11. In this movement, the saw cylinder which rotates at a fairly high rate of speed will carry the cotton through the space at its own rate of speed, and this action is insured by the firm engagement of the teeth of the saws of the cylinder with the cotton. As the saw cylinder carries the cotton from the feeding point around to the doffing point, it drags the cotton over the screening member and scrapes it on the edges of the longitudinal bars located between the two points, causing the hulls and trash to be rolled out or scraped off and to pass between the spaces 12 between the bars. The separation of the hulls from the cotton is made effective by the teeth of the saws firmly engaging the cotton without engaging the hulls, so that, necessarily, the cotton is positively carried through the space 11 more rapidly than the hulls. In other words, while the edges of the bars 9 cause the cotton to be engaged by the teeth of the saws as it is pulled over the bars, they do not interfere with the cotton going through the space 11 at the same speed as the saw cylinder is moving, but the edges of the bars do tend to hold back or retard the movement of the hulls, which enables the saws to pull the cotton loose from the hulls, and as soon as this occurs, the hulls roll out through the spaces between the bars. The cotton, being freed from the hulls, which action may begin at the first separating space 9, is dragged along over the remaining bars so that, in addition to the separation of the hulls through the spaces 12, considerable small trash is also scraped off the cotton by the edges of the bars and discharged with the hulls through the said spaces and onto the conveyor 15, which discharges the same from the bottom of the machine.

To effectively separate the hulls and trash from the cotton, it is essential that the substantially semi-circular space between the screening member formed by the bars 9 and the rotating saw cylinder, be sufficiently narrow, so that the locks of cotton, while engaged on one side by the saw cylinder, will rub on the other side against the edges of the bars. A space of this width, however, is too small for properly breaking bolls or for pulling apart the four hulls or sections which form each boll. For properly handling the unbroken bolls, therefore, it is necessary to force them through spaces between the saw cylinder and boll breaking bars of greater width than the space 11 before they reach such space, and such spaces as above described are formed by the breaker bars 7 and 8.

With this arrangement, any unbroken bolls fed to the saw cylinder are first caught in the comparatively wide space afforded by the breaker 7, where the latter operates to

hold back such unbroken bolls sufficiently for the teeth of the saw cylinder to engage the bolls and pull the hulls apart. Most of the bolls are quartered at this point; that is, the four sections thereof are separated from each other, and during the operation, any cotton which comes in contact with the teeth of the saws is pulled loose from the hulls and carried at a greater speed than the hulls travel, which serves to pull the cotton loose from the hulls. Any half bolls or pairs of hulls that are not completely separated from each other at the breaker 7 are caught in the smaller space between the breaker 8 and the saw cylinder, which is too narrow for a half boll to go through without the two hulls being pulled apart or separated from each other; and, likewise, while these hulls are retarded while they are being pulled apart, the cotton is engaged by the teeth of the saws and pulled loose from the hulls, the cotton being instantly carried around to the doffer, while the hulls tend to roll along at a slower speed, and as soon as they reach the separating bars, they are discharged through the longitudinal spaces 12.

As will be understood, the doffer 16 operates to continuously remove the cotton from the saw cylinder and to discharge it through the opening 3, whence it passes to the gin, as previously stated.

My invention is not limited to the precise details of construction and arrangement of parts shown, and various changes in this regard may be made therein without departing from the broad principle of the invention as outlined in the claims.

I claim:

1. A cotton cleaning machine comprising a rotatable cylinder, the entire working surface of which is provided with saw teeth, means for feeding bolls and mixed cotton and hulls directly thereto, a breaker located at a given distance from said cylinder, a screening member having openings for the passage of hulls, located adjacent to one portion of said cylinder beyond said breaker and co-operating therewith to effect separation of the hulls from the cotton as the latter is engaged by and drawn over the screening member by the saw cylinder, and a doffer co-operating with said saw cylinder beyond said screening member.

2. A cotton cleaning machine comprising a rotatable saw cylinder, means for feeding bolls and mixed cotton and hulls directly thereto, a plurality of breakers located successively at decreasing distances from said saw cylinder, a screening member having openings for the passage of hulls located adjacent to one portion of said saw cylinder beyond said breakers and co-operating therewith to effect separation of the hulls from the cotton as the latter is engaged by and drawn over the screening member by the

saw cylinder, and a doffer co-operating with said saw cylinder beyond said screening member.

3. A cotton cleaning machine comprising a
5 rotatable saw cylinder, means for feeding
bolls and mixed cotton and hulls directly
thereto, a breaker spaced from and co-oper-
ating with said saw cylinder, a screening
10 member comprising a series of bars located in
spaced relation to each other with their in-
ner edges defining a circular space around a
portion of said saw cylinder and co-operat-
ing therewith to effect separation of the hulls
15 from the cotton as the latter is engaged by
and drawn over the screening member by the
saw cylinder, and a doffer co-operating with
said saw cylinder beyond said screening
member.

4. A cotton cleaning machine comprising a
20 rotatable saw cylinder, means for feeding
bolls and mixed cotton and hulls directly
thereto, a plurality of breakers co-operating
with said saw cylinder and located succes-
sively at decreasing distances from its sur-
25 face, a screening member located adjacent
to a portion of said saw cylinder beyond said
breakers and defining a semi-circular space
around such portion of the saw cylinder of
30 less width than the space between the surface
of the saw cylinder and the last of said
breakers, said screening member having
openings for the passage of hulls and co-op-
erating with the saw cylinder to effect sepa-
35 ration of the hulls from the cotton as the lat-
ter is engaged by and drawn over the screen-
ing member by the saw cylinder, and a doffer
co-operating with said saw cylinder beyond
said screening member.

5. A cotton cleaning machine comprising a
40 rotatable saw cylinder, means for feeding
bolls and mixed cotton and hulls directly
thereto, a breaker spaced from and co-oper-
ating with said saw cylinder, a screening

member located beyond said breaker and
comprising a series of spaced parallel bars, 45
the inner edges of which define a circular
space around such portion of the saw cylin-
der of less width than the space between said
breaker and the saw cylinder, said bars be-
ing radially disposed with reference to the 50
center of the saw cylinder to provide spaces
between them for the escape of hulls increas-
ing in width in a direction away from the
saw cylinder the hulls being separated from
the cotton by engaging the edges of said bars 55
and falling between said spaces as the cotton
is engaged by and drawn over the bars by
the saw cylinder, and a doffer co-operating
with said saw cylinder beyond said screen-
ing member. 60

6. A cotton cleaning machine comprising a
rotatable saw cylinder, means for feeding
bolls and mixed cotton and hulls directly
thereto, a breaker spaced from and co-oper- 65
ating with said saw cylinder, a screening
member located adjacent to one portion of
said saw cylinder and defining a circular
space around said portion of less width than
the space between said breaker and saw cyl- 70
inder, said screening member comprising a
series of spaced parallel longitudinal bars,
the spaces between which are of a size to
permit hulls and trash to fall through them,
and the said circular space between said 75
screening member and the surface of the saw
cylinder, defined by the inner edges of said
bars being of such width as to permit the cot-
ton to be drawn through it by the saws, while
permitting said bars to engage the hulls and
80 retard their passage therethrough and cause
them to fall through the spaces between the
bars.

In testimony whereof, I have hereunto set
my hand.

JOHN E. MITCHELL.